

# Application Form

## ERASMUS MUNDUS 2010 Call for proposals

### Joint Master Courses / Joint Doctorate Programmes

**Before you begin completing this eform:**

- Try the test eForm. This is a very brief eForm to help you become familiar with how the fields and tables work and to test that your software and internet connection allow an application to be submitted.
- Check that you have the latest available version of the eForm. In the event of a significant eForm problem arising, the Agency may decide to publish an updated i.e. corrected version of the eForm. Please check to see if a later version is available and to see details of any problems that have arisen and their impact.

Click on the following link to go to the webpage to try the test eForm and to check for the latest version of the eForm:

[http://eacea.ec.europa.eu/eforms/index\\_en.php](http://eacea.ec.europa.eu/eforms/index_en.php)

<b>Programme * :</b>	ERASMUS MUNDUS
<b>Sub-programme * :</b>	Action 1 Erasmus Mundus Joint Programmes
<i>Programme guide / Call for proposals</i>	EACEA 29/09
<b>Action * :</b>	EMMC
<b>Sub-action * :</b>	N/A
<i>Deadline for submission</i>	30/04/2010
<b>Project title * :</b>	Erasmus mundus Master in Membrane Engineering
<b>Project acronym * :</b>	EM3E
<b>Language used to complete the form * :</b>	English

**YOU MUST COMPLETE ALL FIELDS ON THIS FIRST PAGE BEFORE COMPLETING ANY OTHER PARTS OF THE FORM. SELECTIONS YOU MAKE ON THIS FIRST PAGE, DICTATE THE APPEARANCE AND BEHAVIOUR OF THE REST OF THE FORM.**





### Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

#### A.1 Organisation

Partner number	P1	
Role in the application	Applicant Organisation	
Full name of the organisation * :	Université Montpellier 2 Sciences et Techniques	
Full name of the organisation in latin characters		
Acronym * :	UM2	
Erasmus University Charter number	28072-IC-1-2007-1-FR-ERASMUS-EUCX-1	
Department / Faculty		
Registered address		
Street * :		Number
Place Eugène Bataillon		
Post code * :	Town * :	
34095	Montpellier cedex 05	
Country * :	Region * :	
FRANCE	Languedoc-Roussillon	
Internet address:	http:// www.univ-montp2.fr	
Telephone 1 * :	Telephone 2	Fax
+ 33 (0)4 67 14 30 15		+ 33 (0)4 67 14 48 08



### A.2 Person responsible for the management of the application (contact person)

Title \* : Family name \* : First name \* :  
Prof. AYRAL André

Role in the organisation \* : E-mail address \* :  
Project Coordinator andre.ayral@iemm.univ-montp2.fr

Check this box if the address is different from the address provided in section A.1

#### Address

Street \* : Number  
Place Eugène Bataillon, CC047

Post code \* : Town \* :  
34095 Montpellier, Cedex 05

Country \* : Region \* :  
FRANCE Languedoc-Roussillon

Telephone 1 \* : Telephone 2 Fax  
+ 33 (0)4 67 14 91 43 +33 (0)4 67 14 91 19

Check this box if the legal representative is different from the person responsible for the management

### A.3 Person authorised to represent the organisation in legally binding agreements (legal representative)

Title \* : Family name \* : First name \* :  
Prof. HERIN Danièle

E-mail \* :  
presidence@univ-montp2.fr



European Commission



Form version : 1.01 EN Adobe Reader version : 9.3

ERASMUS MUNDUS

Role in the organisation \* :

President

Check this box if the address is different from  
the address provided in section A.1

Address:

Street \* :

Number

Place Eugène Bataillon

Post code \* :

Town \* :

34095

Montpellier cedex 05

Country \* :

Region \* :

FRANCE

Languedoc-Roussillon

Submission number:  
511935-EM-1-2010-1-FR-ERA MUNDUS-EMMC

<http://eacea.ec.europa.eu>

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## Part B. Organisation and activities

### B.1 Structure

Status * :	Public
Type of organisation	University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

UM2 is one of the oldest French universities, founded in the 13th century. It is a scientific and technological university which offers 189 degree programmes from bachelor's degree to PhDs. The offer of study programme is supported by a dynamic and internationally recognized research through the association of our 45 laboratories with the great national research organizations. These laboratories are gathered within 6 doctoral schools. 2500 permanent staff and nearly 15 200 students (among them 2 230 international students) take part in the life of the establishment.

The teaching and R&D on membranes fields is mainly performed by the staff of the European Membranes Institute (IEM) of UM2. The IEM is a multi-field research laboratory on membrane materials and processes.

Please describe the role of the organisation in the project. (Max. 1000 characters)

UM2 will be the coordinating organisation of the Master, in charge of the registration procedures and in charge of the teaching course on material science during the first semester of the Master.

As coordinating organisation, UM2 will be responsible of the correct running and performance of the project, responsible for the day-to-day coordination and management of the project, and the intermediary for all communication between the co-beneficiaries and the EACEA. UM2 will offer assistance and advice to potential and actual student participants and will provide useful information about the particularities of national education systems, visas requirements, credit transfers, and other tools. UM2 will be ambassador of the project and will develop partnership with institutions inside and outside of Europe. As partner in charge of the registration procedures (only one place for paying the participation costs), UM2 will centralize and will process enquiries and applications for admission.

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project	
LLLP/Erasmus	28072-IC-1-2007-1-FR-ERASMUS-EUCX-1	UM2	Erasmus Student Mobility	X



Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project	
EMECW (Lot 1)	2008-1896/001-001-EMECW	UM2	AVERROES	X
EMECW (Lot 1)	2009-1795/001-001-ECW	UM2	AVERROES	X
Erasmus Mundus Action1	159437-EM-1-2009-1-NL-ERA MUNDUS-EMMC	University of Groningen (NL)	Erasmus Mundus Master Programme in Evolutionary Biology (MEME)	X
TEMPUS	CD-JEP-34064-2006	UPVD (France)	MDALEP	X
LEONARDO	-	Université de Liège (Belgique)	UNIVERSE II	X
INTERREG 4B SUDOE	SOE1/P2/F153	Conseil Général de l'Hérault (France)	ECO-LAGUNES	X
FP7 - People	236316	UM2	FISHECO	X
FP7 - People	236091	UM2	SURFROIDS	X
FP7 - Cooperation	233253	European Membrane House	MEMBRIDGE	X
FP7 - Capacity	232603	Universitat Autònoma de Barcelona	FUNENTECH	X
FP7 - Cooperation	228581	CEA Liten	ANASTASIA	X
E Content +	ECP-2008-EDU-428046	DFKI Gm Bh (DE)	MATH-BRIDGE	X
FP7 - Cooperation	223998	Nanoplus Nanosystems and Technologies GmbH (Germany)	SENSYS	X
FP7 - Cooperation	224012	Aalborg University (DE)	TIME	X
FP7 - People	220664	CNRS (FR)	RONDA PYROXENITES	X
FP7 - People	219218	UM2	NEST	X
FP7 - Cooperation	211732	Universität de Hanovre -ALTERRA B.V (Germany)	MIRAGE	X
FP7 - Cooperation	210496	IRD (FR)	MADE	X
FP7 - People	218068	Imperial College	IMeTI	X
FP7 - Cooperation	214538	Liverpool University	BISNES	X



FP7 - People	219819	UM2	GOODWIN2007IEFPHY	X
FP7 - Cooperation	224565	Scuola Superiore di Studi Universitari e di Perfezionamento Sa	ARAKNES	X
FP7 - Cooperation	212797	Instituto Espanol de oceanografia – Madrid (ES)	SELFDOTT	X
FP7 - Cooperation	-	NEUREVA Montpellier (FR)	MADNES	X
FP7 - People	215281	Medical Research Council	InterMalTraining	X
FP7 - Cooperation	222992	IGMM (FR)	BRAINCAV	X
FP6 – Marie Curie TOK	42261	UM2	FEMMES	X
FP6 – Marie Curie EST	20492	UM2	MALPARTRAINING	X
FP6 – Network of Excellen	500623	UM2	NANOMEMPRO	X
FP6 - STREP	18480	NTNU (Norway)	EUROMBRA	X
FP6 – Network of Excellen	503578	Institut Pasteur (FR)	BIOMALPAR	X
FP6 – Integrated Project	18834	London School of hygiene and tropical Medecine (UK)	ANTIMAL	X
FP6 - Network of Excellen	502235	GMBH Institute for solid State Research (Germany)	SOFTCOMP	X

**Add a programme**

*Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.*

Programme concerned	Amount requested
<b>Add a programme</b>	



### Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

#### A.1 Organisation

Partner number	P2		
Role in the application * :	Partner		
Full name of the organisation * :	Université Paul Sabatier		
Full name of the organisation in latin characters			
Acronym * :	UPS		
Erasmus University Charter number	27993-IC-1-2007-1-FR-ERASMUS-EUC-1		
Department / Faculty			
Registered address			
Street * :		Number	
route de Narbonne		118	
Post code * :	Town * :		
31062	Toulouse		
Country * :	Region * :		
FRANCE	Midi-Pyrénées		
Internet address:	http:// www.ups-tlse.fr		
Telephone 1 * :	Telephone 2	Fax	
+33 (0)5 61 55 66 11			





**A.2 Person responsible for the management of the application (contact person)**

Title \* : \_\_\_\_\_ Family name \* : \_\_\_\_\_ First name \* : \_\_\_\_\_  
 Prof. \_\_\_\_\_ BACCHIN \_\_\_\_\_ Patrice \_\_\_\_\_

Role in the organisation \* : \_\_\_\_\_ E-mail address \* : \_\_\_\_\_  
 UPS Project Coordinator \_\_\_\_\_ bacchin@chimie.ups-tlse.fr \_\_\_\_\_

Check this box if the address is different from the address provided in section A.1

*Address*

Street \* : \_\_\_\_\_ Number \_\_\_\_\_  
 route de Narbonne \_\_\_\_\_ 118 \_\_\_\_\_

Post code \* : \_\_\_\_\_ Town \* : \_\_\_\_\_  
 31062 \_\_\_\_\_ Toulouse \_\_\_\_\_

Country \* : \_\_\_\_\_ Region \* : \_\_\_\_\_  
 FRANCE \_\_\_\_\_ Midi-Pyrénées \_\_\_\_\_

Telephone 1 \* : \_\_\_\_\_ Telephone 2 \_\_\_\_\_ Fax \_\_\_\_\_  
 +33 (0)561558163 \_\_\_\_\_ +33 (0)561556139 \_\_\_\_\_



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

UPS was founded in 1229. It is one of the oldest universities in Europe. The university welcomes 29,000 students including 2,500 foreigners (8.5 %) through 200 foreign partner universities. The campus hosts 2,000 teachers and teachers-researchers, 600 researchers and 1,300 engineers, technicians, administrative and ancillary staff. In science, there are 5 departments and 9 Doctoral Schools. The research is realised in 70 laboratories and research department with a budget of 40 M€.

Research activities on membrane science and engineering are developed in the Laboratoire de Génie Chimique in the department Génie des Interfaces et des Milieux Divisés.

The teaching activities in membrane are mainly realised in the master "Procédés Physico-Chimiques" which host around 70 students. The staff working on membrane engineering includes 2 full professors, 3 assistant professors, 3 research directors of CNRS and about 10 PhD students, several post-docs and technicians.

Please describe the role of the organisation in the project. (Max. 1000 characters)

The Université Paul Sabatier will be in charge of:

-The teaching course and research on physico-chemical processes during the first semester (S1) of the Master. In the last semester, the Laboratoire de Génie Chimique of the University Paul Sabatier will welcome students during the training course and offer a quality working environment.

-The information and promotion activities of the Master course.

-participate in the different committees of the project (the Executive Board; admission and examination committee ; Evaluation Committee in charge of implementation and management of the e-learning platform; EM3E Management Office)

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
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Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			

Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



### Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

#### A.1 Organisation

Partner number	P3		<b>X</b>
Role in the application * :	Partner		
Full name of the organisation * :	Institute of Chemical Technology Prague		
Full name of the organisation in latin characters			
Acronym * :	ICT Prague		
Erasmus University Charter number	49509-IC-1-2007-1- -CZ-ERASMUS-EUCX-1		
Department / Faculty			
Registered address			
Street * :		Number	
Technická		5	
Post code * :	Town * :		
16628	Prague		
Country * :	Region * :		
CZECH REPUBLIC	Praha		
Internet address:	http:// www.vscht.cz		
Telephone 1 * :	Telephone 2	Fax	
+420 220 444 144	+420 220 443 896	+420 220 444 345	



**A.2 Person responsible for the management of the application (contact person)**

Title \* : Family name \* : First name \* :  
 Prof. BOUZEK Karel

Role in the organisation \* : E-mail address \* :  
 ICT Project Coordinator Karel.Bouzek@vscht.cz

Check this box if the address is different from the address provided in section A.1

*Address*

Street \* : Number  
 Technická 5

Post code \* : Town \* :  
 16628 Prague

Country \* : Region \* :  
 CZECH REPUBLIC Praha

Telephone 1 \* : Telephone 2 Fax  
 +420 220444019 +420220444410



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

ICT, founded in 1952, provides education and pursues scientific, research, development and implementation activities. It is a member of EUA (European University Association), FEANI (European Federation of National Engineering Associations) and IGIP (Gesellschaft für Ingenieurpädagogik). It is known for its educational and research activities in almost all branches of chemistry. The ICT comprises 780 staff, including about 40 professors, 100 associate professors, and 280 assistant professors and assistants. The Faculties of the ICT are accredited to provide 3-year Bachelor programmes, 2-year Master programmes and PhD programmes. The total enrolment is about 2500 Master and Bachelor students and 600 PhD students.

The ICT cooperates with more than 150 universities and institutions mostly in Europe, but also in the USA, Canada, Japan. The ICT is the most active among Czech universities in the ERASMUS programme (126 incoming students, 106 outgoing, 130 Erasmus Agreements)

Please describe the role of the organisation in the project. (Max. 1000 characters)

The ICT will be in charge of:

-The teaching course and research on theoretical subjects related to the field of the process design, including mathematical modelling and optimisation during the second semester (S2) of the Master. Most particularly in the applied reaction kinetics, thermodynamics, membrane processes and process design. In the last semester, it will welcome students during the training course (S4), providing wide spectra of diploma's theses subjects starting from the synthesis of inorganic, polymeric and composite membranes, membrane reactors design, mathematical modelling and optimization of membrane processes.

-The information and promotion activities of the Master course.

-participate in the different committees of the project (the Executive Board; admission and examination committee; Evaluation Committee in charge of relationships with industries and cooperation programme of Master; EM3E Management Office)

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.



Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			

Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



## Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

### A.1 Organisation

Partner number	P4		
Role in the application * :	Partner		
Full name of the organisation * :	Universidade Nova de Lisboa		
Full name of the organisation in latin characters			
Acronym * :	UNL		
Erasmus University Charter number	29191-IC-1-2007-1-PT-ERASMUS-EUCX-1		
Department / Faculty	Chemistry Department (FCT)		
Registered address			
Street * :			Number
Campus da Caparica			
Post code * :	Town * :		
2829-516	Caparica		
Country * :	Region * :		
PORTUGAL	Lisboa		
Internet address:	www.dq.fct.unl.pt		
Telephone 1 * :	Telephone 2	Fax	
+351 21 294 83 85	+351 21 294 8000	+351 21 294 85 50	





### A.2 Person responsible for the management of the application (contact person)

Title \* : Family name \* : First name \* :  
Prof. CRESPO João

Role in the organisation \* : E-mail address \* :  
UNL Project Coordinator jgc@dq.fct.unl.pt

Check this box if the address is different from the address provided in section A.1

#### Address

Street \* : Number  
Campus da Caparica

Post code \* : Town \* :  
2829-516 Caparica

Country \* : Region \* :  
PORTUGAL Lisboa

Telephone 1 \* : Telephone 2 Fax  
+351 212948385 +351 212948550



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

The Faculdade de Ciência e Tecnologia of UNL involves on total 7000 students and 450 professors. It offers undergraduate, Masters and PhD programs in most scientific and engineering areas. R&D activity on Membrane Science and Technology at UNL is carried out at the Chemistry Department by the Biochemical and Process Engineering Group. The Biochemical and Process Engineering Group integrates the Centro de Química Fina e Biotecnologia, one of the research centres of the REQUIMTE, the largest network in Chemistry and Chemical Engineering established in Portugal. It is recognized as the Associated Laboratory for the Green Chemistry by the Portuguese Ministério da Ciência e do Ensino Superior. Research activity is carried out at the Laboratory of Membrane Processes, Instituto de Biologia Experimental e Tecnológica (IBET), the largest Biotechnology Research Organisation in Portugal. IBET acts as an interface between institutions and industries and as a support to its autonomous knowledge.

Please describe the role of the organisation in the project. (Max. 1000 characters)

The FCT-UNL will be in charge of:

- The teaching course and research on specialized subjects of Membrane Technologies applied to Biotechnologies, Food & Health during the third semester (S3) of the Master. In the last semester, it will welcome students during the training course (S4).
- The information and promotion activities of the Master course.
- participate in the different committees of the project (the Executive Board; admission and examination committee ; Evaluation Committee in charge of exploring and monitoring of extra-funding for assuring the Master sustainability; EM3E Management Office)

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			



Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



### Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

#### A.1 Organisation

Partner number	P5		X
Role in the application * :	Partner		
Full name of the organisation * :	Universidad de Zaragoza		
<i>Full name of the organisation in latin characters</i>			
Acronym * :	UNIZAR		
Erasmus University Charter number	28666-IC-1-2007-1-ES-ERASMUS-EUCX-1		
Department / Faculty	Vice-Rector for International Relations		
<i>Registered address</i>			
Street * :			<i>Number</i>
C/ Pedro Cerbuna			12
Post code * :	Town * :		
50009	Zaragoza		
Country * :	Region * :		
SPAIN	Aragón		
Internet address:	http://www.unizar.es		
Telephone 1 * :	Telephone 2	Fax	
+34 976 762052	+34 976 761000	+34 976 762320	



**A.2 Person responsible for the management of the application (contact person)**

Title \* : \_\_\_\_\_ Family name \* : \_\_\_\_\_ First name \* : \_\_\_\_\_  
Prof. \_\_\_\_\_ MALLADA \_\_\_\_\_ Reyes \_\_\_\_\_

Role in the organisation \* : \_\_\_\_\_ E-mail address \* : \_\_\_\_\_  
UNIZAR Project Coordinator \_\_\_\_\_ rmallada@unizar.es \_\_\_\_\_

Check this box if the address is different from the address provided in section A.1

*Address*

Street \* : \_\_\_\_\_ Number \_\_\_\_\_  
Edificio Torres Quevedo. C/Maria de Luna \_\_\_\_\_ 3 \_\_\_\_\_

Post code \* : \_\_\_\_\_ Town \* : \_\_\_\_\_  
500018 \_\_\_\_\_ Zaragoza \_\_\_\_\_

Country \* : \_\_\_\_\_ Region \* : \_\_\_\_\_  
SPAIN \_\_\_\_\_ Aragón \_\_\_\_\_

Telephone 1 \* : \_\_\_\_\_ Telephone 2 \_\_\_\_\_ Fax \_\_\_\_\_  
+34976762392 \_\_\_\_\_ +34976761879 \_\_\_\_\_



## Part B. Organisation and activities

### B.1 Structure

Status * :	Public
Type of organisation * :	University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

The University of Zaragoza was founded in 1583. UNIZAR currently has over 3200 professors and researchers (55% permanent), 1700 (80% permanent) personal for administrative services and laboratory technicians. There are over 30000 students, in the academic year 08/09, 1875 were PhD students.

The postgraduate studies at the UNIZAR related with the PhD in membrane engineering correspond to the PhD in Chemical and Environmental Engineering. The University of Zaragoza and the Institutes of Nanoscience and Materials Science of Aragón have exceptional materials preparation and characterization equipment, including some unique instruments in Spain and Europe. The international cooperation activities in the field of Membrane Engineering include the collaboration in 2 international networks: the European Network of Excellence Nanomempro and the "Red Iberoamericana del Hidrógeno" with 20 partners of 10 countries of central and southamerica.

Please describe the role of the organisation in the project. (Max. 1000 characters)

The University of Zaragoza participates in this project as an expert in the field of Nanoscience and Nanotechnology and in particular, in this broad field, in the area related to membranes and films.

The specific role of UNIZAR is:

- specialization of the students (semester 3). They would apply the knowledge acquired during the first year on membrane engineering, towards the field of Nanoscience and Technology, as the researchers/professors involved in the project are doing.
- in charge of the information and promotion activities of the Master course.
- participate in the different committees of the project (the Executive Board; admission and examination committee ; Evaluation Committee in charge of information and promotion of the Master; EM3E Management Office)

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			



Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



## Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

### A.1 Organisation

Partner number

P6

X

Role in the application \* :

Partner

Full name of the organisation \* :

University of Twente

Full name of the organisation in latin characters

Acronym \* :

UTwente

Erasmus University Charter number

28896-IC-1-2007-1-NL-ERASMUS-EUCX-1

Department / Faculty

Registered address

Street \* :

Number

University of Twente

Post code \* :

Town \* :

7500 AE

Enschede

Country \* :

Region \* :

NETHERLANDS

Overijssel

Internet address:

www.utwente.nl

Telephone 1 \* :

Telephone 2

Fax

+31 53 4899111

+31 53 489 5687

+31 53 4892000





**A.2 Person responsible for the management of the application (contact person)**

Title \* : Family name \* : First name \* :  
Prof. WESSLING Matthias

Role in the organisation \* : E-mail address \* :  
UTwente Project Coordinator M.Wessling@tnw.utwente.nl

Check this box if the address is different from the address provided in section A.1

*Address*

Street \* : Number  
University of Twente

Post code \* : Town \* :  
7500 AE Enschede

Country \* : Region \* :  
NETHERLANDS Overijssel

Telephone 1 \* : Telephone 2 Fax  
+31 53 489 2951 +31 53 489 4611



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

*Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)*

The Faculdade de Ciência e Tecnologia of UNL involves on total 7000 students and 450 professors. It offers undergraduate, Masters and PhD programs in most scientific and engineering areas. R&D activity on Membrane Science and Technology at UNL is carried out at the Chemistry Department by the Biochemical and Process Engineering Group. The Biochemical and Process Engineering Group integrates the Centro de Química Fina e Biotecnologia, one of the research centres of the REQUIMTE, the largest network in Chemistry and Chemical Engineering established in Portugal. It is recognized as the Associated Laboratory for the Green Chemistry by the Portuguese Ministério da Ciência e do Ensino Superior. Research activity is carried out at the Laboratory of Membrane Processes, Instituto de Biologia Experimental e Tecnológica (IBET), the largest Biotechnology Research Organisation in Portugal. IBET acts as an interface between institutions and industries and as a support to its autonomous knowledge.

*Please describe the role of the organisation in the project. (Max. 1000 characters)*

The specific role of UTwente is:

- To educate students in the third semester (S3) by offering dedicated courses and practical training in the field of Energy & Environment. The field encompasses application of membranes in typical applications such as gas separation, water treatment, batteries and fuel cells, etc. where such application could significantly reduce the cost of energy and/or environmental impact. In the final semester, UTwente will welcome and guide students enrolled in their final Master's assignment/internship.
- in charge of the information and promotion activities of the Master course.
- participate in the different committees of the project (the Executive Board; admission and examination committee ; Evaluation Committee in charge of monitoring of the quality aspects; EM3E Management Office)

### B.3 Other community grants

*Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.*

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			



Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



## Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

### A.1 Organisation

Partner number	P7		
Role in the application * :	Associated partner		
Full name of the organisation * :	Katholieke Universiteit Leuven		
Full name of the organisation in latin characters			
Acronym * :	K.U.Leuven		
Erasmus University Charter number	27945-IC-1-2007-1-BE-ERASMUS-EUC-1		
Department / Faculty			
Registered address			
Street * :		Number	
Naamsestraat		22	
Post code * :	Town * :		
3000	Leuven		
Country * :	Region * :		
BELGIUM	Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest		
Internet address:	http:// www.kuleuven.be		
Telephone 1 * :	Telephone 2	Fax	
+32 16 32 40 67		+32 16 32 41 96	



**A.2 Person responsible for the management of the application (contact person)**

Title \* : \_\_\_\_\_ Family name \* : \_\_\_\_\_ First name \* : \_\_\_\_\_  
 Prof. dr. \_\_\_\_\_ VANKELECOM \_\_\_\_\_ Ivo \_\_\_\_\_

Role in the organisation \* : \_\_\_\_\_ E-mail address \* : \_\_\_\_\_  
 Prof. & KU.Leuven Coordinator \_\_\_\_\_ ivo.vankelecom@biw.kuleuven.be \_\_\_\_\_

Check this box if the address is different from the address provided in section A.1

*Address*

Street \* : \_\_\_\_\_ Number \_\_\_\_\_  
 COK; Kasteelpark Arenberg \_\_\_\_\_ 23 \_\_\_\_\_

Post code \* : \_\_\_\_\_ Town \* : \_\_\_\_\_  
 3001 \_\_\_\_\_ Leuven \_\_\_\_\_

Country \* : \_\_\_\_\_ Region \* : \_\_\_\_\_  
 BELGIUM \_\_\_\_\_ Région de Bruxelles-Capitale / Brussels Hoofdstedelijk Gewest \_\_\_\_\_

Telephone 1 \* : \_\_\_\_\_ Telephone 2 \_\_\_\_\_ Fax \_\_\_\_\_  
 +32-16-321594 \_\_\_\_\_ +32-16-321998 \_\_\_\_\_



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

K.U.Leuven, founded in 1425, is Belgium's largest university. As a leading European research university, it offers a wide variety of academic programmes in Dutch and English (more than 60 master programmes are taught in English), supported by high-quality interdisciplinary research. More than 6000 researchers, from over 120 countries, participate in fundamental and transnational in close collaboration with industry. With its research output it belongs to the top five in Europe as well as for participation in European research projects.

The Arenberg Doctoral School of Science, Engineering and Technology is the ideal hub for research areas, that are structured around four themes: Information, Matter, Life and Habitat. In addition to research-based scientific training, it offers transferable skills and competencies which go beyond the specific research topic of the doctorate and which prepare doctoral researchers for a professional career inside or outside the university.

Please describe the role of the organisation in the project. (Max. 1000 characters)

The specific role of K.U.Leuven is:

- Participate to the master courses, tutorial of students, seminars
- Promote and disseminate the Master programme
- Support special events
- Host students for traineeships
- Participate in the Evaluation Committee of the project and will be in charge of monitoring evolution of the curriculum.

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			



Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



### Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

#### A.1 Organisation

Partner number	P8		
Role in the application * :	Associated partner		
Full name of the organisation * :	Université Hassan II Mohammedia		
Full name of the organisation in latin characters			
Acronym * :	FSTM		
Erasmus University Charter number			
Department / Faculty	Faculté des Sciences et Techniques		
Registered address			
Street * :		Number	
Route de Rabat BP 146			
Post code * :	Town * :		
28820	Mohammedia		
Country * :	Region * :		
Morocco	N/A		
Internet address:	<a href="http://www.fstm.ac.ma">http://www.fstm.ac.ma</a>		
Telephone 1 * :	Telephone 2	Fax	
+212 523315352	+212 523314685	+212 523315353	





**A.2 Person responsible for the management of the application (contact person)**

Title \* : Family name \* : First name \* :  
 Dr. RAFIQ Mohammed

Role in the organisation \* : E-mail address \* :  
 Professor & FSTM coordinator m\_rafiq51@yahoo.fr

Check this box if the address is different from the address provided in section A.1

*Address*

Street \* : Number  
 Route de Rabat BP 146

Post code \* : Town \* :  
 28820 Mohammedia

Country \* : Region \* :  
 Morocco N/A

Telephone 1 \* : Telephone 2 Fax  
 + 212 523315352 + 212 523315353



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

The Faculty of Sciences and Techniques in Mohammedia is one of the main components of the University Hassan II. Created in 1994, Its objectives are academic education in sciences and techniques, life-long learning, applied research and Dissemination of scientific and technical information.

The European Higher Education system has been adopted since the academic year 2006- 2007, in order to offer Higher Education programs in agreement with the international standards.

FSTM offers a large range of bachelor and master degrees in sciences and techniques : 9 Bachelor's degree in science and 6 Master's degrees in Science and 2 technological degrees.

In term of international co-operation, the FSTM has established a large number of agreements with different universities and networks, within Europe and USA.

Please describe the role of the organisation in the project. (Max. 1000 characters)

The specific role of FSTM is:

- Participate to the master courses, tutorial of students, seminars
- Promote and disseminate the Master programme
- Support special events
- Host students for traineeships
- Participate in the Evaluation Committee of the project and will be in charge of relationship and evolution with African Third-Countries.

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			



Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	



## Part A: Identification of the Applicant and other organisations participating in the project.

Parts A and B must be completed separately by each organisation participating in the project.

### A.1 Organisation

Partner number	P9		
Role in the application * :	Associated partner		
Full name of the organisation * :	Università della Calabria		
Full name of the organisation in latin characters			
Acronym * :	UNICAL		
Erasmus University Charter number	29388-IC-1-2007-1-IT-ERASMUS-EUCX-1		
Department / Faculty			
Registered address			
Street * :		Number	
Via Pietro Bucci			
Post code * :	Town * :		
87036	Arcavacata di Rende (CS)		
Country * :	Region * :		
ITALY	Calabria		
Internet address:	http:// www.unical.it		
Telephone 1 * :	Telephone 2	Fax	
+39 0984 493894	+39 0984 493932	+39 0984 493896	



## A.2 Person responsible for the management of the application (contact person)

Title \* : Family name \* : First name \* :  
Prof. DRIOLI Enrico

Role in the organisation \* : E-mail address \* :  
Professor & UNICAL coordinator e.drioli@unical.it

Check this box if the address is different from the address provided in section A.1

### Address

Street \* : Number  
Via Pietro Bucci

Post code \* : Town \* :  
87036 Arcavacata di Rende (CS)

Country \* : Region \* :  
ITALY Calabria

Telephone 1 \* : Telephone 2 Fax  
+39 0984 492093 +39 0984 496655



## Part B. Organisation and activities

### B.1 Structure

Status \* : Public

Type of organisation \* : University or higher education institution (tertiary level)

### B.2 Aims and activities of the organisation\*

Please provide a short presentation of your organisation (key activities, affiliations etc.) relating to the domain covered by the project. (Max. 1000 characters)

The University of Calabria was established in 1972. Today, UNICAL represents a leader institution of higher formation attracting a significant number of professors, researchers and PhD students from different countries. More than 35,000 students stay in the Arcavacata Campus (the largest in Southern Italy).The University includes six faculties (Engineering & Material Sciences, Pharmacy and Health Sciences, Mathematical-Physical-Natural Sciences, Humanities & Social Sciences, Economical Sciences and Political Sciences) and 25 Departments

In UNICAL, the R&D consists of 44 first level degree courses, 38 Masters, 15 PhD Courses and 5 Doctorate Schools in 2009-2010. The University promotes academic research and strongly encourages practical applications at commercial level as a key to economic development in the Calabria. Competences on membrane science and technology related to the Master activities are mainly developed at the Department of Chemical Engineering and Materials.

Please describe the role of the organisation in the project. (Max. 1000 characters)

The specific role of UNICAL is:

- Participate to the master courses, tutorial of students, seminars
- Promote and disseminate the Master programme
- Support special events
- Host students for traineeships
- Participate in the Evaluation Committee of the project and will be in charge of assuring link with "Erasmus Mundus Doctorate in Membrane Engineering – EUDIME" and Bachelor programmes

### B.3 Other community grants

Please list the projects for which the organisation, or the department responsible for the management of this application, has received financial support from the EU Programme during the last three years.

Programme or initiative	Reference number	Beneficiary Organisation	Title of the Project
<b>Add a programme</b>			



Please list other grant applications submitted by your organisation, or the department responsible, for this project proposal. For each grant application, please mention the EU Programme concerned and the amount requested.

Programme concerned	Amount requested
<b>Add a programme</b>	

Number of organisations to add \* :

**Add organisation(s)**

### List of partner organisations

Partner no	Role	Organisation Name	City	Country
P1	Applicant Organisation	Université Montpellier 2 Sciences et Techniques	Montpellier cedex 05	FRANCE
P2	Partner	Université Paul Sabatier	Toulouse	FRANCE
P3	Partner	Institute of Chemical Technology Prague	Prague	CZECH REPUBLIC
P4	Partner	Universidade Nova de Lisboa	Caparica	PORTUGAL
P5	Partner	Universidad de Zaragoza	Zaragoza	SPAIN
P6	Partner	University of Twente	Enschede	NETHERLANDS
P7	Associated partner	Katholieke Universiteit Leuven	Leuven	BELGIUM
P8	Associated partner	Université Hassan II Mohammedia	Mohammedia	Morocco
P9	Associated partner	Università della Calabria	Arcavacata di Rende (CS)	ITALY



### Part C. Description of the project

#### C.1 STATISTICAL DATA

The EMMC joint programme corresponds to the equivalent of \* : 120 ECTS

Is the proposal a continuation of an existing EMMC ? \* : No

Joint Programme Duration and Mobility :

The joint programme will start in month \* : Sep of year "n".

and will end in month \* : Aug of year "n + " \* : 2

During their EMMC period, the students will study in at least \* : 3 different countries.

The EMMC tuition language(s) will be \* :

Language to add

\_\_\_\_\_ [Add >>] [EN] [Clear All] [Clear Last]

The EMMC student participation costs per semester will be :

\_\_\_\_\_ 4 000€

per semester for European students\*

\_\_\_\_\_ 8 000€

per semester for Third-country students\*

Estimated number of students planned to be enrolled in the first edition of the Joint programme  
*applies to all students, with or without EM scholarship*

EU Students \* :  
14

Third Country Students \* :  
16





### C.2 THEMATIC FIELD

Main Area :

Level 1 \* :

Engineering, Manufacturing and Construction

Code

5

Level 2

Chemical and process

Code

524

Second Area :

Level 1

Science, Mathematics and Computing

Code

4

Level 2

Chemistry

Code

442

Third Area :

Level 1

Code

Level 2

Code



### **C.3 SUMMARY DESCRIPTION OF THE PROJECT \* (Max. 3000 characters)**

The Master in Membrane Engineering EM3E offers an advanced education programme related to membrane science and engineering at the interface between material science and chemical engineering and focused on specific applicative fields. It involves 6 HEI of 5 European countries: University of Twente (Netherlands), University of Lisboa (Portugal), University of Zaragoza (Spain), Institute of Chemical Technology Prague (Czech Republic), University Paul Sabatier (Toulouse, France) and University Montpellier 2 (France, coordinating organisation). Associated partners are the University of Calabria (Italy), the Catholic University of Leuven (Belgium) and the University Hassan II of Mohammedia (Morocco). The pedagogical project of Master comes from the closely collaboration between partners through the European Research Network of Excellence NanoMemPro.

The Master course will have a duration of two years: 4 semesters corresponding to 30 ECTS each and given at least in 3 countries.

In the first year, theoretical and practical fundamentals will be provided: After an integration week, students will enter the Master at University Montpellier 2 or at University Paul Sabatier. In each of these universities, there will be common mandatory and optional units, corresponding to teaching and research field of excellence of each partner (material science in Montpellier and physico-chemical processes in Toulouse). This first semester will be adapted to students by taking into account the background and their learning objectives. During the second semester, students will follow mandatory teaching units to acquire knowledge and skills on process modelling and simulation at the Institute of Chemical Technology of Prague.

During the second year, students will choose to pursue their training in one of three university in order to acquire specific skills in an application field: Nanosciences and Nanotechnology (University of Zaragoza), Energy and Environment (University of Twente), and Biotechnologies, Food and Health (University of Lisboa). The last semester will be devoted to a 6 months master thesis in a university or an industrial company.

The number of enrolled students is expected to be 30. The language of instruction is English. During the study period, the courses and activities country languages and culture are also provided.

Students will be awarded with a multiple Master's degrees from the three hosting universities, together with a Diploma Supplement.



## Part D. Technical Capacity

### D.1 Consortium experience of the area of joint programmes and the specific discipline(s) of the project

Provide a list of projects/activities implemented by the consortium organisations in relation with the proposal

Title	Duration	Funding	Programme	Partners involved	
NanoMemPro - Expanding membrane macroscale applications by exploring nanoscale material properties	54 months	6 380 000,00 €	FP6 – NMP - European Research Network of Excellence NanoMemPro Network	UM2 UNL UTwente UNIZAR ICTP UNICAL	X
NanoMemCourse - Training course on nanostructured materials for advanced membrane processes	48 months	583 400,00 €	FP6 - Marie Curie actions- Intra-European Fellowships	UM2 UTwente UNIZAR UNICAL	X
IMeTI - Implementation of Membrane Technology to Industry	48 months	1 810 000,00 €	FP7 - Marie Curie Actions - Industry-Academia Partnerships and Pathways (IAPP)	UM2 UNICAL	X
NanoGLOWA - Nanomembranes against global warming	60 months	7 200 000,00 €	FP6 – Integrated project	UM2 UTwente UNICAL	X
ZEOCELL - Nanostructured electrolyte membranes based on polymer-ionic liquids zeolite composites	36 months	2 650 000,00 €	FP7, Energy Topic 2007.1.1.1: Basic research for materials and processes for PEMFC's.	UNIZAR UTwente	X

Add Project / Activity

### D.2 Skills and expertise of key staff involved in the project

Summary of the relevant skills and experience, including where relevant a list of the (main) publications related to the domain of the project (Maximum 750 characters). Maximum 3 CV's per partner institution.

**Organisation number****P1****Organisation name****Université Montpellier 2 Sciences et Techniques**

Name of Key Person*	Summary of relevant skills and experience*	
André AYRAL	<p>Professor in Materials Science, Membrane Materials and Processes</p> <p>Responsible of Master degrees at Departement of Chemistry and international relations- Deputy Director in European Institute on Membranes of Montpellier (IEM) - Member of the executive committee of the Department of Chemistry of UM2</p> <p>-Teaching of Analytical Material chemistry and Membrane Science (L and M levels)</p> <p>-Research in multifunctional membranes, more than 120 publications in scientific journals</p> <p>-Skills : Creation and management of master degrees, Management of research team and laboratory, of international projects, organization of international conferences, Supervision of Master and Ph.D. students</p>	X
Stéphanie ROUALDES	<p>Assistant Professor in Physico-chemistry, Materials Science, Membrane Materials and Processes</p> <p>Member of board of the Department of Chemistry at the Faculty of Sciences</p> <p>-Teaching of General Chemistry, Analytical Chemistry, Electrochemistry, Engineering chemistry and Material chemistry (L and M levels).</p> <p>-Research:Synthesis by plasma enhanced CVD and characterisation of hybrid or polymeric thin layers and membranes,more than 40 publications in international scientific journals</p> <p>-Skills: Management of education programs, participations to international studies or projects, organization of international conferences, Supervision of Ph.D. students</p>	X
Sandrine CANADAS	<p>International project manager</p> <p>-Implementation of international projects and cooperations (administrative and financial management)</p> <p>-Monitoring projects with mobility schedule</p> <p>-Assistance and administrative support to incoming students and academic staffs</p> <p>-Promotion and dissemination activities</p>	X



Organisation number

P2

Organisation name

Université Paul Sabatier

Name of Key Person*	Summary of relevant skills and experience*	
Patrice BACCHIN	Professor in Chemical Engineering - Responsible of the Master degree in "Chemical Engineering and Environment"  -Teaching in mass transfer, interface science, and chemical engineering operations -Research activities in Interfacial science and process engineering, more than 20 publications and 30 communications -Skills :Management of education programs, Management of research team, Management of european projects, Supervision of master and Ph.D. students	X
Pierre AIMAR	Senior Researcher – CNRS (Nationale Scientific Research Council)  -Research activities in Membrane Science and Engineering. Author of 85 publications in international journals, 3 patents and more than 100 communications. -Skills: Supervision of Ph.D. students; Secretary of European membrane Society	X
Maude PERIER CAMBY	International project manager  -Implementation of international projects and cooperations (administrative and financial management) -Monitoring projects with mobility schedule -Assistance and administrative support to incoming students and academic staffs -Promotion and dissemination activities	X

**Organisation number****P3****Organisation name****Institute of Chemical Technology Prague**

Name of Key Person*	Summary of relevant skills and experience*	
Karel BOUZEK	Head of Department of Inorganic Technology, Vice Dean of the Faculty of chemical Technology  -Research activities in technical electrochemistry and electrochemical engineering - Participation as the applicant or joint applicant in the 5 EC grants, 7 international grants and 15 national grants, as core research team member in 10 national and 1 EC grants -Membership in the scientific organizations: Czech Chemical Society (member), Czech Society of Chemical Engineering (member of the board), Czech Society of Industrial Chemistry (vice chairman of the board)	X
Vlastimil FILA	Assistant Professor in Inorganic Technology  -Teaching subjects: Applied reaction kinetics, Membrane processes, Process design, Fundamentals of computer simulations - Research activities in heterogeneous catalysis, membrane processes and process engineering, more than 20 publications, and 80 contributions to the scientific meetings, - Skills: Management of education programs, participations to international studies or projects, Organization of international conferences, Supervision of Ph.D. students -Membership in the scientific organizations: Czech Chemical Society (member), Czech Society of Chemical Engineering (member), European Membrane Society (member)	X
Hana OPATOVA	Head of the international department at ICT Prague  -Coordinating and administrating international activities of the ICT Prague -Managing students and staff mobility -Implementation of international strategy, projects and cooperations (administrative and financial management) -Promotion and dissemination of international activities	X



## Organisation number

P4

## Organisation name

Universidade Nova de Lisboa

Name of Key Person*	Summary of relevant skills and experience*	
Joao CRESPO	Professor of Chemical Engineering - Academic Dean - Faculty of Science and Technology  -Teaching of Chemical engineering -Research: in membrane (bio)reactors, in the recovery of bioactive molecules, in the development of techniques for on-line, real-time monitoring and at molecular scale and in sustainable processes -Skills: Creation and management of a Doctorate Programme, management of research team and laboratory, of international projects, organization of international conferences, Supervision of Master and Ph.D. Students -Award: "Estímulo à Excelência", Ministry of Science and Higher Education	X
Maria REIS	Vice President of the Scientific Council - Associate Professor at Chemistry Department  -Teaching of Biochemical engineering -Research: Environmental Engineering, Biological Nutrients Removal, Products from Renewable Feedstocks, Biopolymers, Water and Wastewater Treatment processes, Membrane Bioreactors, more than 90 publications -Skills: Project coordinator and member of team project, Supervision of Ph. D. students -Award: Solvay & Hovione Ideas Challenge SHIC'08: won Solvay Prize. November 2008	X
Carla BRAZINHA	-Implementation of international projects and co-operations (administrative and financial management) -Assistance and administrative support to incoming students and academic staffs -Promotion and dissemination of international activities -Management of the participation of IBET on the European Network of Excellence named NanoMemPro. Participation in the NanoMemPro activities and connection between partners	X



Organisation number

P5

Organisation name

Universidad de Zaragoza

Name of Key Person*	Summary of relevant skills and experience*	
Reyes MALLADA	Associate professor in chemical engineering  -Teaching of Chemical Engineering Kinetics, Environmental technologies, Chemical Process Technology. -Research: Synthesis and characterization of inorganic membranes, applied in gas separation, pervaporation and membrane reactors. Participation in more than 40 conferences and more than 30 Publications in international journals -Skills: Project coordinator and member of team project, organisation of courses and international conferences, Supervision of Ph.D. students	X
Joaquin CORONAS	Professor in Chemistry  -Teaching of Chemistry, Separation processes -Research topics: Synthesis and characterization of zeolites and related materials, Membranes for gas applications, Organic-inorganic composites. 85 Publications in international journals -Skills: organisation of international meeting	X
Eva PASTOR	Head International relations Office  Implementation of international projects and cooperations (administrative and financial management), Assistance and administrative support to incoming students and academic staffs, Promotion and dissemination of international activities	X



**Organisation number****P6****Organisation name****University of Twente**

Name of Key Person*	Summary of relevant skills and experience*	
Henny BOUWMEESTER	Associate Professor in Inorganic Membranes, Solid State Electrochemistry  - Teaching subjects: Chemical Equilibria, Electrochemistry, Defect chemistry and transport in solids - Research: Dense ceramic membranes, microporous membranes, fuel cells; more than 120 publications in scientific journals - Skills: Supervision of master and PhD students, management of research team, participation in international projects and advisory boards.	X
Matthias WESSLING	Professor and head of Membrane Technology group, University of Twente, Alexander-von-Humboldt Professor at RWTH Aachen University, Germany  -Teaching of Chemical engineering -Research: membranes in medical application, nanofluidics, microfluidics; more than 150 scientific papers published -Skills: Supervision of Ph.D. students - Honary Scientific member of the Russian Academy of Science Institute TIPS (Topchiev Institute of Petrochemical Sciences), Moscow	X
Karin F. PAARDENKOOPER	International project manager  Implementation of international projects and cooperations (administrative and financial management), Assistance and administrative support to incoming students and academic staffs, Promotion and dissemination activities	X

**PART E. Degree(s) awarded**

The joint programme will result in the award of a\* :

- Double degree (i.e. more than one official degree)
- Multiple degree (i.e. more than two official degrees)
- Joint degree i.e. a single diploma officially recognised in at least two of the European consortium countries

Organisation number

Name of the Degree Awarding Organisation

P1

Université Montpellier 2 Sciences et Techniques

Official name of the degree in		Type*	Recognition status	
National language*	English		Already recognised?*	Expected recognition date OR validity end date (/ next review date)*
Master en Ingenierie des Membranes	Master in Membrane Engineering	Joint degree	Yes	september 2011

Add a Degree

Organisation number

Name of the Degree Awarding Organisation

P2

Université Paul Sabatier

Official name of the degree in		Type*	Recognition status	
National language*	English		Already recognised?*	Expected recognition date OR validity end date (/ next review date)*
Master en Ingenierie des Membranes	Master in Membrane Engineering	Joint degree	Yes	september 2011

Add a Degree

Organisation number

Name of the Degree Awarding Organisation

P3

Institute of Chemical Technology Prague

Official name of the degree in		Type*	Recognition status	
National language*	English		Already recognised?*	Expected recognition date OR validity end date (/ next review date)*
Inženýr – Ing.	Master of science	National degree	Yes	30/05/2013

Add a Degree



Organisation number      Name of the Degree Awarding Organisation

**P4**      **Universidade Nova de Lisboa**

Official name of the degree in		Type*	Recognition status	
National language*	English		Already recognised?*	Expected recognition date OR validity end date (/ next review date)*
Mestrado Erasmus Mundus em Engenharia de Membranas	Master in Membrane Engineering	National degree	No	Fall 2010

X

Add a Degree

Organisation number      Name of the Degree Awarding Organisation

**P5**      **Universidad de Zaragoza**

Official name of the degree in		Type*	Recognition status	
National language*	English		Already recognised?*	Expected recognition date OR validity end date (/ next review date)*
Master universitario en materiales nanoestructurados para aplicaciones nanotecnologica	Master in nanostructured materials for nanotechnology	National degree	Yes	March 2011

X

Add a Degree

Organisation number      Name of the Degree Awarding Organisation

**P6**      **University of Twente**

Official name of the degree in		Type*	Recognition status	
National language*	English		Already recognised?*	Expected recognition date OR validity end date (/ next review date)*
Master of science in chemical engineering	Master of science in chemical engineering	National degree	Yes	Fall 2010

X

Add a Degree



European Commission



Form version : 1.01 EN Adobe Reader version : 9.3

ERASMUS MUNDUS

## **Attachments**

**Declaration of Honour. JPEG document (jpeg, jpg) or PDF document(pdf).**

Document: EMMC\_FR\_EM3E\_DecHon.pdf

**Award Criteria. Word document (doc,docx), PDF document (pdf) or RTF document (rtf).**

Document: EMMC\_FR\_EM3E\_Award.doc

Submission number:  
511935-EM-1-2010-1-FR-ERA MUNDUS-EMMC

<http://eacea.ec.europa.eu>

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European Commission



Form version : 1.01 EN Adobe Reader version : 9.3

ERASMUS MUNDUS

**511935-EM-1-2010-1-FR-ERA MUNDUS-EMMC**

**Submission  
number**

Submission number:  
511935-EM-1-2010-1-FR-ERA MUNDUS-EMMC

<http://eacea.ec.europa.eu>

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## Declaration on Honour by legal representative of applicant organisation

### To be completed by the person legally authorised to sign on behalf of the applicant organisation, as defined in Part A.2 of the Application Form.

I, the undersigned, certify that all information contained in the application "Erasmus Mundus Master in Membrane Engineering", including the description of the project, is correct to the best of my knowledge and that I am aware of the content of the annexes to the application form.

I confirm that my institution/organisation has the financial and operational capacity to carry out the proposed project.

I take note that under the provisions of the Financial Regulation applicable to the general budget of the European Communities<sup>(1)</sup>, grants may not be awarded to applicants who are in any of the following situations:

- a) are bankrupt or being wound up, are having their affairs administered by the courts, have entered into an arrangement with creditors, have suspended business activities, are the subject of proceedings concerning those matters, or are in any analogous situation arising from a similar procedure provided for in national legislation or regulations;
- b) have been convicted of an offence concerning their professional conduct by a judgment which has the force of *res judicata*;
- c) have been guilty of grave professional misconduct proven by any means which the contracting authority can justify;
- d) have not fulfilled obligations relating to the payment of social security contributions or the payment of taxes in accordance with the legal provisions of the country in which they are established or with those of the country of the contracting authority or those of the country where the contract is to be performed;
- e) have been the subject of a judgment which has the force of *res judicata* for fraud, corruption, involvement in a criminal organisation or any other illegal activity detrimental to the Communities' financial interests;
- f) following another procurement procedure or grant award procedure financed by the Community budget, have been declared to be in serious breach of contract for failure to comply with their contractual obligations;
- g) in their grant application, are subject to a conflict of interest;
- h) in their grant application, are guilty of misrepresentation in supplying the information required by the contracting authority as a condition of participation in the grant award procedure, or fail to supply this information.

I confirm that neither I nor the institution for which I am acting as legal representative are in any of the situations described above, and that I am aware that the penalties set out in the Financial Regulation may be applied in the case of a false declaration.

In the event that my application is successful, I am aware that the Education, Audiovisual and Culture Executive Agency / European Commission will publish on its website or in any other appropriate medium the name and address of the beneficiary, the subject of the project, the future grant awards;

I declare that the organisation I represent is (please tick as appropriate):

a public body <sup>(2)</sup>

a private body which has financial and operational capacity to carry out the proposed action or work programme and is able to provide a Bank Guarantee for the amount of the 1<sup>st</sup> (and 2<sup>nd</sup>, if applicable) pre-financing payment(s), should the Education, Audiovisual and Culture Executive Agency request so.

By signing this application form, I accept all the conditions set out in the Erasmus Mundus 2009-2013 Programme Guide and the Call for proposals EACEA 29/09, including the general conditions published on the Education, Audiovisual and Culture Executive Agency's website. I also declare that all the partners participating in this project have agreed with the content of the application and have confirmed their intention to carry out the tasks described accordingly.

Done at: Montpellier

Date 02 / 04 / 2010 (day/month/year)

Signature:



Stamp of the applicant organisation

Name and position in capitals: DANIELE HERIN, PRESIDENT



<sup>1</sup> Council Regulation (EC, Euratom) No 1605/2002 (OJ L 248 of 16.09.2002), amended by Regulations (EC, Euratom) No 1995/2006 (OJ L 390 of 30.12.2006) and (EC) No 1525/2007 (OJ L 343 of 27.12.2007). These can be consulted in the Official Journal online at: <http://europa.eu.int/eur-lex/lex/en/index.htm>.

<sup>2</sup> The Erasmus Mundus Programme considers as public bodies all higher education institutions specified by Member States (participating countries), and all institutions or organisations which have received over 50 % of their annual revenues from public sources over the last two years, or which are controlled by public bodies or their representatives.

**Erasmus Mundus Call for Proposals 2010 (EACEA/29/09)**  
**A - Award criteria for Erasmus Mundus Masters Courses (EMMC)**

**A.1 Academic quality - Course content (30 % of the max. score)**

A.1.1 Describe the EMMC's **objectives** (including in socio-economic terms) in relation to the **needs analysis** in the field(s) concerned.

Despite a favourable growth rate in the field of membrane technology, with more than hundred of current available positions, none master fully devoted to this area exists in Europe or all over the world. Based on this observation, our consortium of European Universities (see Appendix 1) decided to design the project of **Erasmus Mundus Master in Membrane Engineering (EM3E)**. The objectives of the EM3E project are to expand knowledge and educate students in Membrane Science in order to provide outstanding students to be inserted in the industry or in academic research. For instance, the recruitment at a master level in a membrane industry is constricted to either a "material" or a "chemical engineering" profile with no specific background and advanced knowledge in the field of Membrane Science, which represents a terrible waste of time of formation and so money for industrial companies and also does not enable a fast adaptation and implication in the frame of doctoral studies.

As a matter of fact, environmental concerns like massive scale air or water pollution and also the gradual rarefaction of fossil energy resources gave rise to the concept of sustainable growth and to related strategies like process intensification, water and solvents at their point of use, hydrogen as energetic vector (requiring H<sub>2</sub> production and using fuel cells as electric generators) or CO<sub>2</sub> capture and storage. Membrane processes have a key role in the construction of these strategies. Moreover a lot of separation operations are currently performed using membranes in industrial processes. Among the major applications for liquids, it can be mentioned the water desalination by reverse osmosis, the preparation of food, beverage, dairy or pharmaceutical products or the treatment and the recycling of industrial effluents, the production of tap or ultrapure water, the dehydration of ethanol, the dialysis of blood (artificial kidney), etc. For gas separation, some examples of current applications are the removal of hydrogen from ammonia synthesis gas, the removal of carbon dioxide from natural gas and the air separation. On the other hand, the industrial market of membrane bioreactors (MBR) for wastewater treatments is now considered as mature, and the European Directive on Integrated Pollution Prevention and Control EC96/61 encourages the use of MBR as "**Best Available Technology**" by many industries. National and European regulations (as for instance, Integrated Pollution Prevention Control Directive 96/61/EEC, Urban Waste Water Treatment Directive 91/271/EEC), and the economical pressure also favour internal water recycling<sup>1</sup>.

The North European market on membrane separation systems is currently passing through a **high growth phase**, catalysed by steadily increasing demand from both the municipal and the industrial sectors, reaching \$1 billion<sup>2</sup>. Reverse Osmosis market is estimated at close to \$10 Billion dollars in size, growing at double digit rates (in Europe ~ 10% per year) and it includes a good number of companies originated in the major geographical market -the US, Japan, Europe, and Asia/China, with most of them playing the global sales game<sup>3</sup>.

Intensive efforts of R&D are now engaged over the world to develop high performance membranes. As an example, the membrane technologies are identified as "**Key Technologies 2010**" by the French government. The European Federation of Chemical engineering (more than 100,000 members) has now a new section dedicated to "Membrane Engineering". A European Network of Excellence named NanoMemPro (acronym for "Expanding membrane macro scale applications by exploring nanoscale material properties"), was funded for 4.5 years (2004-2009) in the scope of the FP6 (<http://www.nanomempro.euromemhouse.com/>) and has created a legal entity, the European Membrane House (<http://www.euromemhouse.com>) which now host all the activities.

One of the main objectives of NanoMemPro was the establishment of long-term synergies between European teachers, researchers, engineers, manufacturers, suppliers and end-users in order to solve problems related to the multidisciplinary nature of membrane science and engineering. The creation of education programs in Membrane Engineering was strongly supported by the Club of Interest of NanoMemPro gathering a significant number of small and medium-sized enterprises or large industrial companies covering fields of activities related to membrane engineering. It was also the case of the European Membrane Society (EMS) and of a lot of academic institutions all over the world. Corresponding

<sup>1</sup> B. Lesjean and E. H. Huisjes, IWA 4<sup>th</sup> International Membrane Technologies Conference, May 15-17<sup>th</sup> 2007, Harrogate, UK.

<sup>2</sup> Membrane Technology 4 (2007) 3.

<sup>3</sup> J. Fernandez, Water Purification by Membrane Filtration is a fast growing global market, Gerson Lehrman Group (2007).

support letters are attached to this application (see Appendix 2).

The EM3E project is believed to answer most of the industrial and academic needs in terms of background and advanced knowledge in Membrane Science, by bringing together the expertise of the best European Universities working in that field in the frame of a close relationship with the industrial and academic worlds.

A.1.2 Explain the EMMC's **added value** compared with existing masters courses in the same field at national, European and international level.

As previously mentioned, a systematic investigation has been performed about the possible existence of multidisciplinary Master degrees entirely devoted to membranes over the world. The North America Membrane Society and the main Asian and Australian Societies on Membranes have been questioned. Numerous master degrees, usually centred on Materials Science or on Chemical Engineering, have been identified with no more than three courses related to membrane. In consequence, this Erasmus Mundus Master would be the first over the world to respond to industrial and academic concerns in Membrane Science and Technology.

The creation of this education program in Membrane Engineering was strongly supported by the Club of Interest of NanoMemPro grouping a significant number of small and medium-sized enterprises or large industrial companies covering fields of activities related to membrane engineering. It was also the case of the European Membrane Society (EMS) and of a lot of academic establishments all over the world. Corresponding support letters are attached to this application (see Appendix 2).

This new curriculum will offer coherent courses integrating the best of the partners' skills. The training program has been prepared during meetings attended by the different partners of NanoMemPro Network of Excellence and by integrating the advises and requests of professional sectors. It will enable to promote excellence, innovation, mobility and diversity in high-quality courses related to membrane science and engineering at the interface between material science and chemical engineering. Students will benefit of the teaching of **internationally recognised specialists** being deeply involved in this field both at scientific and at industrial levels. The strong implication of all these teachers in the field of membrane research and/or technologies would enable to perform high-level courses with already updated contents.

In the frame of the recognised Erasmus Mundus program with an international visibility, the Master course will bring to Europe highly-motivated and educated students in the increasingly important and competitive domain of membrane science and engineering.

A.1.3 Present the **structure and content** of the EMMC and justify the added value and relevance of the **mandatory mobility** component.

The EM3E Master programme is schematically depicted in Figure 1. The programme spreads over 2 years (120 ECTS) of normal study. The courses provided in the four semesters, S1-S4, bridge different scientific domains like material science, physics & chemistry, engineering & processes, while keeping a focus on relevant applications of membranes in food and health industry, industrial and chemical processing, energy, environmental control, pharmaceutical industry, biomedical applications, etc. The planned number of students per academic year is ~ 30.

During semester S1, after **registration and an integration week** at the University of Montpellier 2 (UM2), France, all the students will stay together at the University of Montpellier 2 (France) or at the University of Toulouse 3 (UPS), France (the location will be swapped every other academic year between the two universities). The first semester will be on **fundamentals of Materials Science and Chemical Engineering**. Depending on their bachelor track and on the option chosen when applying, students, will have the opportunity to choose between two specialities (four courses) more focused on Materials Science or on Chemical Engineering.

Semester S2 will be on fundamentals of **process modelling and technologies** at the Institute of Chemical Technology of Prague (ICTP), Czech Republic.

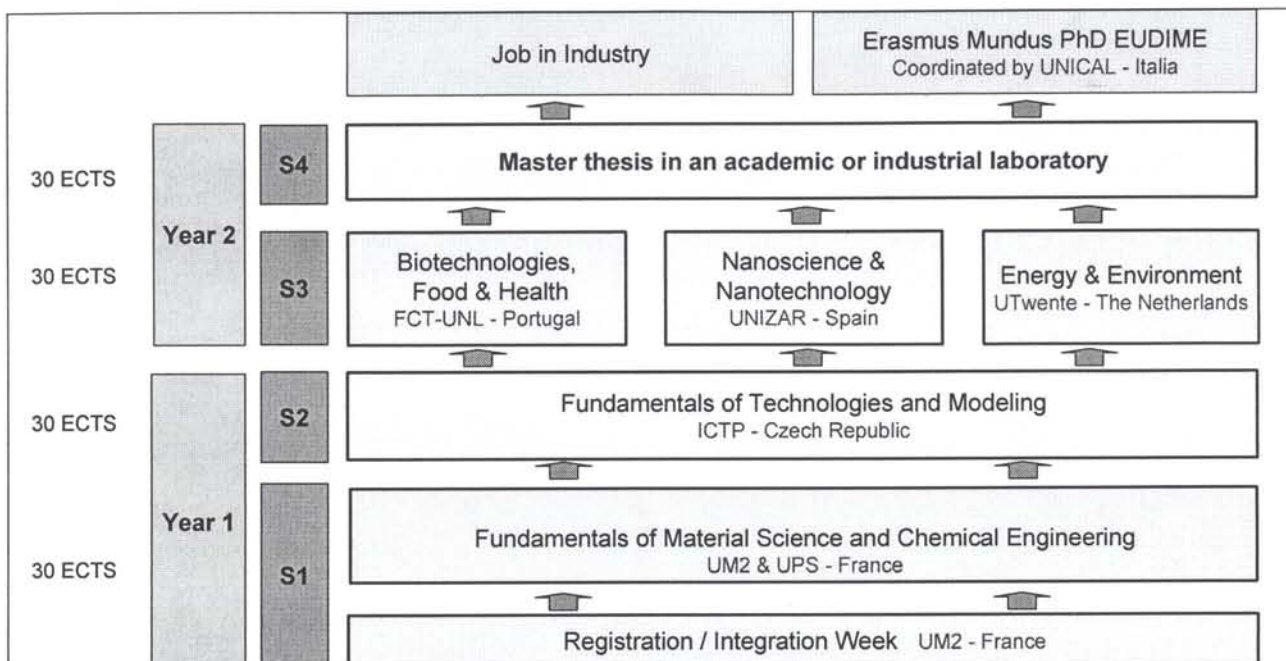
The courses offered in the first year, semesters S1 and S2, will provide a broad and flexible orientation in the field of science and technology of membranes.

During the second year, semester S3, students will get advanced courses in one of the following mobility option:

- Biotechnologies, Food and Health, at the University of Lisboa (UNL), Portugal (~ 10 students)
- Nanoscience and Nanotechnology, at the University of Zaragoza (UNIZAR), Spain (~ 10 students)
- Energy and Environment, at the University of Twente (UTwente), The Netherlands (~ 10 students).

In the final semester S4, they will have their first experience in research over a period of 6 months on an extensive research project, in either an academic or an industrial environment. The student will be in charge of planning, critical analysis of the project progress, as well as of reporting.





**Figure 1:** Operational structure of the Master project EM3E.

Semesters S1-S3 will be completed by **individual projects** (6 ECTS), in which the student has to conduct a literature survey and/or experimental study, selected in close consultation with the examination committee.

Detailed descriptions of the content of the scientific courses in semesters S1-S4 are given in Appendix 3. The scientific program will be completed by **compulsory courses** (in semesters S1 and S2) on:

- Safety, Security, Health and Environmental Regulation (2 ECTS);
- Quality Assurance and Laboratory Practice (2 ECTS);
- International and European Labour Law (2 ECTS);
- Intellectual capital management (3 ECTS);
- Valorisation, Marketing and entrepreneurship (3 ECTS).

The used language will be mainly English. However, at each institution, a national language and culture course will be offered to the students. Language acquisition is one of the objectives. The courses further aim at giving an overview of today's culture and society of the country of the home-institution. During the total period (S1-S2-S3), each student will be obliged to be registered at least one time at one of these courses and will have also to make an oral presentation of his individual project in the corresponding national language.

**A.1.4 Justify the learning outcomes relevance in view of the students' future academic opportunities (e.g. at doctorate level) and employability.**

The choices made for the content and structure of the program are based on a detailed analysis of the European Membrane Strategic and Business Research Agenda (SBRA) established by NanoMemPro in strong links with European industry.

Moreover, the analysis of the requested skills or profiles associated with current job offers in scientific or technological fields evidences the frequent use of key-words such as REACH regulation, Ecodesign, processes intensification, atom economy, sustainability, etc. That is resulting from more and more restrictive regulations and of related new industrial practices. Membranes will play a key role in these new technologies and in the separation operations associated with these strategies. Moreover a lot of separation operations are already performed using membranes in industrial processes (food industry and water production, for example).

As a consequence, the suggested Master program centred on membrane engineering should give highly valuable competences and professional outcomes for the graduate students both for future academic and/or professional careers:

- in Materials Science and Chemical Engineering, (S1);
- in Technologies and Modelling (S2);
- in Biotechnology, Food, Pharmaceutical and Biomedical Technologies for a student who has performed the semester S3 in UNL, in Nanoscience and Nanotechnology for a student who has performed the semester S3 in UNIZAR, or in Energy and Environmental Control for a student who has performed the semester S3 in Utwente.

The Master programme will provide knowledge in membrane engineering, and a first experience in

research through the internship in an academic laboratory or in a company.

They will acquire skills as:

- to be able to communicate at a professional level;
- to have an analytical mind, to be prepared to the labour market;
- to be good at drawing ideas together;
- to be able to manage a team or a project;
- to get a good ability to adapt multicultural and international environment;
- to learn at least 3 European languages;
- to use new information and communication technologies and modern research methods and techniques;
- to build a scientific project and write a research proposal;
- to be able to take all position of engineer or researcher in industry or in an academic laboratory.

All of the learning outcomes of the programme are extremely relevant for students' careers, both if they will continue in PhD programmes and if they decide to integrate a job in industries. Through the mobility periods, the internship in associated organisations and the interactions with the other students and staff, the students will experience and learn from different European cultures, improve their language skills, and competencies. All these outcomes will be an advantage for the students' employability or academic opportunities. Already, some of associated partners will open positions to students graduated within the Master programme (see Appendix 2).

A.1.5 Justify the relevance of the **consortium composition** and the expertise of the key **academic staff** involved to achieve the EMMC objectives.

Although membrane engineering is a fundamental and well established discipline, there are only few master programmes with focus on this area. Nowadays, no university in the world can offer the complete range of sub-disciplines of this highly multidisciplinary research area. To our knowledge, Europe offers no internationally organised master programme focussed on membrane engineering. The closest existing international master programmes are in the area of material sciences or nanotechnology and chemical sciences (e.g: MESC, NANOMAT, FAME, EMM-Nano programmes). The goal in Membrane engineering is to integrate disciplines that have traditionally been separated.

**Academic quality of the partners and complementarities:**

The creation of a Master Mundus in Membrane Engineering (EM3E) is born from the collaboration between European researchers and teachers through the European Network of Excellence on nanoscale-based membrane technologies (NanoMemPro). This network is formed by well-recognised European partners, all leaders in the field of membrane research and technologies. The partners and associated partners of the Master program come from the NanoMemPro Network. They actively participated in the past years to the creation of a Label in "Membrane Engineering at Master level" which was used to promote the mobility of students through Europe.

The universities involved are all **long-existing universities** with research and training activities in many fields of science. The Master Mundus in Membrane Engineering programme will build on the well-developed master courses at each of the six European partner universities. The partner universities complement each other in terms of research and teaching topics, but also in terms of facilities, such as research methods and laboratory equipment. The partners are highly complementary to each other in their expertise and approach, making a joint programme a real asset: Montpellier (UM2), has strengths in Material Science, Toulouse (UPS) excels in Chemical engineering. Prague (ICTP) has a focus on Technologies and Modelling, Lisbon (UNL) is a specialist in Biotechnologies, food and health, Zaragoza (UNIZAR) in Nanosciences and Nanotechnology, and Twente in Energy and Environment. Short descriptions of these six universities with striking facts are provided in Appendix 4.

From each of the partner universities and associated partners, top level researchers and teachers are committed to the EM3E programme. Table 1 lists the key staff involved for the implementation of the programme.

**Administrative Key staff:**

All the 6 partner universities have the capacity to manage the mobility flows of an Erasmus Mundus Master programme as the EM3E project. They have qualified staff with extensive experience in managing students and staff mobility, within Erasmus, Leonardo actions, Marie Curie & other bilateral or multilateral programs. They have appropriate structures and resources to assist international students, including in most cases on campus housing facilities and cultural and linguistic integration programs. They have a **long standing co-operation and on-going projects in research and training** as they have been collaborating in particular through the Network of Excellence NanoMemPro since 2004.

In each university, in co-ordination with Montpellier 2 University, the EM3E Management Office will facilitate the implementation of the Master. The administrative key staff (Table 1) will be all involved in the implementation of the programme, working in close relation with the teaching/research staff, the secretary and the local co-ordinator. They are administrative responsible or Project Manager of the International

relations Office in the partner universities, and have skills and expertise in organisation and implementation of international programmes with mobility scheme. The EM3E administrative staff will give to the consortium the guarantee of an effective support to the management of the mobility flow for incoming mobility, including practical issues (administrative support for insurance, travel, visas, accommodation etc...). In addition, they will be the link between the administrative organisation of the university and the Master programme (students, teachers, committees). In Montpellier 2 University, a project manager dedicated to the project and specialised in European project will be employed to assist the project coordinator, in supplement of the existing administrative and financial services. All the University accounting services and the general administration will supervise the project finances.

**Table 1:** Key Staff involved in the EM3E programme.

(see Appendix 5 for a more detailed version of Table 1 and for the related Europass CVs).

<b>Partner</b>	<b>First Name</b>	<b>Function</b>	<b>Responsibility in the project</b>
<b>UM2</b> Fundamentals of Material Sciences	AYRAL André	Professor	Coordinator of the EMMC - Member of Executive Board - Member in admission and examination committee -Teacher/Mentor - Responsible for the contacts with the associated partner. Member of the Evaluation Committee in charge of organisational arrangements and cooperation mechanism within the consortium.
	ROUALDES Stéphanie	Associate Professor	Teacher/Mentor. Shared responsibilities for supervision of programme with A.A.
	CANADAS Sandrine	Administrative Engineer	Organisation of the implementation of EME3 Master - Member of EM3E Management Office UM2 - Coordination with Partner Office
<b>UPS</b> Fundamental of Chemical Engineering	Patrice BACCHIN	Professor	Member of the Executive Board - Coordinator of the semester S1 in Toulouse. Member in admission and examination committee - Teacher/Mentor. Member of the Evaluation Committee in charge of management of the e-learning platform.
	Pierre AIMAR	Senior Researcher – CNRS	Teacher/Mentor. Shared responsibilities for project implementation with P.B
	Maude PERRIER CAMBY	International project manager	Organisation of the implementation of EME3 Master - Member of EM3E Management Office UPS
<b>ICT</b> Fundamentals of Technologies and Modeling	Karel BOUZEK	Professor	Member of the Executive Board - Coordinator of the semester S2 in Prague. Member in admission and examination committee - Teacher/Mentor.
	Vlastimil FILA	Assistant Professor	Member of the Evaluation Committee in charge of relationships with industries and cooperation programme of Master. Teacher/Mentor
	Hana OPATOVA	Head of the international Department	Organisation of the implementation of EME3 Master - Member of EM3E Management Office ICTP
<b>UTwente</b> Energy and Environment	Henny BOUWMEESTER	Associate Professor	Member of the Executive Board -Coordinator of semester S3 in Twente- Teacher/Mentor. Member of the Evaluation Committee in charge of monitoring of the quality aspects. Member in admission and examination committee -Teacher/Mentor.
	Matthias WESSLING	Department Head, Chemical Engineering	Member of the Executive Board - shared responsibilities with HB. Teacher/Mentor
	Karin F. PAARDENKOOPEER	Head International Office	Member of EM3E management office
<b>UNIZAR</b> Nanoscience and Nanotechnology	Reyes MALLADA	Associate professor	Member of the Executive Board Coordinator of the semester S3 in Zaragoza. Member in admission and examination committee - Teacher/Mentor. Member of the Evaluation Committee in charge of information and promotion of the Master.
	Joaquin CORONAS	Professor	Teacher/Mentor. Shared responsibilities with RM
	Eva PASTOR	Head International relations Office	Organisation of the implementation of EME3 Master - Member of EM3E Management Office UNIZAR
<b>UNL</b> Biotechnologies, Food and Health	Joao CRESPO	Professor	Member of the Executive Board - Coordinator of the semester S3 in Lisbon.
	Maria A. REIS	Vice President of the Scientific Council - Associate Professor	Member in admission and examination committee - Teacher/Mentor
	Carla BRAZINHA	International project manager	Member of the Evaluation Committee in charge of the sustainability plan Organisation of the implementation of EME3 Master - Member of EM3E Management Office UNL

**Scholars mobility contribution to the project:**

During the EM3E integration week, staff members from each of the partner universities, who have an official role in the programme will participate and give presentations. External staff from associated partners and international experts on membrane engineering will be also invited to this event. Meetings of boards and committees and boards in charge of the management of the master EM3E (see later in section A3.1) will be organised during this period.

Experts from the consortium or out of the consortium will be involved to give specific lectures or will be in charge of one part of the different courses in semesters S1, S2 and S3. They will also participate to the committees in charge of the evaluation of the individual projects (S1, S2 and S3) and of the master thesis (semester S4).

In order to minimise the cost of such mobility activities, we will couple as well as possible meetings (for EM3E or for other co-operation programs) and teaching activities. Videoconferences and e-learning tools will also be used (see later in section A4.6).

#### A.1.6 Explain the EMMC interaction with the professional socio-economic/scientific/cultural sectors concerned.

Professional, scientific and cultural sectors are strongly involved in EM3E as they will actively participate to the students' courses, training, evaluation and placement. The non-educational actors of these sectors are represented by the consortium associated members such as the EMS<sup>4</sup> and EMH<sup>5</sup>, but also industrialists and experts from the North America Membrane Society or the Membrane Society of Japan. The EM3E management structure (see later in section A3.1) includes an **Evaluation Committee** and an **External Quality and Evaluation board**, in which these sectors will be strongly committed by providing advises and requests concerning the courses but also giving highly specialised lectures, supervision of individual projects and/or of internships during the fourth semester (S4).

The EMH and EMS for example represent a valuable link between EM3E and the industrial companies, small and medium-sized enterprises or larger ones. They will use their knowledge of the different professional sectors to encourage the students' work placement or internships but they may also provide them financial supports by means of scholarships and grants either for their training period or their full degree. Specific grants may also be delivered by the EMS to allow students to interact directly with scientists and industrials by participating to European Conferences, where the promotion of exchanges between students and professionals are strongly present.

The industrialists who are dedicated to support the EM3E are committed to offer internships, training vacations and job positions at different levels of the curriculum but also to provide financial supports and grants or scholarships depending on their possibilities (see Appendix 2).

The strong interaction between scientists and industrials is completed by an important relationship with different social and cultural sectors with the objectives of providing students not only scientific and professional skills but also a cultural knowledge. The networking between students and the non-educational sectors will be promoted by the E-learning platform (see later in section A4.6), favouring social and informal learning that should be of interest for industrialists, researchers, teachers and students (video of plenary session of conference, thesis, and life long learning contents...), the EM3E website ([www.em3e.eu](http://www.em3e.eu)) and leaflet.

Other cultural sectors will be represented by the students associations to develop strong interactions between students and the non-educational sectors by organising social events to gather people or through the preparation of a newsletter (it would be also inserted in the regular newsletter of EMS) or the development of a forum on the EM3E website with the students' job or internships opportunities and their travel and work experiences in the different areas and countries visited.

The EM3E course implementation is strongly highlighted by the numerous interactions between the non-educational, professional, scientific and cultural sectors and the academics to provide students the best of Education and Culture, Employment.

## A.2 Course integration (25% of the max. score)

### A.2.1 Justify the extent to which the EMMC is organised in a truly integrated way.

The European Network of Excellence NanoMemPro "*Expanding membrane macroscale applications by exploring nanoscale material properties*" was co-ordinated by the French partner represented by the two laboratories involved in the coordination of the EM3E Master project, i.e. the *Institut Européen des Membranes* at the University of Montpellier (UM2) and the *Laboratoire de Génie Chimique* at the University of Toulouse (UPS).

The work package of NanoMemPro dedicated to Education has jointly developed the Erasmus Mundus curriculum in Membrane Engineering at Master level, EM3E. This Master project has emerged from collaborations between European researchers and teachers through the Network of Excellence with the objective of **long-term synergies** between European teachers, researchers, engineers, manufacturers, suppliers and end-users in order to overcome problems related to the multidisciplinary nature of the membrane science and engineering.

Courses offered in EM3E curriculum ensures a high level background to all students in Material Science, Chemical Engineering, modelling and technologies (M1 year) and are focused during the second year on specific application fields such as **energy, environmental, water, food industry, pharmacy and**

<sup>4</sup> EMS : European Membrane Society

<sup>5</sup> EMH : European membrane House

**biomedical applications** in accordance with the scientific expertise of each university involved in the consortium and with the European Membrane Strategic and Business Research Agenda (SBRA) established with European industry. These different universities having an international position in the field of education and research on membranes are thus able to provide high level and up-to-date teaching and training around membrane science and engineering. The partners involved in the EM3E preparation first established tables of the teaching courses already given on membranes in their own university. The final Master architecture (Figure 1), the course contents, the suitable tracks and the location for each semester were finally discussed in the consortium through several meetings.

A.2.2 Justify the extent to which the EMMC is **recognised in participating countries** and leads to the award of an **official degree** by each of the partner institutions. Describe the type of degree(s) that will be awarded to successful students.

**Integration :**

The EM3E program is a fully integrated program, based on master courses at the partner universities, using existing modules and also new elements. It will have a joint student application and admission procedure. The ECTS system is commonly used at all partner universities and study elements and credit points will be recognised across the universities. The partners will provide a multiple degree (from the three universities visited during the semesters S1, S2 and S3) to students after completion of the 2-year Master. The letters of approval and the documents of recognition of national degree for all the partner universities are grouped in Appendix 6.

**Recognition process :**

- **In France:** The Master proposal must be on a specific Application Form (description of study plan, recruitment, lecturers...). The procedure for accreditation of a Master degree is : 1/ Master must be approved by the councils of the university and by the President; 2/ It must be sent to the French Ministry of Education for submission; 3/ The application is studying by an expert Commission; 4/ The Master is approved by the National Committee (CNESER). **UM2** and **UPS** have deposited a French accreditation for a joint degree in October 2008, and obtained the final agreement from the French Ministry of Education (see Appendix 6).

- **In Czech Republic (ICTP):** The application for accreditation of a study program must be sent to the Ministry of Education, Youth, and Sports by the university based in the Czech Republic. It must be undersigned by the rector. The application is then discussed on the next meeting of the Accreditation Commission. These are held five times a year. The accreditation must cover number of obligatory information on the specific study plan, description of the procedure of student recruitment, information on the lecturers, subject abstracts, technical background of the institutions etc.

- **In Portugal (FCT-UNL):** The national procedure for approving a Master degree consists of the following steps: 1/ the Master degree must be approved at the Academic Council of the Faculty, 2/ the Rectory of the University must be informed about it, 3/ the Master degree must be submitted to the Ministry of Education, Ministério da Ciência, Tecnologia e Ensino Superior, 4/ the Master degree must be approved by the Ministry, 5/ the Master degree must be approved by the Government.

- **In Spain (UNIZAR):** Once the University Council has verified the conformity of the programme of study to the protocols laid down by ANECA (Spanish National Agency for Quality Assessment and Accreditation), the programme of study is sent to the Agency for the evaluation report. The programme of study is assessed by a review panel consisting of experts who use the protocols to draw up a draft report on the programme of study, which will either be positive or negative, with reasons provided, together with recommendations, where applicable, for improvement. ANECA then sends the draft report to the University in order for any pleas (supporting arguments) to be made. The University has twenty days to do so. Once this deadline has passed and any pleas have been assessed, ANECA then draws up the final evaluation report, which will be either positive or negative, and it is then sent to the Universities Council. The University may appeal the verification resolution before the Board of the Universities Council.

- **In the Netherlands (UTwente):** Currently, Dutch law does not allow a Dutch higher education institution to award a joint degree. A Dutch university has the authority to award a degree if the programme concerned is legally accredited. Accreditation is done by the Accreditation Organisation of the Netherlands and Flanders (NVAO), which is rooted in the Dutch Higher Education Act (WHW). Its role is to accredit programmes on the basis of an evaluation by an external party. Programmes that have been accredited are listed in the Central Registry of Higher Education (CROHO in Dutch). This lists only accredited Dutch Higher Education programmes ([http://www.ibgroep.nl/zakelijk/HO/CROHO/Inleiding\\_CROHO.asp](http://www.ibgroep.nl/zakelijk/HO/CROHO/Inleiding_CROHO.asp)). In December 2008, the Minister has forwarded the new Higher Education Act (WHW) to Parliament. Part of the changes proposed in this new Act involves three subjects of interest to the Erasmus Mundus Programme: joint degrees, the language of the names of programmes, and the number of credits for a Master's programme. Concerning Joint degrees, to remove obstacles in engaging international partnerships, it is proposed that joint degrees will be allowed in the future. These are degrees awarded by a higher education institution together with another

institution, to students who have successfully completed a programme for which both institutions are equally responsible. Both the Dutch and the international part of the joint degree curriculum will be accredited together and regarded as a combined programme: the Dutch university is responsible for the accreditation of the entire curriculum.

**Degrees awarded :**

As mentioned above, the partners will first provide a multiple degree (from the three universities visited during the semesters S1, S2 and S3) and a Diploma Supplement (see Appendix 7) to students after completion of the 2-year Master (September, year n+2). They will subsequently receive the multiple diploma by post, from each partner Institution. As indicated previously, UM2 and UPS have already obtained a French accreditation for a joint degree- Table 2 details the degrees awarded in each EM3E university.

**Table 2:** Degrees awarded by EM3E partner universities.

Institution	Title of degree awarded	Type of degree	Expected recognition date
UM2	Master en Ingenierie des Membranes, Master in Membrane Engineering in France	Multiple	Already recognised
UPS			
ICTP	Inženýr – Ing. Master of Science – MSc	Multiple	Already recognised
FCT-UNL	Master Engenharia de Membranas, Master in Membrane Engineering	Multiple	Fall 2010
UNIZAR	Máster universitario en Materiales Nanoestructurados para Aplicaciones Nanotecnologica, Master in Nanostructured Materials for Nanotechnology	Multiple	Already recognised
UTwente	Master of Science in Chemical Engineering	Multiple	Already recognised.

The final objective of the consortium is to offer a joint degree throughout all the universities participating from the consortium. However severe problems due to specific national rules in several countries still have to be solved before reaching this aim (e.g., in Netherlands, it will be possible from January 2011).

**A.2.3 Describe the consortium joint student application, selection and admission procedure.**

The EM3E consortium has agreed to common, transparent and objective procedures concerning the students' application, selection and admission to the EM3E master program. The establishment of a project management structure of EM3E (see later in section A3.1) has led to the creation of specific committees with an Admission and Examination Committee, an Evaluation Committee and an External Quality and Evaluation Board to ensure the fair recruitment of the best candidates.

The common approaches and criteria for the different procedures decided by the EM3E consortium are detailed below:

**Students' application procedure:**

The EM3E consortium has created a dedicated website ([www.em3e.eu](http://www.em3e.eu)) where the application procedure will be available and downloadable online by the students from the 15<sup>th</sup> of October of the year n-1 (i.e. the year prior the beginning of the EM3E courses) and will end two months after on the 15<sup>th</sup> of December of year n-1. Candidates will fill in the application form and submit it exclusively online. They will be allocated a personal and confidential file number and will receive an email on receipt of their application form by the head of the Admission and Examination Committee.

The procedure requires students to provide a selected track by choosing their choices for semesters 1 and 3, a detailed CV specifying their scientific and/or professional experiences and their English level and a motivation letter, both written in English. Concerning the 3<sup>rd</sup> countries candidates, they should explain their goals and interests to enrol the EM3E in Europe.

In addition, candidates are required to provide by registered mail a copy of their academic certificates stating their final classification including their rank, grade distinctions in each discipline/subject attended, accompanied with a stamped official transcript if not in English. They should also provide an official document from their last institution visited, college, university or technical school, stating the candidate's relative position in the corresponding graduation course i.e. top 5%, top 10% or top 20% of his/her Bologna 1<sup>st</sup> cycle class or of his/her bachelor's course.

Finally, 2 letters of recommendation should be sent by mail in a sealed envelop directly by the author itself. All the correspondence is to be directed to the Head of the Admission and Examination Committee not later than the 31<sup>st</sup> of December of the year n-1, preceding the beginning of the EM3E academic year.

**Selection and admission procedure:**

The Admission and Examination Committee is composed of 6 members from the different partner universities and is lead by the Head elected by the Committee's members for 2 years.

The Head of the Committee is in charge of collecting the students' application files and the mailed documents to ensure the files are correctly filled and then to establish a pre-selection based on the criteria detailed in Table 3 to build a first list of 45 students.

The second step of the selection procedure consists in the examination of the different applications. The

Head will therefore divide the completed files to the 6 members of the Committee to proceed to a fair examination. For this, two members of two universities will examine independently one student's file following the selection criteria listed in Table 3.

The selected students will have to be evaluated through a phone or videoconference interview in English to assess their motivation, their skills and their English level. To ensure equity between the students and a fair and homogeneous interview, a list of mandatory questions will be established and asked to the candidates by the members of the Committee.

After completion of the examination process by the members of the Committee, the Head will organise a meeting within the two first weeks of January with all the members in person or by teleconference to decide a main selection list of 30 students plus 5 on a complementary list. At this stage, a good balance in terms of the country of origin, gender, disadvantaged students must be ensured.

Once the academic year is completed, the students will have to send their results to the Head of the Committee in order to validate the selection list. The selection will end on the 10<sup>th</sup> of January of year n for category A students and on the 10<sup>th</sup> of May of year n for category B students. At this point of the procedure, students will be invited by email to connect to the EM3E website using their personal registration number to take notice of the Admission and Examination Committee selection decision concerning their application.

The final selection list will be available online after reception by the Committee of the final grades of the students or additional results from the last academic period with a deadline mid-July of year n.

To be eligible for application to the EM3E, students should fulfil the following requirements:

- Hold a Bologna 1<sup>st</sup> cycle degree or a bachelor degree in Chemistry, Physics, Materials Engineering, Chemical Engineering, Bio Engineering, related Bioscience or equivalent degrees from a College, University or Technical School with a recognised standing or alternatively, a recognised professional experience in these areas. Students in the final year of a degree may be admitted as long as they present the certificate and official transcripts before they enrol.
- Be part of category A or B students and provide a complete application forms with all the required documents and current and correct mail and email addresses to ensure a good communication between the Committee and the students.

**Table 3:** Pre-selection, Evaluation and Selection Criteria.

<b>Final grade of the Bologna 1st cycle or the bachelor degree</b>	<b>Grading</b>		
In the top 5% – included in the 5% best students of the corresponding Bologna 1 <sup>st</sup> cycle or the bachelor degree	5		
In the top 10% –included in the 10% best students of the corresponding Bologna 1 <sup>st</sup> cycle or the bachelor degree	4		
In the top 20% –included in the 20% best students of the corresponding Bologna 1 <sup>st</sup> cycle or the bachelor degree	3		

<b>Other Criteria</b>	<b>Excellent +2</b>	<b>Good +1</b>	<b>Average +0.5</b>
Quality of the application file: - CV with scientific and/or professional experiences - Motivation letter - Recommendation letters English level Interview			

All partners undertake to avoid discriminations based on age, sex, political or religious criteria. The consortium promotes the participation of women and of socially disadvantaged students (via the pre-selection process). All partner universities have adopted accessibility measures for disabled students with special needs.

The selection procedures are centred upon academic excellence, which is one of the most important selection criteria. It is the responsibility of the Admission and Examination Committee to identify students suffering from socio-economic handicaps even though no specific criteria are listed. The committee will place them in priority on their lists, provided they meet the expected level of academic excellence. If selected, they will have priority to available student housing on campus. Special attention will be given to their socio-cultural integration, both in the home and host universities.

In order to ensure balanced gender participation, in the event of equality of the academic and professional application, the Admission and Examination Committee will give the priority to these candidates for equity purpose.

A.2.4 Describe the **joint examination methods and mechanisms** in place between the consortium partners to assess the students' achievements.

The European Credit Transfer and Accumulation System (ECTS) will be applied for the Master EM3E. The used grading scale will be the ECTS grading system defined in the ECTS framework by the European Commission (Table 4).

The Master EM3E is programmed over a 2-year period (4 semesters) with courses of 30 ECTS credits per semester, carrying therefore 120 ECTS credits at Master level, representative of students learning outcomes (see details in Appendix 3). The Master degree will be given to a student who has individually validated each of the four semesters (S1, S2, S3 and S4).

A semester validation will require an average grade superior or equal to E without any grade F for one of the semester's courses. The average grade for one semester will be calculated from the individual course grades weighted by the number of attributed ECTS.

An individual course validation will require a grade superior or equal to E. This grade will result from the combination of the continuous assessment along the related semester (if a continuous assessment is performed for this course) and of the mark obtained during the final examination. For the failing students (grade FX or F), a second examination session will be organised at least 6 weeks after the first examination session. The mark obtained for the second examination session will replace that from the first session (and the possible contribution of continuous assessment). The examination calendar is described in Appendix 8.

Concerning the fourth semester (S4 – Master thesis), the grade will be attributed from the assessments of the written report ( $\frac{1}{3}$  of the final mark), of the oral defence ( $\frac{1}{3}$  of the final mark) and of the general behaviour of the student during his internship period ( $\frac{1}{3}$  of the final mark, provided by his supervisor). The oral defence in English will be done in front of a defence committee including at least one person from each university partner of the Master EM3E and the supervisor (using teleconferencing).

**Table 4:** Used grading scale and national grade equivalents.

GRADE	Best	National grade equivalents				
		France	Czech republic	Portugal	Spain	The Netherlands
A	10 %	20 - > 18	A	20 - > 18	10-9	10 - > 9
B	25 %	18 - > 16	B	18 - > 16	9-8	9 - > 10
C	30 %	16 - > 14	C	16 - > 14	8-7	8 - > 9
D	25 %	14 - > 12	D	14 - > 12	7-6	7 - > 6
E	10 %	12 - > 10	E	12 - > 10	6-5	6 - > 5.5
FX	Fail - some more work required before the credit can be awarded	10 - > 8	FX	10 - > 8	Fail	5.5 - > 5
F	Fail - considerable further work is required	< 8	F	< 8	Fail	<5

The overall classification of the qualification or final grading scale of the students will be done at the end of the two years by the Admission and Examination Committee (see later in section A.3.1) from the average grade obtained for the four semesters. The students will obtain their Master degree with a distinction defined in Table 5.

**Table 5:** Final grading scale of the Master EM3E students.

Average grade	A	B	C	D	E
Distinction	Excellent	Very good	Good	Quite good	Pass

The Diploma Supplement will be delivered to students by University of Montpellier. The Diploma Supplement, jointly written by the partners in the consortium, gives details about the student and their skills acquired during his formation (see Appendix 7). It will be signed by the Head of the Executive Board (see later in section A.3.1) and delivered in September of the second year.

A.2.5 Explain how the **students' participation costs** to the EMMC have been calculated and agreed upon by the consortium.

The registration fees, including tuition fees and others participation costs, will be 8,000 €/year for non-EU students and 4,000 €/year for EU students. They were calculated considering: 1) the average value of the registration fees of Master programmes in the EM3E Universities, 2) the maximum contribution to the Master course participation cost awarded by individual Erasmus Mundus scholarships, 3) the importance of the attractiveness of European student to guarantee a cultural enrichment. The tuition fees are similar for all the students (2,000 €/year). The difference between the costs for non-EU and EU students is due to extra costs for the non-EU students for special support as e.g. visa deliverance, lectures about European culture and European HEI's organisation and administrative taxes. The other participation costs cover insurance costs, attendance at the integration week and cultural lectures and visits, library, phone and fax access, fieldwork costs, and costs related with the student support. Students will pay the registration fees in



one only place (Montpellier 2 University) and at the beginning of each year (semester S1 and semester S3).

The distribution of the fees among the partner universities will be realised as follows (see also Appendix 9):

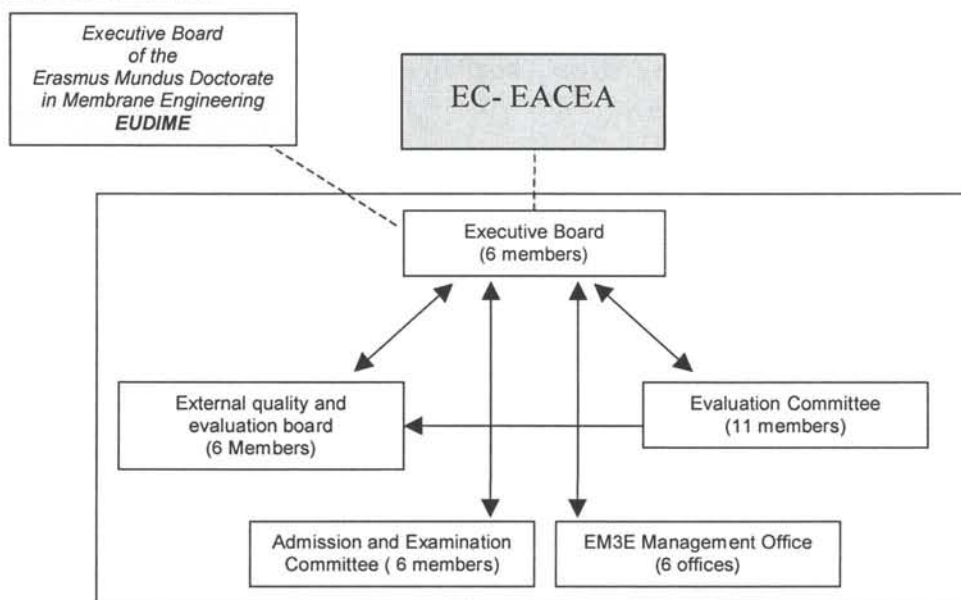
- The tuition fees will be allocated proportionally to the number of students registered at each university for each semester.
- The other participation costs will be equally distributed to each university. The fees will be used by each university to finance a part of the functional and specific expenses for the EM3E Master (see later in section A.3.3).

### A.3 Course management, visibility and sustainability measures (20 % of the max. score)

#### A.3.1 Describe the organisation of **the cooperation mechanisms within the consortium.**

The project management will be ensured by the following co-operation bodies, established within the partners, and formalised by an EM3E consortium agreement.

In order to ensure the academic co-operation an Executive Board and three committees will be established (Figure 2). The calendar of these committees meetings is detailed in Appendix 8. An EM3E consortium agreement signed by all consortium partners will be clearly established laying down the Master course academic, administrative and financial rules (see Appendix 10). All the minutes of the board and committees meetings will be published on the EM3E website. In the forum page in the website of the Master EM3E, a space will be dedicated to exchanging ideas, remarks and suggestions about the boards/committees decisions.



**Figure 2:** EM3E Management structure.

**Executive Board** has a highest advisory, strategic and decisional role. It is composed by the local co-ordinator of each involved institutions (one representative per university – 6 members). The head of the Executive Board is elected by its members for a period of 2 years. It gathers 4 times a year by teleconference or in one of the partner universities. The Programme Co-ordinator, member of the executive board, will insure the interface with the Executive Agency (EC-EACEA) and with the Executive Board of the Erasmus Mundus Doctorate in Membrane Engineering (EUDIME).

**Admission and Examination Committee** is responsible for Admission and Examination procedures and to advise Executive Board and teachers. It is composed of 1 staff member per Partner University. The head of the Committee is elected by its members for a period of 2 years. It gathers 4 times a year by teleconference or in one of the partner universities.

**Evaluation Committee** is co-ordinating evaluation activities and curriculum modifications and is in charge of advising the *Executive Board* and the *External quality and Evaluation Board*. It is composed of 1 staff member per Partner University and associated university and 2 students' representatives (1 first-year students and 1 second-year students). The head of the Committee is elected by its members for a period of 2 years. It gathers twice a year by teleconference or in one of the partner universities. Within the Programme Committee, each partner institution has a specific role:

- UM2 as co-ordinating institution: organisational arrangements and co-operation mechanism within the consortium.
- UPS: implementation and management of the e-learning platform.
- ICTP: relationships with industries and co-operation programme of Master.

- FCT-UNL: exploring and monitoring of extra-funding for assuring the sustainability of the Master
- UNIZAR: information and promotion of the Master.
- UTwente: monitoring of the quality aspects.
- UNICAL: assuring link with "Erasmus Mundus Doctorate in Membrane Engineering – EUDIME" and Bachelor programmes.
- K.U.Leuven: monitoring evolution of the curriculum.
- FSTM: relationship and evolution with African Third-Countries.

**External Quality and Evaluation Board:** this board is in charge of the external evaluation of the programme and to control the quality of the Master EM3E. It analyses the evaluations on the educational programme, courses and semester evaluation (panel discussion). Every year, it has to submit a report based on information obtained from the evaluation committee, academic staff, students, and the EM3E management office and team. It provides its feedback to the Executive Board in order to improve administrative, pedagogical and scientific quality of the Master EM3E and to define strategic developments in terms of future research trends and employment opportunities in Europe.

It is constituted by 6 representatives nominated by the executive board for 2 years: 2 industrialists, 2 external academics working in the field of Membrane Science and Engineering and 2 expert's representative of one of the 3 following organisations: North America Membrane Society (NAMS), Membrane Society of Japan (MSJ), and European Membrane Society (EMS). An equilibrated number of representatives from Europe, North America and Asia will be respected.

The head of the Committee is elected by its members for a period of 2 years. It gathers one a year by teleconference or in one of the partner universities.

**EM3E Management Office:** it's composed by 6 offices, one in each partner universities, co-ordinated by the management office in Montpellier 2 University. Each management office facilitates the implementation of the Master. It is the link between the administrative organisation of the university (international relations office, registration office, accounting service..), the students life and the Master programme (students, teachers, committees).

In each Management office, there will be a "student life co-ordinator" from the administrative staff who will be the contact person for the student services and will work in close relation with the EM3E university co-ordinator, and with the Co-ordinating management office.

The co-ordinating management office, located at Montpellier 2 University, will give assistance to the partners and will help students during their application procedure, before their arrival (visas and residence permit obtaining, planning the trip, accommodation) and during their stay (insurance, bank account opening). It is responsible for the administrative and financial management of the Master programme, the preparation of the summer school, preparation of committees, and the monitoring of the web-site.

In order to achieve an efficient communication channel between partners, a collaborative platform is being developed on the EM3E web site. It will enable to achieve an effective project monitoring and document management accessible to all the partner organisations. All the EM3E partners are already accommodate to the collaborative tools after the successfully experience of the tool used in the frame of the NanoMemPro Network.

With the active contribution of partners and associated organisations through the NanoMemPro Network, the Master EM3E starts as a real community. The step of learn through mutual exchanges and to establish sound basis of communication is almost achieved.

A.3.2 Provide information on the **partner institutions' contribution** to the EMMC and describe the way the EMMC will be managed from a **financial** point of view.

**Human resources:**

From all the 6 partners involved in the EM3E project, a high level and quality of resources are provided to the project. The EM3E project gathered among the most important European researchers on Membranes field. As already specified in Table 1 (see also Appendix 5 for a more detailed version of Table 1 and for the related Europass CVs), numerous of EM3E key staff involved in each partners are pre-eminent European researchers and professors in the field of membranes engineering. Administrative staff is also provided by the partner universities (except the co-ordinating office, which will be financed through the EM3E programme). In Table 6 , are reported the names of other teaching persons who will be directly involved in Master EM3E.

**Table 6 :** Additional list of teaching persons involved in Master EM3E.

<b>UM2</b>	Prof. Vasile Hulea, 4 assistant professors : Dr Damien Quemener, Dr Sophie Cerneaux, and Dr Florence Rouessac, 1 Head Research Scientist : Dr Anne Julbe.
<b>UPS</b>	Prof. Christel Causserand, 3 assistant professors : Dr Sylvain Galier, Dr J.C. Remigy, Dr J.F. Lahitte, Dr H�el�ene Roux and Dr Martine Meireles,
<b>ICTP</b>	Prof. Bohumil Bernauer Dr. Martin Paidar, Dr. Juraj Kosek, Dr. Dalimil �nita, Dr. Josef Kr�yza, Dr. Roman Kod�ym and Dr. Miloslav Lhotka.
<b>UNIZAR</b>	Prof Jesus Santamar�a (subdirector of INA), Prof Miguel Men�endez, Dr Joaqu�n Coronas and Dr Pilar Pina.
<b>UTwente</b>	Dr. Ir. A.G.J. van der Ham, Dr. Ir. R.G.H. Lammertink, Dr. Ir. A.J.B. Kemperman, Dr. Ir. D.C. Nijmeijer, Dr. A.J.A. Winnubst and Dr. Ir. N.E. Benes.

**Technical resources:**

The partners have the technical capacity to ensure a successful implementation of the EM3E project. Particularly, each partner provides advanced equipment in membranes engineering and research facilities to allow the best training for all the EM3E students and scholars, and to reach the objectives of EM3E project.

**Financial resources:**

The financial support provide to students is organised between the different partners and managed by the co-ordinator institution (UM2). However, each of the 6 partners involved in the project will accept financial responsibility for extra miscellaneous fees in order to ensure an equal treatment of all student in each institution (see later section A.3.4).

**Other support:** The universities will provide office space for the co-ordinating office, for courses and research activities. The EM3E programme and students can use research facilities (such as field stations and laboratories). The general university facilities are all available for the students, such as libraries, infrastructures and sport facilities.

The distribution of the students' contribution to the participation costs among the partner universities has been already explained in section A.2.5. and detailed in Appendix 9 :

- The tuition fees will be allocated proportionally to the number of students registered at each university for each semester.
- The other participation costs will be equally distributed to each university. The fees will be used by each university to finance a part of the functional and specific expenses for the EM3E Master.

From the consortium lump sum (30,000 €/edition), Montpellier 2 University as the co-ordinating institution will receive a higher financial contribution (6,000 €/edition). The remaining amount (24,000 €/edition) will be equally divided among the partner universities (4,000 €/edition and university). The remaining expenses not covered by the fees will be covered by each university and with local support.

The EM3E consortium already takes its commitment for providing co-funding in order to ensure an equal quality of the programme between the partners in administrative, pedagogical and technical fields, and an equal treatment of all selected students.

**EM3E Course implementation funding:**

The organisational aspects of the EM3E programme are sustainable and do not depend only on the Erasmus Mundus contribution: they are mostly provided by the partner universities. However, the co-ordinating office, which has the most important expenses, will be financing through EU management contribution, and also by others additional institutional funding sources (National or Regional). Moreover, industries have to finance curriculum of High Education Institution. For instance, in France, it exists two different funding mechanisms: the "Taxe d'apprentissage – Training Tax" (mandatory Tax) or the "Cr dit d'imp t recherche- Research and Development Tax Credit" (possibility to finance technological monitoring expenditures up to 60 000  per year per program). The different contacted companies agree with these two mechanisms (see for instance in Appendix 2, the letter of support from CTI SA ). The co-ordinator expect to recover necessary funds through these 2 mechanisms, particularly through the "Taxe d'apprentissage" (date of yearly application: each January), extra funds will be carried over each n+1 year.

**Additional Students scholarships:**

The Number of EU scholarships will decrease during the five editions of EM3E Master Course (see Appendix 11). The partnership have to find at least for the first year of the programme 13 additional grants for students, up to 60 per year at the end of the 5 editions.

The partners, through institutional funds and co-operation with associated organisations, will secure the necessary additional scholarships.

Each of the 6 partners guarantees at least 4 scholarships per year, by public and private funding source:

- From private organisations: Industrial companies (but also research centres and associations) who have declared their strongly support to the Master (see Letters of support in Appendix 2) will be invited to offer

scholarships to students not EU granted for the full time programme or for their training period (semester 4). As example, in Czech Republic MEGA and MemBrain (private companies) agree to finance at least 2 student grants per year.

- From the EM3E consortium: Master EM3E will offer also scholarships to European and third-country students entering the full time programme. The number of this EM3E grants will be fixed annually by the Executive Board with initially 2 grants (1 EU and 1 non-EU). These EM3E fellowships will cover half of the tuition fee. Applicants for these Consortium fellowships should make use of the usual application procedure of the programme.

- From other public funding source: National or local authorities allocate mobility grants for foreign students and for national students to study abroad. In France, Regional Council of Languedoc-Roussillon and Regional Council of Midi-Pyrénées will allocate 2 grants per year to students (all nationalities available – 400 €/month). The European students will receive the Erasmus mobility grant, through the bilateral agreements existing between partner universities.

Moreover, the partners will assist the non-European Students to find funding source possibilities. They can candidate to scholarships:

- from their own HEI,

- from their home country: some countries allow scholarships to study abroad. Information is available at the Ministry of Education or Foreign Minister of the country of origin, embassies or with the organism in charge of scholarships,

- from international organisations or Networks: allocation of scholarships of excellence. (e.g.: AUF, Egide (Eiffel grant), UNESCO, Fords Foundation, Gates Foundation, Nature, ESF),

- from local authorities of the hosting country.

A.3.3 Describe the consortium **development and sustainability plan** designed to ensure the proper implementation and continuity of the EMMC beyond the period of Community funding.

**General Strategy and impact expected:**

EM3E Master Course has been created by the partner organisations to develop their existing Master courses, through co-operation and joint curriculum development with HEIs in other European countries offering the same subject discipline, in the aim to propose the highest quality courses in membrane engineering.

Through the EM3E programme, the consortium expects to contribute to the **promotion of academic excellence**, in line with the aims of the “Bologna process” of strengthening the European dimension in education and promoting increased mobility, in particular by encouraging European HEIs to foster co-operation and joint working with other HEIs regarded as “world-class” in the field of membrane science and chemical engineering. The consortium expects that the reputation of the Master will increase very fast and will contribute to the promotion of the European high education system in the word. Achieving an important number of self-financing students will indicate us that the Master courses become better established and increasingly prestigious; this will help funds go further and serve as a testament to the quality and reputation of Master Courses.

It could be projected to open a fourth track in Semester S3, specifically devoted to water applications (currently S3 “Energy & Environment”). Such a new track could be for instance developed by a Third countries university with relevant expertise.

At the end of the programme, we will candidate to a new call for proposals in EMMC. In the same time, we will find different funding through industrial companies, clubs of enterprise and our associated partners, as the European Membrane House, to contribute to the sustainability of our Master.

The sustainability of the Master will be also improved by extending the programme to the PhD level (a Joint Doctorate Programme in Membrane Engineering is submitted in this same 2010 call: EUDIME). This would enable HEIs to attract and retain the brightest EM3E students beyond the confines of the current maximum 2 year duration of the Masters Courses.

**Sustainability Strategy plan:**

To guarantee the sustainable implementation of EM3E project, we have planed to develop strategies in:

- Implementation of an integrated curriculum and a join diploma degree, to raise the academic excellence and to increase the international visibility of the partner universities. Sharing of experience and good practices between partners on these issues will have a long-term structuring impact.

- Ensuring sustainable leadership succession and process to avoid staff loss or unavailability will prevent the reduction in the academic offering for the students. To ensure that sustainability, the universities involved will implement actions: Development of joint research teams, development of an accreditation process to maintain the quality of each EM3E members, participation of staff in different activities in the partner universities, maintain a strong institutional anchorage, maintain a critical mass in the interdisciplinary teams, develop a quality chart (updated by the Evaluation & quality committees).

- Implementing a process for leave the consortium, which guarantee the research of new excellence partners and their good integration (to be specified in the consortium agreement),

- Implementing a strategy to attract new quality partners and associated partners: leaflet and presentations will be created and disseminated to stimulate applications for membership. This strategy would be benefit for the notoriety of the programme and for the students' future academic opportunities and employability.
- Research of additional funding sources (already detailed in section A.3.2).
- Developing a co-operation strategy to reinforce the partnership and enhance new extended activities through the EM3E programme (e.g., international seminars, workshops).

#### **Financial Sustainable plan:**

The consortium is conscious that the implementation of financial sustainable plan is necessary to anticipate the decreased funding from EC during the EM3E Master Course. Different options have been explored, like: national mechanisms for funding high education & research activities and management costs, private capital from industry or funding from public organisations (already detailed in section A.3.2).

A.3.4 Describe the **course promotion measures** taken by the consortium to increase the course's (and the EM programme's) visibility and attractiveness.

In order to manage the visibility of the Master EM3E the consortium will establish two strategies: a communication strategy based on networking, and general information mainly spread by communication tools and a specific website.

#### **To spread the general information:**

*By the internet network:*

As specified a website will be specially created for the Master: <http://www.em3e.eu>. Its offers information about Master's courses, detailed explanations and links to others sources of information such as the EU Commission, HEI, European Membrane House, European Membrane Society, etc. This website will also offer an online application/registration service that will benefit students concerning all the formalities and that will give detailed explanations on procedures to be followed for example. The website will be updated periodically to offer reliable information to students.

Furthermore, the website visibility will be relay on the partners' University website, and more specifically in the International Relations section and study offers section of their website to enhance the international dimension of the Erasmus Mundus master's courses.

A link to the EM3E website will be added on the website of the associated partners such as student association (Student associations within the different Universities, Erasmus Mundus Alumni EMA), associated partner universities, companies and industries.

*By the e-learning platform of EM3E programme, which will be discussed in part A.4.*

*By the distribution of a communication tools, as posters, guide and leaflet: (see Appendix 12)*

A student guide and a leaflet will be print to promote the EM3E. It contains the basic information about the course; i.e. field of study and objectives, universities/partners involved, general structure of the courses and main contents. Information about recruitment, tuition fees and scholarships it will be also available in the leaflet.

They will be available:

- in information and career advisers' centres and offices present in the partners university,
- in the main student information centres in towns,
- in the European and international education Fairs,
- in the partner laboratories in membrane engineering area through the associated network as European membranes House and the European Membrane Society networks.

The aim is to focus the information on student interested by membranes engineering but also to inform widely the European and international student community.

#### **Communication strategy:**

- Mails mailing list will be constitute to create a continuous link between all the partners of EM3E.
- Newsletter will be monthly sent to partners and people registered on the website (and also inserted in the EMS newsletter). It will spread the EM3E achievement and inform about the EM3E events such as: kick off meeting, consortium meetings, Integrate school, graduation, cultural events, etc.
- Press release will be done for all the main events regulating the Master's execution, (Kick off meeting, Summer School for student integration, calls for applicants, graduation, etc.) and relay through local and national media & press agencies from each partner's country and specialist publication on membrane engineering.
- The EM3E recent events will be relay on the News section of the partner institution's website or on the international news section so that they will be the most accessible.
- Information about calls for application will be sent to partners by the means of:
  - institutional networks and Partners (through Universities' International Relations Office),
  - scientific networks (European Membranes House and the European Membrane Society) and international scientific conferences,
  - student networks (student associations, ERASMUS MUNDUS ALUMNI network),

- partners' embassies networks.

This wide communication aims to show the transparency of EM3E activities. Furthermore Annual activity reports will be available on-line on the web site and Report of consortiums' meeting will be also available for consultation.

#### **A.4 Students' services and facilities (15% of the max. score)**

A.4.1 Describe the nature of the **information (/support) provided to students** prior to their enrolment and the way this information will be delivered.

The information about the EM3E programme and Consortium will be largely provided to the potential students by means of various ways (see section A.3.4). The main of them will be the website of master EM3E giving access to all the details about the master program, the application conditions (on-line), a e-learning platform (see later in section A.4.6) and agenda but also about the expertise of the master consortium partners in term of education and research. In addition, an updated EM3E student guide and communication tools like leaflet will be yearly sent to partners (universities, international networks, embassies...) of the EM3E consortium master (see Appendix 12) for information and dissemination. The leaflet will contain information about the web site address and about the annual key-dates for selection and for the online application. Advertising will be also made during scientific and education events, fairs, membrane conferences, by means of dedicated pages in regular membrane journals and of the national education or student journals.

A.4.2 Describe the content (and, if available, provide a model) of the **Student Agreement** defining the rights and obligations of the two signing parties.

A student agreement has been already established (see Appendix 13). In order to guarantee the adequate transparency of the EM3E Master participation rules, during the registration process, it will be signed by the Consortium and student enrolled in the Master. This agreement defines clearly the mutual rights, obligations and responsibilities of both parties. It is indicated the academic, financial and administrative modalities related to the student's participation in the EM3E programme and the award and usage of the scholarship.

A.4.3 Present the **services** that will be provided by the partner institutions to **host students / scholars**.

The organisation of the services offered to the students and scholars will be coordinated by the EM3E Management office at the Montpellier 2 University and locally managed by the corresponding office in each partner university (see section A.3.1).

The welcoming and the service offer to students of the foreign students is a crucial point for the success of the learning in the Master programme. The International Offices of each partner universities will give a specific support to this Master programme. Students will find qualified people (speaking various languages) ready to help foreign students.

As soon as students will apply to the Master, the EM3E Erasmus Mundus Student Guide published by the EM3E Management office will be given to students. Students will then be aware of the necessary steps to take in order to enrol. After their acceptance in the Master, the students will get in contact with the international services of the University of Montpellier that will answer their questions on visas delivery, insurance, grants and tuition fees for housing facilities and for specific assistance (students with a family or with special needs).

For non-EU students, once he/she is admitted to the Master Programme, he/she should start the procedures to obtain a long-stay student visa with a residence permit to seek in his/her home country in the embassy/consulate of France (first semester country). Documents confirming his/her admission for two years to the Master Programme and confirmation of scholarship will be provided by the Master co-ordinator to the student. At the beginning of each semester, the procedures for obtaining the next visa will be started. The international office of UM2 and the Master Programme Management office will advise and support the student on how to obtain the visas and facilitate the procedure.

A personalised welcome will be offered for students arriving (pick up at the airport).

During the registration week, a welcome ceremony will be organised and during the week practical information will be given to students in order to:

- make the administrative steps (inscription, insurance and if necessary constitution of residence permit),
- prepare the organisation of next semesters,
- learn in the best conditions during the Master (by introducing the language policy in place and the possibility of networking, of social and informal learning, and of formal learning offered by the e-learning platform),
- have cultural activities aiming at their social integration.

During the Master, the student will have news on general practical information via the web site or for specific internal communication via the e-learning platform. Each university has its own organisation for international services. Within the consortium, a high level of organisation between these services will be required.

**The student life coordinator**, who is the contact person in the Management Office for the students' services in each university, will be in charge to:

- solve the problem encountered by students during their stay,
- help student to find accommodations (by reserving student room in student residencies or student hotels and by giving a list of possible accommodation in the private sector or in families),
- develop specific artistic, cultural and sporting activities for the Master student,
- facilitate the integration of the students in existing cultural offices and students associations and give information on the university, the city and the region,
- participate to discussion with other partners to ensure an equilibrated and consistent service in each university (discussion has already started to write a common "plea text" on this point).

Students will have a mentor where he/she will study in each institution of the consortium. These universities mentors will belong to the teaching staff of the university and will supervise the work of students through a teaching follow-up. Each student and his/her mentor will meet at least once a month.

More specifically, a description of student services offered by each university is presented in Appendix 14. More details are provided in the web site (menu student life /in each university). All services listed are available for candidates with a family or with special needs. Associations of Students present in all the Universities of the Consortium aim to facilitate a greater integration of its members in the university community, and to favour the development of cultural, sport, artistic and recreational activities. The Consortium is conceived as an international environment, which presents its staff and students with the challenge of being fluent in more than one language. All Universities involved, through their language centres, offers English/National Language courses taught by professional language trainers, and facilities for language study. The Student Counselling Services, present in all Universities of the Consortium, provide support and information to Master students on regulations and financial aspects related to the university life.

**A.4.4 Explain the nature and coverage of the **insurance scheme** to be put in place to cover the EM students against health issues and accidents.**

The co-ordinating university, i.e. Montpellier 2 University, will guarantee students health insurance scheme covering travel, accident and sickness risks during the student's stay in Europe (2 years). These insurance costs (500 €/year) are included in the participation costs and will be paid by UM2. The health insurance scheme could be adjusted to individual profiles (family cover), with different variants giving different service options.

Students after registration at the Montpellier 2 university will be registered with the French student social security and with a student mutual insurance French company for a supplementary medical insurance policy "all-inclusive healthcare" to optimally cover all eventual healthcare needs (see Appendix 15). The student will receive a European Health Insurance Card (EHIC). With this card and the student mutual, the student will benefit from the social security in all EU countries. Following the national rules, the French insurance company will be selected after a call for tender.

**A.4.5 Describe the consortium **language policy**.**

The official language of the EM3E programme is English. It will be the language for the training programme, the instruction, the discussion and examination. A course will be offered to complete a good knowledge of English during the first semester and the second semester.

In each university, a course of English Language and of the hosting country language, culture and civilisation will be offered and organised. The idea won't be necessary to acquire a high level of knowledge in the language of each country visited but to be able to live in the given country by knowing basic words as well as to discover its culture and civilisation.

During the three first semesters (S1- S2 and S3), courses on the national language and culture will be thus offered. Moreover, during the total period (S1-S2-S3), each student will have to be registered at least one time at one of these courses and also to make an oral presentation of his individual project in the corresponding national language.

A Level Certification will attest of the ability of students to understand and use languages they have chosen in their curriculum and in their specific work area. Certification will follow the basic ideas and spirit set-up in the UNlcert framework. (For more details see at: <http://rcswww.urz.tu-dresden.de/~unicert/e/unicert.htm>)"

A.4.6 Indicate the measures taken to facilitate **networking** among the Erasmus Mundus students and between these students and other students from the partner institutions.

The EM3E Programme will encourage networking in professional and social fields. During the integration week, the students will meet all the key staff of their Master programme: teachers, mentors, and researchers, with representatives of the six participating universities, including invited industrialists and scientists. In each partner university, students will have the opportunity to meet many people through socio-cultural activities, the mentoring programme and the internship in research laboratories. The students will also be encouraged to actively contribute to the EM3E Master programme, by creating an EM alumni association, organising social events and writing for the forum EM3E website or the newsletter. Specific activities will be planned to encourage networking with professionals outside the academic field. Such activities are excursions to organisations or companies, invited speakers from organizations or companies. Language courses and possible participation to other alumni associations, or for example sport activities, will help the networking between students of the partner universities.

A **platform for e-learning** (see Appendix 16) is currently developed by the partners of the Erasmus Mundus project. The trial version in which the resources will be implemented is located on <http://www.em3e.eu> (actual reviewer's access: username *reviewer* and password *revem3e*). The core of the platform "**The Erasmus Mundus area**" will be dedicated to students and teachers of the Erasmus Mundus Master and PhD program in Membrane Engineering. This area has several aims:

- to give to Erasmus Mundus students access to a computer-based teaching or training,
- to promote the exchange between teachers and students in the formation (a part of these exchange should lead to develop a group spirit in the Master),
- to manage learning and collaborative activities,
- to manage evaluation and self-assessment.

The platform and also teleconference facilities will be available to offer the possibility of performing collaborative activities between students and tutors (for example during the project activities). They will also be an important tool to keep the contact between the students and the teachers during the second year (i.e. during courses in semester S3 and during the Master thesis). The platform space will be linked to the website of the **Erasmus Mundus Alumni Association**.

The different resources developed for the Master course will be also used in the context of long-life learning. To do that, the platform is also developing a "**Life-Long learning area**". An access will be given to all the members of the associated partners European Membrane House (EMH) and European Membrane Society (EMS) willing to be formed to membrane engineering and to improve their practical and theoretical level in the domain. This area integrates different learning resources that are organised in theoretical and practical courses of training with a beginner, an advanced of an expert level.

As an entrance of these previous spaces, a "**Networking area**" dedicated to Social and Informal Learning space will be open to the Erasmus Mundus (Master and PhD program) teachers and students, to the EMH and EMS members, and to other European students working in membrane engineering (the database of the universities working in this area will be used as a first reference). The objectives of the area will be:

- to develop social and informal learning in the "membrane engineering" community,
- to promote exchanges between student/industrialist/researcher.

To achieve these objectives, this area will present learning materials in an informal way (compared to the formal activities in the "Life-long learning area" and in the "Erasmus Mundus area"). The learning materials will be some easy learning courses and activities, video of conferences (plenary session, general conferences), video of summer school and of thesis. The EMS which is the main organiser of conferences in membrane area in Europe is ready to participate to the project and to the realisation of these videos (see EMS letter of support in Appendix 2). A **Forum** will be dedicated to favour the exchanges and the networking between the students and the industrialist members of the EMH and the EMS (it will be an important help for students to find data for their industrial based project and also to find position at the end of their Master or thesis).

In parallel to these areas, a restricted access to members a "**Public area**" will be open for visitors and citizens. This space will present some generalities and some attractive and accessible multimedia resources. The objectives of this area are:

- to attract external people toward the Master and the PhD program but also to the EMH and EMS (allowed to access the restricted area),
- to improve citizen awareness on the membrane and their applications in the industry in Europe (the technique guide edited at the end of the NanoMemPro Network will be one of the resources).

Numerous European universities have given their intention to use this platform and to participate to its evolution by integrating learning resources (see letters of support in Appendix 2). The European Membrane Society (EMS) which is in charge in Europe of the development of the knowledge in membrane area wants also to actively participate to the platform. The European Membrane House (EMH) wishes also to be a user



of this platform to disseminate some of their activities in the transfer of technology. About financial aspects, the cost for the first development of the platform has been supported by the NanoMemPro Network. The operating costs (hosting and maintenance) when the platform will be running are estimated to be 1,500 €/year, cost that will be jointly supported by the EMS, the EMH and the Erasmus Mundus Master and PhD programs.

## **A.5 Quality assurance and evaluation (10 % of the max. score)**

A.5.1 Describe the **internal evaluation** strategy and mechanisms in place.

Quality control will be carried out both internally and externally in order to improve semester after semester the Master Course. The Internal evaluation will be performed by establishing a Quality Chart with objectives and achievements in terms of Course quality and evaluation, Teaching quality and evaluation, Management quality and evaluation. The Internal Evaluation process will provide twice a year to the External Quality and Evaluation Board the required information for the EM3E evaluation.

According to the EM3E management structure described in the section A.3.1 (Figure 2), the internal evaluation of the Master will be done by the Evaluation Committee. This committee will be in charge of preparing the assessment of the teaching units. A questionnaire addressing the evaluation of the courses (lectures, case studies...) will be established on the basis of already existing documents in each country. It must be mentioned that the members in this committee include 2 students' representatives in sort that they will participate actively to the preparation of the questionnaire. All universities will share the same questionnaire to assess the EM3E teachings.

Before to give the questionnaire to the students, a staff member from the Evaluation committee will explain in oral the importance of this questionnaire for the Master improvement and also will give briefly some information about the tract followed by the questionnaire from the student to the External Quality and Evaluation Board.

The questionnaire will be filled anonymously by the students at the end of each semester. A free space will be offered to the student in the form to collect any comment not covered by the proposed questions.

Once filled, the documents will be collected by the head of the Evaluation committee and transferred both to the Executive board and to the External Quality and Evaluation board for evaluation.

Together with a questionnaire, it is proposed to offer an anonymous space into the private area of the EM3E website to collect any comment regarding the teaching quality. The posted comments will be collected, moderated and viewed only by the head of the Evaluation Committee, before to be transferred to the External Quality and Evaluation Board.

This regular self-evaluation will be done by students and teachers involved in delivering course as well as course co-ordinators. It will ensure that quality is continuously assessed during the 5 first years of operation of courses.

A.5.2 Describe the **external quality assurance** envisaged.

Additionally, the Master EM3E will be subjected to quality assessment with an external dimension in order to ensure that course quality is maintained throughout the 5 first years of operation of the courses. The External Quality and Evaluation Board is composed by external academics and industry managers working in the field of Membrane Science and Engineering (see section A3.1). This board will evaluate the results of questionnaires (intake and exit) filled in by the students for assessing what is expected from the Master program and the evaluation of the students at the end of the program. The questionnaires will take into account not only academic aspects, but also, infrastructure and organisational aspects of the Master. These documents will be available online for all persons involved in the Master (committee's members, teachers, students, EACEA). The Quality and Evaluation Committee will also evaluate the success of the Master program in terms of employment after graduation on a short term basis. During two meetings at the middle and the end of each academic year, the feedback from the External Quality and Evaluation Board will be given to the Executive Board.

The role of this External Committee is not only to evaluate the Courses, Teaching and Managing Quality of the EM3E but also to give its feedback on the EM3E to help its improvement through the years.

Quality control will be also implemented in each partner university, by the dedicated national evaluation organisation where the local master programme is accredited (e.g., AERES<sup>6</sup> in France).

<sup>6</sup> AERES : Agence d'Evaluation de la Recherche et de l'Enseignement Supérieur (« Evaluation Agency of Research and High Education» – High Education and Research Ministry of France.



# LEGAL ENTITIES

PRIVACY STATEMENT

[http://ec.europa.eu/budget/execution/legal\\_entities\\_fr.htm](http://ec.europa.eu/budget/execution/legal_entities_fr.htm)

## PUBLIC ENTITIES

<b>TYPE OF COMPANY</b>	University		
<b>NGO</b>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	(Non-Governmental Organisation)
<b>NAME(S)</b>	Université Montpellier 2 Sciences et Techniques		
<b>ABBREVIATION</b>	UM2		
<b>OFFICIAL ADDRESS</b>	Place Eugène Bataillon		
<b>POSTCODE</b>	34095	<b>P.O. BOX</b>	CEDEX 05
<b>TOWN/CITY</b>	Montpellier		
<b>COUNTRY</b>	FRANCE		
<b>VAT**</b>	FR01 193 410 883		
<b>PLACE OF REGISTRATION</b>	PARIS		
<b>DATE OF REGISTRATION</b>	29 D D	10 M M	1970 Y Y Y Y
<b>REGISTRATION No</b>			
<b>PHONE</b>	0033/4 67 14 30 15	<b>FAX</b>	0033/4 67 14 48 08
<b>E-MAIL</b>	presidence@univ-montp2.fr		

**THIS "LEGAL ENTITIES" FORM SHOULD BE COMPLETED, SIGNED AND RETURNED TOGETHER WITH:**  
\* A COPY OF THE RESOLUTION, LAW, DECREE OR DECISION ESTABLISHING THE ENTITY IN QUESTION;  
\* OR, FAILING THAT, ANY OTHER OFFICIAL DOCUMENT ATTESTING TO THE ESTABLISHMENT OF THE ENTITY BY THE NATIONAL AUTHORITIES  
\*\* IF THIS FIELD IS COMPLETED, PLEASE ATTACH AN OFFICIAL VAT DOCUMENT

DATE: 23/02/2010

NAME + FUNCTION OF AUTHORISED REPRESENTATIVE

Prof. Danièle HERIN  
President

SIGNATURE

STAMP



### Approbation des statuts de l'université de Montpellier-II.

Le ministre de l'éducation nationale,

Vu la loi n° 68-978 du 12 novembre 1968 d'orientation de l'enseignement supérieur, et notamment son article 41 ;

Vu le décret n° 70-263 du 14 mars 1970 fixant la composition des collèges électoraux et les modalités de recours contre les élections dans les conseils des établissements publics à caractère scientifique et culturel, et notamment ses articles 7, 8 et 10 ;

Vu le projet de statuts adopté par l'assemblée constitutive provisoire de l'université de Montpellier-II ;

Vu l'avis de la commission chargée de l'examen des statuts des universités,

Arrête :

Art. 1<sup>er</sup>. — Les élections au conseil de l'université de Montpellier-II se dérouleront conformément à la première formule et à la première option prévues aux articles 7 et 8 du décret susvisé du 14 mars 1970.

Art. 2. — Les statuts de l'université de Montpellier-II sont approuvés.

Art. 3. — Le recteur de l'académie de Montpellier est chargé de l'exécution du présent arrêté, qui sera publié au Journal officiel de la République française.

Fait à Paris, le 29 octobre 1970.

OLIVIER GUICHARD.

### Approbation des statuts de l'université de Metz.

Le ministre de l'éducation nationale,

Vu la loi n° 68-978 du 12 novembre 1968 d'orientation de l'enseignement supérieur, et notamment son article 41 ;

Vu le décret n° 70-263 du 14 mars 1970 fixant la composition des collèges électoraux et les modalités de recours contre les élec-

## MINISTÈRE DU DEVELOPPEMENT INDUSTRIEL ET SCIENTIFIQUE

Décret du 26 octobre 1970 prolongeant la validité du permis exclusif de recherches d'hydrocarbures dit « Permis de Schweighouse » détenu par la Société Eurafrep.

Le Premier ministre,

Sur le rapport du ministre du développement industriel et scientifique,

Vu la pétition en date du 2 février 1970, modifiée le 11 mars 1970, par laquelle la Société Eurafrep, dont le siège social est à Paris (8<sup>e</sup>), 75, avenue des Champs-Élysées, sollicite la prolongation, pour une durée de un an, de la validité du permis exclusif de recherches d'hydrocarbures liquides ou gazeux dit « Permis de Schweighouse » ;

Vu les plans, pouvoirs, engagements et autres pièces produits à l'appui de cette pétition ;

Vu les rapport et avis des ingénieurs des mines de l'arrondissement minéralogique de Metz en date des 12 et 17 juin 1970 ;

Vu l'avis du préfet du Haut-Rhin en date du 17 juillet 1970 ;

Vu l'avis du préfet du territoire de Belfort en date du 26 juin 1970 ;

Vu l'avis du conseil général des mines en date du 21 septembre 1970 ;

Vu le code minier ;

Vu le décret n° 55-1154 du 27 août 1955 modifié portant règlement d'administration publique sur les permis exclusifs de recherches d'hydrocarbures liquides ou gazeux ;

Vu le décret du 26 mai 1965 accordant un permis exclusif de recherches d'hydrocarbures liquides ou gazeux, dit « Permis de Schweighouse », à la Société de recherches et d'exploitation de pétrole (Eurafrep),

Décrète :

Art. 1<sup>er</sup>. — La validité du permis exclusif de recherches d'hydrocarbures liquides ou gazeux dit « Permis de Schweighouse », détenu par la Société Eurafrep, est prolongée jusqu'au 2 juin 1971 à l'intérieur d'un périmètre englobant une superficie de 200 kilomètres carrés environ, portant sur partie des départements du Haut-Rhin et



# FINANCIAL IDENTIFICATION

PRIVACY STATEMENT

[http://ec.europa.eu/budget/execution/ftiers\\_fr.htm](http://ec.europa.eu/budget/execution/ftiers_fr.htm)

## ACCOUNT NAME

ACCOUNT NAME(1)	Université Montpellier 2 Sciences et Techniques		
ADDRESS	Place Eugène Bataillon		
TOWN/CITY	Montpellier	POSTCODE	34095
COUNTRY	FRANCE		

CONTACT	Mme Danièle HERIN		
TELEPHONE	0033/4 67 14 30 15	FAX	0033/4 67 14 48 08
E - MAIL	presidence@univ-montp2.fr		

## BANK

BANK NAME	Direction Régionale des Finances Publiques de la Région Languedoc-Roussillon et du Département de l'Hérault		
BRANCH ADDRESS	Allée Henri 2 de Montmorency		
TOWN/CITY	Montpellier	POSTCODE	34954
COUNTRY	FRANCE		
ACCOUNT NUMBER	10071 34000 00001003385 33		
IBAN(2)	FR76 1007 1340 0000 0010 0338 533		

REMARKS: BIC : BDFEFRPPXXX

### BANK STAMP + SIGNATURE OF BANK REPRESENTATIVE

(Both Obligatory)(3)



### DATE + SIGNATURE ACCOUNT HOLDER :

(Obligatory)



(1) The name or title under which the account has been opened and not the name of the authorized agent

(2) If the IBAN Code (International Bank account number) is applied in the country where your bank is situated

(3) It is preferable to attach a copy of recent bank statement, in which event the stamp of the bank and the signature of the bank's representative are not required. The signature of the account-holder is obligatory in all cases.

# APPENDIX

## LIST OF APPENDIX

- Appendix 1 : Letters of intent and of support from Partner Institutions
- Appendix 2 : Letters from External Supporting Organisations
- Appendix 3 : Content and detailed description of the Courses
- Appendix 4 : Short description of Universities
- Appendix 5 : Presentation of staff involved in the EM3E project
- Appendix 6 : EM3E Degrees awarded and recognition documents
- Appendix 7 : EM3E Diploma Supplement
- Appendix 8 : Calendar of EM3E Master edition
- Appendix 9 : Budget description
- Appendix 10 : EM3E Consortium Agreement
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- Appendix 13 : EM3E Student Agreement
- Appendix 14 : Description of student services offered by each partner university
- Appendix 15 : Insurance coverage
- Appendix 16 : Structure and learning objectives of E-learning Platform

**Appendix 1: Letters of intent and of support from Partner Institutions**

- Full partners:

1. Université Montpellier 2 Sciences et Techniques
2. Université Paul Sabatier
3. Institute of Chemical Technology Prague
4. Faculdade de Ciências e Tecnologia – Universidade Nova de Lisboa
5. Universidad de Zaragoza
6. University of Twente

- Associated partners:

7. Katholieke Universiteit Leuven
8. Faculté des Sciences et Techniques – Université Hassan II Mohammedia
9. Università della Calabria

## LETTER OF INTENT

**Project title: Erasmus Mundus Master In Membrane Engineering**

**Our organisation:**

Université Montpellier 2 Sciences et Technique  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a coordinator to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:



A handwritten signature in blue ink, appearing to read 'D. Herin', is written over the seal.

Name: Prof. Daniele HERIN  
Position: President  
Place and Date :Montpellier, 03/03/2010



## LETTER OF SUPPORT

### Cabinet de la Présidence

---

Tél. +33(0) 467 143 015  
Fax +33(0) 467 144 808  
presidence@univ-montp2.fr  
www.univ-montp2.fr

---

Place Eugène Bataillon  
34095 Montpellier cedex 5  
France

---

Affaire suivie par :  
Sandrine CANADAS

Tél. : + 33 (0) 4 67 14 39 11  
Fax.: + 33 (0) 4 67 14 93 25  
Mel :  
sandrine.canadas@univ-  
montp2.fr

N.Réf : JMP/SC n°

I, the undersigned, confirm that the Montpellier 2 University Sciences and Technology states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering, by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme and the attribution of the corresponding degree to the students that complete these studies with success.

The international relation office will provide all necessary assistance to welcome and accommodate the Masters' Students using all means available, including the reservation in student residence.

Danièle HERIN



## LETTER OF INTENT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering / EM3E*

### **Our organisation:**


Full Name: Université Paul Sabatier  
Address: 118 Route de Narbonne  
Postcode: 31062  
Town/city: Toulouse Cedex 9  
Country: France  
Tel.: +33 (0)5 61 55 66 11  
Fax: +33 (0)5 61 55 64 70  
President/Rector: Professeur Gilles FOURTANIER  
Contact person's name: Pr. Patrice BACCHIN

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:



Name: Professeur Gilles FOURTANIER

Position: Président

Place and Date:

*Toulouse 25.01.2010*

## LETTER OF SUPPORT

I, the undersigned, confirm that the Paul Sabatier University states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering, by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme and the attribution of the corresponding degree to the students that complete these studies with success. The international relation office will provide all necessary assistance to welcome and accommodate the Masters' Students using all means available, including the reservation in student residence.

Toulouse, le 25.01.2010



Le Président,  
Professeur Gilles FOURTANIER



Signature



## LETTER OF INTENT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: Erasmus Mundus Master In Membrane Engineering / EM3E

### Our organisation:

Full Name: Institute of Chemical Technology, Prague  
Address: Technická 5  
Postcode: 166 28  
Town/city: Prague 6  
Country: Czech Republic  
Tel.: +420 220 443 3896  
Fax: +420 224 311 082  
President/Rector: Assoc. Prof. Josef Koubek, MSc. PhD.  
Contact person's name: Hana Opatová MSc. PhD.

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:

VYSOKÁ ŠKOLA  
CHEMICKO-TECHNOLOGICKÁ V PRAZE  
Technická 5, 166 28 Praha 6  
961/2

Name: Assoc. Prof. Josef Koubek, MSc. PhD.  
Position: Rector  
Place and Date: Prague, March, 1<sup>st</sup> 2010



Prague, January 15<sup>th</sup>, 2010  
Ref. Nr. 10/961/0028

**TO WHOM IT MAY CONCERN**

The Institute of Chemical Technology Prague states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering and the attribution of the corresponding degree to the students that complete these studies with success.

Assoc.Prof. Josef Koubek, PhD  
Rector

VYSOKÁ ŠKOLA  
CHEMICKO-TECHNOLOGICKÁ V PRAZE  
Technická 5, 166 28 Praha 6  
961/2



Prague, January 15<sup>th</sup>, 2010  
Ref. Nr. 10/961/0029

**TO WHOM IT MAY CONCERN**

The Institute of Chemical Technology Prague states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme. The Department of International Relations of the Institute will provide all necessary assistance to welcome and accommodate the Master students using all means available, including the Students Residence in the Institute campus.

Assoc.Prof. Josef Koubek, PhD  
Rector

VYSOKÁ ŠKOLA  
CHEMICKO-TECHNOLOGICKÁ V PRAZE  
Technická 5, 166 28 Praha 6  
961/2

LETTER OF INTENT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

**Our organisation:**

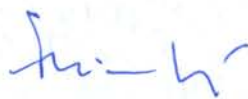
Full Name: Faculty of Sciences and Technology  
Address: *Campus* of Caparica  
Postcode: 2829-516 Caparica  
Town/city: Almada  
Country: Portugal  
Tel.: 00351 21 2948300  
Fax: 00351 21 2948599  
Dean : Professor **Fernando** José Pires **Santana**  
Contact person's name: 00351 21 2948595

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:



Name: **Fernando** José Pires **Santana**  
Position: Dean  
Place and Date: Caparica, 22<sup>nd</sup> March 2010

LETTER OF SUPPORT

Project title: *Erasmus Mundus Master In Membrane Engineering*

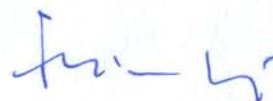
I, the undersigned, confirm that the Faculty of Sciences and Technology/UNL states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering, by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme and the attribution of the corresponding degree to the students that complete these studies with success.

The international relation office will provide all necessary assistance to welcome and accommodate the Masters' Students using all means available, including the reservation in student residence.

Caparica, 22<sup>nd</sup> March, 2010

Professor **Fernando José Pires Santana**,  
Dean

Signature







Universidad de Zaragoza

To: Université Montpellier 2 Sciences et  
Techniques  
Contact Person : Mr André **Ayral**  
Address : Place Eugene Bataillon, CC047  
Postcode : 34095  
City : Montpellier Cedex 05  
Country : F R A N C E

## LETTER OF INTENT

Project title: *Erasmus Mundus Master In Membrane Engineering*

### **Our organisation:**

Full Name: Universidad de Zaragoza  
Address: c/ Pedro Cerbuna, 12  
Postcode: 50009  
Town/city: Zaragoza  
Country: Spain  
Tel.: +34 976 762052  
Fax: +34 976 762320 email: [relint@unizar.es](mailto:relint@unizar.es)  
President/Rector: Prof. Manuel José López Pérez  
Contact person's name: Prof. María Reyes Mallada Viana

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:



Name: Prof. Manuel José López Pérez  
Position: Rector de la Universidad de Zaragoza  
Place and Date: Zaragoza, 25 March, 2010.



Universidad de  
Zaragoza

## LETTER OF SUPPORT

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, confirm that the University of Zaragoza states its commitment to implement the Erasmus Mundus Master in Membrane Engineering, by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme and the attribution of the corresponding degree to the students that complete these studies with success.

The International Relations Office will provide all necessary assistance to welcome and accommodate the Masters' Students using all means available, including the reservation of student residences.

Zaragoza (Spain), 25 March, 2010.

Prof. Dr. Manuel José López Pérez – Rector of the University of Zaragoza

A handwritten signature in blue ink, appearing to read "Manuel Lopez".

Signature



## UNIVERSITY OF TWENTE.

P.O. Box 217  
7500 AE Enschede  
The Netherlands

[www.utwente.nl](http://www.utwente.nl)

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

your reference  
our reference S&C/389.297/rv  
date March 3, 2010

phone +31 53 489 2202  
fax +31 53 489 4611  
e-mail [H.J.M.Bouwmeester@tnw.utwente.nl](mailto:H.J.M.Bouwmeester@tnw.utwente.nl)

### LETTER OF INTENT

Project title: *Erasmus Mundus Master In Membrane Engineering / EM3E*

#### **Our organisation:**

Full Name: University of Twente  
Address: Postbus 217  
Postcode: 7500 AE  
Town/city: Enschede  
Country: The Netherlands  
Tel.: + 31 53 489 5687  
Fax: + 31 53 4894898  
President/Rector: Dr. A.H. Flierman  
Contact person's name: Dr. H.J.M. Bouwmeester

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

UNIVERSITY OF TWENTE.

Signature and stamp:



Name: Dr. A.H. Flierman  
Position: President of the Executive Board  
Place and Date: Enschede, March 3, 2010

## UNIVERSITY OF TWENTE.

P.O. Box 217  
7500 AE Enschede  
The Netherlands

[www.utwente.nl](http://www.utwente.nl)

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

your reference  
our reference S&C/389.313/rv  
date March 3, 2010

phone +31 53 489 2202  
fax +31 53 489 4611  
e-mail [H.J.M.Bouwmeester@tnw.utwente.nl](mailto:H.J.M.Bouwmeester@tnw.utwente.nl)

### LETTER OF SUPPORT

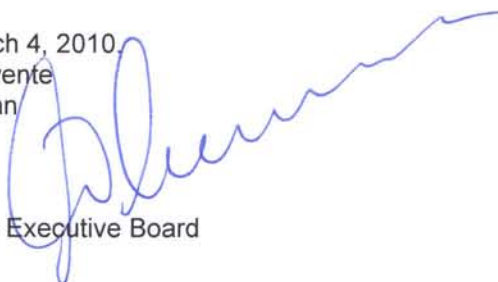
I, the undersigned, confirm that the University of Twente states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering, by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme and the attribution of the corresponding degree to the students that complete these studies with success.

The international relation office will provide all necessary assistance to welcome and accommodate the Masters' students using all means available, including the reservation in student residence.

Contact person for this programme will be dr. H.J.M. Bouwmeester.

Enschede, March 4, 2010  
University of Twente  
Dr. A.H. Flierman

President of the Executive Board





## LETTER OF INTENT

KATHOLIEKE  
UNIVERSITEIT  
LEUVEN

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

### Our organisation:

Full Name: Katholieke Universiteit Leuven  
Address: Naamsestraat 22  
Postcode: 3000  
Town/city: Leuven  
Country: Belgium  
Tel.: +32 16 32 40 68  
Fax: +32 16 32 41 96  
President/Rector: Prof. M. Waer  
Contact person's name: Prof. I. Vankelecom

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:

Name: Prof. Mark Waer  
Position: Rector  
Place and Date: Leuven, 09/04/2010



RECTOR'S OFFICES  
NAAMSESTRAAT 22 BUS 5000  
BE-3000 LEUVEN



KATHOLIEKE  
UNIVERSITEIT  
LEUVEN

Full Name: Katholieke Universiteit Leuven  
Address: Naamsestraat 22  
Postcode: 3000  
Town/city: Leuven  
Country: Belgium  
Tel.: +32 16 32 40 68  
Fax: +32 16 32 41 96  
President/Director: Prof. M. Waer  
Contact person's name: Prof. I. Vankelecom

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, Prof. Mark Waer, confirm that K.U.Leuven expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. We will commit to the project by making available all the facilities and equipment necessary to achieve the educational and scientific goals of this programme and the attribution of the corresponding joint degree to the students that complete these studies with success.

The international relation office will provide all necessary assistance to welcome and accommodate the students using all means available in the K.U.Leuven, including housing facilities, meal service, coaching, sport and social activities, assistance with social insurance and visas, and support to candidates with special needs.

Signature and stamp:



Name: Prof. Mark Waer  
Position: Rector  
Place and Date: Leuven, 09/04/2010



## LETTER OF INTENT

**To:** Université Montpellier 2 Sciences et Techniques  
**Contact person's name:** Mr. André Ayrat  
**Address:** Place Eugène Bataillon, CC047  
**Postcode:** 34095  
**Town/city:** Montpellier Cedex 05  
**Country:** FRANCE

**Project title:** *Erasmus Mundus Master In Membrane Engineering*

**Our organisation:**

**Full Name:** University Hassan II  
**Address:** Avenue Hassan II - BP 150  
**Postcode:** 28820  
**Town/city:** Mohammedia  
**Country:** MOROCCO  
**Tel.:** 212-523-314-635  
**Fax:** 212-523-314-634  
**President/Rector:** Pr Rahma BOURQIA  
**Contact person's name:** Pr Mohamed RAFIQ

I declare agreement to:

- (a) Operating as a partner with University Montpellier 2 Sciences and Techniques to carry out the project identified above;
- (b) Undertaking the roles stipulated in the application form.

**Signature and stamp:**

 Pour la Présidente et P.O.  
le Vice Président  
Pr. Ahmed FAHLI

**Name:**  
**Position:**  
**Place and Date:**

*FAHLI Ahmed*  
*Vice président*





**Full Name:** University Hassan II  
**Address:** Avenue Hassan II - BP 150  
**Postcode:** 20820  
**Town/city:** Mohammedia  
**Country:** MOROCCO  
**Tel.:** 212-523-314-635  
**Fax:** 212-523-314-634  
**President/Director:** Pr Rahma BOURQIA  
**Contact person's name:** Pr Mohamed RAFIQ

## LETTER OF SUPPORT

**To:** Université Montpellier 2 Sciences et Techniques  
**Contact person's name:** Prof. André Ayrat  
**Address:** Place Eugène Bataillon, CC047  
**Postcode:** 34095  
**Town/city:** Montpellier Cedex 05  
**Country:** FRANCE

**Project title:** *Erasmus Mundus Master In Membrane Engineering*

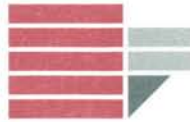
I, the undersigned, [Name of President/Director or Contact person], confirm that [Name of organisation] expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

**Signature and stamp:**



**Name:**  
**Position:**  
**Place and Date:**

Ahmed FAHLI  
Vice président



Il Rettore

## LETTER OF INTENT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Mr. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

### Our organisation:

Full Name: **UNIVERSITY OF CALABRIA**  
Address: Rettorato, via P. Bucci  
Postcode: 87036  
Town/city: Arcavacata di Rende (CS)  
Country: Italy  
Tel.: +39 0984 493894/493932  
Fax: +39 0984 493896  
President/Rector: **Prof. Giovanni Latorre**  
Contact person's name: Prof. Enrico DRIOLI

I, the undersigned, confirm that I have read and approved the proposal, the annexes and the breakdown of work among partners, as submitted in the application form addressed to the Education, Audiovisual and Culture Executive Agency. We confirm our intention to carry out the tasks described, and that the key staff involved in the project, as presented in the application form, will be available to fulfil the role outlined. We undertake to comply with the principles of good partnership practice.

I declare agreement to:

- (a) operating as a partner with Université Montpellier 2 Sciences et Techniques to carry out the project identified above;
- (b) undertaking the roles stipulated in the application form.

Signature and stamp:



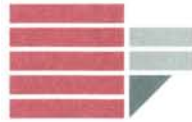
IL RETTORE  
(Prof. *Giovanni LATORRE*)

Name: Giovanni LATORRE

Position: Rector

Place and Date: Arcavacata di Rende, on February 10<sup>th</sup>, 2010





Il Rettore

## LETTER OF SUPPORT

I, the undersigned **Prof. Giovanni LATORRE**, Rector of the **University of Calabria** (Italy), confirm that this Institution states its commitment to the implementation of the Erasmus Mundus Master in Membrane Engineering, by making available the facilities and equipment necessary to achieve the educational and scientific goals of this programme.

The international relation office will provide all necessary assistance to welcome and accommodate the Masters' Students using all means available, including the reservation in student residence.

Arcavacata di Rende, on February 10<sup>th</sup>, 2010

Prof. Giovanni Latorre, Rector

Signature

IL RETTORE  
(Prof. Giovanni LATORRE)



## **Appendix 2 : Letters from External Supporting Organizations**

### **1. Higher Education Institutions**

<b>AMERICA</b>	<b>Canada</b>	<b>University of Laval</b> Institut of Nutraceuticals and Functional Foods
	<b>Chile</b>	<b>University of Santiago de Chile</b> Department of Chemical Engineering Laboratory of Membrane Separation Processes
	<b>Mexico</b>	<b>Universidad Tecnológica de Tecamachalco</b>
		<b>Instituto Tecnológico de Veracruz</b>
		<b>Instituto Tecnológico de Tepic</b>
	<b>USA</b>	<b>PERMEANT (NSF project)</b> Support of the USA participants of the Partnership for Education and Research in Membrane Nanotechnologies (PERMEANT). PERMEANT is joint project funding through National Science Foundation's Partnerships for International Research and Education program. The USA participants are: <b>Michigan State University</b> and <b>Duke University</b>
		<b>The Pennsylvania State University</b> Materials Research Laboratory
		<b>University of Michigan</b> Macromolecular Science and Engineering Department
		<b>University of Colorado</b> MAST Center (Membrane Applied Science and Technology Center) NSF Multi-University Site Industry-University Cooperative Research Center
		<b>Worcester Polytechnic Institute</b> Department of Chemical engineering
<b>Senegal</b>		<b>Faculté des Sciences et Techniques de Dakar</b>
<b>ASIA</b>	<b>China</b>	<b>UNEP TONGJI Institute of Environment for Sustainable Development</b> College of Environmental Science and Engineering State Key Laboratory of Pollution Control and Resource Reuse Study
	<b>Japan</b>	<b>Waseda University</b> Department of Earth Sciences and Graduate School of Science and Engineering
	<b>Singapore</b>	<b>National University of Singapore - NUS</b> Faculty of Engineering Department of chemical and Biomolecular Engineering
	<b>South Korea</b>	<b>Hanyang University</b> School of Chemical Engineering, College of Engineering
	<b>Taiwan</b>	<b>Chung Yuan University</b> R&D Center for Membrane Technology
		<b>National Taiwan University</b> Department of Chemical Engineering
<b>AUSTRALIA</b>	<b>Australia</b>	<b>Monash University</b> Faculty of Science – School of Chemistry
<b>EUROPE</b>	<b>Hungary</b>	<b>Budapest University of Technology and Economics (BUTE)</b> Department of Physical Chemistry and Material Science
	<b>Italy</b>	<b>University of Bari</b>

Department of Chemistry

**Lithuania**      **Kaunas University of Technology**  
Faculty of Chemical Technology

**Russia**            **Kuban State University**  
Physical Chemistry Department

## 2. Industrial organisations

AMERICA	USA	<b>Pall Corporation</b> ( <i>membrane manufacturer</i> ) Pall Life Sciences R&D
EUROPE	Czech Republic	<b>DHI</b> Innovation Products and Technology Department
		<b>MEGA a.s.</b> ( <i>membrane manufacturer</i> )
		<b>MIKROPUR s.r.o.</b>
		<b>MemBrain</b>
	Denmark	<b>Alfa Laval</b> ( <i>equipment and system manufacturer – membrane end-user</i> )
	France	<b>CTI</b> (Céramiques Techniques et Industrielles, s.a.s) Producer of ceramic membranes and filters for liquid and gas treatments.
		<b>EDF</b> (French Electricity national company – membranes end-user) Department of Materials and Composant Mechanic
		<b>Total S.A.</b> ( <i>multinational energy company – membranes end-user</i> ) Corporate Science and Technology - Catalysis and Process Engineering
		<b>VEOLIA Environment</b> ( <i>environmental services in the water: water production and wastewater treatment – membranes end user</i> ) Water Research Center
	Italy	<b>GVS Filter Technology</b> ( <i>manufacturers of security insert molded filter components</i> )
	Russia	<b>Joint Stock Company Scientific and Technical Centre “Vladipor”</b> ( <i>development and creation of membranes and technological processes</i> )
	The Netherlands	<b>KEMA</b> ( <i>energy production – membranes end-user</i> )

## 3. Research Centers

EUROPA	Russia	<b>A. V. Topchiev Institute of Petrochemical Synthesis RAR</b> Russian Academy of Sciences
		<b>MemBrain s.r.o.</b>
	The Netherlands	<b>ECN - Energy Centre of the Netherlands</b> Membrane Technology Group

#### 4. Associations

##### EUROPE

##### **European Membrane Society – EMS**

Learning society created in the 70ths to promote the knowledge and the use of membranes and membrane processes both at Universities and in Industry

##### **European Membrane House a.i.s.b.l. - EMH**

Durable integrated structure created in 2008 as at an outcome of the European Network of Excellence NanoMemPro (FP6)

##### Czech Republic

##### **CZEMP - Czech Membrane Platform**

## **Appendix 2 : Opinion poll from supporting organizations**

### **1. Opinion poll for the Universities supporting the master EM3E**

<i>Request</i>	<i>% of favorable responses</i>
Participate in supervisory boards	85
Participate to the master courses, tutorial of students, seminars	85
Promote and disseminate the Master programme	85
Host students for traineeships	70

### **2. Opinion poll for the Companies supporting the master EM3E**

<i>Request</i>	<i>% of favorable responses</i>
Participate to the master courses, tutorial of students, seminars	60
Host students for traineeships	85
Open positions to students graduated within the Master programme	60



Institut des nutraceutiques  
et des aliments fonctionnels (INAF)

Québec, Tuesday 30<sup>th</sup> March 2010

Prof. Vlastimil Fila  
ICT Prague  
Technicka 5  
16628 Prague 6  
Czech Republic

**Subject: Letter of support – European Master in Membrane Engineering**

---

Dear Prof. Fila,

The Institute of Nutraceuticals and Functional Foods (INAF) of Laval University (Québec, CANADA) leads an innovative multidisciplinary research program on the complex interactions between food components, nutrition and health, and supports the development of safe and effective food products to improve health and prevent disease. INAF creates dynamic synergies between experts from seven major research institutions in Quebec and actively supports networking and collaborative efforts between its members and experts elsewhere in Canada and abroad. The mission of INAF is to generate and apply scientific knowledge with the aim of developing nutraceuticals and functional foods to improve human health through interdisciplinary research, education, technology transfer and communication.

Furthermore, as a scientist involved in membrane processes and as INAF technology theme leader, it appears that membrane processes is a very promising field of technology for the development and patenting of novel technological processes for the extraction and purification of highly valuable molecules, which pose as a safe alternative to current methods using solvent extraction. Membrane processes have a strong potential for applications in the nutraceutical field but lots of research have to be carried-out to demonstrate their feasibility and to understand the different underlying mechanisms. In our institute we have well recognized experts in the fields of membrane separation (electromembrane and pressure-driven separation) applied to nutraceuticals and bioactive molecules as well as on the applications of membranes to the production of functional foods. In addition, we also have members



experts in the fields of bioactive molecules (antioxidant, lipids, peptides...) and their health benefits (cardio-vascular, diabete, alzheimer's disease...). Nowadays, the food and bio-pharmaceutical industries show a huge interest in products that can promote health and well being. The growing interest for nutraceuticals and functional foods reflects the fact that consumers hear about epidemiological studies indicating that a specific diet or component of the diet is associated with a lower risk for certain diseases. To respond to the consumer demands for healthy products, the food and bio-pharmaceutical industries are looking for innovative technologies for their manufacture. INAF could provide some specific expertises and training opportunities for the future students enrolled in your master program in membrane engineering. The experts of INAF could participate, for example, by means of internships and/or short courses on all these aspects. At our Institute, we have recently succeeded in a Canada-wide training program that will include organization of a course specifically aiming the technological and health aspects of nutraceuticals and functional foods. This opportunity could be certainly shared with your Master program.

In this respect, I am pleased to confirm that INAF fully supports the Erasmus Mundus Program for the formation of a master degree in membrane technology and hope that this opportunity will allow the strengthening of collaborative works such as with the Institut Européen des Membranes and the development of scientific projects with european partners from this master program and the mutual exchange of students in the promising field of nutraceutical separation by membrane processes.

Best regards,



Laurent BAZINET, Ph.D.  
Research Scientist  
Technology Theme Leader  
Institut des Nutraceutiques et des Aliments Fonctionnels (INAF)  
Food and Nutrition Sciences  
Pavillon Paul-Comtois  
2425 Rue de l'Agriculture  
Université Laval





University of Santiago de Chile  
Department of Chemical Engineering  
Laboratory of Membrane Separation Processes

Santiago, April 17<sup>th</sup> 2009

Professor André Ayrál  
European Institute of Membranes  
CC 047, UM2, Pl. E. Bataillon  
34095 Montpellier cedex 5

Dear Professor Ayrál,

It is my pleasure write a letter in support of the proposals “**Master in Membrane Engineering**” and “**PhD in Membrane Engineering**” being submitted to the Erasmus Mundus Program by your work team at the European Institute of Membranes.

Fruitful collaborations between our institutions over the last ten years have allowed developing several research projects, which involve high-level formation of human resources in different subjects related to new membrane contactor and reactor processes and supercritical fluid applications.

In conclusion, I fully support the efforts of the European Institute of Membranes as you seek external funding to support a project designed to improve the current state of knowledge on Membrane Science and Technology by means of two international graduate programs.

Sincerely,

Julio Romero Ph.D.  
Head of Laboratory of Membrane Separation Processes  
Department of Chemical Engineering

Cher Monsieur Professeur André AYRAL:

Les sous-signants Docteurs Rosa Isela ORTIZ BASURTO et Francisco CALDERON CERVANTES, Professeurs de l'Universidad Tecnológica de Tecamachalco et de l'Instituto Tecnológico de Veracruz au MEXIQUE, respectivement, nous exprimons notre total soutien et appui au Programme ERASMUS MUNDUS qui va permettre aboutir les projets de formation de très haute niveau: Master en Génie de Membranes et PhD en Génie de Membranes.

La formation de professeurs chercheurs dans le domaine du Génie de membranes, et sous la modalité et contenu établie, va nous donner la possibilité de développer un très grand réseau de coopération au niveau mondial pour résoudre des problèmes stratégiques y d'importance régional, au profit d'environnement, l'économie et du bien être des membres de notre société.

Nous signons cette lettre de soutien à noms de nos établissements de enseignements respectifs, compte tenue des contraintes administratives que la situation d'urgence sanitaire provoque dans notre pays le MEXIQUE.

Très cordialement

Fait au Mexique le 27 avril 2009.



Dra. Rosa Isla ORTIZ BASURTO  
Professeur  
Universidad Tecnológica de Tecamachalco



Dr. Francisco CALDERON CERVANTES  
Professeur  
Instituto Tecnológico de Veracruz



SUBSECRETARÍA DE EDUCACIÓN SUPERIOR  
DIRECCIÓN GENERAL DE EDUCACIÓN SUPERIOR TECNOLÓGICA  
INSTITUTO TECNOLÓGICO DE TEPIC

SECRETARÍA DE  
EDUCACIÓN PÚBLICA

SEP

Tepic, Nayarit. Mexico. March 26, 2010

Full Name: **Instituto Tecnológico de Tepic**  
Address: Av. Tecnológico # 2595, Col. Lagos del Country  
Postcode: 63175 Town/city: Tepic, Nayarit. MEXICO  
Tel.: +00523119400 Fax: +00523119401  
President/Director: **Lic. Marco Antonio LEDESMA GONZÁLEZ**  
Contact person's name: Dra. Rosa Isela ORTIZ BASURTO

SUPPORT LETTER

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05, FRANCE

Project title: **Erasmus Mundus Master In Membrane Engineering**

I, the undersigned, **Marco Antonio LEDESMA GONZÁLEZ**, confirm that the **Technological Institute of Tepic**, expresses its strong **support to the application of Erasmus Mundus Master programme in Membrane Engineering**. After knowing the aim of this project, we are very interested in having the possibility that one of our profesor's or student's from our institute could study his or her Master's and or PhD. To strengthen the academic level from our Institution and expand our possibilities to collaborate with the European Union and other Country's that are involve with this project.

We will await with great interest the acceptance of this project.

  
Name: **Marco Antonio LEDESMA GONZÁLEZ**  
Position: **Director of the Technological Institute of Tepic**



"2009, Año de la Reforma Liberal"

"XXXV Aniversario del I.T. Tepic"

Av. Tecnológico No. 2595, Fraccionamiento Lagos del Country, C.P. 63175, Tepic, Nayarit.  
Teléfono Conmutador : 01 (311) 211-94-00, Fax : 01 (311) 211-94-01, e-mail : info@ittec.edu.mx,

www.ittec.edu.mx



Alcance: "Proceso Educativo"

**MICHIGAN STATE**  
**UNIVERSITY**

March 4, 2010

To: Professors André Ayrál

Subject: Letter of support for the EM<sup>3</sup>E (Erasmus Mundus Master in Membrane Engineering) project

Dear Dr. Ayrál,

On behalf of all U.S. participants of the Partnership for Education and Research in Membrane Nanotechnologies (PERMEANT), we are expressing our strong support for the Erasmus Mundus Master in Membrane Engineering (EM<sup>3</sup>E) project proposal.

PERMEANT is a joint project funded by a \$2,303,000 grant through National Science Foundation's Partnerships for International Research and Education program. This is a collaborative work of environmental engineers and membrane scientists from two U.S. research universities (Michigan State University and Duke University), Université Paul Sabatier (Toulouse), Institut National des Sciences Appliquées de Toulouse, Centre Européen de Recherche et d'Enseignement des Géosciences de l'Environnement (Aix-en-Provence), one university in Russia, and one university in Ukraine. The general goal of this research is to synthesize and improve membranes with the help of nanotechnology to ensure drinking water safety. More information on the project can be found at the project website <http://www.egr.msu.edu/permeant/>. The PERMEANT project provides, in our opinion, an excellent framework that can be leveraged to collaborate on new research projects, such as the one described in the EM<sup>3</sup>E proposal.



COLLEGE OF  
**ENGINEERING**

Department of Civil and  
Environmental Engineering

Michigan State University  
3546 Engineering Building  
East Lansing, Michigan  
48824-1226

Phone: 517/355-5107

Fax: 517/432-1827

E-Mail: [cee@egr.msu.edu](mailto:cee@egr.msu.edu)

Website:

[www.egr.msu.edu/cee](http://www.egr.msu.edu/cee)

With this letter we confirm our commitment to collaborate on the proposed EM<sup>3</sup>E project, which we see as an opportunity to not only expand the fundamental knowledge base pertaining to membrane science in general but also to further develop and deepen the scientific exchange between U.S. and European membrane research community. Specific plans on collaboration include: (1) Enrollment of U.S. graduate students (both MS and Ph.D.) in EM<sup>3</sup>E courses; (2) Training of European students in laboratories at MSU and Duke University as a part of an exchange program offering U.S. students similar training in European Universities or industry; (3) Participation of PERMEANT faculty in the EM<sup>3</sup>E seminar program as guest speakers. Eventually, if the PERMEANT project were to be funded by NSF for another 5 years term it might become a full partner of the present EM<sup>3</sup>E project. We understand that no financial support will be provided to the MSU side from this project.

With best regards,

Volodymyr V. Tarabara,  
PERMEANT Co-Director,  
Assistant professor of Civil and  
Environmental Engineering,  
Michigan State University

Thomas C. Voice,  
PERMEANT Co-Director,  
Professor of Civil and  
Environmental Engineering,  
Michigan State University

Mark R. Wiesner,  
PERMEANT Co-PI,  
James L. Meriam Professor of Civil  
and Environmental Engineering,  
Duke University



March 10, 2010

Prof. Andre Ayrat  
Institut Europeen des Membranes,  
UMR n° 5635 CNRS-ENSCM-UM2, CC047,  
Universite Montpellier 2,  
Place Eugene Bataillon,  
F-34095 Montpellier cedex 5, FRANCE

Dear Prof. Ayrat:

It is my pleasure to support the "Erasmus Mundus Master programme in Membrane Engineering". This is an excellent idea as it will benefit students from experts in the membrane field of different institutes of the consortium of European Universities. I am very interested in the membrane field and I would be happy to participate in this network as soon as it starts. Best regards.

Sincerely yours,

*Sridhar Komarneni*

Sridhar Komarneni  
Distinguished Professor of Clay Mineralogy

I, the undersigned, Michael Lanagan, Associate Director, confirm that Materials Research Institute expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering".

Sincerely yours,

*Michael Lanagan*

Michael Lanagan  
Associate Director, Materials Research Institute  
University Park, PA 16802, USA



MRI



Richard M. Laine  
Professor  
The University of Michigan  
Materials Science and Engineering  
Director  
Macromolecular Science and Eng.  
2114 H.H. Dow Bldg  
Ann Arbor, MI 48109-2136  
734-764-6203, Cell 657-0881, talsdad@umich.edu

March 27, 2009

Professor André Ayrat  
Professor and Deputy Director  
Institut Européen des Membranes  
IEM / UM II - CC 047  
Place Eugène Bataillon  
34095 Montpellier cedex 5, France  
Tel : + 33 (0)4 67 14 91 43  
Fax : + 33 (0)4 67 14 91 19  
e-mail: andre.ayrat@iemm.univ-montp2.fr

Cher Andre:

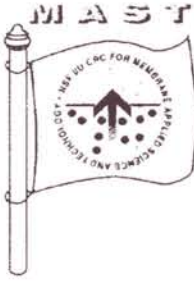
As you know, I have visited the University de Montpellier and the Ecole Normal Superior de la Chemie in Montpellier many many times beginning in 1980, most recently as a Prof. Invité in the ECNSC. I have also had the pleasure of visiting you and IEM now several times. Indeed based on your presentation at our Hybrid Workshop at the MRS some four years ago, we have begun a small collaboration in a few areas. Furthermore, I have been most impressed with the quality of research done by many of your collaborators as well, especially Anne Julbe and Mihai Barboiu.

Given my current position as Director of Macromolecular Science and Engineering, we are always looking for mechanism to expand our students' research experience. As a consequence, we have sought and successfully developed exchange programs with Kyoto, Nagoya and JAIST in Japan and Seoul National, Hanyang and Kyung Hee Universities in Korea. We have active exchanges ongoing with most of these universities. However, we lack ties to European Universities and would very much like to establish exchange programs like the one you have proposed called the Erasmus Mundus Masters program.

I would like to request the opportunity to participate through student exchanges with IEM in this program. Therefore, I am strongly in support of its creation and wish to know how I might help.

Sincerely,

Richard M. Laine  
Professor of MSE and  
Director, Macromolecular Science and Engineering



**Membrane Applied Science and Technology Center  
NSF Industry/University Cooperative Research Center Program**

March 16, 2010

Professor André Ayrat  
Université Montpellier 2 Sciences et Techniques  
Place Eugène Bataillon, CC047  
Montpellier Cedex 05 34095  
FRANCE

**RE: Letter of Support for European Masters and Ph.D. degree program in Membrane Engineering**

I am pleased to provide a letter supporting a European Masters and Ph.D. degree program in Membrane Engineering within the framework of the **Erasmus Mundus** 2010 call. Membrane technology is still an evolving separation methodology with enormous potential. The consortium of European universities listed for this program is an excellent assemblage with expertise that spans the wide range of materials and applications for membrane technology. This program can provide the technical leadership for generations of highly trained personnel. The benefits are economic as well as educational. As the research advances evolve from the program, they can generate new business opportunities for the European community.

I have personally interacted with researchers at most of the universities listed. I have the highest respect for their technical capabilities. The synergism that has developed from the European Network of Excellence NanoMemPro provides the structure for this program and insures that this program will provide the excellent student training and research opportunities for which it is designed.

We look forward to the implementation of this program and the opportunity to interact and collaborate.

Yours Truly,

Richard D. Noble  
Alfred T. & Betty E. Look Professor of Chemical Engineering  
MAST Center Co-Director





100 Institute Road  
Worcester, MA 01609-2280, USA  
Ph.508-831-5398 Fax 508-831-5853  
[www.wpi.edu/+che](http://www.wpi.edu/+che)

Full Name: Centre for Inorganic Membrane Studies  
Address: 100 Institute Road  
Postcode: 01609  
Town/city Worcester, Massachusetts  
Country: USA  
Tel.: 508 831 5398  
Fax: 508 831 5853  
Director: : Yi Hua Ma  
Contact person's name: Yi Hua Ma

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: Erasmus Mundus Master In Membrane Engineering

I, the undersigned, *Yi Hua Ma*, confirm that *Centre for Inorganic Studies, Department of Chemical Engineering, Worcester Polytechnic Institute* expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

I am writing in support of the proposed formation of European Master in Membrane Engineering and the associated application for submission within the frame work of the Erasmus Mundus 2010-2014 program.

In the current energy intensive society coupled with the expected population growth, the demand for energy is expected to increase steadily in the next several decades. Membrane technologies will play a key role in substantially reducing energy expenditure for large scale operations such as desalination, CO<sub>2</sub> sequestration and hydrocarbon separations. Currently, there are no academic programs in the world specifically concentrated on providing a framework to educate young scientists and engineers in the membrane areas. The formation of the consortium of European universities for the establishment of European Master in Membrane Engineering is not only timely but also important and necessary. In addition, the universities participating in the consortium all have excellent existing membrane programs and are among the top membrane research groups in the world. I believe that the professionals graduating from the proposed Master in Membrane Engineering program will play leading roles in the membrane field, in particular, and in the broad energy areas in general.

Therefore, I commend the European group for initiating such an effort and strongly support their proposed establishment of the European Master Membrane Engineering Program. If I can be of any further assistance to the initiative, please do not hesitate to let me know.

.....

A rectangular box containing a handwritten signature in black ink. The signature appears to be 'Y. H. Ma' written in a cursive style.

Name: Yi Hua Ma

Position: James H. Manning Professor of Chemical Engineering and Director, Centre for Inorganic Membrane Studies

Place and Date: 100 Institute Rd, Worcester, MA 01609 USA

19 February, 2010



UNIVERSITE CHEIKH ANTA DIOP  
FACULTE DES SCIENCES ET TECHNIQUES

UCAD - BP 1005 Dakar  
Tel : 829441920/201  
Fax : 8242318  
E-mail : ucad@ucad.sn

Paris, le 29 avril 2009

Le Doyen de la Faculté des Sciences et Techniques  
Professeur SECK Matar Mous


Professeur André AYRAL  
Université Montpellier 2


### Lettre d'appui

La Faculté des Sciences et Techniques de Dakar, par son Doyen, M. Matar SECK, accepte d'accorder son soutien à ces deux projets majeurs intitulés de « Master in Membrane Engineering » et « Ph.D. in Membrane Engineering ».

Ces deux projets donnent la possibilité à nos étudiants et chercheurs dans ce domaine de bénéficier de formations et de plateaux techniques très relevés et sur des questions d'actualité au Sénégal.

Conscient de l'intérêt pour le Sénégal de ces projets, le doyen que je suis, accorde tout son soutien.

SECK Matar Mous
 Le Doyen de la Faculté des Sciences et Techniques
Doyen de la Faculté des Sciences et Techniques



**LOGO**

Full Name: UNEP-Tongji Institute of Environment for Sustainable Development  
Address: Tongji University, 1239 Siping road, Shanghai, China.  
Postcode: 200092  
Town/city: Shanghai  
Country: P.R. China  
Tel.: 86-21-65985059  
Fax:86-21-65985059  
President/Director: Jiang Wu  
Contact person's name: Fengting Li

**LETTER OF SUPPORT**

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

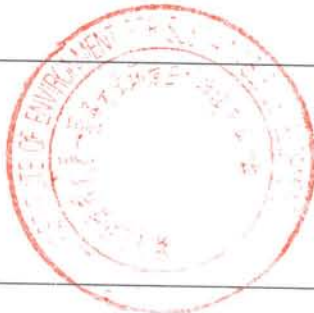
Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, *Fengting Li* confirm that Tongji University expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. ....

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

Signature and stamp:

*fengting Li*



Name: Fengting Li  
Position: Vice Dean of UNEP-Tongji Institute of Environment for Sustainable Development, Tongji University  
Place and Date: Shanghai, China. March 7, 2010



The Global COE for "Practical Chemical Wisdom"  
WASEDA UNIVERSITY

Room 603, Robert J. Shillman Hall, Waseda University  
3-14-9 Ohkubo, Shinjuku-ku, Tokyo 169-0072, Japan  
Tel&Fax:+81-3-5286-2817, e-mail: GCOE-Prac-Chem@list.waseda.jp



Full Name: Waseda University  
Address: Room 603, Robert J. Shillman Hall, Ohkubo-3  
Postcode: 169-0072  
Town/city: Shinjuku, Tokyo  
Country: Japan  
Tel.:  
Fax:  
President/Director: Kazuyuki KURODA  
Contact person's name: Makoto OGAWA

LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, *Kazuyuki KURODA*, confirm that *Gloval COE for Practical Chemical Wisdome* expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

It is envisaged that a High Quality Master and PhD study program in Membrane Engineering will be made available to students of Europe and Asia. This will surely contribute to the advancement of science and technology in a field which has an increasing importance.

Signature and stamp:

Name: Makoto OGAWA

Position: Professor

Place and Date: Tokyo, Japan, March 3, 2010



Full Name: National University of Singapore  
Department of Chemical and Biomolecular Engineering  
Address: Blk E5-02-09, 4 Engineering Drive 4  
Postcode: Singapore 117576  
Town/city: Singapore  
Country: Singapore  
Tel.: +65 6516 6645  
Fax: +65 6775 7460  
Contact person's name: Prof. Neal Chung Tai-Shung

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, *Prof. Neal Chung Tai-Shung*, confirm that *Department of Chemical and Biomolecular Engineering, National University of Singapore* expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

I am writing this letter to support the proposed of setting up of Erasmus Mundus Master in Membrane Engineering.

Energy, water, affordable healthcare and global warming have major worldwide impact resulting from resource depletion, record high oil prices, clean water shortages, high costs of pharmaceuticals, and changing climate conditions. Membrane technology is one of the most direct, effective and feasible approaches to address some of the key issues in resolving the above problems. Membrane technology demonstrate a wide range of useful applications; like hydrocarbon separations, carbon dioxide sequestration, membrane distillation, forward osmosis for water reuse and seawater desalination and so on. Nevertheless, the current membrane technologies are far from perfect. By forming the consortium of European universities for establishment of Erasmus Mundus Master in Membrane Engineering will definitely provide a special platform to promote and educate young scientists specifically in the area of membrane technology. I believe the proposed Master in Membrane Engineering is an excellence program which will nurture the future leading professions in membrane area.

With this, I strongly support the idea of the proposed formation of Erasmus Mundus Master in Membrane Engineering Program.

.....

Signature and stamp:

A handwritten signature in red ink that reads "Neal Chung". The signature is written in a cursive style with a long, sweeping tail on the letter 'g'.

Name: Prof. Neal Chung Tai-Shung

Position: Professor

Place and Date: National University of Singapore, 23<sup>rd</sup> Feb 2010



# Hanyang University

School of Chemical Engineering, College of Engineering  
Young Moo Lee, PhD, Distinguished Professor  
Editor, *Journal of Membrane Science*

17 Haengdang-dong, Seongdong-ku, Seoul, 133-791 Korea  
Tel: +82-2-2290-0525 Fax: +82-2-2291-5982  
E-mail: ymlee@hanyang.ac.kr <http://mbl.hanyang.ac.kr>

February 18, 2009

Dear Professor Bouzek  
Institute of Chemical Technology, Prague  
Faculty of Chemical Technology  
Department of Inorganic Technology  
Technicka 5  
166 28 Prague 6  
Czech Republic

Dear Professor Bouzek

I am writing this letter to strongly support the Erasmus Mundus Program which supports new Masters Program in Membrane Engineering. This program is excellent. I have been involved in membranes for energy storage and conversion which is an urgent global issue now and is what you will be exploring in the future under the consortiums with your colleagues in EU. By looking at your program brochure, this program provides an excellent opportunity for students intending for their career path to the energy field. At Hanyang University, we have also newly established Energy Engineering Program under the government support, called World Class University Program. I strongly support your new program and hope that we will have a mutual exchange of students in membranes and energy engineering fields.

Best regards,

A handwritten signature in cursive script, appearing to read 'Young Moo Lee'.

Young Moo Lee  
Hanyang Distinguished Professor





CHUNG YUAN UNIVERSITY  
R&D Center for Membrane Technology

Juin-Yih Lai

Director, Center for Membrane Technology Research and Development

February 28<sup>th</sup>, 2009

Letter of Intent for supporting the project of European Master in Membrane Engineering, organized by the NANOMEMPRO consortium

Dear Dr. Andre Deratani:

It is my honor and pleasure to accept your invitation to participate in the network, associated with your project of European Master in Membrane Engineering. I strongly feel that this Master program is well organized, with ambition to offer wonderful and complete curricula for membrane science and engineering, from solid fundamentals to research frontiers. Also, I am so glad to be involved with this program, so that the students in Taiwan can as well benefit from this terrific program.

As a professor in Chemical Engineering and a researcher of membrane technology for more than forty years, I always believe that the membrane society should do something to bridge the gap between the material and engineering aspects of membrane research. The program your consortium proposed, stressing both fundamentals of materials and engineering, can educate students to have expertise in both, who will definitely play important roles in membrane research and development for which the breakthrough needs interdisciplinary knowledge. In addition, serving as Director for a membrane R&D center, I have contacts with industries and know what kind of people they would recruit. I would say that the students trained by your proposed program suit their needs.

In summary, I am willing to provide my strongest support for your European Master program. I appreciate your kind invitation to get me involved and look forward to playing active roles in the network, to cooperate with your excellent program.

Best regards,

Juin-Yih Lai

Professor, Dept. of Chemical Engineering

Director, Center for Membrane Technology Research and Development



國立臺灣大學化學工程學系

National Taiwan University

Department of Chemical Engineering

Taipei, Taiwan 106-17

TEL : +886-2-2363-5230 FAX : +886-2-2362-3040

Da-Ming Wang, Professor

Feb. 27<sup>th</sup>, 2009

Letter of Intent for supporting the project of European Master in Membrane Engineering

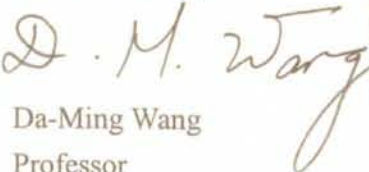

Dear Dr. Andre Deratani:

First of all, I would like to express my full support for the project of European Master in Membrane Engineering, organized by the NANOMEMPRO consortium. In my opinion, this is a wonderful program, giving young students a golden opportunity to get solid and throughout training in membrane science and technology. I especially appreciate you include in the program the three frontiers of membrane applications: nano, bio, and energy technologies, consolidating the future of membrane researches.

I do agree with you that the program can serve to bridge the two major research fields: material science and chemical engineering. As Professor in a Chemical Engineering Department, while I am proud of the distinguished design expertise that students can learn from the traditional ChE curriculum, I also realize how the shortage of training in material properties and structures limits their future career. A program like what you proposed is definitely of help for ChE students to jump over the hurdles; therefore, once the program is officially established, I will enthusiastically recommend it to the students in my department.

Thank you for inviting me to participate in such a wonderful program. I will take this advantage of joining your network to give the engineering students at National Taiwan University opportunities to be involved in the program and get solid training in membrane science and engineering. Once again, I would like to provide here without any reservation my support for your project of European Master in Membrane Engineering.

Yours sincerely,

Da-Ming Wang

Professor

Dept. of Chemical Engineering

National Taiwan University



31 March 31, 2010

Prof. André Ayrat  
Université Montpellier 2 Sciences et Techniques  
Place Eugène Bataillon, CC047  
Montpellier Cedex 05, 34095  
FRANCE

Dear Prof. Ayrat,

**Project title: Erasmus Mundus Master In Membrane Engineering**

I, the undersigned, [*Professor Steven Langford*, confirm that [*Monash University*] expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

The School of Chemistry at Monash University would be delighted to participate in this network as we have well established research in the field of materials/macromolecular chemistry, biosensors and membranes that would provide an outstanding and unique opportunity for students interested in membrane research to experience diverse educational and laboratory environments at the highest level.

The exchange of technology and the cultural interactions afforded by the program would be of great value to students who will become the future generation of scientists as it will give them an appreciation for the diversity of research and styles in a critical formative stage of their education.

.....

Signature and stamp:

Name: Professor Steven J. Langford  
Position: Head of School  
Place and Date: Monash University Clayton Campus, 31/03/2010  
Contact Person: Professor Leone Spiccia



Full Name: Budapest University of Technology and Economics  
Address: Műegyetem rakpart 1-3.  
Postcode: H-1111  
Town/city: Budapest  
Country: Hungary  
Tel.: 36 1 463 2911 (contact person)  
Fax: 36 1 463 3767 (contact person)  
President/Director: Prof. Gábor Péceli (rector)  
Contact person's name: Dr. Zoltán Hórvölgyi

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, [Zoltán Hórvölgyi], confirm that [BME] expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

Thank you for your invitation to take part in the initiative for *a joint master course and PhD program in the field of Membrane Engineering*. The suggested topic is very important for us. The controlled porous structure of sol-gel derived inorganic coatings is in the focus of our recent interest. We have many BSc and MSc students who work in this area. Hence, I kindly inform you that we support this initiative and we are ready to participate in the program.

Signature and stamp:



Name: Dr. Zoltán Hórvölgyi  
Position: Head, Laboratory of Physical Chemistry  
Place and Date: Budapest, March 11, 2010

**Budapest University of Technology  
and Economics  
Department of Physical Chemistry  
and Materials Science  
1521 Budapest HUNGARY**



Department of Chemistry  
University of Bari

Prof. Riccardo d'Agostino  
Via Orabona 4 – 70126 Bari, Italy  
Phone +39-080-5442080 fax +39-080-5443405  
[r.dagostino@chimica.uniba.it](mailto:r.dagostino@chimica.uniba.it)

---

Prof. André Ayral  
Institute Européen des Membranes  
Université Montpellier 2  
Montpellier

March 16, 2009

**Subject:** *letter of intent for supporting the project of the  
European Master in Membrane Engineering*

Dear Professor Ayral,

I am writing also on behalf of my colleagues of the Department of Chemistry of Bari University and of the Institute for Inorganic Methodologies and Plasmas (CNR) in order to express my deep appreciation and support of the Erasmus Mundus Project “*Membranes Engineering*” proposed by the European Consortium shown in your document of information.

It is envisaged that a High Quality Master and PhD study program in Membrane Engineering will be made available to European students. This will surely contribute to the advancement of science and technology in a field which has an increasing importance and it will reveal as a precious tool for young scientists. These aims are particularly important in the moment of world crisis as the one we are experiencing now.

Our Institutions will surely be very active in spreading the information of the project in the case of success among the student population and will cooperate in selecting the best candidates for such a program.

I am sure that our institutions will seriously consider for hiring, on a parity basis, the students graduated with the proposed program.

Sincerely yours,

Riccardo d'Agostino



Full Name: **Kaunas University of Technology**  
Address: K. Donelaičio g. 73  
Postcode: LT-44029  
Town/city: Kaunas  
Country: Lithuania  
Tel.: +370 37 30 00 00  
Fax: +370 37 32 41 44  
President/Director: Prof. Raimundas Šiaučiūnas  
Contact person's name: Prof. Raimundas Šiaučiūnas

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, *Prof. Raimundas Šiaučiūnas*, confirm that Kaunas University of Technology expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

It is envisaged that a High Quality Master and PhD study program in Membrane Engineering will be made available to European students. This will surely contribute to the advancement of science and technology in a field of the membranes which has an increasing importance and it will reveal as a precious tool for young scientists. These aims are particularly important in the moment then the environment friendly and less energy consuming processes are needed.

Our Institutions will surely be very active in spreading the information of the project in the case of success among our university students and will cooperate in selecting the best candidates for this program.

Signature and stamp:



Name: Prof. Raimundas Šiaučiūnas  
Position: Rector of **Kaunas University of Technology**  
Place and Date: Kaunas, Lithuania



Kuban State University

**Федеральное агентство по образованию**

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(861) 219-95-02, факс: 219-95-17, 219-95-46

http://www.kubsu.ru

E-mail: rector @ kubsu.ru

1.04.09

№ 278/01

на № \_\_\_\_\_

April 1, 2009

Professor Bouzek  
Institute of Chemical Technology,  
Prague  
Faculty of Chemical Technology  
Department of Inorganic Technology  
Technicka 5  
166 28 Prague 6  
Czech Republic

Dear Professor Bouzek

We support completely the Project of Erasmus Mundus Master in Membrane Engineering. Membrane technologies and, in particular, electromembrane ones, where we are specializing, become more and more demanded in industry being cost efficient and environment friendly. Development and implementation of these technologies need multidisciplinary knowledge. The initiative of the European Network of Excellence NanoMemPro to carry out actions aimed at formation European masters and doctors in the field of membrane engineering is quite actual and useful.

The Membrane Institute and the Physical Chemistry Department at the Kuban State University are preparing specialists and doctors in membrane science and technology since 1973. In 2009, formation of masters with specialization in this field will be opened. Besides, we are preparing specialists in " Management of high technologies " with a membrane technology bias.

We cooperate with the European Network of Excellence NanoMemPro and the European Membrane House within the frame of a FP7 project MemBridge aimed at the rapprochement of the European and Russian membrane networks. We consider the initiative Erasmus Mundus project as well-timed and valuable, and are ready to contribute in its realization

Rector of Kuban State University

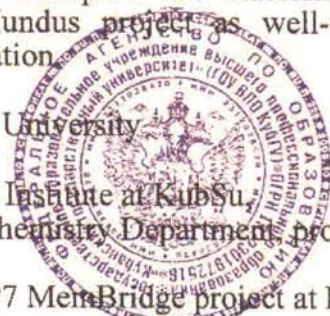
M.B. Astapov

Director of Membrane Institute at KubSU,  
head of the Physical Chemistry Department, professor

V.I. Zabolotsky

Responsible for the FP7 MemBridge project at KubSU,  
professor

V.V. Nikonenko





Life Sciences  
25 Harbor Park Drive  
Port Washington, NY 11756 USA

516.484.3600 phone  
516.484.7795 fax  
www.pall.com

Port Washington, New York  
Thursday, April 09, 2009

Dear Dr Andre Deratani,

I recently received your letter about your application for an Erasmus Mundus Master (and PhD) label in preparation of a European Master in Membrane Engineering. This initiative is of the highest interest to Pall Corporation as the curriculum taught in this new program will help produce a new generation of technical experts in the field of membrane science and technology. The international dimension of this educational program and the diversity and specificity of membrane-related disciplines taught (materials, processes and applications) are very appealing to our company. It's an honor for Pall Corporation to have been solicited to participate in this consortium of network universities and companies and I am eager to support a master that promotes excellence and innovation in the field of membrane science.

Please, let me know how I can be of further assistance to ensure that Pall Corporation will be an active contributor to this network and to this new master program.

Dr Abdoulaye Doucouré  
Senior Principal Scientist,  
Pall Life Sciences R&D  
[Abdoulaye\\_doucoure@pall.com](mailto:Abdoulaye_doucoure@pall.com)  
Tel: 001 516 - 801-9316  
25 Harbor Park Drive Port Wahsington,  
NY 11050 - USA

A handwritten signature in black ink, appearing to be "A. Doucouré", written in a cursive style.





Institute of Chemical Technology, Prague  
Department of Inorganic Technology  
Technická 5  
166 28 Prague 6  
Czech Republic

**Att: Prof. Karel Bouzek**

Agern Allé 5  
DK-2970 Hørsholm  
Denmark

Tel: +45 4516 9200  
Fax: +45 4516 9292  
ghk@dhigroup.com  
www.dhigroup.com

Ref:  
Init: GHK/ELS

Date: 2009-02-23

### **Letter of Intent for supporting the project of European Master in Membrane Engineering**

I am writing this letter to express the strong support from DHI to the application of ERASMUS MUNDUS Master Programme on "Membrane Engineering" prepared by University of Twente, University of Lisboa, University of Zaragoza, Institute of Chemical Technology Prague, University of Montpellier and University of Toulouse.

DHI sees membrane filtration as a key technology for numerous applications in industrial production as well as water and wastewater treatment. Thus, DHI is involved in several research and development activities within the field of membrane filtration and membrane engineering and we clearly see the need for education of well qualified master students and PhD candidates able to contribute to continuous innovation within membrane science and engineering.

DHI will be happy to participate in the network and cooperate within the European Master.

I hope you will be successful in your efforts to establish this programme.

Yours sincerely

**DHI**

A handwritten signature in blue ink, appearing to read 'G. Holm Kristensen', written over a horizontal line.

Gert Holm Kristensen  
Head of Innovation - Industrial Products and Technology  
Urban and Industry



**MEGA a.s.**  
Branch office: Pod Vinici 87  
471 27 Stráž pod Ralskem  
Czech Republic



Full Name: MEGA a.s.  
Address: Pod Vinici 87  
Postcode: 471 27  
Town/city: Straz pod Ralskem  
Country: Czech Republic  
Tel.: +420 487 888 304  
Fax: +420 487 888 102  
President/Director: Ing. Lubos Novak, CSc.  
Contact person's name: Ing. Ales Cernin, Ph.D.

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, **Luboš Novák**-managing director and the sole member of the Board of Directors, confirm that **MEGA** expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. In the field of membrane processes, there are many companies worldwide but only ten of them have been able to maintain comprehensive membrane programme consisting of research, development and production of membranes – main components of membrane process – as well as production and deliveries of entire technological units including launching, guaranties and servicing. MEGA a.s. (Inc.) belongs to this group and it is virtually the only company with this demanding specialisation in the Czech Republic. The company achieved this position thanks to lasting and consistent orientation to applied research in the field of membrane materials and processes with immediate industrial implementation of its results. To sustain or strengthen the position of the company and of the Czech industry in the worldwide market, it is necessary to keep up this trend. System of education for new young specialists and popularization or promotion of membrane processes are very important activity for long time stability and development.

In this respect, we strongly support of your proposal of the Erasmus Mundus Project "Membranes Engineering" prepared by the mentioned consortium. It will significantly contribute to the educational growth of young membrane engineering.

Signature and stamp:

**MEGA a.s.**  
IČ: 44567146  
Drahobejlova 1452/54  
(05) 190 00 Praha 9 - Vysočany

Name: LUBOS NOVAK  
Position: Managing director and the sole member of the Board of Directors  
Place and Date: Straz pod Ralskem, Czech Republic 17<sup>th</sup> March 2010

Bank: UniCredit Bank Czech republic a.s.  
Na Příkopě 20, 111 21 Praha 1  
Account No: 318881-004 / 2700  
VAT: CZ44567146  
IN: 44567146



Tel.: +420 487 888 100  
Fax: +420 487 888 102  
Mobile: +420 724 076 272  
e-mail: [jana.hauftova@mega.cz](mailto:jana.hauftova@mega.cz)  
<http://www.mega.cz>

Registered Office: Drahobejlova 1452/54, 190 00 Prague 9 - Vysočany  
The company is registered in the Commercial Register maintained by the Municipal Court in Prague, Section B,  
Insert No. 9113.

Full Name: Dr.-Ing. Jaroslav Přidal  
Address: Wonkova 799  
Postcode: 500 02  
Town/city: Hradec Králové  
Country: Czech Republic  
Tel.: +420495499072  
Fax: +420495499072  
Director: Dr.-Ing. Jaroslav Přidal

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, Dr.-Ing. Jaroslav Přidal confirm that Mikropur, s.r.o. expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. The cooperation in the field of membrane separation between our institution and Institute of Chemical Technology, Prague has been very fruitful during last several decades not only in exchange of ideas, but also in mutual development of several scientific instruments, e.g. simulated moving bed chromatograph, series of RO/UF/MF units ARNO or various pervaporation cells. All these units serve successfully in academia as well as in industry. I believe that proposed program will enhance our mutual research capacity.

Signature and stamp:

**MIKROPUR s.r.o.**  
Wonkova 799  
500 02 Hradec Králové 2

Name: Jaroslav Přidal  
Position: Director of Mikropur, s.r.o.  
Place and Date: Hradec Králové, 22.2.2010



Full Name: MemBrain, s.r.o.  
Address: Pod Vinicí 87  
Postcode: 471 27  
Town/city: Straz pod Ralskem  
Country: Czech Republic  
Tel.: +420 487 888 304  
Fax: +420 487 888 102  
President/Director: Ing. Ales Cernin, Ph.D.  
Contact person's name: Ing. Ales Cernin, Ph.D.

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, **Aleš Černín** - *managing director and corporate agent*, confirm that RD engineering company **MemBrain** expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. Although the field of membrane processes represents the most up-to-date technical and technological branch worldwide, penetrating all strategic application areas, as well as one of the branches of the Czech industry that are successful nationally and internationally, the research capacities within the Czech Republic have been very fragmented so far. Moreover, there is neither systematic education program in this field at all educational levels, nor sufficient administrative support of this field from the point of view of standards, certifications etc. Another problem is marked with the fact that the subjects of research activity, primarily at academic centers, are usually remote from the market requirements and the subsequent know-how transfer into industrial implementation is little efficient. This fact not only decreases substantially the efficiency of conducted research and invested financial resources, but also hinders the transfer of its results into practice.

It is great pleasure to support of your proposal of the Erasmus Mundus Project "Membranes Engineering" prepared by the mentioned consortium. It will significantly contribute to the educational growth of young membrane engineering.

Company MemBrain can offer the participation in this project based on our experience with implementations and training or practice courses for students and young membrane engineers. Membrane Innovation Centre in Straz pod Ralskem, under modern coordination and management of MemBrain offer a very flexible and efficient workplace for the set activities in the field of membrane processes.

Signature and stamp:



 MemBrain  
Pod Vinicí 87  
471 27 Stráž pod Ralskem  
-6- IČ: 28676092

Name: ALES CERNIN  
Position: Managing director and Corporate Agent  
Place and Date: Straz pod Ralskem, Czech Republic; 17<sup>th</sup> March 2010



Full Name: Nick Corner-Walker  
Address: Alfa Laval Nakskov A/S - Business Centre Membranes  
Postcode: DK-4900  
Town/city: Nakskov  
Country: Denmark  
Tel.: +45 54 97 18 00  
Fax: +45 70 20 49 10  
President/Director: Nick Corner-Walker  
Contact person's name: Dr. Frank Lipnizki

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, Nick Corner-Walker, Managing Director of the Alfa Laval Business Centre Membrane confirm that Alfa Laval expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering. Alfa Laval is one of the leading European producers of membranes and membrane systems for food, life science, environmental and process industry. Therefore, we would like to support the proposal for the creation of a Erasmus Mundus Master programme in Membrane Engineering.

The creation of such a Master Programme would not only contribute to the educational growth of the young engineers, but it would also increase the European competitiveness in the field of membrane engineering by ensuring that researchers with advanced knowledge of membrane technology are available for industrial R&D. This programme will further ensure that the European excellence in innovation in membrane technology will be sustainable, and the European position compared to worldwide competition in this fast growing and developing technology will be secured. Hence, the Erasmus Mundus Master programme in Membrane Engineering would provide the foundation for maintaining and strengthening the position of European membrane and membrane system producers and as such Alfa Laval.

Signature and stamp:

Alfa Laval Nakskov A/S  
Stavangervej 10  
DK-4900 Nakskov  
tel +45 7020 4900 fax +45 7020 4910  
[www.alfalaval.com](http://www.alfalaval.com)

Name: Nick Corner-Walker  
Position: Managing Director  
Place and Date: Nakskov, 10<sup>th</sup> March 2010

# Céramiques Techniques et Industrielles s.a.s

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**CTI**

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La Resclause, 382 Avenue du Moulinas  
30340 SALINDRES - FRANCE

Site Internet : [www.ctisa.fr](http://www.ctisa.fr)

Tél : (33) 04.66.85.88.70

Fax : (33) 04.66.85.70.09

Email : [ctisa@ctisa.fr](mailto:ctisa@ctisa.fr)

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Salindres on Tuesday 20<sup>th</sup> of april 2010

### **Project title:** *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, *Nadine Del Bianco*, confirm that the company *Céramiques Techniques Industrielles (CTI sas)* expresses its strong support to the application of Erasmus Mundus Master program in Membrane Engineering.

CTI SA is a French producer of ceramic membranes and filters for liquid and gas treatments. It is strongly involved in several national and European programs of Research and Development. We are convinced that European companies like CTI SA could strongly benefit of such education program to strengthen the position of the European Union in the competitive field of membrane production and membranes technologies.

In case of success of this application, our company claims that it is ready to financially support this education program by directing to it one part of its research and development tax credit (*crédit d'impôt-recherche*) and of its training tax (*taxe d'apprentissage*).

Signature





Prof Karel Bouzek  
Technica 5  
168 28 Prague 6  
Czech Republic

**Vos références**

**Nos références** HT20-C2009- 049 /DNL

**Interlocuteur** M D, Noël

**Téléphone** 01 60 73 63 19

**Objet** Letter of intent for supporting the European Master in Membrane Engineering

Les Renardières, april 2, 2009

Dear Professor,

You have transmitted us the Erasmus Mundus project for an European Master in Membrane Engineering.

I am pleased to confirm the interest and the support from EDF R&D for this project. Our interest comes from the progress in membrane engineering and the wide applications it will allow, going from energy issues (fuel cells) to environmental control issues (liquid waste control from power plants, gas separation, water purification).

This program is very useful and will contribute to assure a high quality level formation, and we are ready to open some possibilities (training periods, fellowship) in our laboratories.

Sincerely yours

Didier Noël

Senior Scientist

Copie : H. Catalette

Page 1/1

EDF R&D  
Département Matériaux et  
Mécanique des Composants

Site des Renardières  
Avenue des renardières  
Ecuelles  
77818 MORET SUR LOING

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Télécopie +33 (0)1 60 73 68 89

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552 081 317 R.C.S. Paris

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Département certifié ISO 9001 Ed 2000 par DNV



**TOTAL**

Dr. Francis Luck  
Research Manager  
Corporate Science&Technology/Catalysis and Process Engineering  
TOTAL S.A – 2 place Jean Millier  
F-92078 Paris la Défense Cedex  
Tel.: +33 1 47 44 63 21  
Fax: +33 1 47 44 44 94

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: Erasmus Mundus Master In Membrane Engineering

I, the undersigned, Dr. Francis Luck, confirm that Total expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering, after having reviewed the objectives of this high quality project. This training partnership will attract talented young international students to advanced studies in this area, strengthening herewith the leadership of the European Union in the applications of membrane technologies.

Since all our Branches have developed either R&D projects or practical applications of membranes for various separations, we are willing to:

- host students for traineeships in our research centres;
- open positions at Total to the students graduated within this programme on a fair basis with other candidates.

I look forward to the success of your ambitious project.

Signature and stamp:

**TOTAL S.A.**  
*Direction Scientifique*  
2 place Jean Millier  
92078 PARIS LA DEFENSE CEDEX  
Tél. : 01 47 44 45 46

Name: Dr. Francis Luck  
Position: Research Manager  
Place and Date: Paris la Défense, March 11, 2010



Maisons-Laffitte, April 10th, 2009

### Letter of support

During the last years, membrane technology has emerged, as one of the main contributor to solve water problems. The stringent regulation in the industrialized countries and the increase in scarcity of water in several places promote the use of membrane for water treatment. Based on two decades of experience, water companies, municipalities and industries operate nowadays several thousands of membrane plants delivering everyday more than 50 millions m<sup>3</sup> of treated water. This number is however still quite small (less than 1% of overall water treatment plants) and it is expected that this number will grow quite rapidly in the near future. An annual growth of 10% is anticipated in the next 10 years with both desalination and water reclamation expected to grow at a faster rate than other applications.

I, therefore strongly support the proposal for the creation of a Joint European Master in "Membrane Engineering" in the frame of Erasmus Mundus actions as it will significantly contribute to the educational growth of young membrane engineers.

Best regards



Jean-Christophe Schrotter  
Membrane R&D Director  
Water research Center  
Veolia  
France

President: Grazia Valentini  
Director: Massimo Scagliarini  
Contact person's name: Soccorso Gaeta

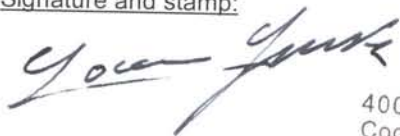
## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: *Erasmus Mundus Master In Membrane Engineering*

I, the undersigned, Soccorso Gaeta confirm that GVS S.P.A. expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

Signature and stamp:



**GVS S.p.A.**  
Via Roma, 50  
40069 Zola Predosa (BO)  
Codice Fiscale 03636630372  
Partita IVA 0 0 6 4 4 8 3 1 2 0 8

Name: Soccorso Gaeta  
Position: Manger – International Cooperation & Consulting Scientist  
Place and Date: Zola Predosa – 23.02.2010



77 B. Nizhegorodskaya Str.,  
Vladimir 600016  
Russian Federation

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(4922) 47-53-21  
Phone/Fax: (4922) 21-56-74  
E-mail: [vladipor@vtsnet.ru](mailto:vladipor@vtsnet.ru)  
Internet: [www.vladipor.ru](http://www.vladipor.ru)

April 6, 2009

Professor Bouzek

Institute of Chemical Technology, Prague  
Faculty of Chemical Technology  
Department of Inorganic Technology  
Technicka 5  
166 28 Prague 6  
Czech Republic

Dear Professor Bouzek

We have studied the proposed Erasmus Mundus Program and find it extremely interesting both for active players in the field of membranes production and application, and for those who are studying this matter now and need practice. Our company as a manufacturer of various types of membranes will be glad to assist in further exploration of the membrane technologies' full potential

We fully support this initiative and are sure that this program will have a great future.

Truly yours,

Vladimir P. Dubyaga

General Director  
JSC STC "Vladipor"



RUSSIAN ACADEMY OF SCIENCES  
A.V.TOPCHIEV INSTITUTE OF PETROCHEMICAL SYNTHESIS RAS  
(TIPS RAS)

Leninsky prospect 29,  
119991 Moscow, GSP-1, Russia  
Phone: +7 (495) 952-59-27,  
+7 (495) 955-42-01  
Fax: +7 (495) 633-85-20  
e-mail: [tips@ips.ac.ru](mailto:tips@ips.ac.ru)

---

Institute of Chemical Technology  
Faculty of Chemical Technology  
Prof. K. Bouzek  
Technika 5  
166 28 Praque 6  
Czech Republic

Dear Prof Karel Bouzek,

With this letter our Institute, as a world-known research organization in the membrane area, would like to strongly support the proposed Erasmus Mundus Program of Master degree in Membrane Engineering. We believe that such Program is urgently required today because it focuses on the education of high-skilled young scientists in the very important and potential areas such as energy, environment, nanotechnologies, biodevices, biotechnologies, food and health. We hope that this Program will be supported and looking forward for long-term and fruitful collaboration.

With kind regards,  
Alexey Volkov

A.V.Topchiev Institute of Petrochemical Synthesis  
Russian Academy of Science  
Leninsky pr., 29  
Moscow Russia  
119991  
T: +7 495 955 41 62  
F: +7 495 633 85 20  
E: [avolkov@ips.ac.ru](mailto:avolkov@ips.ac.ru)

Prof. Karel Bouzek  
Technicka 5  
166 28 Prague 6  
Czech Republic  
Phone: +420 220 444 019  
Fax: +420 220 444 410  
E-mail: Karel.Bouzek@vscht.cz

Straz p. Ralskem, March 24<sup>th</sup>, 2009

**Subject:** Letter of Intent for supporting the project of European Master in Membrane Engineering


Dear Prof. Bouzek,

Although the field of membrane processes represents the most up-to-date technical and technological branch worldwide, penetrating all strategic application areas, as well as one of the branches of the Czech industry that are successful nationally and internationally, the research capacities within the Czech Republic have been very fragmented so far. Moreover, there is neither systematic education program in this field at all educational levels, nor sufficient administrative support of this field from the point of view of standards, certifications etc. Another problem is marked with the fact that the subjects of research activity, primarily at academic centers, are usually remote from the market requirements and the subsequent know-how transfer into industrial implementation is little efficient. This fact not only decreases substantially the efficiency of conducted research and invested financial resources, but also hinders the transfer of its results into practice.

It is great pleasure to support of your proposal of the Erasmus Mundus Project "Membranes Engineering" prepared by the mentioned consortium. It will significantly contribute to the educational growth of young membrane engineering.

Company MemBrain can offer the participation in this project based on our experience with implementations and training or practice courses for students and young membrane engineers. Membrane Innovation Centre in Straz pod Ralskem, under modern coordination and management of MemBrain offer a very flexible and efficient workplace for the set activities in the field of membrane processes.

Best regards



Ales Cernin  
Registered Agent  
MemBrain s.r.o.



Institute of Chemical Technology  
Faculty of Chemical Technology  
Prof. K. Bouzek  
Technika 5  
166 28 Praha 6  
Czech Republic

Date : 27 February 2009  
Your ref. : -  
Our ref. : JV/TZ ECN-EI-2009-54

Tel direct : +31 224 56 4916  
Fax direct : +31 224 56 8615  
E-mail : vente@ecn.nl

Subject : Letter of support for the European Master in Membrane Engineering

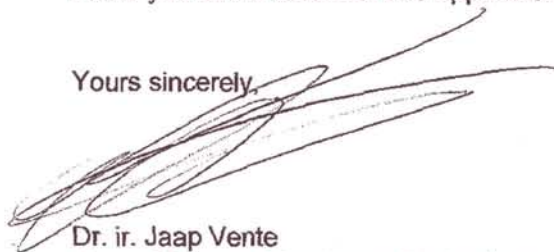
Dear Prof Karel Bouzek,

I have been reading your plans for a European Master degree in Membrane Technology with great interest. The application of membranes is of great interest to a large number of fields, and those are covered in your program. Still, the actual application of membranes is relatively limited if one considers the full potential. A further strengthening of the knowledge bases within Europe is highly desirable and your proposal is a timely attempt to achieve this. Within the proposed consortium recognised centres of excellence are gathered, thus securing the quality of the education provided.

For these reasons ECN supports this application whole heartily. As a research institute dedicated to bringing technology to the market, we open our doors frequently to visiting students to perform a part of their education in non-university environment. We will be more than willing to invite suitable candidates from your curriculum as well.

I wish you all the best with this application and I am looking forward to hear any progress.

Yours sincerely,



Dr. ir. Jaap Vente  
Group Manager Membrane Technology  
ECN Efficiency & Infrastructure

## Energy research Centre of the Netherlands



EMS - European Membrane Society

26 April 2010

TO WHOM IT MAY CONCERN

This is to certify that the European Membrane Society ([www.emsoc.eu](http://www.emsoc.eu)) is willing to strongly support the Joint European Master in Membrane Engineering. The involvement of the EMS in sponsoring this action has been formally approved at unanimity in the Council Meeting of 6 April 2009.

The Master at European level will permit the creation of new and legally recognized professional expertises in a scientific and technological sector that is widely considered strategic for the sustainable growth of the modern society. In addition, this instrument created at European level among top level universities will catalyze the adaptation of educational system in other EU Member States.

Based on these challenging perspectives, the EMS is very pleased to contribute to the programme. In particular, The EMS will:

- Support the formation by promoting the participation of EMS members to the courses, to the tutorial of students during projects and to the programme committees
- Be a catalyst to promote the exchanges between students, industrialists and researchers
- Favour the insertion of students in industry during their training course or later for a job position
- Participate to develop the networking area and the public area in the E-learning platform by contributing to the running cost of the platform
- Support special events, such as master thesis defence, participation of students to conference and schools
- Offer EMS membership to the students during one year after the defence of their master
- Be ready to appear as a supporting partners in the official document of the Erasmus Mundus programme
- Create a new section in the Membrane News for the dissemination of the Master activities.

*President, European Membrane Society*

Lidietta Giorno,

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*The Statutes of the European Membrane Society are officially registered at the Prefecture de la Haute-Garonne, Toulouse, France under # 11681, 26 February 1982.*

Montpellier, April 6 2010

The idea to create a new European Master and PhD in “Membrane Engineering” have grown during the project of Network of Excellence NanoMempro conducted between October 2004 and February 2009 by a consortium of 13 European partners (EC project - NMP3-CT-2004-500623-“Expanding membrane macroscale applications by exploring nanoscale material properties”).

Today, the Erasmus Mundus program provides the opportunity to support the implementation of this important project.

The new Durable Integrated Structure (DIS), the so-called “European Membrane House” (EMH), set up specifically to coordinate all future R&D operations in this area after the end of NanoMemPro, can only turn to the project whose primary objective is the preparation of a new kind of specialist able to embrace all facets of this new discipline, from materials to processes aspects through modelling, simulation...Who better than these specialists can feed the new operations to drive?

On its turn, the EMH will support through its daily work and as far as needed the new cursus (search for new training periods in industry, lobbying for new funding, and presentation of the Master/PhD through international contacts...).



Prof. Gilbert M. Rios – CEO EMH





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Tel.: +420 487523854  
Fax:  
President/Director: Luboš Novák, President  
Contact person's name: Miroslav Bleha, Executive Director

## LETTER OF SUPPORT

To: Université Montpellier 2 Sciences et Techniques  
Contact person's name: Prof. André Ayrat  
Address: Place Eugène Bataillon, CC047  
Postcode: 34095  
Town/city: Montpellier Cedex 05  
Country: FRANCE

Project title: Erasmus Mundus Master In Membrane Engineering

I, the undersigned, Miroslav Bleha, confirm that Czech Membrane Platform expresses its strong support to the application of Erasmus Mundus Master programme in Membrane Engineering.

The field of membrane processes represents one of the most up-to-date technical and technological branch worldwide. It has a potential to penetrate all strategic application areas not only in the Czech industry, but also on the international level. Therefore absence of systematic highly qualified education programme in this field at all educational levels represents an important drawback. Additional aspect of the current situation represents inefficient transfer of knowledge generated within the academic institutions to the industrial practice. Profit obtained is thus not adequate to the resources invested into the research activities. With gladness I have seen, that your proposal of Joint European Master's degree addresses also this issue.

In this respect, Czech Membrane Platform representing beside its academic members also participating industry strongly supports the proposal for the creation of Joint European Master programme in "Membrane Engineering" in the frame of ERASMUS MUNDUS Program as it will significantly contribute to the educational growth of young membrane engineering generation.

Czech Membrane Platform can offer the cooperation in this project based on experience of its members in the field.

Signature and stamp:

Česká membránová platforma o.s.  
Myslbekova 2447  
470 01 Česká Lípa  
IČ: 226 88 218  
(1)

Name: Miroslav Bleha  
Position: Executive Director  
Place and Date: Česká Lípa, March 18, 2010

## **Appendix 3: Content and detailed description of the courses**

### **Appendix 3.1. Content of the EM3E Master programme per semester.**

<b>Semester 1: UM2+UPS France (30 ECTS)</b>			
<b>Module 1.A.1 – 24 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Characterization of porous materials	Mandatory	3	UM2-UPS
Colloid and surface engineering	Optional	3	UPS
Structural characterization of solids	Optional	3	UM2
<i>Speciality 1 – Materials Science</i>			UM2
Inorganic materials	Mandatory	3	UM2
Polymer materials	Mandatory	3	UM2
Hybrid and composite Materials	Mandatory	3	UM2
Materials for chemical reactions/ heterogeneous catalysis	Mandatory	3	UM2
<i>Speciality 2 – Chemical Engineering</i>			UPS
Transport phenomena	Mandatory	3	UPS
Thermodynamics, kinetics and reactivity	Mandatory	3	UPS
General chemistry and physico-chemical analytical methods	Mandatory	3	UPS
Separation science	Mandatory	3	UPS
Individual project (bibliographic and experimental study)	Mandatory	6	UM2-UPS
<b>Module 1.A.2 – 6 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Safety, Security, Health and Environmental Law	Mandatory	2	UM2-UPS
Quality Assurance and Laboratory Practice	Mandatory	2	UM2-UPS
International and European Working Law	Mandatory	2	UM2-UPS
French language and culture	Mandatory*	-	UM2-UPS

(\*) Mandatory for at least one of first three semesters and associated with an oral presentation of the individual project in the corresponding national language.

<b>Semester 2: ICTP, Czech Republic (30 ECTS)</b>			
<b>Module 2.1 – 24 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Membrane processes	Mandatory	4	ICTP
Process design	Mandatory	5	ICTP
Applied reaction kinetics	Mandatory	4	ICTP
Separation Technology	Mandatory	5	ICTP
Individual project (bibliographic and experimental study)	Mandatory	6	ICTP
<b>Module 2.2 – 6 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Czech language and culture	Mandatory*	-	ICTP
Intellectual capital management	Mandatory	3	ICTP
Valorisation, commercialisation and entrepreneurship	Mandatory	3	ICTP/UTwente

<b>Semester 3: UNL, Portugal (30 ECTS)</b>			
<b>Module 3.A.1 – 30 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Membrane contactors and bioreactors	Mandatory	6	UNL
Membranes in downstream processing	Mandatory	6	UNL
Barrier membranes for food applications	Mandatory	6	UNL
Membranes in regenerative medicine	Mandatory	6	UNL
Individual project (bibliographic and experimental study)	Mandatory	6	UNL
<b>Module 3.A.2 – - ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Portuguese language and culture	Mandatory*	-	UNL

<b>Semester 3: UNIZAR, Spain (30 ECTS)</b>			
<b>Module 3.B.1– 30 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Fundamental properties of nanostructured materials	Mandatory	6	UNIZAR
Preparation of nanostructured materials	Mandatory	6	UNIZAR
Assembly and fabrication of nanostructures	Mandatory	6	UNIZAR
Case studies of industrial applications	Mandatory	6	UNIZAR
Individual project (bibliographic and experimental study)	Mandatory	6	UNIZAR
<b>Module 3.B.2 – - ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Spanish language and culture	Mandatory*	-	UNIZAR

<b>Semester 3: UTwente, The Netherlands (30 ECTS)</b>			
<b>Module 3.C.1 – 30 ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Batteries, fuel cells and electrolysers	Mandatory	5	UTwente
Gas separation membranes and gas treatment	Mandatory	5	UTwente
Water treatment	Mandatory	5	UTwente
Membrane process plant design	Mandatory	5	UTwente
Microdevices and sensors	Mandatory	4	UTwente
Individual project (bibliographic and experimental study)	Mandatory	6	UTwente
<b>Module 3.C.2 – - ECTS</b>			
<i>Course</i>	<i>Type</i>	<i>ECTS</i>	<i>Responsibility</i>
Dutch language and culture	Mandatory*	-	UTwente
<b>Semester 4: 30 ECTS</b>			
<b>Module 4 - 24 weeks, research assignment in industry or university</b>			

**Appendix 3.2. Detailed description of the contents of the scientific courses**

<b>Course name</b>			
Characterisation of porous materials			
<b>ECTS Credits</b>	3	<b>Semester</b>	S1
		<b>Type</b>	Mandatory
<b>Used sources</b>	<ol style="list-style-type: none"> <li>Lecture notes</li> <li>Slide shows</li> <li>Methods for the characterisation of porous structure in membrane materials" A. JULBE, J.D.F. RAMSAY, in "Fundamentals of Inorganic Membrane Science and Technology", Membrane Science and Technology Series 4, Ed. A.J. Burggraaf and L. Cot, Elsevier (Amsterdam, NL), Chapter 4, 1996, pp: 67-118.</li> </ol>		
<b>Short description of course contents</b>	<ol style="list-style-type: none"> <li>Description of porous materials- Definitions</li> <li>Static characterisation techniques               <ol style="list-style-type: none"> <li>Stereology</li> <li>Intrusive methods</li> <li>Non intrusive methods</li> </ol> </li> <li>Dynamic characterisation techniques               <ol style="list-style-type: none"> <li>Rejection measurements</li> <li>Liquid displacement techniques</li> </ol> </li> </ol>		
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b></p> <ol style="list-style-type: none"> <li>To know general concepts about porous materials and porosity</li> <li>To have a general knowledge about the main techniques for the characterization of porosity</li> <li>To be able to develop an analytical strategy and analytical methods for the characterisation of porosity</li> </ol> <p><b>Generic Competences</b></p> <ol style="list-style-type: none"> <li>Communication skills. Preparation and display of 'posters' reporting project work</li> <li>To perform bibliographic searches and to process the acquired information</li> <li>Ability to perform team-work</li> </ol>		
	<b>Credits ECTS</b> (h) 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>
Lectures	0,6 (15)	Lectures by teaching staff	1, 2, 3
Seminars	0,2 (5)	Presentations by external professionals and researchers	1, 2, 3
Laboratory courses	0,4 (10)	Lab coursed in groups. Characterization of different types of porous materials	2, 3
Tutorials	0,4 (10)	Solving exercises Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3
Collaborative project	0,4 (10)	Discussion and analysis of the results obtained in the laboratory.	2, 3, 4, 5, 6
Self-study, working individually	0,8 (20)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6
Evaluation	0,2 (5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6
<b>System for assessment and evaluation</b>	<ol style="list-style-type: none"> <li>Assistance and participation in class and laboratory</li> <li>Personal assignments</li> <li>Oral Presentation</li> <li>Examination</li> </ol>		

<b>Course name</b>			
Colloid and surface engineering			
<b>ECTS Credits</b>	3	<b>Semester</b>	S1
		<b>Type</b>	Mandatory
<b>Used sources</b>	4. <i>R.F. Probstein, Physico-chemical hydrodynamics,</i> 5. <i>Hiemenz, Principles of colloid and surface chemistry, Deker, 1986</i> 6. <i>Mohamed Dauoud, Claudine E. Williams, Soft Matter Physics, Springer, 1999</i>		
<b>Short description of course contents</b>	1. Intermolecular and surface forces and their consequences in term of surface interaction 2. Electro-kinetics phenomena (electrophoresis, electro-osmosis ...) 3. Colloidal properties (stability, coagulation, ...) 4. Practice of product formulation		
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b></p> 6. To know general concepts about surface forces and their consequences on colloids and nanoparticles properties 7. To be able to estimate electro-kinetics phenomena 8. To be able to estimate the stability of colloids 9. To know the effect of the suspendant fluid on the properties of dispersed particles 10. To know the practice of product formulation <p><b>Generic Competences</b></p> 7. To perform bibliographic searches and to process the acquired information 8. Ability to perform team-work 9. Ability to manage operators		
	<b>Credits ECTS (h)</b>	<b>Methodology</b>	<b>Relationship with competences</b>
	1ECTS=25h		
Lectures	1 (25)	Lectures by teaching staff	1, 2, 3, 4
Laboratory courses	0,6 (15)	Lab coursed in groups. Examples: Distillation, Absorption, Reactor, Extraction...	2, 3, 4, 5
Collaborative project "Lab course director"	0,6 (15)	A team-work manages a process and the students working on it. The team work analyse the whole data obtained on the process.	5, 6, 7, 8
Self-study, working individually	0,6 (15)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7
Evaluation	0,2 (5)	Oral presentations of the "Lab course director" Examinations	1, 2, 3, 4, 5, 6, 7
<b>System for assessment and evaluation</b>	5. Assistance and participation in class and laboratory 6. Personal assignments 7. Oral Presentation 8. Examination		

<b>Course name</b>					
Structural characterization of solids					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Mandatory
<b>Used sources</b>		7. Lecture notes 8. Slide shows			
<b>Short description of course contents</b>		5. Fundamentals on interactions of radiation with matter 6. X-ray absorption spectroscopy (EXAFS and XANES) 7. Solid-state NMR 8. Vibrational spectroscopies (IR and Raman) 9. X-ray scattering and related techniques 10. Surface analysis techniques			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>11. To know general concepts about interactions of radiation with solids 12. To have a general knowledge about the main techniques for the structural characterization of solids 13. To be able to develop an analytical strategy and analytical methods for the characterisation of solids</p> <p><b>Generic Competences</b></p> <p>14. Communication skills. Preparation and display of 'posters' reporting project work 15. To perform bibliographic searches and to process the acquired information 16. Ability to perform team-work</p>			
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h		<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures	0,6	(15)	Lectures by teaching staff	1, 2, 3	
Seminars	0,2	(5)	Presentations by researchers	1, 2, 3	
Laboratory courses	0,4	(10)	Lab coursed in groups. Sample cross-testing programs of characterization	2, 3	
Tutorials	0,4	(10)	Solving exercises Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3	
Collaborative project	0,4	(10)	Discussion and analysis of the results obtained in the laboratory.	2, 3, 4, 5, 6	
Self-study, working individually	0,8	(20)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6	
Evaluation	0,2	(5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6	
<b>System for assessment and evaluation</b>		9. Assistance and participation in class and laboratory 10. Personal assignments 11. Oral Presentation 12. Examination			

<b>Course name</b>					
Inorganic materials					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Homologation
<b>Used sources</b>		9. Lecture notes 10. Slide shows			
<b>Short description of course contents</b>		1. Chemical bonding and solid state properties 2. Metals and alloys 2.1. Extractive metallurgical – examples of Fe and Al 2.2. Solidification and precipitation in solid solutions 2.3. Thermal treatments and transition curves 3. Glasses and vitreous state 3.1. Glass transition 3.2. Glass compositions 3.3. Glass properties 4. Ceramics 4.1. Particle packing and rheology of concentrated suspensions 4.2. Different stages of the ceramic process 5. Hydraulic binders, cements, mortars and concretes 6. Films and coatings 6.1. Liquid phase deposition methods 6.2. Vapour phase deposition methods 7. Different types of inorganic membranes			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> 17. To get basic knowledge about the main types of inorganic materials 18. To get basic knowledge about the deposition methods for the preparation of inorganic coatings and thin films 19. To get a first overview on the different types of inorganic membranes. <p><b>Generic Competencies</b></p> 20. Communication skills. Preparation and display of 'posters' reporting project work 21. To perform bibliographic searches and to process the acquired information			
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h		<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures	1	(25)	Lectures by teaching staff	1, 2, 3	
Seminars	0,2	(5)	Presentations by external professionals	1, 2, 3	
Laboratory courses	0,4	(10)	Lab coursed in groups. Preparation of ceramic membranes.	1, 2, 3	
Tutorials	0,4	(10)	Solving exercises Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3	
Self-study, working individually	0,8	(20)	Preparation of assignments Personal study	1, 2, 3, 4, 5	
Evaluation	0,2	(5)	Oral presentations Examinations	1, 2, 3, 4, 5	
<b>System for assessment and evaluation</b>		13. Assistance and participation in class and laboratory 14. Personal assignments 15. Oral Presentation 16. Examination			



<b>Course name</b>					
Polymer materials					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Homologation
<b>Used sources</b>		11. Lecture notes 12. Slide shows			
<b>Short description of course contents</b>		11. Introduction, Definitions & Nomenclature 12. Classification of Polymers & Basic Morphology 13. Polymer processing and synthesis 14. Mechanical and Thermal properties 15. Copolymers & Advanced Morphology 16. Smart polymers and polymeric materials 17. The world market of plastic industry 18. Polymers in membrane technologies 19. Current trends in polymer membranes			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> 22. To gain understanding in polymer materials. 23. To prepare and characterize the main polymers. 24. To be able to choose the right polymer in function of the application ( eg. membrane application). 25. To understand the ties between chemical structure, morphology and properties 26. To know the world plastic market and the future trends <p><b>Generic Competences</b></p> 10. Communication skills. Preparation and display of 'posters' reporting project work 11. To perform bibliographic searches and to process the acquired information 12. Ability to perform team-work			
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h		<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures	0,6	(15)	Lectures by teaching staff	1, 2, 3, 4, 5	
Seminars	0,2	(5)	Presentations by external professionals	1, 3, 4, 5	
Laboratory courses	0,4	(10)	Lab coursed in groups. Polymer syntheses and chaaracterization	2, 3, 4, 5	
Tutorials	0,4	(10)	Solving exercises Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3, 4, 5	
Collaborative project	0,4	(10)	Discussion and analysis of the results obtained in the laboratory.	2, 3, 4, 5, 6, 7, 8	
Self-study, working individually	0,8	(20)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7, 8	
Evaluation	0,2	(5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6	
<b>System for assessment and evaluation</b>		17. Assistance and participation in class and laboratory 18. Personal assignments 19. Oral Presentation 20. Examination			

<b>Course name</b>					
Hybrid and composite materials					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Mandatory
<b>Used sources</b>		13. Lecture notes 14. Slide shows			
<b>Short description of course contents</b>		20. General definitions of hybrid and composite materials a. Hybrid materials: definition and properties b. Composite materials: definition and main properties 21. Surface grafting 22. Preparation, shaping of hybrid and composite materials 23. Industrial applications of hybrid and composite materials 24. Hybrid and composite membranes			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>27. To know general concepts about hybrid and composite materials and surface grafting</p> <p>28. To be able to prepare hybrid and composite materials and apply the previous knowledge acquired in membrane technology</p> <p><b>Generic Competences</b></p> <p>29. Communication skills. Preparation and display of 'posters' reporting project work</p> <p>30. To perform bibliographic searches and to process the acquired information</p> <p>31. Ability to perform team-work</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		0,6 (15)	Lectures by teaching staff	1, 2	
Seminars		0,2 (5)	Presentations by external professionals	1, 2	
Laboratory courses		0,4 (10)	Lab coursed in groups. Preparation of hybrid and composite materials	2	
Tutorials		0,4 (10)	Solving exercises Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2	
Collaborative project		0,4 (10)	Discussion and analysis of the results obtained in the laboratory.	1, 2, 3, 4, 5	
Self-study, working individually		0,8 (20)	Preparation of assignments Personal study	1, 2, 3, 4, 5	
Evaluation		0,2 (5)	Oral presentations Examinations	1, 2, 3, 4, 5	
<b>System for assessment and evaluation</b>		21. Assistance and participation in class and laboratory 22. Personal assignments 23. Oral Presentation 24. Examination			

<b>Course name</b>					
Materials for chemical reactions – heterogeneous catalysis					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Mandatory
<b>Used sources</b>		15. Lecture notes 16. Slide shows			
<b>Short description of course contents</b>		1. Catalysis et catalytic processes 1.1. Basic principles of heterogeneous catalysis 1.2. Preparation and characterisation of catalytic materials 1.3. Redox catalysis 1.4. Acid-base catalysis 1.5. Industrial processes based on heterogeneous catalysis 2. Membrane reactors using inorganic membranes 2.1. Basic concepts 2.2. Membrane materials 2.3. Studies of cases			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>32. To know general concepts about heterogeneous catalysis, catalytic materials and membrane reactors 33. To be able to apply previous knowledge acquired in membrane reactors and catalytically active membranes with membranes 34. To prepare and to apply catalytically active membranes</p> <p><b>Generic Competences</b></p> <p>35. Communication skills. Preparation and display of 'posters' reporting project work 36. To perform bibliographic searches and to process the acquired information</p>			
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h		<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures	1	(25)	Lectures by teaching staff	1, 2, 3	
Seminars	0,2	(5)	Presentations by external professionals	1, 2, 3	
Laboratory courses	0,4	(10)	Lab coursed in groups. Preparation and application catalytic membranes	1, 2, 3	
Tutorials	0,4	(10)	Solving exercises Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3	
Self-study, working individually	0,8	(20)	Preparation of assignments Personal study	1, 2, 3, 4, 5	
Evaluation	0,2	(5)	Oral presentations Examinations	1, 2, 3, 4, 5	
<b>System for assessment and evaluation</b>		25. Assistance and participation in class and laboratory 26. Personal assignments 27. Oral Presentation 28. Examination			

<b>Course name</b>					
Transport phenomena					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Homologation
<b>Used sources</b>		17. R. Byron Bird, Warren Stewart, et E.N. Lightfoot, <i>Transport Phenomena</i> , John Wiley & Sons Ltd, 2007			
<b>Short description of course contents</b>		25. Fluid dynamic (momentum transfer) 26. Mass transfer 27. Heat transfer 28. Coupled transfer phenomena in processes 29. Macroscopic mass and heat balance in processes			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>37. To know general concepts about transport phenomena and the analogy between momentum, mass and heat transfer</p> <p>38. To be able to develop momentum, mass and heat balances to determine velocity, concentration or temperature variation</p> <p>39. To be able to use adimensional corelation to estimate friction, mass transfer or heat transfer coefficient at interface</p> <p>40. To know the consequences of the coupling of transport phenomena in main processes</p> <p>41. To be able to evaluate the limiting transport phenomena in a processes through the calculation of an adimensionnal number</p> <p><b>Generic Competences</b></p> <p>13. To perform bibliographic searches and to process the acquired information</p> <p>14. Ability to perform team-work</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		1 (25)	Lectures by teaching staff	1, 2, 3, 4,5	
Laboratory courses		0,6 (15)	Lab coursed in groups. Examples: Fluid dynamics, Mass transfer coefficient, Heat conductivity ...	2, 3, 4, 5	
Collaborative project		0,4 (10)	Team-work on the description of transfer problem in a process	2, 3, 4, 5, 6, 7	
Self-study, working individually		0,8 (20)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7	
Evaluation		0,2 (5)	Oral presentations of the project Examinations	1, 2, 3, 4, 5	
<b>System for assessment and evaluation</b>		29. Assistance and participation in class and laboratory 30. Personal assignments 31. Oral Presentation 32. Examination			

<b>Course name</b>					
Thermodynamic, kinetics and reactivity					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Mandatory
<b>Used sources</b>		18. P.W. Atkins, <i>Physical Chemistry, Oxford, 1990</i> 19. 20.			
<b>Short description of course contents</b>		30. Thermodynamic of ideal and non ideal phase 31. Kinetics of complex reactions (chain reaction, polymerisation, catalysis ...) 32. Processes at solid surface (adsorption, catalytic activity ...)			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> 42. To know general concepts about thermodynamics and changes of state 43. To be able to calculate equilibrium in solids or fluids 44. To be able to estimate reaction rates (in homogeneous and heterogeneous conditions) 45. To know how to describe non ideal solution 46. To know the application of surface reactivity in processes <p><b>Generic Competences</b></p> 15. To perform bibliographic searches and to process the acquired information 16. Ability to perform team-work 17. Ability to explain a concept			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		1 (25)	Lectures by teaching staff	1, 2, 3, 4, 5	
Laboratory courses		0,6 (15)	Lab coursed in groups. Examples: Distillation, Absorption, Reactor, Extraction...	2, 3, 4, 5	
Collaborative project "Physico-chemical course"		0,6 (15)	A team-work will prepare a course to explain a concept in physical chemistry. T	6, 7, 8	
Self-study, working individually		0,6 (15)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7	
Evaluation		0,2 (5)	Oral presentations of the "Physico-chemical course" Examinations	1, 2, 3, 4, 5, 6, 7	
<b>System for assessment and evaluation</b>		33. Assistance and participation in class and laboratory 34. Personal assignments 35. Oral Presentation 36. Examination			

<b>Course name</b>					
General chemistry and physico-chemical analytical methods					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Mandatory
<b>Used sources</b>	21. <i>Daniel C. Harris, Quantitative Chemical Analysis, W.H.Freeman &amp; Co Ltd, 2006</i> 22.				
<b>Short description of course contents</b>	33. General chemistry 34. Fundamental physical and chemical theories underlying analytical chemical measurements 35. Instrumentation for chemical and physical measurements 36. Development and application of analytical chemical methods				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b></p> <p>47. To know general concepts about chemistry and the way to determine chemical composition and physical properties 48. To know the possible application of the physico-chemical methods 49. To be able to choose the correct instrumentation for an analysis 50. To be able to use an instrument for chemical and physical measurements 51. To know the good practice for an analysis</p> <p><b>Generic Competencies</b></p> <p>18. To perform bibliographic searches and to process the acquired information 19. Ability to perform team-work 20. To perform lab work with the Good Laboratory Practice</p>				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Lectures	1 (25)	Lectures by teaching staff	1, 2, 3		
Laboratory courses	0,6 (15)	Lab coursed in groups.	2, 4, 5, 7, 8		
Collaborative project "An analysis for a problem"	0,6 (15)	A team-work has to find the instrumentation to use, the operating conditions, and the procedure for a fixed problem.	6, 7, 8		
Self-study, working individually	0,6 (15)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7		
Evaluation	0,2 (5)	Oral presentations of the "An analysis for a problem" Examinations	1, 2, 3, 4, 5, 6, 7		
<b>System for assessment and evaluation</b>	37. Assistance and participation in class and laboratory 38. Personal assignments 39. Oral Presentation 40. Examination				

<b>Course name</b>					
Separation science					
<b>ECTS Credits</b>	3	<b>Semester</b>	S1	<b>Type</b>	Mandatory
<b>Used sources</b>	<p>23. <i>Separation Process Engineering</i>, Phillip C. Wankat 2006  24. <i>Separation Process Technology</i>, Jimmy Humphrey, George Keller, 1997  25. <i>Chemical Engineering: Particle Technology and Separation Processes</i>, J.M. Coulson, J.F. Richardson, J.R. Backhurst, J.H. Harker, 1996</p>				
<b>Short description of course contents</b>	<p>37. Role of separation science in industry  38. Physico-chemical processus involved in separation  39. Separating agents and associated technologies  40. Efficiency and capacity of separation processes  41. Elements for process selection</p>				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b>  52. To know general concepts about separation processes and their role in industry  53. To be able to associate a separating agent to a separation technology  54. To know the scientific fundaments of separation processes  55. To be able to estimate the efficiency and the capacity of a separation process (the modelling aspects of the processes will be given in semester 2 in the course Separation Technology)  56. To know simple criteria to choose a separation processes</p> <p><b>Generic Competences</b>  21. To perform bibliographic searches and to process the acquired information  22. Ability to perform team-work  23. Ability to communicate</p>				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Lectures	1 (25)	Lectures by teaching staff	1, 2, 3, 4, 5		
Laboratory courses	0,6 (15)	Lab coursed in groups. Examples: Distillation, Absorption, Extraction...	1, 2, 4		
Collaborative project "Physico-chemical course"	0,6 (15)	A team-work will work on a project to propose processes in regard to a "separation problem".	1, 5, 6, 7, 8		
Self-study, working individually	0,6 (15)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6		
Evaluation	0,2 (5)	Oral presentations of the "separation problem" Examinations	1, 2, 3, 4, 5, 7, 8		
<b>System for assessment and evaluation</b>	<p>41. Assistance and participation in class and laboratory  42. Personal assignments  43. Oral Presentation  44. Examination</p>				

<b>Course name</b>					
Individual project					
<b>ECTS Credits</b>	6	<b>Semester</b>	S1-S3	<b>Type</b>	Mandatory
<b>Used sources</b>		26. Data bases ( like SciFinder Scholar – CAS), University library 27. Documents (papers, theses, books, patents) 28. Laboratory			
<b>Short description of course contents</b>		In the individual project, the student conducts a bibliographic and/or experimental study. The project is formulated and carried out in consultation with a supervisor. A report is presented at the end of the project and the project presented orally and discussed publicly. External experts may be invited for monitoring the progress and/or attendance of oral presentations.  1. Bibliographic study 2. Experimental study 3. Preparation of a written report 4. Oral presentation and defense			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b> 57. The ability to deal with and address specific problems, and to integrate previous knowledge acquired.</p> <p><b>Generic Competences</b> 2. The ability to manage and/or conduct an individual project (bibliographic search and/or experimental study), and to process acquired information. 3. Communication skills; Oral presentation and group discussions.</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Self-study, working individually		5 (125)	Preparation of assignment	1	
Evaluation		1 (25)	Personal study report Oral presentations	2, 3	
<b>System for assessment and evaluation</b>		45. Written report 46. Oral Presentation and defense			



<b>Course name</b>					
Membrane processes					
<b>ECTS Credits</b>	4	<b>Semester</b>	S2	<b>Type</b>	Mandatory
<b>Used sources</b>		29. Richard W. Baker Membrane Technology and Applications, 2nd Edition, John Wiley & Sons, Ltd., 2004 30. T. Sata, Ion Exchange Membranes: Preparation, Characterization, Modification and Application, RSC, 2004. 31. D. Pletcher, F.C. Walsh, Industrial Electrochemistry – Second Edition, Springer, 1990. 32. S.P.Nunes, K.-V. Peinemann, Membrane Technology in the Chemical Industry, Wiley-VCH Verlag GmbH, 2001 33. J.G. Sánchez Marcano and T.T. Tsotsis, Catalytic Membranes and Membrane Reactors			
<b>Short description of course contents</b>		a. Basic membrane types and their preparation b. Characteristic properties of membranes, methods of testing c. Membrane separation processes – classification according to the driving forces d. Membrane separation processes based on the concentration gradient - osmosis, dialysis e. Pressure membrane processes – reverse osmosis, ultrafiltration, microfiltration, nanofiltration f. Electromembrane processes – electrodialysis, electrodeionization g. Ion exchange membranes as a solid electrolyte – “zero-gap” membrane electrolysis h. Utilization of ion exchange membranes in fuel cells i. Micro- and mesoporous membranes for gas and liquid separation j. Mechanism of mass transfer in membranes k. Utilization of membranes in separation technologies, industrial applications l. Membrane reactors for homogeneous reactions m. Membrane reactors for heterogeneous catalytic reactions n. Membrane technologies in chemical industry, directions of development			
<b>Competencies acquired by the student</b>		<b>Specific Competencies</b> 58. To understand general concepts of membrane technology 59. To be able to apply previous knowledge acquired in separation processes and transport phenomena in the separation processes with membranes 60. To understand transport mechanisms in membranes 61. To know the main applications of membranes in separation processes, reactor/separation processes and new applications of technological interest 62. To know basic of membrane preparation and characterization method  <b>Generic Competences</b> 24. Communication skills. Preparation and display of 'posters' reporting project work 25. To perform bibliographic searches and to process the acquired information Ability to perform team-work			
		<b>Credits ECTS (h)</b> 1ECTS=25h		<b>Methodology</b>	<b>Relationship with competences</b>
Lectures		1	(25)	Lectures by teaching staff	1, 2, 3, 4, 5
Seminars		1,2	(30)	Exercises by teaching staff	1, 3, 4, 5
Laboratory courses					
Tutorials		0,4	(10)	Solving questions presented by the students. Direction of the student self-learning. Orientation in the personal assignments.	1, 2, 3, 4, 5
Collaborative project		0,4	(10)	Discussion and analysis of the results obtained within the project.	2, 3, 4, 5, 6, 7, 8
Self-study, working individually		0,8	(20)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7, 8
Evaluation		0,2	(5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6
<b>System for assessment and evaluation</b>		47. Assistance and participation in class and laboratory 48. Personal assignments 49. Oral Presentation 50. Examination			

<b>Course name</b>					
Process design					
<b>ECTS Credits</b>	5	<b>Semester</b>	S2	<b>Type</b>	Mandatory
<b>Used sources</b>		34. R. Smith: <i>Chemical Process: Design and Integration</i> , Wiley, 2002 35. Perry's <i>Chemical Engineers' Handbook</i>			
<b>Short description of course contents</b>		<p>a. On the process view of chemical production, know-how.  b. Selection of reactions' pathway, economical criterions, environmental protection.  c. Technological schema, mass and energy balance.  d. Application of design software.  e. Chemical reactors, membrane reactors and their models.  f. Pumps – characteristics and examples of selection.  g. Compression devices – characteristics, exhausters.  h. Filtration of suspensions, characteristics of filters and filtration membranes.  i. Energy exchange – heat exchangers and their characteristics.  j. Simulation of heat exchangers, design of optimal exchanger.  k. Rectification and pervaporation – the fundamentals, characteristics of columns.  l. Simulation of rectification and pervaporation.  m. Process control – the regulation cycle, characteristics of regulators.  n. Examples of complex design of a concrete process.</p>			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b>  63. To understand general concepts of process design  64. To be able to apply previous knowledge acquired in chemical engineering, applied physical chemistry and separation processes to the process design  65. To understand synthesis of processes from the energy saving, waste minimization, construction material and equipment selection point of view.  66. Application of simulation software in solution of process design problems.</p> <p><b>Generic Competences</b>  67. Communication skills. Preparation and display of 'posters' reporting project work  68. To perform bibliographic searches and to process the acquired information  69. Ability to perform team-work</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		1.6 (40)	Lectures by teaching staff	1, 2, 3, 4	
Seminars		0.2 (5)	Industrial process presentation by external professionals	1, 2, 3, 4,	
Laboratory courses		0.8 (20)	Lab courses - Application of flowsheeting software for solving of typical technology problems	2, 3, 4, 5	
Tutorials		0.8 (20)	Discussion of problems presented by the students. Leadership of the student self-learning. Orientation in the personal assignments.	1, 2, 3, 4, 5	
Collaborative project		0.6 (15)	Discussion and analysis of the results obtained in individual project	2, 3, 4, 5, 6, 7	
Self-study, working individually		0.8 (20)	Preparation of assignments. Personal study	1, 2, 3, 4, 5, 6, 7	
Evaluation		0,2 (5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6	
<b>System for assessment and evaluation</b>		51. Assistance and participation in class and laboratory 52. Personal assignments 53. Oral Presentation 54. Examination			

<b>Course name</b>					
Applied reaction kinetics					
<b>ECTS Credits</b>	4	<b>Semester</b>	S2	<b>Type</b>	Mandatory
<b>Used sources</b>	36. Schmidt L D.: The Engineering of Chemical Reactions, Oxford University Press, 1998. 37. H.S.Fogler, Elements of Chemical Reaction Engineering, 2nd Edition, Prentice Hall, 1992 38. J.G. Sánchez Marcano and T.T. Tsotsis, Catalytic Membranes and Membrane Reactors 39. WWW page of prof. H.Scott Fogler: <a href="http://www.engin.umich.edu/~cre/">http://www.engin.umich.edu/~cre/</a>				
<b>Short description of course contents</b>	1. Reaction rate definition. Elementary reactions. Systems of chemical reaction. 2. Balances in isothermal reacting systems. Stoichiometry, conversion. 3. Basic models of chemical reactors for homogeneous systems. 4. Kinetic parameters estimation from isothermal kinetic data. 5. Energy balance in reacting systems. Models of homogeneous non isothermal reactors. 6. Dynamic behaviour of non isothermal homogeneous reactors. 7. Heterogeneous catalytic reactions in a gas phase. 8. Mass and heat transfer in porous catalyst. 9. Fixed bed reactor. 10. Simultaneous separations and reactions. 11. Catalytic membrane separation processes and reactors. 12. Pervaporation membrane reactors 13. Membrane bioreactors. 14. Industrial reactor design				
<b>Competencies acquired by the student</b>	<p><b>Specific Competences</b></p> 70. To understand general concepts of reacting system description and transfer of the knowledge to experimental data processing. 71. To be able to apply previous knowledge acquired in chemical engineering, physical chemistry and transport phenomena in the reacting systems. 72. To understand transport mechanisms in catalytic systems 73. To understand reacting systems with simultaneous separation and combination of reacting systems with membrane separation processes. 74. To know the main applications of membranes in reactor/separation processes and new applications of technological interest <p><b>Generic Competences</b></p> 26. Communication skills. Preparation, presentation and reporting of project work 27. To perform bibliographic searches and to process the acquired information 28. Ability to perform team-work				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Lectures	1 (25)	Lectures by teaching staff	1, 2, 3, 4, 5		
Seminars	0,6 (15)	Exercises by teaching staff	1, 2, 3, 4		
	0.4 (10)	Practice in experimental or technology data treatment	1, 2, 3, 4, 5		
Laboratory courses					
Tutorials	0.6 (15)	Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3, 4, 5		
Collaborative project	0,4 (10)	Discussion and analysis of the experimental results.	2, 3, 4, 5, 6, 7, 8		
Self-study, working individually	0.8 (20)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7, 8		
Evaluation	0,2 (5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6		
<b>System for assessment and evaluation</b>	55. Assistance and participation in class and laboratory 56. Personal assignments 57. Oral Presentation 58. Examination				

<b>Course name</b>			
Separation technology			
<b>ECTS Credits</b>	5	<b>Semester</b>	S2
		<b>Type</b>	Mandatory
<b>Used sources</b>	<p>40. Bird, Stewart, Lightfoot: <i>Transport Phenomena</i>, John Wiley &amp; Sons, NY (2002).  41. <i>Separation Process Principles</i>, 2<sup>nd</sup> edition, Seader, J.D., and Henley E.J.,.  42. Perry's Chemical Engineers' handbook</p>		
<b>Short description of course contents</b>	<p>a. Material and energy balances in chemical engineering applications.  b. Basic numerical methods in chemical engineering  c. Fluid mechanics for chemical engineers, momentum balances, laminar and turbulent flows in the pipes, equipment and porous media.  d. Heat and mass transfer fundamentals, heat and mass transfer coefficients, heat exchangers, mass and heat transfer on phase interfaces.  e. Separation processes, phase equilibria, rate processes.  f. Adsorption and ion exchange – linear and nonlinear sorption.  g. Membrane separation processes - fundamentals  h. Ionic exchange and electroforetic separation methods.  i. Selection and arrangement of separation methods, criteria for selection. Membrane processes design.  j. Gas permeation, reverse osmosis.  k. Ultrafiltration, dialysis.  l. Electrodialysis, pervaporation.  m. Crystallisation - basic principles, phase equilibria, nucleation, grow of crystals. Population balances, crystal size distributions and sieve analysis.</p>		
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b>  75. To understand general concepts of heat and mass balances  76. To be able to apply previous knowledge acquired in applied physical chemistry and transport phenomena  77. To understand chemical engineering principles of processes  78. To know the basic method of numerical solution of equations resulting from material and energy balances  79. To be able to solve individually chemical engineering problems</p> <p><b>Generic Competences</b>  29. Communication skills. Preparation and reporting project work  30. To perform bibliographic searches and to process the acquired information  31. Ability to perform team-work</p>		
	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>
Lectures	1 (25)	Lectures by teaching staff	1, 2, 3, 4, 5
Seminars	0,6 (15)	Exercises by teaching staff	1, 3, 4, 5
	0.6 (15)	Practise in solving mass and energy balances equations	1, 2, 3, 4, 5
Laboratory courses			
Tutorials	1 (25)	Solving questions presented by the students. Direction of the self-learning of the student. Orientation in the personal assignments.	1, 2, 3, 4, 5
Collaborative project	0,4 (10)	Discussion and analysis of the results obtained in the laboratory.	2, 3, 4, 5, 6, 7, 8
Self-study, working individually	1,2 (30)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7, 8
Evaluation	0,2 (5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6
<b>System for assessment and evaluation</b>	<p>59. Assistance and participation in class and laboratory  60. Personal assignments  61. Oral Presentation  62. Examination</p>		

<b>Course name</b>					
Individual project					
<b>ECTS Credits</b>	6	<b>Semester</b>	S1-S3	<b>Type</b>	Mandatory
<b>Used sources</b>	43. Data bases ( like SciFinder Scholar – CAS), University library 44. Documents (papers, theses, books, patents) 45. Laboratory				
<b>Short description of course contents</b>	In the individual project, the student conducts a bibliographic and/or experimental study. The project is formulated and carried out in consultation with a supervisor. A report is presented at the end of the project and the project presented orally and discussed publicly. External experts may be invited for monitoring the progress and/or attendance of oral presentations.  1. Bibliographic study 2. Experimental study 3. Preparation of a written report 4. Oral presentation and defense				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b> 80. The ability to deal with and address specific problems, and to integrate previous knowledge acquired.</p> <p><b>Generic Competencies</b> 2. The ability to manage and/or conduct an individual project (bibliographic search and/or experimental study), and to process acquired information. 3. Communication skills; Oral presentation and group discussions.</p>				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Self-study, working individually	5(125)	Preparation of assignment	1		
Evaluation	1(25)	Personal study report Oral presentations	2, 3		
<b>System for assessment and evaluation</b>	63. Written report 64. Oral Presentation and defense				

<b>Course name</b>					
Membrane contactors and bioreactors					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		specialized scientific journals			
<b>Short description of course contents</b>		42. Introduction and general concepts 43. Cell Membrane Bioreactors 44. Enzymatic Membrane Bioreactors 45. Multiphasic Membrane Bioreactors 46. Momentum, mass and heat transport in Membrane Contactors 47. Selected case-studies of Membrane Contactors: liquid extraction, gas-liquid Membrane Contactors, membrane distillation, crystallization in Membrane Contactors, emulsification with Membrane Contactors 48. Hybrid processes and process integration 49. Process monitoring and control			
<b>Competencies acquired by the student</b>		<b>Specific Competencies</b> 81. To acquire general concepts about Membrane Contactors and Bioreactors 82. To be able to design Membrane Bioreactors and Membrane Contactors 83. To be able to design process integration schemes 84. To acquire knowledge about emerging process monitoring tools and their use for process control 85. Understand how a specific problem may be approached by the Industry <b>Generic Competences</b> 86. Development of communication skills 87. Development of problem-solving competences 88. Ability to perform autonomous work 89. Ability to perform data mining 90. Ability to perform autonomous work			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		1.20 (30)	Lectures by teaching staff	1, 2, 3, 4	
Seminars		0.24 (6)	Presentations by external academic lecturers, industrial professionals and students	1, 2, 3, 4, 5	
Tutorials		0.68 (17)	Case-studies and problems discussion. Direction of the self-learning of the student. Orientation of individual assignments. Students recitation of individual assignments. Support of students for preparation of their individual seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Self-study, working individually		3.24 (81)	Preparation of assignments Preparation of individual seminar Individual study	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Evaluation		0.64 (16)	Students Recitations Written Examination Individual oral presentations by the students Written reports of selected external seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
<b>System for assessment and evaluation</b>		65. Assistance and participation in class, Recitation sessions and in the seminars 66. Written reports of seminars 67. Individual seminar 68. Individual assignments 69. Examination			

<b>Course name</b>																													
Membranes in downstream processing																													
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory																								
<b>Used sources</b>		specialized scientific journals																											
<b>Short description of course contents</b>		50. Introduction and general concepts 51. Specificity of biological complex media and media /membrane interactions 52. Product recovery and fractionation 53. Product purification and polishing 54. Hybrid processes and process integration 55. Process monitoring and control																											
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>91. To acquire general concepts about downstream processing 92. To be able to apply previous knowledge, acquired in separation processes and transport phenomena, in the processing of biological media 93. To be able to design process integration schemes 94. To acquire knowledge about emerging process monitoring tools and their use for process control 95. Understand how a specific problem may be approached by the Industry</p> <p><b>Generic Competencies</b></p> <p>96. Development of communication skills. 97. Development of problem-solving competences 98. Ability to perform autonomous work 99. Ability to perform data mining 100. Ability to perform autonomous work</p>																											
<table border="1"> <thead> <tr> <th><b>Activity</b></th> <th><b>Credits ECTS (h)</b> 1ECTS=25h</th> <th><b>Methodology</b></th> <th><b>Relationship with competences</b></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>1.20 (30)</td> <td>Lectures by teaching staff</td> <td>1, 2, 3, 4</td> </tr> <tr> <td>Seminars</td> <td>0.24 (6)</td> <td>Presentations by external academic lecturers, industrial professionals and students</td> <td>1, 2, 3, 4, 5</td> </tr> <tr> <td>Tutorials</td> <td>0.68 (17)</td> <td>Case-studies and problems discussion. Direction of the self-learning of the student. Orientation of individual assignments. Students recitation of individual assignments. Support of students for preparation of their individual seminar</td> <td>1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td> </tr> <tr> <td>Self-study, working individually</td> <td>3.24 (81)</td> <td>Preparation of assignments Preparation of individual seminar Individual study</td> <td>1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td> </tr> <tr> <td>Evaluation</td> <td>0.64 (16)</td> <td>Students Recitations Written Examination Individual oral presentations by the students Written reports of selected external seminar</td> <td>1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td> </tr> </tbody> </table>						<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	Lectures	1.20 (30)	Lectures by teaching staff	1, 2, 3, 4	Seminars	0.24 (6)	Presentations by external academic lecturers, industrial professionals and students	1, 2, 3, 4, 5	Tutorials	0.68 (17)	Case-studies and problems discussion. Direction of the self-learning of the student. Orientation of individual assignments. Students recitation of individual assignments. Support of students for preparation of their individual seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Self-study, working individually	3.24 (81)	Preparation of assignments Preparation of individual seminar Individual study	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Evaluation	0.64 (16)	Students Recitations Written Examination Individual oral presentations by the students Written reports of selected external seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>																										
Lectures	1.20 (30)	Lectures by teaching staff	1, 2, 3, 4																										
Seminars	0.24 (6)	Presentations by external academic lecturers, industrial professionals and students	1, 2, 3, 4, 5																										
Tutorials	0.68 (17)	Case-studies and problems discussion. Direction of the self-learning of the student. Orientation of individual assignments. Students recitation of individual assignments. Support of students for preparation of their individual seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10																										
Self-study, working individually	3.24 (81)	Preparation of assignments Preparation of individual seminar Individual study	1, 2, 3, 4, 5, 6, 7, 8, 9, 10																										
Evaluation	0.64 (16)	Students Recitations Written Examination Individual oral presentations by the students Written reports of selected external seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10																										
<b>System for assessment and evaluation</b>		70. Assistance and participation in class, Recitation sessions and in the seminars 71. Written reports of seminars 72. Individual seminar 73. Individual assignments 74. Examination																											

<b>Course name</b>					
Barrier membranes for food applications					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		specialized scientific journals			
<b>Short description of course contents</b>		56. Introduction and general concepts 57. Development of flakes (including reactive flakes) 58. Development of Barrier Membranes 59. Transport mechanisms in Barrier Membranes 60. Selected case-studies of Barrier Membranes for Food Applications 61. New challenges in Barrier Membranes development			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>101. To acquire general concepts about Barrier Membranes</p> <p>102. To be able to model mass transport in complex Barrier Membrane systems</p> <p>103. To acquire knowledge about emerging materials for Barrier Membranes</p> <p>104. To acquire knowledge about emerging applications for Barrier Membranes</p> <p>105. Understand how a specific problem may be approached by the Industry</p> <p><b>Generic Competences</b></p> <p>106. Development of communication skills</p> <p>107. Development of problem-solving competences</p> <p>108. Ability to perform autonomous work</p> <p>109. Ability to perform data mining</p> <p>110. Ability to perform autonomous work</p>			
<b>Credits ECTS (h) 1ECTS=25h</b>					
<b>Activity</b>		<b>Methodology</b>		<b>Relationship with competences</b>	
Lectures	1.20 (30)	Lectures by teaching staff		1, 2, 3, 4	
Seminars	0.24 (6)	Presentations by external academic lecturers, industrial professionals and students		1, 2, 3, 4, 5	
Tutorials	0.68 (17)	Case-studies and problems discussion. Direction of the self-learning of the student. Orientation of individual assignments. Students recitation of individual assignments. Support of students for preparation of their individual seminar		1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Self-study, working individually	3.24 (81)	Preparation of assignments Preparation of individual seminar Individual study		1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Evaluation	0.64 (16)	Students Recitations Written Examination Individual oral presentations by the students Written reports of selected external seminar		1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
<b>System for assessment and evaluation</b>		75. Assistance and participation in class, Recitation sessions and in the seminars 76. Written reports of seminars 77. Individual seminar 78. Individual assignments 79. Examination			



<b>Course name</b>					
Membranes in regenerative medicine					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		specialized scientific journals			
<b>Short description of course contents</b>		62. Introduction and general concepts 63. Preparation and characterization of membranes for Tissue Culture 64. Preparation and characterization of membranes for Artificial Organs 65. Transport phenomena in Tissue Culture and Artificial Organs 66. Selected case-studies in Tissue Culture and Artificial Organs 67. New challenges in Tissue Culture and Artificial Organs			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>111. To acquire knowledge about development and characterization of membranes for Tissue Culture and Artificial Organs</p> <p>112. To be able to model transport in complex Tissue Culture and Artificial Organs systems</p> <p>113. To acquire knowledge about emerging materials for Tissue Culture and Artificial Organs</p> <p>114. To acquire knowledge about emerging applications in Tissue Culture and Artificial Organs</p> <p>115. Understand how a specific problem may be approached by the Industry</p> <p><b>Generic Competences</b></p> <p>116. Development of communication skills</p> <p>117. Development of problem-solving competences</p> <p>118. Ability to perform autonomous work</p> <p>119. Ability to perform data mining</p> <p>120. Ability to perform autonomous work</p>			
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h		<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures	1.20	(30)	Lectures by teaching staff	1, 2, 3, 4	
Seminars	0.24	(6)	Presentations by external academic lecturers, industrial professionals and students	1, 2, 3, 4, 5	
Tutorials	0.68	(17)	Case-studies and problems discussion. Direction of the self-learning of the student. Orientation of individual assignments. Students recitation of individual assignments. Support of students for preparation of their individual seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Self-study, working individually	3.24	(81)	Preparation of assignments Preparation of individual seminar Individual study	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Evaluation	0.64	(16)	Students Recitations Written Examination Individual oral presentations by the students Written reports of selected external seminar	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
<b>System for assessment and evaluation</b>		80. Assistance and participation in class, Recitation sessions and in the seminars 81. Written reports of seminars 82. Individual seminar 83. Individual assignments 84. Examination			

<b>Course name</b>					
Individual project					
<b>ECTS Credits</b>	6	<b>Semester</b>	S1-S3	<b>Type</b>	Mandatory
<b>Used sources</b>	46. Data bases ( like SciFinder Scholar – CAS), University library 47. Documents (papers, theses, books, patents) 48. Laboratory				
<b>Short description of course contents</b>	In the individual project, the student conducts a bibliographic and/or experimental study. The project is formulated and carried out in consultation with a supervisor. A report is presented at the end of the project and the project presented orally and discussed publicly. External experts may be invited for monitoring the progress and/or attendance of oral presentations.  1. Bibliographic study 2. Experimental study 3. Preparation of a written report 4. Oral presentation and defense				
<b>Competencies acquired by the student</b>	<b>Specific Competencies</b> 121. The ability to deal with and address specific problems, and to integrate previous knowledge acquired. <b>Generic Competencies</b> 2. The ability to manage and/or conduct an individual project (bibliographic search and/or experimental study), and to process acquired information. 3. Communication skills; Oral presentation and group discussions.				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Self-study, working individually	5(125)	Preparation of assignment	1		
Evaluation	1(25)	Personal study report Oral presentations	2, 3		
<b>System for assessment and evaluation</b>	85. Written report 86. Oral Presentation and defense				

<b>Course name</b>					
Fundamental properties of nanostructured Materials					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>	<ol style="list-style-type: none"> <li>1. Springer handbook of nanotechnology / Bharat Bhushan (ed.) Ed. Springer.</li> <li>2. Nanotechnology: basic science and emerging technologies / Michael Wilson. et al. Ed. Chapman &amp; Hall/CRC. Boca Raton, Florida.</li> <li>3. The Chemistry Of Nanomaterials (Vols. 1 Y 2). C.N..R. Rao, A. Müller &amp; A.K. Cheetham. Wiley-VCH</li> </ol>				
<b>Short description of course contents</b>	<ul style="list-style-type: none"> <li>- Introduction to Nanoscience and Nanotechnology. Nanomaterials vs. macroscopic materials.</li> <li>- Optical, electric, magnetic, and mechanical properties of nanomaterials. Physical Chemistry of Surfaces: thermodynamic and electrical aspects of surface chemistry and interfaces.</li> <li>- Colloids, tensoactives, monolayers, micelles, vesicles, capsules.</li> <li>- Meso and microporous materials, zeolites.</li> <li>- Nanobiomaterials. Biomacromolecules.</li> <li>- Applications of nanoparticles in biomedicine.</li> <li>- Nanotoxicology and eco-nanotoxicology.</li> </ul>				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b></p> <ol style="list-style-type: none"> <li>1. To know the "state of the art" in Nanoscience and Nanotechnology, giving value to its multidisciplinary nature as well as its social, economic and legal implications.</li> <li>2. To understand the conceptual differences between macro and nano systems, acquiring the needed knowledge to approach to nanoscale.</li> <li>3. To identify materials and compounds of special relevance in the nanoscale, evaluating the achievements and the problems to solve.</li> <li>4. To understand the importance of surface effects and the forces that appear at the nanoscale as well as their influence in the properties of the nanosystems.</li> <li>5. To acquire basic knowledge to evaluate properties of special interest in nanostructured materials.</li> <li>6. To know the legislation about nanostructured materials, analyzing its potential influence on health issues, environment and sustainability.</li> </ol> <p><b>Generic Competencies</b></p> <ol style="list-style-type: none"> <li>7. To relate previous knowledge acquired, in the field of science, to a new field such as nanoscience and nanotechnology.</li> <li>8. Self-study and ability to gather information and summarize.</li> </ol>				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Lectures	1,6 (40)	Lectures, open discussions, by teaching staff	1, 2, 3, 4, 5, 6, 7, 8		
Self-study, working individually	3,6 (90)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6, 7, 8		
E-teaching and new technologies	0,6 (15)	Use of new technologies, (e-teaching, e-learning, e-testing).	8		
Evaluation	0,2 (5)	Evaluation of assignments, Examination	1, 2, 3, 4, 5, 6, 7, 8		
<b>System for assessment and evaluation</b>	<ul style="list-style-type: none"> <li>- Assistance and participation in class</li> <li>- Evaluation of assignemnts</li> <li>- Written exam</li> </ul>				

<b>Course name</b>					
Preparation of nanostructured materials					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>	<ol style="list-style-type: none"> <li>Handbook of Microlithography, Micromachining And Microfabrication, Vols 1 Y 2. P. Rai-Choudhury. SPIE</li> <li>Nano and Microelectromechanical Systems (NEMS and MEMS) And Molecular Machines. David A. LaVan et al. Materials Research Society.</li> <li>Fundamentals of Microfabrication. Marc. J. Madou. CRC Press</li> <li>Principles of Lithography. Harry J. Levinson. SPIE Press</li> <li>Principles of Chemical Vapor Deposition. Daniel M. Dobkin And Michael K. Zuraw (Eds.). Kluwer Academic Publishers</li> <li>Materials Science of Thin Films: Deposition &amp; Structur. Milton Ohring. Academic Press</li> </ol>				
<b>Short description of course contents</b>	<p>Fabrication methods of nanostructured materials: top-down and bottom-up approaches.            Vacuum technology. PVD. CVD.            Liquid Phase Deposition.            Electrochemical deposition.            Optical lithography. Fabrication of MEMS/NEMS. Electron beam lithography. Ion beam lithography. Scanning probe lithography. Nanoimprint, micro-printing, step-and-flash lithography. Other lithography techniques.            Lab demonstrations</p>				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b></p> <ol style="list-style-type: none"> <li>To get a general conception of the different techniques, physical and chemical, for the preparation of nanostructured materials.</li> <li>To be able to correlate the unique properties of the raw material, the preparation technique and the final characteristics and properties of the obtained nanostructure.</li> <li>To acquire the necessary skills to recognize the difficulties in the laboratory to fabricate nanostructured materials and to be able to develop strategies to solve these difficulties and choose the most convenient solution in each case.</li> <li>-Planning, design and implementation of experiments for fabrication of nanostructured materials, assesing the problems and difficulties for doing so.</li> </ol> <p><b>Generic Competences</b></p> <ol style="list-style-type: none"> <li>Organization and design of an experimental protocol</li> <li>Self-study and ability to gather information and summarize.</li> </ol>				
	<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
	Lectures	1,6 (40)	Lectures by teaching staff	1, 2, 3, 4, 5	
	Self-study, working individually	3,0 (75)	Preparation of assignments Personal study	1, 2, 3, 4, 5, 6	
	Laboratory	1,2 (30)	Preparation of materials, tutored by teaching staff	4,5	
	Evaluation	0,2 (5)	Evaluation of assignments Examinations	1, 2, 3, 4, 5, 6	
<b>System for assessment and evaluation</b>	<ul style="list-style-type: none"> <li>Assistance and participation in class</li> <li>Evaluation of assignemnts</li> <li>Written exam</li> </ul>				

<b>Course name</b>					
Assembly and fabrication of nanostructures					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>	<ol style="list-style-type: none"> <li>1. Self-Assembled Nanostructures. Jin Zhang et al. Kluwer Academic Publishers.</li> <li>2. Three-Dimensional Nanoengineered Assemblies. Thomas M. Orlando et al. Materials Research Society</li> <li>3. Nanoparticles. From Theory To Application. Günter Schmid. Wiley-VCH.</li> <li>4. The Chemistry Of Nanomaterials (Vols. 1 Y 2). C.N..R. Rao, A. Müller &amp; A.K. Cheetham Wiley-VCH</li> </ol>				
<b>Short description of course contents</b>	<ul style="list-style-type: none"> <li>• Synthesis methods of nanoparticles. Synthesis of carbon nanotubes and graphitic structures. Nanocomposites. Mesoporous and microporous structures.</li> <li>• Jerarchical structures and molecular self-assembly.</li> <li>• Quirality in the nanoscale. Supramolecular chemistry and polymer chemistry. Intercalation chemistry.</li> <li>• Biofunctionalization of nanomaterials.</li> <li>• Lab demonstrations</li> </ul>				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b></p> <ol style="list-style-type: none"> <li>1. Theoretical knowledge of the preparation methods of nanostructures bottom-up (self-assembly) and top down (micro and nano-litography).</li> <li>2. To acquire competences for the planification, design and implementation in the fabrication of nanomaterials, evaluating the problems, risks and the results.</li> <li>3. To know the equipments for the preparation of nanostructures by bottom-up and top-down techniques.</li> </ol> <p><b>Generic Competences</b></p> <ol style="list-style-type: none"> <li>4. Experimental design</li> <li>5. Communication skills. Ability to present and discuss the obtained results in the laboratory</li> </ol>				
	<b>Credits ECTS</b>		<b>Methodology</b>	<b>Relationship with competences</b>	
	(h)				
	1ECTS=25h				
Lectures	1,6 (40)		Lectures by teaching staff	1, 2, 3, 4	
Self-study, working individually	2,8 (70)		Preparation of assignments Personal study	1, 2, 3, 4	
Laboratory	1,2 (30)		Preparation of materials, tutored by teaching staff	2,4,5	
Evaluation	0,4 (10)		Evaluation of assignments Examination Discussion of experimental results	1, 2, 3, 4, 5	
<b>System for assessment and evaluation</b>	<ul style="list-style-type: none"> <li>- Assistance and participation in class</li> <li>- Evaluation of assignemnts</li> <li>- Written exam</li> </ul>				

<b>Course name</b>					
Case studies of industrial applications					
<b>ECTS Credits</b>	6	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		49. Commercializing Micro-nanotechnology Products. Tolfree, D., Jackson, M. J., Ed. CRC Press 50. World Wide Web to look for companies and products 51. Patent Database; European Patent Office (esp@cenet), Derwent Innovation Index (ISI)			
<b>Short description of course contents</b>		<p>The course consists of a series of seminars taught by industrialists, in different fields, where nanotechnology has been applied as a solution to solve a problem or for the development of a new product.</p> <p>Several case studies of industrial applications will be analyzed. A detailed description of the market before the introduction of a certain nanotechnology product will be performed, followed by the identification of the opportunity, the design of the product or process together with its technological implementation and commercialisation.</p> <p>Representative case studies will be analyzed including the pharmaceutical, automotive, textile, cosmetic, and biotechnology industry as well as the fabrication of nanosensors.</p> <p>The students in a team-work will prepare a project for the development of a new product based on their acquired knowledge on nanotechnology/membranes.</p>			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>122. To evaluate the importance of the nanotechnology products in the market.</p> <p>123. To understand the high potential of nanotechnology as an horizontal discipline which is able to integrate in the fabrication process.-</p> <p>124. To identify the distinctive characteristics that the application at the nanoscale give to certain commercial products.</p> <p>125. To identify the difficulties for the implementation of the advances in the laboratory to the commercial practice.</p> <p>126. To know directly from the companies and the "main actors" their industrial experience.</p> <p>127. To recognize the main factors in product design in high technology and their main features that makes them successful commercial products.</p> <p><b>Generic Competencies</b></p> <p>32. Communication skills. How to present an idea.</p> <p>33. Ability to perform team-work</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		0,6 (15)	Lectures by teaching staff	1, 2, 3, 4, 5	
Seminars		0,2 (5)	Presentations by external professionals of industrial applications of membranes	1, 3, 4, 5	
Collaborative project		0,4 (10)	Discussion and analysis of the results obtained in the laboratory.	5, 6	
Evaluation		0,2 (5)	Oral presentations Examinations	1, 2, 3, 4, 5, 6	
<b>System for assessment and evaluation</b>		87. Assistance and participation in class 88. Collaborative project 89. Oral Presentation			

<b>Course name</b>					
Individual project					
<b>ECTS Credits</b>	6	<b>Semester</b>	S1-S3	<b>Type</b>	Mandatory
<b>Used sources</b>		52. Data bases ( like SciFinder Scholar – CAS), University library 53. Documents (papers, theses, books, patents) 54. Laboratory			
<b>Short description of course contents</b>		<p>In the individual project, the student conducts a bibliographic and/or experimental study. The project is formulated and carried out in consultation with a supervisor. A report is presented at the end of the project and the project presented orally and discussed publicly. External experts may be invited for monitoring the progress and/or attendance of oral presentations.</p> <ol style="list-style-type: none"> <li>1. Bibliographic study</li> <li>2. Experimental study</li> <li>3. Preparation of a written report</li> <li>4. Oral presentation and defense</li> </ol>			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b> 128. The ability to deal with and address specific problems, and to integrate previous knowledge acquired.</p> <p><b>Generic Competencies</b></p> <ol style="list-style-type: none"> <li>2. The ability to manage and/or conduct an individual project (bibliographic search and/or experimental study), and to process acquired information.</li> <li>3. Communication skills; Oral presentation and group discussions.</li> </ol>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Self-study, working individually		5(125)	Preparation of assignment Personal study	1	
Evaluation		1(25)	report Oral presentations	2, 3	
<b>System for assessment and evaluation</b>		90. Written report 91. Oral Presentation and defense			

<b>Course name</b>					
Batteries, fuel cells and electrolysers					
<b>ECTS Credits</b>	5	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		55. Lecture notes, slides 56. Fuel cell Handbook: U.S. Department of Energy, 2004.			
<b>Short description of course contents</b>		68. Introduction, basic principles and theory 69. Thermodynamics of electrochemical cells, losses and efficiency 70. Electrolyte membranes, membrane electrode assemblies 71. Electrode kinetics 72. Different types of batteries and fuel Cells; SOFC, SAFC, PEMFC, DMFC, BioFC, AFC, primary and secondary batteries, etc. 73. Miniaturization and other recent trends 74. Societal relevance and acceptance			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>129. To know basic concepts and design principles of state-of-the-art fuel cells and batteries.</p> <p>130. To understand main transport mechanisms, electrode reactions and interfacial kinetics.</p> <p>131. The ability to describe the different types of fuel cells and batteries, and to mention differences, application areas, operation conditions, and limitations.</p> <p>132. To know major developments in the field of fuel cells and batteries, and future trends.</p> <p><b>Generic Competencies</b></p> <p>5. Communication skills; Oral presentation and group discussions.</p> <p>6. The ability to conduct a bibliographic search, and how to process the acquired information</p> <p>7. The ability to perform team-work.</p>			
		<b>Credits ECTS (h)</b>		<b>Methodology</b>	
<b>Activity</b>		1ECTS=25h		<b>Relationship with competences</b>	
Lectures	0,8	(20)	Lectures by teaching staff	1, 2, 3, 4	
Seminars	0,4	(10)	Presentations held by external/industrial professionals	1, 2, 3, 4	
Assignment	1,6	(40)	Group assignment focused towards selected fuel cell development	4, 5, 6, 7	
Laboratory course	0,2	(5)	Practice course organized in groups; testing of fuel cell	1,2	
Tutorials	0,8	(20)	Solving exercises, Solving questions raised by the students. Offering support and orientation in assignments.	1, 2, 3, 4	
Self-study, working individually	0,8	(20)	Individual preparations and study time. Preparation of assignments.	1, 2, 3, 4, 6, 7	
Evaluation	0,4	(10)	Oral presentation and discussions. Examination	1, 2, 3, 4, 5, 6, 7	
<b>System for assessment and evaluation</b>		92. Assignment 93. Oral presentation, and participation in discussions 94. Examination			



<b>Course name</b>					
Gas separation membranes and gas treatment					
<b>ECTS Credits</b>	5	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		57. Lecture notes, slides 58. Y. Yampolskii, I. Pinnau, B.D. Freeman, Materials Science of Membranes, John Wiley & Sons, Ltd. 2006. 59. R.W. Baker, Membrane Technology and Applications, John Wiley and Sons Ltd., 2004.			
<b>Short description of course contents</b>		75. Introduction, basic principles and theory 76. Metallic membranes 77. Carbon, zeolite and micro-porous (sol-gel derived) ceramic membranes 78. Polymer membranes 79. Mixed conducting oxide membranes 80. Competitive technologies for gas separation and treatment (cryogenic distillation, pressure swing adsorption, absorption methods etc.) 81. Societal relevance and acceptance			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>133. To know general concepts, state-of-the-art membranes and technology used for gas separation and gas treatment.</p> <p>134. To understand main transport mechanisms in different types of gas separation membranes.</p> <p>135. To know main applications of membranes in separation processes, (catalytic) membrane reactors, and new applications of technological interest.</p> <p>136. To know competitive technologies for gas separation membranes and gas treatment.</p> <p>137. To prepare and characterize selected membranes.</p> <p>138. The ability to interpret experimental data and to draw conclusions.</p> <p><b>Generic Competences</b></p> <p>7. Communication skills; Oral presentation and group discussions.</p> <p>8. The ability to conduct a bibliographic search, and how to process the acquired information.</p> <p>9. The ability to perform team-work.</p> <p>10. Based on a general problem description the ability to design an experimental plan</p> <p>11. Based on a general problem description and experimental plan the ability to conduct practical lab work in an independent way.</p>			
<b>Activity</b>	<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Lectures	0,8 (20)	Lectures by teaching staff	1, 2, 3, 4		
Seminars	0,4 (10)	Presentations held by external/industrial professionals	1, 2, 3, 4		
Case Study	0,2 (5)	Demonstration	1, 2		
Laboratory course	1,6 (40)	Practice course organized in pairs; membrane preparation and characterisation	5, 6, 9, 10, 11		
Tutorials	0,8 (20)	Solving exercises, Solving questions as raised by the students. Offering support and orientation in assignments.	1, 2, 3, 4		
Self-study, working individually	0,8 (20)	Individual preparations and study time. Preparation of assignments.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11		
Evaluation	0,4 (10)	Oral presentation and discussions. Examination	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11		
<b>System for assessment and evaluation</b>		95. Assignment 96. Oral presentation, and participation in discussions 97. Examination			

<b>Course name</b>					
Water treatment					
<b>ECTS Credits</b>	5	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		60. Lecture notes, slides 61. J. Wesselingh, Multi-component mass transport			
<b>Short description of course contents</b>		82. Introduction to Maxwell-Stefan description of mass transport 83. Application to membrane separation processes 84. Reverse Osmosis, Pervaporation 85. Ion exchange 86. Ultrafiltration 87. Membrane contactors for heavy metal removal 88. Membrane reactors for advanced oxidation			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>139. To understand main transport mechanisms of multi-component transport through liquid separation membranes.</p> <p>140. To know general concepts, state-of-the-art membranes and technology used for water treatment.</p> <p>141. To know main applications of membranes in separation processes, and new applications of technological interest.</p> <p>142. To characterize and describe mass transport properties of selected membranes.</p> <p>143. The ability to interpret experimental data and to draw conclusions.</p> <p><b>Generic Competences</b></p> <p>7. Communication skills; Oral presentation and group discussions.</p> <p>8. The ability to conduct a bibliographic search, and how to process the acquired information.</p> <p>9. The ability to perform team-work.</p> <p>10. Based on a general problem description the ability to design an experimental plan</p> <p>11. Based on a general problem description and experimental plan the ability to conduct practical lab work in an independent way.</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures		0,8 (20)	Lectures by teaching staff	1, 2, 3, 4	
Seminars		0,4 (10)	Presentations held by external/industrial professionals	1, 2, 3, 4	
Case study		0,2 (5)	demonstration	1, 2	
Laboratory course		0,2 (40)	Practice course organized in pairs; membrane preparation and characterisation	1,2	
Tutorials		0,8 (20)	Solving exercises, Solving questions raised by the students. Offering support and orientation in assignments.	1, 2, 3, 4	
Self-study, working individually		0,8 (20)	Individual preparations and study time. Preparation of assignments.	1, 2, 3, 4, 6, 7, 8, 9, 10, 11	
Evaluation		0,4 (10)	Oral presentation and discussions. Examination	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	
<b>System for assessment and evaluation</b>		98. Assignment 99. Oral presentation, and participation in discussions 100. Examination			

<b>Course name</b>					
Membrane process plant design					
<b>ECTS Credits</b>	5	<b>Semester</b>	S3	<b>Type</b>	Mandatory
<b>Used sources</b>		62. Lecture notes, slides 63. W.D. Seider, J.D. Seader, D.R. Lewin; Product and Process Design Principles: synthesis, analysis and evaluation. 64. R.W. Baker; Membrane Technology and Applications			
<b>Short description of course contents</b>		89. Introduction to systematic process design 90. Introduction to process simulation (flowsheeting: Unisim or ..) 91. Introduction to cost estimation			
<b>Competencies acquired by the student</b>		<p><b>Specific Competencies</b></p> <p>144. To know main applications of membranes in separation processes, (catalytic) membrane reactors, and new applications of technological interest.</p> <p>145. Clearly define scope and design basis</p> <p>146. generate process alternatives in systematic procedure: Combine membrane module(s) with additional unit operations to obtain an operational process. Make balanced choices.</p> <p>147. Simulate (membrane) processes with a commercial flowsheeteer.</p> <p>148. To understand main transport mechanisms in different types of membranes.</p> <p>149. The ability to design a (membrane) process (calculate membrane area, optimal module configuration etc.</p> <p>150. technical en economical evaluation</p> <p><b>Generic Competences</b></p> <p>8. Communication skills; Oral presentation and group discussions.</p> <p>9. The ability to conduct a systematic bibliographic search, and to process the obtained information.</p> <p>10. The ability to perform team-work. Phasing and project organization.</p>			
<b>Activity</b>		<b>Credits ECTS (h)</b> 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>	
Lectures + tutorials		1,0 (25)	Lectures by teaching staff	1, 2, 3, 4, 5, 6, 7	
Seminars		0,2 (5)	Presentations held by external/industrial professionals	1, 2, 3, 4, 5, 6, 7	
Assignment		3,5 (88)	Design of a membrane process in a systematic way.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
Evaluation		0,3 (8)	Report and Oral presentation and discussions.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	
<b>System for assessment and evaluation</b>		101.	Assignment		
		102.	Report, oral presentation, and participation in discussions		

<b>Course name</b>					
Individual project					
<b>ECTS Credits</b>	6	<b>Semester</b>	S1-S3	<b>Type</b>	Mandatory
<b>Used sources</b>	65. Data bases ( like SciFinder Scholar – CAS), University library 66. Documents (papers, theses, books, patents) 67. Laboratory				
<b>Short description of course contents</b>	<p>In the individual project, the student conducts a bibliographic and/or experimental study. The project is formulated and carried out in consultation with a supervisor. A report is presented at the end of the project and the project presented orally and discussed publicly. External experts may be invited for monitoring the progress and/or attendance of oral presentations.</p> <ol style="list-style-type: none"> <li>1. Bibliographic study</li> <li>2. Experimental study</li> <li>3. Preparation of a written report</li> <li>4. Oral presentation and defense</li> </ol>				
<b>Competencies acquired by the student</b>	<p><b>Specific Competencies</b> 151. The ability to deal with and address specific problems, and to integrate previous knowledge acquired.</p> <p><b>Generic Competences</b></p> <ol style="list-style-type: none"> <li>2. The ability to manage and/or conduct an individual project (bibliographic search and/or experimental study), and to process acquired information.</li> <li>3. Communication skills; Oral presentation and group discussions.</li> </ol>				
<b>Activity</b>	<b>Credits ECTS (h)</b> 1 ECTS=25h	<b>Methodology</b>	<b>Relationship with competences</b>		
Self-study, working individually	5(125)	Preparation of assignment Personal study	1		
Evaluation	1(25)	report Oral presentations	2, 3		
<b>System for assessment and evaluation</b>	103. 104.	Written report Oral Presentation and defense			

#### **Appendix 4:** Short description of the EM3E Partner Universities

**Montpellier 2 University (UM2)** is a scientific and technological university and one of the oldest French universities, founded in the 13th century. It was created in 1970 when the university in Montpellier split. It has a large international network and a strong reputation for academic teaching and research, through its participation to European funded projects (EMECW, Leonardo, Tempus, FP7...). In the ranking of the Centre for Higher Education Development (CHE), the University of Montpellier 2 is ranked in the so-called Excellence Group of the best universities in Europe in the fields of Chemistry and Biology. The University is associated through 50 laboratories with the majority of the great national research organisations. These laboratories are gathered within 10 departments of research. 2500 permanent staff and nearly 14,900 students (where 1,200 international students) take part in the life of the institution. The teaching and R&D on membrane field is mainly performed by the staff of the European Membrane Institute (IEM). The IEM is a multi-field research laboratory on membrane materials and processes, co-ordinator through CNRS of the European Network of Excellence on membranes NanoMemPro (FP6) and hosts the Unesco Chair SIMEV (Sciences of Membranes Applied to the Environment). UM2 will be in charge of the teaching course and research during the first semester (S1) of the Master, in collaboration with UPS.

**University Paul Sabatier (UPS)**, founded in 1229, is one of the oldest universities in Europe after Bologna, Paris Sorbonne and Salamanca. The university welcomes 29,000 students including 2,500 foreigners through 200 foreign partner universities. The university is known for its strong research and teaching. The research is realised in 70 laboratories and research departments. Research activities on membrane science and engineering are developed in the Chemical Engineering Laboratory (LGC), linked to two universities in Toulouse: the Institut National Polytechnique de Toulouse (INPT) and the University Paul Sabatier. The LGC conducts world-leading research in disciplines ranging from material sciences and physico-chemical processes. UPS will be in charge of the teaching course and research during the first semester (S1) of the Master, in collaboration with UM2. It will be assisted by the International Office of its university that already has the experience of Erasmus Mundus Master (MESC programme).

**Institute of Chemical Technology (ICT)**, Prague, was founded in 1952, but its roots date back to 1807 when the first course in chemistry was delivered at the Prague Polytechnic. The ICT is known for both the depth and broadness of its educational and research activities in almost all branches of chemistry, chemical engineering, food chemistry and technology, biochemistry, refining, water-treatment, power and biological sciences and technologies, as well as environment protection, materials sciences and other chemistry-based fields of study. ICT Prague hosts about 2500 Master and Bachelor students and more than 600 PhD students. It is one of the most active Czech institutes and cooperates with more than 150 universities and institutions in the world. ICT will be in charge of the teaching course and research about fundamentals in technologies and Modelling during the second semester (S2) of the Master. It includes materials development and characterisation as well as process optimisation.

**University of Zaragoza (UNIZAR)** has an important experience in international co-operation for Higher Education and Research, and participates in this project as an expert in the field of Nanoscience and Nanotechnology - in particular in the area related to membranes and films. The University of Zaragoza and the Institutes of Nanoscience (INA) and Materials Science of Aragón (ICMA) have last generation equipment useful for the preparation and characterisation of membranes and films, including some unique instruments in Spain and Europe (e.g : PLD-Sputtering, XPS, Nanolithography...). The international cooperation activities in the field of Nanotechnology include more than 40 collaborations, and participation in 2 Networks of excellence "Nanomempro" and "Red Iberoamericana del Hidrógeno" (with Latin-American partners). UNIZAR will be in charge of the specialization courses during the third semester (S3). Based on the Master in "Nanostructured materials for Nanotechnology Applications", it will be completely taught in English by highly qualified members of research and academic staff within the INA, ICMA, and the Faculty of Science of Zaragoza University as well as by other national and international departments and industrial representatives.

**The University of Twente (UTwente)** is an entrepreneurial research university. It was founded in 1961 and offers education and research in areas ranging from public policy studies and applied physics to biomedical technology. The UTwente is the Netherlands' only campus university, and currently has over 5200 Bachelor students, 2300 Master students and 800 PhD students. Education is organised in courses that are allocated in faculties, such as the Faculty of Science and Technology. All MSc courses are taught in English. R&D activities on Membrane Science & Technology at the UTwente are integrated at the Department of Science and Technology (TNW) which will manage the Master EM3E. According with this high level of excellence in these fields of competence, the University of Twente will educate students in the third semester (S3) by offering

dedicated courses and practical training in the field of Energy & Environment. UTwente will be also in charge of quality assurance aspects of the Master.

**The Universidade Nova de Lisboa (UNL)** is one of three main public Universities in the Lisbon area. The Faculdade de Ciência e Tecnologia (FCT) of UNL involves on total 7000 students and 450 professors. FCT offers undergraduate, Masters and PhD programs in most scientific and engineering areas. R&D activities on Membrane Science and Technology at FCT are mostly carried out at the Chemistry Department, by the Biochemical and Process Engineering Group. The Master EM3E will be managed by the Department of Chemistry of UNL. Indeed, UNL is responsible for co-ordination of one lecturing semester of the Joint Master Course (S3). This semester consists of a specialisation on the subjects of Membrane Technologies applied to Biotechnologies, Food & Health. The academic staff of UNL has expertise in these fields which turns it totally capable of organising this semester. UNL will be also in charge of exploring and monitoring of extra-funding for assuring the Master sustainability.

## **Appendix 5: Presentation of staff involved in the EM3E project**

### **A - CVs' summary of Key staff**

### **B - CVs of the main actors in each Partner Institution**

#### **1. Université Montpellier 2 Sciences et Techniques - France**

- Prof. André AYRAL (EM3E project coordinator)
- Dr. Stéphanie ROUALDES
- Ms Sandrine CANADAS

#### **2. Université Paul Sabatier - France**

- Prof. Patrice BACCHIN
- Dr. Pierre AIMAR
- Ms Maude PERIER CAMBY

#### **3. Institute of Chemical Technology Prague - Czech Republic**

- Prof. Karel BOUZEK
- Dr. Vlastimil FILA
- Ms Hanna OPATOVA

#### **4. Faculdade de Ciências e Tecnologia – Universidade Nova de Lisboa – Portugal**

- Prof. Joao CRESPO
- Prof. Maria REIS
- Ms Carla BRAZHINA

#### **5. Universidad de Zaragoza - Spain**

- Dr. Reyes MALLADA
- Prof. Joaquin CORONAS
- Ms. Eva PASTOR

#### **6. Universiteit Twente - The Netherlands**

- Prof. Matthias WESSLING
- Prof. Henny BOUWMEESTER
- Ms Karin F. Paardenkooper

**7. Katholieke Universiteit Leuven**

- Prof. Ivo Frans Johanna Vankelecom

**8. Faculté des Sciences et Techniques – Université Hassan II Mohammedia**

- Prof. Saad ALAMI YOUNSSI
- Prof. Mohamed OUAMMOU
- Prof. Mohamed RAFIQ

**9. Università della Calabria**

- Mr. Raffaele ARENA
- Dr. Efrem CURCIO
- Prof. Enrico DRIOLI



**A - CVs' summary of Key staff**

University	Specific Fields of expertise	Key Actors	Function	Main activities and Skills	Responsibility in the Project
Montpellier 2 University	Fundamentals of Material Sciences	André AYRAL	<b>Professor in Materials Science, Membrane Materials and Processes</b> - Responsible of Master degrees at Department of Chemistry and international relations- Deputy Director in European Institute on Membranes of Montpellier (IEM) - Member of the executive committee of the Department of Chemistry of UM2	-Teaching of Analytical Material chemistry and Membrane Science (L and M levels) -Research in multifunctional membranes, more than 120 publications in scientific journals -Skills : Creation and management of master degrees, Management of research team and laboratory, of international projects, organization of international conferences, Supervision of Master and Ph.D. students	<b>Coordinator of the EMMC</b> - Member of Executive Board - Member in admission and examination committee -Teacher/Mentor - Responsible for the contacts with the associated partner  Member of the Evaluation Committee in charge of organisational arrangements and cooperation mechanism within the consortium.
		Stephanie ROUALDES	<b>Assistant Professor in Physico-chemistry, Materials Science, Membrane Materials and Processes</b> -Member of board of the Department of Chemistry at the Faculty of Sciences	- Teaching of General Chemistry, Analytical Chemistry, Electrochemistry, Engineering chemistry and Material chemistry (L and M levels). -Research: Synthesis by plasma enhanced CVD and characterisation of hybrid or polymeric thin layers and membranes.more than 40 publications in international scientific journals -Skills: Management of education programs, participations to international studies or projects, organization of international conferences, Supervision of Ph.D. students	Teacher/Mentor  Shared responsibilities for supervision of programme with A.A.
		Sandrine CANADAS	International project manager	Implementation of international projects and cooperations (administrative and financial management), Assistance to incoming students and academic staffs, Promotion and dissemination activities	Organisation of the implementation of EME3 Master - Member of EM3E Management Office UM2 - Coordination with Partner Offices
University Paul Sabatier (Toulouse3)	Fundamental of Chemical Engineering	Patrice BACCHIN	<b>Professor in Chemical Engineering</b> - Responsible of the Master degree in "Chemical Engineering and Environment"	-Teaching in mass transfer, interface science, and chemical engineering operations -Research activities in Interfacial science and process engineering, more than 20 publications and 30 communications -Skills :Management of education programs, Management of research team, Management of european projects, Supervision of master and Ph.D. students	Member of the Executive Board - Coordinator of the semester S1 in Toulouse  Member in admission and examination committee - Teacher/Mentor  Member of the Evaluation Committee in charge of management of the e-learning platform.
		Pierre AIMAR	<b>Senior Researcher – CNRS (Nationale Scientific Research Council)</b>	-Research activities in Membrane Science and Engineering. Author of 85 publications in international journals, 3 patents and more than 100 communications. -Skills: Supervision of Ph.D. students; Secretary of European membrane Society	Teacher/Mentor shared responsibilities for project implementation with P.B
		Maude PERRIER CAMBY	International project manager	Implementation of international projects and cooperations (administrative and financial management), Assistance to incoming students and academic staffs, Promotion and dissemination activities	Organisation of the implementation of EME3 Master - Member of EM3E Management Office UPS
Institut of Chemical Technology Prague	Fundamentals of Technologies and Modeling	Karel BOUZEK	<b>Professor in Inorganic Technology, Technical Electrochemistry, Electrochemical Engineering</b> - Head of Department of Inorganic Technology, Vice Dean of the Faculty of chemical Technology	-Teaching of Membrane processes, Thermodynamics of Water, Electrochemical Engineering -Research activities in technical electrochemistry and electrochemical engineering, more than 60 publications and 240 participations in scientific meetings -Skills :Management of education programs, Management of research team, Coordination and Management of international projects in research, Supervision of Ph.D. students -Membership in the scientific organizations: Czech Chemical Society (member), Czech Society of Chemical Engineering (member of the board), Czech Society of Industrial Chemistry (vice chairman of the board)	Member of the Executive Board - Coordinator of the semester S2 in Prague  Member in admission and examination committee - Teacher/Mentor
		Vlastimil FILA	<b>Assistant Professor in Inorganic Technology</b>	-Teaching subjects: Applied reaction kinetics, Membrane processes, Process design, Fundamentals of computer simulations - Research activities in heterogeneous catalysis, membrane processes and process engineering, more than 20 publications, and 80 contributions to the scientific meetings, - Skills: Management of education programs, participations to international studies or projects, Organization of international conferences, Supervision of Ph.D. students -Membership in the scientific organizations: Czech Chemical Society (member), Czech Society of Chemical Engineering (member), European Membrane Society (member)	Member of the Evaluation Committee in charge of relationships with industries and cooperation programme of Master. Teacher/Mentor
		Hana OPATOVA	Head of the international Department	Implementation of international projects and cooperations (administrative and financial management), Assistance to incoming students and academic staffs, Promotion and dissemination activities	Organisation of the implementation of EME3 Master - Member of EM3E Management Office ICTP

University	Specific Fields of expertise	Key Actors	Function	Main activities and Skills	Responsibility in the Project
University of Twente	Energy and Environment	Henny BOUWMEESTER	Associate Professor in Inorganic Membranes, Solid State Electrochemistry	<ul style="list-style-type: none"> <li>- Teaching subjects: Chemical Equilibria, Electrochemistry, Defect chemistry and transport in solids</li> <li>- Research: Dense ceramic membranes, microporous membranes, fuel cells; more than 120 publications in scientific journals</li> <li>- Skills: Supervision of master and PhD students, management of research team, participation in international projects and advisory boards.</li> </ul>	<ul style="list-style-type: none"> <li>Member of the Executive Board -Coordinator of semester S3 in Twente- Teacher/Mentor</li> <li>Member of the Evaluation Committee in charge of monitoring of the quality aspects.</li> <li>Member in admission and examination committee - Teacher/Mentor</li> </ul>
		Matthias WESSLING	Department Head, Chemical Engineering - Dean Faculty of Science and Technology	<ul style="list-style-type: none"> <li>-Teaching of Chemical engineering</li> <li>-Research: membranes in medical application, nanofluidics, microfluidics; more than 150 scientific papers published</li> <li>-Skills: Supervision of Ph.D. students</li> <li>- Honary Scientific member of the Russian Academy of Science Institute TIPS (Topchiev Institute of Petrochemical Sciences), Moscow</li> </ul>	<ul style="list-style-type: none"> <li>Member of the Executive Board - shared responsibilities with HB</li> <li>Teacher/Mentor</li> </ul>
		Karin F. PAARDENKOOPEER	Head International Office	<ul style="list-style-type: none"> <li>Implementation of international projects and cooperations (administrative and financial management), Assistance to incoming students and academic staffs, Promotion and dissemination activities</li> </ul>	<ul style="list-style-type: none"> <li>Member of EM3E management office</li> </ul>
University of Zaragoza	Nanoscience and Nanotechnology	Reyes MALLADA	Associate professor in Chemical engineering and technology	<ul style="list-style-type: none"> <li>-Teaching of Chemical Engineering Kinetics, Environmental technologies, Chemical Process Technology.</li> <li>-Research: Synthesis and characterization of inorganic membranes, applied in gas separation, pervaporation and membrane reactors. Participation in more than 40 conferences and more than 30 Publications in international journals</li> <li>-Skills: Project coordinator and member of team project, organisation of courses and international conferences, Supervision of Ph.D. students</li> </ul>	<ul style="list-style-type: none"> <li>Member of the Executive Board Coordinator of the semester S3 in Zaragoza</li> <li>Member in admission and examination committee - Teacher/Mentor</li> <li>Member of the Evaluation Committee in charge of information and promotion of the Master.</li> </ul>
		Joaquin CORONAS	Professor in chemistry	<ul style="list-style-type: none"> <li>-Teaching of Chemistry, Separation processes</li> <li>-Research topics: Synthesis and characterization of zeolites and related materials, Membranes for gas applications, Organic-inorganic composites. 85 Publications in international journals</li> <li>-Skills: organisation of international meeting</li> </ul>	<ul style="list-style-type: none"> <li>Teacher/Mentor</li> <li>shared responsibilities with RM</li> </ul>
		Eva PASTOR	Head International relations Office	<ul style="list-style-type: none"> <li>Implementation of international projects and cooperations (administrative and financial management), Assistance to incoming students and academic staffs, Promotion and dissemination activities</li> </ul>	<ul style="list-style-type: none"> <li>Organisation of the implementation of EME3 Master - Member of EM3E Management Office UNIZAR</li> </ul>
New University of Lisbon	Biotechnologies, Food and Health	Joao CRESPO	Professor of Chemical Engineering - Academic Dean - Faculty of Science and Technology	<ul style="list-style-type: none"> <li>-Teaching of Chemical engineering</li> <li>-Research: in membrane (bio)reactors, in the recovery of bioactive molecules, in the development of techniques for on-line, real-time monitoring and at molecular scale and in sustainable processes</li> <li>-Skills: Creation and management of a Doctorate Programme, management of research team and laboratory, of international projects, organization of international conferences, Supervision of Master and Ph.D. Students</li> <li>-Award: "Estímulo à Excelência", Ministry of Science and Higher Education</li> </ul>	<ul style="list-style-type: none"> <li>Member of the Executive Board - Coordinator of the semester S3 in Lisbon</li> </ul>
		Maria A. REIS	Vice President of the Scientific Council - Associate Professor at Chemistry Department	<ul style="list-style-type: none"> <li>-Teaching Chemistry</li> <li>-Research: Environmental Engineering, Biological Nutrients Removal, Products from Renewable Feedstocks, Biopolymers, Water and Wastewater Treatment processes, Membrane Bioreactors, more than 90 publications</li> <li>-Skills: Project coordinator and member of team project, Supervision of Ph.D. students</li> <li>-Award: Solvay &amp; Hovione Ideas Challenge SHIC'08: won Solvay Prize, November 2008.</li> </ul>	<ul style="list-style-type: none"> <li>Member in admission and examination committee - Teacher/Mentor</li> </ul>
		Carla BRAZINHA	International project manager	<ul style="list-style-type: none"> <li>-Implementation of international projects and co-operations (administrative and financial management) -Assistance and administrative support to incoming students and academic staffs</li> <li>-Promotion and dissemination of international activities</li> <li>-Management of the participation of IBET on the European Network of Excellence named NanoMemPro, participation in the NanoMemPro activities and connection between partners</li> </ul>	<ul style="list-style-type: none"> <li>Member of the Evaluation Committee in charge of the sustainability plan Organisation of the implementation of EME3 Master - Member of EM3E Management Office UNL</li> </ul>

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** **AYRAL André**  
**Address(es)** IEM, CC047, UM2, Place E. Bataillon, 34095 Montpellier cedex 5, FRANCE  
**Telephone(s)** (33-4) 67 14 91 43  
**Fax(es)** (33-4) 67 14 91 19  
**E-mail** Andre.ayral@iemm.univ-montp2.fr  
**Nationality** FRENCH  
**Date of birth** 20 January 1960  
**Gender** MALE

### Employment / Occupational field

**Professor at the University Montpellier 2, Teaching and Research in Materials Science, Membrane Materials and Processes**

### Work experience

**Dates**  
 Occupation or position held  
 Main activities and responsibilities

#### Since 2002

Professor

#### Research

- Main topics: Synthesis and characterisation of sol-gel-derived inorganic and hybrid thin layers and membranes, multifunctional membranes
- Publications: more than 120, in international scientific journals, chapter books, books and patents.
- Member of Editorial Board: Journal of Porous Materials <http://springerlink.metapress.com/content/102944/>

#### Teaching

- Teaching of Analytical Chemistry, Material chemistry and Membrane Science at the University Montpellier 2 (Bachelor and Master levels) and at the Graduate National Higher School of Chemistry of Montpellier (ENSCM).
- Head of the professional master « PROMAT - Physicochimie appliquée des Matériaux » at the University Montpellier 2 and of the international program of inter-universities exchange and e-learning
- Head of the research master UM2 / ENSCM / CEA « Chimie Séparative, Matériaux et Procédés : application au cycle du combustible nucléaire » (CSMP) »

#### Administration

- Deputy director, in charge of masters and of international relations, of the Department of Chemistry at the Faculty of Sciences of the University Montpellier 2 (2006-2008).
- Leader of a research team on ceramic and hybrid membranes in IEM (2004-2007).
- Deputy director, in charge of research and education, of the research centre: European Institute on Membranes of Montpellier (IEM) (2007)
- Deputy director, in charge of Education, and member of the executive committee, of the Department of Chemistry (Pôle Formation Recherche) at the University Montpellier 2 (since 2008).

Name and address of employer

Type of business or sector

#### Dates

Occupation or position held

Main activities and responsibilities

Name and address of employer

Type of business or sector

#### Dates

Occupation or position held

Main activities and responsibilities

Name and address of employer

University Montpellier 2

Academic

#### 1992-2001

Assistant professor

Research and Teaching

Graduate National Higher School of Chemistry of Montpellier (ENSCM).

Academic

#### 1990-1991

Research engineer

R&D studies

French Nuclear Agency (CEA)

Type of business or sector Research and Development

**Dates** 1988 - 1989

Occupation or position held Research engineer

Main activities and responsibilities R&D studies

Name and address of employer University Montpellier 2

Type of business or sector Research and Development

### Education and training

**Dates** 1992

Title of qualification awarded Habilitation à Diriger des Recherches

Principal subjects/occupational skills Materials Science

Name and type of organisation University Montpellier 2

providing education and training

**Dates** 1988

Title of qualification awarded Ph.D.

Principal subjects/occupational skills Dense Media and Materials

Name and type of organisation University Montpellier 2

providing education and training

**Dates** 1984

Title of qualification awarded Diplôme d'Etude Approfondie

Principal subjects/occupational skills Materials Science

Name and type of organisation University Montpellier 2

providing education and training

**Dates** 1983

Title of qualification awarded Engineer

Principal subjects/occupational skills Materials Science and Technologies

Name and type of organisation Institute of the Engineer Sciences of Montpellier

providing education and training

### Personal skills and competences

Mother tongue(s)

French

Other language(s)

Self-assessment

European level (\*)

English

German

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User

(\*) Common European Framework of Reference for Languages

Scientific skills and competences

Inorganic materials chemistry, colloidal chemistry, synthesis and characterisation of oxide ceramics by the sol-gel route, development of new inorganic and hybrid thin layers and membranes, synthesis and characterisation of nanostructured thin layers and membranes, characterisation of porous thin layers using innovative techniques, multifunctional membranes (separation and photocatalysis, separation and adsorption).

Organisational skills and competences

- Creation and management of education programs
- Management of research team and of research laboratory
- Management of studies or projects in the scope of industrial, national, European and international programs
- Organization of international conferences
- Supervision of Ph.D. students

Technical skills and competences

Main techniques of materials characterisation (XRD, Raman, light scattering, porosimetry, etc)

Computer skills and competences

Current office softwares and updating of web sites

Driving licence

Motorcycle (A) and car (B)

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s)  
Address(es)  
Telephone(s)  
Fax(es)  
E-mail  
Nationality  
Date of birth  
Gender

**ROUALDES Stéphanie**  
IEM, CC047, UM2, Place E. Bataillon, 34095 Montpellier cedex 5, FRANCE  
(33-4) 67 14 91 81  
(33-4) 67 14 91 19  
Stephanie.roualdes@iemm.univ-montp2.fr  
FRENCH  
03<sup>rd</sup> of January, 1975  
FEMALE

### Employment / Occupational field

**Assistant Professor at the University Montpellier 2, Teaching and Research in Physico-chemistry, Materials Science, Membrane Materials and Processes**

### Work experience

*Dates*  
Occupation or position held  
Main activities and responsibilities

**Since 2002**  
Assistant Professor  
**Research**  
- Main topics: Synthesis by plasma enhanced CVD and characterisation of hybrid or polymeric thin layers and membranes (for gas permeation and above all fuel cell applications)  
- Publications: more than 40, in international scientific journals, chapter books, books and patents.  
**Teaching**  
- Teaching of General Chemistry, Analytical Chemistry, Electrochemistry, Engineering chemistry and Material chemistry at the University Montpellier 2 (Bachelor and Master levels).  
- Head of the professional master « PROMAT - Physicochimie appliquée des Matériaux » at the University Montpellier 2.  
**Administration**  
- Member of board of the Department of Chemistry at the Faculty of Sciences of the University Montpellier 2 (since 2009).  
- Member of board of the French plasma network (since 2008).

Name and address of employer  
Type of business or sector

University Montpellier 2  
Academic

#### *Dates*

Occupation or position held  
Main activities and responsibilities

2001-2002  
Assistant professor  
Teaching and research

Name and address of employer  
Type of business or sector

University of Bath, UK  
Academic

#### *Dates*

Occupation or position held  
Main activities and responsibilities

2000-2001  
Temporary assistant professor  
Teaching and research

Name and address of employer  
Type of business or sector

University Montpellier 2  
Academic

### Education and training

*Dates*  
Title of qualification awarded  
Principal subjects/occupational skills  
Name and type of organisation providing education and training

2006  
Habilitation à Diriger des Recherches  
Materials Science  
University Montpellier 2, France

#### *Dates*

2000

Title of qualification awarded Ph.D.  
 Principal subjects/occupational skills Materials Science  
 Name and type of organisation University Montpellier 2, France  
 providing education and training

**Dates** 1997

Title of qualification awarded Diplôme d'Etude Approfondie  
 Principal subjects/occupational skills Chemical Engineering  
 Name and type of organisation Institut Polytechnique de Lorraine, Nancy, France  
 providing education and training

**Dates** 1997

Title of qualification awarded Engineer  
 Principal subjects/occupational skills Chemical Engineering  
 Name and type of organisation Graduate National Higher School of Industrial Chemistry, Nancy, France  
 providing education and training

**Personal skills and competences**

Mother tongue(s)

**French**

Other language(s)

Self-assessment

*European level (\*)*

**English**

**German**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
x	C1	x	C1	x	C1	x	C1	x	C1
x	A2	x	A2	x	A2	x	A2	x	A2

(\*) *Common European Framework of Reference for Languages*

Scientific skills and competences

Synthesis by plasma enhanced CVD of hybrid or polymeric thin layers and membranes. Modification by plasma treatment of conventional membranes. Microstructural, transport and electrochemical characterization of membranes. Development of plasma fuel cells.

Organisational skills and competences

- Management of education programs
- Participation to studies or projects in the scope of industrial, national, European and international programs
- Organization of international conferences
- Supervision of Ph.D. students

Technical skills and competences

Plasma reactors, materials characterisation techniques (IRTF, Raman, Electrochemical impedance spectroscopy, liquid or gas permeation cells)

Computer skills and competences

Current office softwares and updating of web sites

Driving licence

Motorcycle (A) and car (B)

## Europass Curriculum Vitae



### Personal information

**First name / Surname** Sandrine **CANADAS**  
**Address** 2312 BD Paul Valéry BAT A Appt n°12 - 34070 Montpellier (France)  
**Mobile** +33/ (0) 6 08 21 72 55  
**E-mail** Sandrine.canadas@univ-montp2.fr  
**Nationality** French  
**Date of birth** 30/09/1976  
**Gender** Female

### Work experience

<p><b>Dates</b></p> <p><b>Occupation or position held</b></p> <p><b>Main activities and responsibilities</b></p>	<p>01/01/2008 → today</p> <p>International project manager/ Coordinator of projects engineering Department</p> <p>- Main Activities : International political strategy, promotion of European &amp; international programmes, European projects set-up in the area of Education with international partner universities (EMECW, Erasmus Mundus, Double degree programmes, Tempus, LLLP..), negotiation and management of mobility programmes, management of the department budget, monitoring and dissemination of tenders, redaction and negotiation of contracts / agreements, establishment of procedures and management tools, monitoring and coordination of project management, hosting foreign delegations.          - Member of the Steering Committee AVERROES (EMECW Lot n°1 Morocco-Algeria-Tunisia)          - Head of International relations Office (01/09/2009 – 01/01/2010)</p>
<p><b>Name and address of employer</b></p>	<p>Université Montpellier 2 Sciences et Techniques Place Eugène Bataillon – 34095 Montpellier (France)</p>
<p><b>Dates</b></p> <p><b>Occupation or position held</b></p> <p><b>Main activities and responsibilities</b></p>	<p>01/01/2008 - 01/06/2009</p> <p>AVERROES Project Manager</p> <p>Setting-up, coordination and project management : implementation of the mobilities, management of the budget, preparation &amp; participation to the committees and consortium meetings, relations with partners and associated partners, host and assistance to the students and academic staff, promotion and dissemination of the project, creation of communication tools, procedures for quality assurance.</p>
<p><b>Name and address of employer</b></p>	<p>Université Montpellier 2 Sciences et Techniques Place Eugène Bataillon – 34095 Montpellier (France)</p>
<p><b>Dates</b></p> <p><b>Occupation or position held</b></p> <p><b>Main activities and responsibilities</b></p>	<p>01/09/2006 - 01/12/2007</p> <p>Financial manager of International Relations Office</p> <p>Management of mobility programmes for students &amp; academic staff (Erasmus, Region Languedoc-Roussillon, MENSUR), management of international cooperation projects, assistance in educational projects set-up, management of budget.</p>
<p><b>Name and address of employer</b></p>	<p>Université Montpellier 2 Sciences et Techniques Place Eugène Bataillon – 34095 Montpellier (France)</p>
<p><b>Dates</b></p> <p><b>Occupation or position held</b></p>	<p>01/01/2006 - 31/08/2006</p> <p>Coordinator of Network "Technology Platforms" (PFT) of Montpellier Academy</p>

Main activities and responsibilities Administrative and financial management of the Network ( 5 offices - budget = 1 390 000€ - 40 persons): responsible for the reorganization at the functional and financial, establishment of procedures and management tools, technical assistance to preparing applications for funding (regional, national, european level), management of budget.

Name and address of employer Lycée Jean Mermoz (High School Jean Mermoz)  
717 Avenue Jean Mermoz - 34060 Montpellier (France)

Dates 01/09/2002 - 31/12/2005

Occupation or position held Coordinator of Network "Cellules Locales d'Animation Technologique" (Local Cell of Technological Animation) Languedoc-Roussillon

Main activities and responsibilities Administrative and financial management of the Network ( 7 offices - budget = 810 000€ - 28 persons): establishment and management of the budget, establishment of applications for funding (regional, national, european level : FSE-FEDER), establishment of procedures and management tools, financial reports and activity report, HR Management, negotiation with institutional partners, participation and organization of steering committees and meetings.

Name and address of employer Lycée Jean Mermoz (High School Jean Mermoz)  
717 Avenue Jean Mermoz - 34060 Montpellier (France)

Dates 01/03/2002 - 31/07/2002

Occupation or position held Development officer in charge of cross-border cooperation

Main activities and responsibilities Monitoring and dissemination of tenders, partnership research, advice and assistance in european project set-up, set-up of cross-border cooperation projects.

Name and address of employer Pays Pyrénées Méditerranée  
2 rue Jean-Amade BP121 - 66401 Céret

## Education and training

Dates 04/2005 - 06/2005

Title of qualification awarded Conseiller en Affaires Européennes (European Affairs Advisor)

Principal subjects / occupational skills covered Three training weeks: European institutions (at Brussels), European programmes, European project set-up.

Name and type of organisation providing education and training Mission d'Appui aux Programmes Communautaires (MAPROC)  
Avenue Agropolis, 34090 Montpellier (France)

Dates 01/09/2000 – 01/09/2001

Title of qualification awarded DESS Relations transfrontalières – Master 2 in Cross-border Cooperation

Principal subjects / occupational skills covered European policy, European law, European programmes (particularly INTERREG, Cross-border cooperation programmes), local development, foreign languages

Name and type of organisation providing education and training Université Perpignan Via Domitia  
52, Avenue Paul Alduy - 66100 Perpignan

Dates 01/09/1997 – 01/09/2000

Title of qualification awarded Licence et Maîtrise d'Aménagement du territoire – 3rd Year of Bachelor & 1st Year of Master in Urban and Regional Planning

Principal subjects / occupational skills covered Local development, fiscal law, public law, spatial economy, urban planning, economic and touristic development, rural development

Name and type of organisation providing education and training Université Perpignan Via Domitia  
52, Avenue Paul Alduy - 66100 Perpignan

Dates 01/09/1995 – 01/09/1997

Title of qualification awarded DEUG Géographie – Bachelor in Geography (1st-2<sup>nd</sup> years)

Principal subjects / occupational skills covered Local development, spatial spatial analysis, urban planning, economics, rural and touristic development, geology, sustainable development, environmental risk studies, cartography, geodesy, GIS.



Name and type of organisation providing education and training

Université Perpignan Via Domitia  
52, Avenue Paul Alduy - 66100 Perpignan

**Personal skills and competences**

Other language(s)

Self-assessment

European level (\*)

**English**

**Spanish**

**Catalan**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
B2	Independent user	B2	Independent user	B2	Independent user	B1	Independent user	B2	Independent user
C2	Proficient user	C2	Proficient user	B2	Independent user	B2	Independent user	B2	Independent user
C2	Proficient user	C2	Proficient user	B2	Independent user	B2	Independent user	B2	Independent user

(\*) *Common European Framework of Reference (CEF) level*

Computer skills and competences

Word, Excel, Publisher, Power Point, Joomla, Internet Explorer, Outlook, Eudora, Thunderbird, Moveon.

Organisational skills and competences

- Administrative and financial management,
- Evaluation, implementation and monitoring of budget,
- leadership (as project manager and head of international relation office),
- Developing internationalization in higher education programmes,
- Participation, organization and conduct of meetings, steering committees,
- Implementing international strategies,
- Implementating procedures for project quality assurance,
- Set-up, coordination and implementation of projects,
- Management of student exchange programmes,
- Assistance to incoming students & academic staff,
- Promotion and dissemination of international activities.

Additional information

- Contributions in seminars :
  - 31/03/2006: "Technology Transfer" seminar (Béziers – France) - animation of workshop "Management of Technology platforms".
  - 15/16 january 2009 (Sousse – Tunisia) and 26/28 may 2009 (Perpignan – France): "Euro-Mediterranean Days Averroes" – Contributions
- Training :
  - Knowledge of higher education; Erasmus Training; answer to a call for proposals: Erasmus Mundus Action 1, Tempus IV, European Research projects (FP7); Professional English; Excel Development; Infodays Erasmus Mundus Brussels and Paris; Training in Management.

Driving licence(s)

Car driving Licence (B)

Other activities

Cycling, skating, diving (qualified Level 1)

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** **BACCHIN Patrice**  
**Address(es)** Université Paul Sabatier, Laboratoire de Génie Chimique 31062 TOULOUSE CEDEX 9 - FRANCE  
**Telephone(s)** 0561558163 **Mobile:** 0683341527  
**Fax(es)** 0561556139  
**E-mail** bacchin@chimie.ups-tlse.fr  
**Nationality** FRENCH  
**Date of birth** 08/06/1968  
**Gender** MALE

### Work experience

<p><b>Dates</b></p> <p><b>Occupation or position held</b></p> <p><b>Main activities and responsibilities</b></p>	<p>Sept 2008 - Professor</p> <p>Research activities in Interfacial science and process engineering</p> <ul style="list-style-type: none"> <li>• Modelling of colloids concentration in processes (ultrafiltration, drying ...)</li> <li>• Experimental measurement of particles accumulation in microfluidic system or in processes</li> </ul> <p>Teaching in mass transfer, interface science, and chemical engineering operations</p> <p>Author of 21 publications in international journal (including 7 with international co-authors), 1 review article, 4 publications in national journal, 2 international patent, 3 chapter in books, 2 invited conferences, more than 50 communications</p> <p>Supervision or co-supervision of 6 pHD students</p> <p>Responsibility of the Research Master "Génie des procédés et Environnement" 2007- Co-responsibility of the M2 PRO « Procédés de séparation » 2005- Coordinator of the WP 125 in the NOE Nanomempro 2004-2009 Studies Director of the préparation à l'agrégation de sciences physiques option PPC 1999-2004 Responsibility of the second year of the MST Procédés Physico-chimiques 1998- 2004 Co-responsibility of the DESS Génie des Procédés de Séparation 2004-2005</p>
<p><b>Name and address of employer</b></p> <p><b>Type of business or sector</b></p>	<p>Université Paul Sabatier Education and Research</p>
<p><b>Dates</b></p> <p><b>Occupation or position held</b></p> <p><b>Name and address of employer</b></p> <p><b>Type of business or sector</b></p>	<p>Sept 1996 – Sept 2008 Assistant Professor Université Paul Sabatier Education and Research</p>
<p><b>Dates</b></p>	<p>Dec 1995 – Sept 1996</p>

Occupation or position held Researcher  
 Name and address of employer Société Rhone Poulenc Rorer  
 Type of business or sector Chemical Engineering

Dates Dec 1994 – Dec 1995

Occupation or position held Research officer  
 Name and address of employer University of Bath  
 Type of business or sector Chemical Engineering

**Education and training**

Dates October 2006

Title of qualification awarded Habilitation à Diriger des Recherches  
 Principal subjects/occupational skills covered Engineering of surface interactions : applications to the transformation of the soft matter  
 Name and type of organisation providing education and training Université Paul Sabatier

Dates January 1994

Title of qualification awarded Doctorate in Chemical Engineering  
 Principal subjects/occupational skills covered  
 Name and type of organisation providing education and training Université Paul Sabatier

Dates June 1991

Title of qualification awarded Engineer of the Ecole Nationale Supérieure d'Ingénieurs de Génie Chimique  
 Principal subjects/occupational skills covered Chemical Engineering  
 Name and type of organisation providing education and training Institut National Polytechnique de Toulouse

Dates June 1991

Title of qualification awarded Diplôme d'Etude Approfondie « Génie des procédés »  
 Principal subjects/occupational skills covered Chemical Engineering  
 Name and type of organisation providing education and training Institut National Polytechnique de Toulouse

**Personal skills and competences**

Mother tongue(s) **FRENCH**

Other language(s)

Self-assessment

European level (\*)

**English**

**Spanish**

Understanding		Speaking		Writing
Listening	Reading	Spoken interaction	Spoken production	
C1	C1	B2	B2	B2
A1	A2	A1	A1	A1

(\*) Common European Framework of Reference for Languages

**Additional information**

more information on <http://www.patricebacchin.fr>



## Europass Curriculum Vitae

### Personal information

First name(s) / Surname(s) **AIMAR Pierre**  
Address(es) Université Paul Sabatier, Laboratoire de Génie Chimique 31062 TOULOUSE CEDEX 9 - FRANCE  
Telephone(s) 0561558304 Mobile: 0608803024  
Fax(es) 0561556139  
E-mail aimar@chimie.ups-tlse.fr  
Nationality FRENCH  
Date of birth 08/04/1957  
Gender MALE

### Work experience

Dates April 1994  
Occupation or position held Senior Researcher – CNRS (Nationale Scientific Research Council)  
Main activities and responsibilities Research activities in Membrane Science and Engineering  
Membrane fouling  
Membrane characterization  
Water, food and biomedical applications of membrane processes  
Author of 85 publications in international journals, 3 patents and more than 100 communications  
Supervision or co-supervision of 18 PhD students  
Secretary – European membrane Society (1992-)  
Editor – Journal of Membrane Science (2002-)

Name and address of employer CNRS – 16 Avenue E. Belin – 31400 Toulouse  
Type of business or sector Research

Dates December 1983 – March 1994  
Occupation or position held Junior Research officer - CNRS  
Name and address of employer CNRS – 16 Avenue E. Belin – 31400 Toulouse  
Type of business or sector Research

### Education and training

Dates November 1987  
Title of qualification awarded Doctorate in Chemical Engineering  
Principal subjects/occupational skills covered  
Name and type of organisation providing education and training Université Paul Sabatier  
Dates June 1980

Title of qualification awarded | Graduation in Electrochemical Engineering  
 Principal subjects/occupational skills covered  
 Name and type of organisation providing education and training | National Polytechnic Institute – Grenoble - France

**Personal skills and competences**

Mother tongue(s) | **FRENCH**

Other language(s)

Self-assessment

*European level (\*)*

**English**

**Spanish**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
B1	Independent user	B1	Independent user	B1	Independent user	B1	Independent user	A1	Basic User

(\*) *Common European Framework of Reference for Languages*

**Additional information**

<http://lgc.inp-toulouse.fr/spip.php?rubrique1&id=1#res>

## Europass Curriculum Vitae



### Personal information

**First name / Surname** **Maude Perier-Camby**  
**Address** 16 avenue du Général Barbot, 31200 Toulouse (France)  
**Mobile** +33678421155  
**E-mail** periercamby\_maude@yahoo.fr  
**Nationality** French  
**Date of birth** 14/09/1985  
**Gender** Female

### Work experience

<b>Dates</b> <b>Occupation or position held</b> <b>Main activities and responsibilities</b> <b>Name and address of employer</b>	08/09/2009 → today European project manager Strategic intelligence, promotion of European programmes, European projects set-up in the area of Education Paul Sabatier University 118 Route de Narbonne, 31062 Toulouse (France)
<b>Dates</b> <b>Occupation or position held</b> <b>Main activities and responsibilities</b> <b>Name and address of employer</b>	06/04/2009 - 06/09/2009 Trainee Project eligibility studies, European training organization in Brussels, Interreg IIIA projects monitoring Mission d'Appui aux Programmes Communautaires (MAPROC) Avenue Agropolis, 34090 Montpellier (France)
<b>Dates</b> <b>Occupation or position held</b> <b>Name and address of employer</b>	09/2005 - 03/2006 Au pair (Scotland)

### Education and training

<b>Dates</b> <b>Title of qualification awarded</b> <b>Principal subjects / occupational skills covered</b> <b>Name and type of organisation providing education and training</b>	04/2009 - 06/2009 Conseiller en Affaires Européennes Three training weeks: European institutions, European programmes, European project set-up. Mission d'Appui aux Programmes Communautaires (MAPROC) Avenue Agropolis, 34090 Montpellier (France)
<b>Dates</b> <b>Title of qualification awarded</b>	10/2008 - 04/2009 Master Expert en Projets Européens – European projects Expert

Principal subjects / occupational skills covered	European policy, European law, European programmes, local development
Name and type of organisation providing education and training	Caen-Basse Normandie University 14000 Caen (France)
Dates	09/2007 - 04/2008
Title of qualification awarded	Licence professionnelle et Master 1 professionnel Aménagement du Territoire – Land settlement
Principal subjects / occupational skills covered	Local development, public law, spatial economy, urban planning, economic and touristic development, rural development
Name and type of organisation providing education and training	University of Pau and Pays de l'Adour 64000 Pau (France)
Dates	04/2006 - 06/2006
Title of qualification awarded	First Certificate in English of Cambridge - Grade B
Principal subjects / occupational skills covered	English intensive courses
Name and type of organisation providing education and training	Stevenson College Edinburgh (Scotland)
Dates	09/2003 - 06/2005
Title of qualification awarded	Brevet de Technicien Supérieur Animation et Gestion Touristiques Locales
Principal subjects / occupational skills covered	Touristic economy, spatial analysis, touristic law, foreign languages
Name and type of organisation providing education and training	Lycée International 01210 Ferney-Voltaire (France)
Dates	09/2002 - 06/2003
Title of qualification awarded	Baccalauréat Littéraire - Mention Assez Bien
Name and type of organisation providing education and training	Lycée Edouard Herriot 38500 Voiron (France)

### Personal skills and competences

Other language(s)

Self-assessment  
European level (\*)

**English**  
**Spanish / Castilian**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient user	B2	Independent user	B2	Independent user	B2	Independent user	B2	Independent user
B2	Independent user	C1	Proficient user	A2	Basic User	A2	Basic User	A2	Basic User

(\*) *Common European Framework of Reference (CEF) level*

Computer skills and competences Word, Excel, Publisher, Power Point

Driving licence(s) B

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s) **BOUZEK Karel**  
Address(es) Institute of Chemical Technology Prague, Technická 5, 166 28 Prague 6, Czech Republic  
Telephone(s) +420 220444019 Mobile:  
Fax(es) +420 220444410  
E-mail Karel.Bouzek@vscht.cz  
Nationality CZECH  
Date of birth 05/07/1968  
Gender MALE

### Work experience

Dates September 2006 –  
Occupation or position held Head of Department of Inorganic Technology, Vice Dean of the Faculty of chemical Technology  
Main activities and responsibilities Research activities in technical electrochemistry and electrochemical engineering

- Waste and drinking water treatment
- Fuel cells
- Water electrolysis
- Mathematical modelling

Teaching subjects

- Membrane processes
- Electrochemical Engineering
- Thermodynamics of Water Solutions

Publication activity: 55 papers, 5 chapters in monographies, 1 text book, 2 patent applications ,more than 240 contributions to the scientific meetings  
Supervision of 10 thesis  
Participation as the applicant or joint applicant in the 5 EC grants, 7 international grants and 15 national grants, as core research team member in 10 national and 1 EC grants

Name and address of employer Institute of Chemical Technology Prague  
Type of business or sector Education and Research  
Dates September 2005 -  
Occupation or position held Full Professor  
Name and address of employer Institute of Chemical Technology Prague, Department of Inorganic Technology  
Type of business or sector Research and Education  
Dates July 2002 – August 2005  
Occupation or position held Associate Professor



Name and address of employer Institute of Chemical Technology Prague, Department of Inorganic Technology  
 Type of business or sector Research and Education  
 Dates January 1997 – June 2002  
 Occupation or position held Assistant Professor  
 Name and address of employer Institute of Chemical Technology Prague, Department of Inorganic Technology  
 Type of business or sector Research and Education

**Education and training**

Dates May 2005  
 Title of qualification awarded Professor of Inorganic Technology  
 Principal subjects/occupational skills covered Inorganic Technology, Technical Electrochemistry, Electrochemical Engineering  
 Name and type of organisation providing education and training Institute of Chemical Technology Prague  
 Dates December 2001  
 Title of qualification awarded Habilitation  
 Principal subjects/occupational skills covered Inorganic Technology, Technical Electrochemistry, Electrochemical Engineering  
 Name and type of organisation providing education and training Institute of Chemical Technology Prague  
 Dates May 1997  
 Title of qualification awarded Doctorate in Inorganic Technology  
 Principal subjects/occupational skills covered Chemical Engineering and Technology (Electrochemical Synthesis of Ferrates)  
 Name and type of organisation providing education and training Institute of Chemical Technology Prague  
 Dates September 1991  
 Title of qualification awarded Master of Science in Inorganic Technology  
 Principal subjects/occupational skills covered Chemical Engineering and Technology  
 Name and type of organisation providing education and training Institute of Chemical Technology Prague

**Personal skills and competences**

Mother tongue(s) **CZECH**

Other language(s)

Self-assessment

*European level (\*)*

**English**

**German**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C2	Proficient User
B2	Independent	B2	Independent	B2	Independent	B1	Independent	B2	Independent

(\*) *Common European Framework of Reference for Languages*

## Additional information

Membership in the scientific organizations' and other related activities: Czech Chemical Society (member), Czech Society of Chemical Engineering (member of the board), Czech Society of Industrial Chemistry (vice chairman of the board), Electrochemical Society (member), International Society of Electrochemistry (member), Working party on Electrochemical Engineering at EFCE (representative of the Czech Republic), Council of the Institute of Physical Chemistry of J. Heyrovsky of the Academy of Sciences of the Czech Republic (member), Council of the Institute of Inorganic chemistry of the Academy of Sciences of the Czech Republic (member), Grant Agency of the Academy of Sciences of the Czech Republic (member of the committee), Czech Hydrogen Technological Platform (member of the board), Membrane Technological Platform (vice chairman of the board).

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** **FILA Vlastimil**  
**Address(es)** Institute of Chemical Technology Prague, Technická 5, 166 28 Prague 6, Czech Republic  
**Telephone(s)** +420 220444018 **Mobile:**  
**Fax(es)** +420 220444410  
**E-mail** Vlastimil.Fila@vscht.cz  
**Nationality** CZECH  
**Date of birth** 08/09/1968  
**Gender** MALE

### Work experience

**Dates** September 1998 –  
**Occupation or position held** Assistant Professor  
**Main activities and responsibilities** Research activities in heterogeneous catalysis, membrane processes and process engineering
 

- Mathematical modelling of chemical reactors (heterogeneous and homogeneous reaction, membrane reactors)
- Gas separation – experimental measurement and modelling (membrane separation, adsorption)
- Process design – design, optimization and modelling of chemical technology

**Teaching subjects**

- Applied reaction kinetics
- Membrane processes
- Process design
- Fundamentals of computer simulations

**Publication activity:** 15 publications, 1 patent application, 8 industrial realizations, more than 80 contributions to the scientific meetings, more than 30 industrial reports  
**Supervision or co-supervision of 15 thesis**  
**Participation as the applicant or joint applicant in the 4 national grants, 1 international, 3 industrial projects, as core research team member in 10 national grants, 6 EC grants and more than 10 industrial projects**

**Name and address of employer** Institute of Chemical Technology Prague  
**Type of business or sector** Education and Research  
**Dates** September 1997 – July 1998  
**Occupation or position held** Postdoctoral Fellowship  
**Name and address of employer** LAGEP, Université Lyon 1, France  
**Type of business or sector** Research and Education

Dates August 1996 – August 1997  
 Occupation or position held Research Fellow  
 Name and address of employer Institute of Chemical Technology Prague, Department of Inorganic Technology  
 Type of business or sector Research and Education

### Education and training

Dates August 1997  
 Title of qualification awarded Doctorate in Inorganic Technology  
 Principal subjects/occupational skills covered Chemical Engineering and Technology (Mathematical model of the catalytic gauze reactor for ammonia oxidation)  
 Name and type of organisation providing education and training Institute of Chemical Technology Prague

Dates June 1991  
 Title of qualification awarded Master of Science in Inorganic Technology  
 Principal subjects/occupational skills covered Chemical Engineering and Technology  
 Name and type of organisation providing education and training Institute of Chemical Technology Prague

### Personal skills and competences

Mother tongue(s) **CZECH**

Other language(s)

Self-assessment

European level (\*)

**English**

**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient User	C2	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	B2	Independent	B2	Independent	B2	Independent	B2	Independent

(\*) Common European Framework of Reference for Languages

### Additional information

Membership in the scientific organizations' and other related activities: Czech Chemical Society (member), Czech Society of Chemical Engineering (member), European Membrane Society (member)



## Europass Curriculum Vitae

### Personal information

First name(s) / Surname(s) **Hana Opatová**  
Address(es) Ve Struhách 30, 160 00 Praha 6, Czech Republic  
Telephone(s) +420 220 443 896  
Fax(es) +420 220 444 345  
E-mail hana.opatova@vscht.cz  
Nationality Czech  
Date of birth 10.05.1951  
Gender Female

### Work experience

Dates May 2008 onwards  
Occupation or position held Head of the International department at ICT Prague  
Institutional Erasmus Coordinator  
Main activities and responsibilities Coordinating and administrating international activities of the ICT Prague  
Managing students and staff mobility  
Name and address of employer Institute of Chemical Technology, Prague  
Technická 5, 166 28 Prague 6 - CZ  
Type of business or sector High education institution  
Dates 1996 onwards  
Occupation or position held Representative of ICT Prague in ISEKI and ISEKI Mundus (ERASMUS networks)  
Main activities and responsibilities Providing information on study and training activities  
Participating in meetings and working groups  
Name and address of employer Institute of Chemical Technology, Prague  
Technická 5, 166 28 Prague 6 - CZ  
Type of business or sector High education institution  
Dates 1982 onwards  
Occupation or position held Teacher  
Main activities and responsibilities Giving lectures, leading students projects and thesis  
Managing research projects  
Name and address of employer Institute of Chemical Technology, Prague  
Technická 5, 166 28 Prague 6 - CZ  
Type of business or sector High education institution

### Education and training

Dates 2000 - 2010  
 Title of qualification awarded Certificates of courses and trainings in food safety, food legislation, good agricultural practice  
 Principal subjects/occupational skills covered Managing and auditing food safety  
 Training and auditing food and agricultural companies  
 Name and type of organisation providing education and training Czech ministry of agriculture, AFNOR, EFTA, GLOBALGAP, Czech Institute of Accreditation

Dates 1988  
 Title of qualification awarded PhD in Food Chemistry and Technology at ICT Prague

Dates 1975  
 Title of qualification awarded MSc in Food Chemistry and Technology at ICT Prague

**Personal skills and competences**

Mother tongue(s) **Czech**

Other language(s)

Self-assessment

European level (\*)

**English**

**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
B2	Independant	B2	Independant	B2	Independant	B2	Independant	B2	Independant
B2	Independant	B2	Independant	B2	Independant	B2	Independant	B2	Independant

(\*) Common European Framework of Reference for Languages

Computer skills and competences Microsoft office, Internet



## Europass Curriculum Vitae

### Personal information

First name(s) / Surname(s) **JOÃO PAULO S. GOULÃO CRESPO**  
Address(es) Department of Chemistry, Faculty of Science and Technology – Universidade Nova de Lisboa,  
Campus da Caparica, 2829-516 Caparica, Portugal  
E-mail [jgc@dq.fct.unl.pt](mailto:jgc@dq.fct.unl.pt)  
Nationality Portuguese  
Date of birth March 29, 1960  
Gender M

**Occupational field** Full Professor and academic Dean at the New University of Lisbon (UNL)

### Work experience

Dates	Since 2005
Occupation or position held	Full Professor
Main activities and responsibilities	<b>Research</b> - Main topics: Development of technologies, utilizing trials with membranes for detachment - Publications: more than 70, in international scientific journals, chapter books, books and patents. - Member of Editorial Board: the "Journal of Membrane Science" and the "Journal of Biotechnology" <b>Teaching</b> - Teaching of Chemical Engineering <b>Administration</b> -Academic Dean of the university since 2006
Name and address of employer	New University of Lisbon (UNL)
Dates	2001-2005
Occupation or position held	Member of the Direction Board at the European membrane Society
Dates	2002-2005
Occupation or position held	Vice-President of the Portuguese National Science Foundation (Fundação para a Ciência e a Tecnologia)

### Education and training

Title of qualification awarded	2001 "Habilitation" in Chemical Engineering New University of Lisbon, FCT, 1990 Post-doc Gesellschaft für Biotechnologische Forschung, Braunschweig, Germany 1990 PhD in Chemical Engineering New University of Lisbon, FCT, 1983 Graduation in Chemical Engineering Technical University of Lisbon, IST,
Principal subjects/occupational skills covered	Chemical Engineering

**Personal skills and competences**

Mother tongue(s)

**Portuguese**

Other language(s)

Self-assessment

*European level (\*)***English****Spanish**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	C1	Proficient User	B2	Independant	B2	Independant	B2	Independant

*(\*) Common European Framework of Reference for Languages*

Scientific skills and competences

**Participation in research projects as project coordinator**

- European Network "Physico-Chemical Aspects of Transport Phenomena in Membrane Processes". Associated contractor (Coordinator of the Portuguese Team).
- Extractive Membrane Bioreactors for Detoxification of Chemical Industry Wastes. Environment and Climate Programme, European Commission,
- NanoMemPro, Network of Excellence, European Commission, 2004 (Coordinator of the Portuguese Team).
- EUROMBRA, STREP Project, Global Change and Ecosystems, FP6-2004-Global-3, European Commission, Contract 018480 (Coordinator of the Portuguese Team).

**Prizes and awards**

- 2002 Best Scientific Oral Contribution (6 awards conceded)
- 2002 Best Scientific Poster Contribution (6 awards conceded)
- 2005 Best paper published in the field of Membrane Science and Technology (young researcher R. Fortunato)

Organisational skills and competences

- Management of research team and of research laboratory
- Management of studies or projects in the scope of industrial, national, European and international programs
- Supervision of Ph.D. and Master thesis





## Europass Curriculum Vitae

### Personal information

First name(s) / Surname(s) **Maria A Reis**  
Address(es) Department of Chemistry; FCT/UNL;  
2825-516 Caparica, Portugal  
Telephone(s) 351 (1) 2948357  
Fax(es) 351 (1) 2948385  
E-mail amr@dq.fct.unl.pt  
Nationality Portuguese  
Date of birth 4/11/54  
Gender F

**Desired employment / Occupational field** Associate Professor and Vice President of the Scientific Council at Universidade Nova de Lisboa

### Work experience

Dates	current
Occupation or position held	Professor with Habilitation at Chemistry Department
Main activities and responsibilities	Teaching Chemical Engineering
Name and address of employer	Universidade Nova de Lisboa
Type of business or sector	
Dates	1991-2005
Occupation or position held	Assistant Professor at Chemistry Department
Name and address of employer	Universidade Nova de Lisboa
Dates	1983-1991
Occupation or position held	Assistant at Chemistry Department
Name and address of employer	Universidade Nova de Lisboa

### Education and training

Dates	2003-"Habilitation" in Biochemical Engineering FCT/UNL
	1978 -Graduation in Chemical Engineering IST/UTL
	1991- PhD in Biochemical Engineering FCT/UNL

**Personal skills and competences**

Mother tongue(s) **Portuguese**

Other language(s)

Self-assessment

European level (\*)

**English**

**Spanish**

<b>Understanding</b>				<b>Speaking</b>				<b>Writing</b>	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient User	C2	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	B2	Independent use

(\*) Common European Framework of Reference for Languages

Scientific skills and competences

**COLLABORATION ON THE EDITION OF SCIENTIFIC JOURNALS**

2006-present - Editor of Water Research

2000-2006- Member of the advisory board of Re/Views in Environmental Science and Technology.

2000-2006- Associate Editor of Water Research

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** **Carla Brazinha**  
**Address(es)** REQUIMTE / CQFB, Department of Chemistry, FCT, Universidade Nova de Lisboa, P-2829-516 Caparica, Portugal  
**Telephone(s)** +351 21 2948385 **Mobile:** +351 916 629 620  
**Fax(es)** +351 21 2948550  
**E-mail** carla.brazinha@dq.fct.unl.pt  
**Nationality** PORTUGUESE  
**Date of birth** 9 September 1973  
**Gender** FEMALE

### Employment / Occupational field

#### Pos Doctoral Fellow at FCT, Universidade Nova de Lisboa

#### Work experience

<b>Dates</b>	<b>Since 2009</b>
Occupation or position held	Pos Doctoral Fellow
Main activities and responsibilities	- Main topics: Aroma recovery in natural matrices, recovery, concentration and purification of compounds with bioactivity from natural matrices and on-line monitoring by mass spectrometry. - Publications: 5 in international scientific journals, 2 papers in conference proceedings.
Name and address of employer	Instituto de Biologia Experimental e Tecnológica (IBET), Av. República, Qta. do Marquês (EAN), Apartado 12, P-2781-901 Oeiras, Portugal
Type of business or sector	Academic
<b>Dates</b>	<b>February 2008 – February 2009</b>
Occupation or position held	Management of the participation of IBET on the European Network of Excellence named NanoMemPro
Main activities and responsibilities	Participation in the NanoMemPro activities and connection between partners.
Name and address of employer	Instituto de Biologia Experimental e Tecnológica (IBET), Av. República, Qta. do Marquês (EAN), Apartado 12, P-2781-901 Oeiras, Portugal
Type of business or sector	Academic
<b>Dates</b>	<b>1997 - 2003</b>
Occupation or position held	Neoquímica, S.A.
Main activities and responsibilities	Sales Manager of the Chemicals Division
Name and address of employer	Neoquímica, Rua da Estação, 20/22, Vala do Carregado - Apartado 97, P-2584-908 Carregado, Portugal
Type of business or sector	Technical sales
<b>Dates</b>	<b>1997 (6 months)</b>
Occupation or position held	Internship at the Process Technology Department, approved by the Portuguese Engineering Association (Ordem dos Engenheiros)
Main activities and responsibilities	Support to a plant producing pigments. Purifying a biocide through ultrafiltration on a pilot scale.

Name and address of employer Zeneca, Grangemouth, Escócia

Type of business or sector Chemical Industry

**Dates** 1996 (3 months)

Occupation or position held Internship at the Marketing Department

Main activities and responsibilities Brand assistant da marca Pantène

Name and address of employer Procter & Gamble, Oeiras

Type of business or sector Household & Personal Care Products

## Education and training

**Dates** 2008

Title of qualification awarded Ph.D.

Principal subjects/occupational skills Recovery and Fractionation of Aroma Compounds by Organophilic Pervaporation.

Name and type of organisation providing education and training Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa

**Dates** 2005 - 2008

Title of qualification awarded Pos-Graduation in Enology through the "Online Learners Certificate Program"

Principal subjects/occupational skills Module 4, *Wine Stability and Sensory Analysis*. Grade: B+. Module 3 – *Quality Control and Analysis in Winemaking*. Grade: A+. Module 2, *Wine Production*. Grade: A. Module 1, *Introduction to Winemaking*. Grade: A-

Name and type of organisation providing education and training UC Davis Extension, University of California, USA

**Dates** 1997

Title of qualification awarded Degree in Chemical Engineer

Principal subjects/occupational skills Biotechnology. Internship at the pilot plant of the Pharmaceutical company Cipan.

Name and type of organisation providing education and training Instituto Superior Técnico (IST), Universidade Técnica de Lisboa

Level in national or international classification 16 out of 20

## Personal skills and competences

Mother tongue(s) Portuguese

Other language(s)

Self-assessment

European level (\*)

**English**

**French**

**German**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Basic User	A2	Basic User						
A2	Basic User	A2	Basic User						

(\*) Common European Framework of Reference for Languages

Organisational skills and competences

- 1994-1995 Member of the Board of the Student Union at IST (AEIST)  
- Management of a small sales division  
- Communications: 3 oral communications in conferences and 5 posters in conferences.

Technical skills and competences

Analytical techniques (gas chromatography, HPLC and mass spectrometry). Membrane processing with pervaporation membranes, membrane contactors.

Computer skills and competences

Current office softwares (Word, Excel, Power Point, Visio, Origin, Scientist, Table Curve, basic Matlab) and updating of websites

Driving licence

Car (B)

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s) **Mallada, Reyes**

Telephone(s) +34976762392 +34976762392 +34976762392

Fax(es) +34976761879

E-mail rmallada@unizar.es

Nationality Española

Date of birth 30/03/72

Gender Female

### Work experience

01/00-12/00	Post-Doctoral Position at the University of Southern California. Los Angeles (USA).
01/00-05/01	Assistant professor at the University of Southern California.
01/01-01/02	Research associate. University of Zaragoza.
02/03-12/05	Associate professor, University of Zaragoza

Occupation or position held Associate professor with tenure

Main activities and responsibilities Research and Teaching

Name and address of employer Chemical and Environmental Engineering Department.  
Edificio Torres Quevedo.  
C/Maria de Luna 3  
50018 Zaragoza

### Education and training

09/96-12/99 Ph D in Chemistry. University of Zaragoza

### Personal skills and competences

Mother tongue(s) **Spanish**

Other language(s)

Self-assessment  
European level (\*)

**English**

**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient User	C2	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User

Organisation of courses and conferences

XXII Summer School of the European Membrane Society) Inorganic Membranes: Preparation, Characterization and Applications. 5-9 September 2005, Jaca (Spain).  
4th International Zeolite Membrane Meeting. IZMM, 22-25 July 2007, Zaragoza (Spain)  
Nanomemcourse: EF1 : Nanostructured material and membrane synthesis and characterisation. Marie Curie Training Program 7-16 November 2007, Zaragoza (Spain). Replace this text by a description of these competences and indicate where they were acquired. (Remove if not relevant, see instructions)

Research activities

Research topics:

- Synthesis and characterization of inorganic membranes, applied in gas separation, pervaporation and membrane reactors.
- Zeolite layers in microsystems: sensors and microreactors.
- Catalysis.

International conferences

Participation, assistance and more than 45 papers, oral and posters, presented in national and international conferences, in the field of membranes, catalysis and chemical engineering.

Publications

34 Publications in international journals indexed in ISI, h index=12; 1 patent; co-editor of 1 book. 2 book chapters.

Teaching

Graduate level: "Chemical Engineering Kinetics", "Environmental technologies", "Chemical Process Technology".

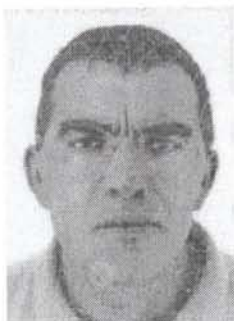
Doctorate level: "Membrane technology" "Chemical Sensors" "Solid characterization techniques"

Co-supervisor of 3PhD thesis, and other 3 in course.

Additional information

Reviewer in different journals: Chemical Engineering Journal, Industrial and Engineering Chemistry Research, Catalysis Today, Journal of Membrane Science, Microporous and Mesoporous Materials, Chemistry of Materials Activities of evaluation in the ANEP (Spanish national agency for evaluation of research projects), since 2005. External evaluator of curricula for CSIC (Council of Studies and Scientific Research Studies in Spain).

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s)	<b>Coronas, Joaquín</b>		
Telephone(s)	+34976762471	+34976762471	+34976762471
Fax(es)	+34976761879		
E-mail	coronas@unizar.es		
Nationality	Spanish		
Date of birth	27/12/66		
Gender	Male		

### Work experience

11/95-2/03	Assistant professor at the University of Zaragoza.
05/95-12/95	Postdoc, IRC-CNRS (Villeurbanne, France).
01/96-12/96	Postdoc, University of Colorado (Boulder, USA).
02/03-02/10	Associate professor, University of Zaragoza.
03/05-08/05	Stay at University of Minnesota (Minneapolis, USA).
02/10-	Professor, University of Zaragoza.

Occupation or position held	Professor
Main activities and responsibilities	Research and Teaching
Name and address of employer	University of Zaragoza Chemical and Environmental Engineering Department. C/Maria de Luna 3 50018 Zaragoza

### Education and training

1990	B.S. in Chemistry/Chemical Engineering. University of Zaragoza
1991	M.S. in Chemistry/Chemical Engineering. University of Zaragoza
1995	PhD in Chemistry. University of Zaragoza

**Personal skills and competences**

Mother tongue(s) **Spanish**

Other language(s)

Self-assessment

European level (\*)

**English**

**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient User	C2	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Proficient User	A2	Proficient User	A2	Basic User	A2	Basic User	A2	Basic User

(\*) Common European Framework of Reference for Languages

Organisation of courses and conferences

4<sup>th</sup> International Conference on Catalysis in Membrane Reactors, July 3-5, 2000, Zaragoza (Spain)  
4<sup>th</sup> International Zeolite Membrane Meeting, July22-25, 2007, Zaragoza (Spain)

Research activities

Research topics:

- Synthesis and characterization of zeolites and related materials.
- Membranes for gas applications.
- Organic-inorganic composites.

85 Publications in international journals indexed in ISI, H-index= 24; 14 patent applications.

Teaching

Graduate level: "Chemistry", "Separation processes"

Doctorate level: "Separation processes"

Co-supervisor of 10 PhD theses, and other 6 in course.



## Europass Curriculum Vitae

### Personal information

First name(s) / Surname(s) Pastor, Eva  
 Telephone(s) +34976762052  
 Fax(es) +34976762320  
 E-mail relint@unizar.es  
 Nationality Spanish  
 Date of birth 04/10/59  
 Gender Female

### Work experience

2000- today	Head of the International Relations Office at Universidad de Zaragoza
1991-1994	Assistant to the Export Manager at EGI, S.A. Zaragoza
1991-1994	Assistant to the Export Manager at Campo Ebro Industrial .Zaragoza
1989-1991	Housing Supervisor at the American Base in Zaragoza
1987-1989	Translator of Legal texts at the American Base in Zaragoza
1987	Internship with lawyer ( M <sup>a</sup> José Falcón) in Zaragoza
1986-1987	Translator in French and English for CNR in Zaragoza
1984-1985	Teaching Assistant for the Department of Spanish at Salford University, UK and teacher of Spanish at the College of adult education Manchester, UK
Occupation or position held	Head of the International Office at Universidad de Zaragoza
Main activities and responsibilities	Coordinating abroad mobility programmes for students , teachers and staff, as well as cooperation with international partners in Academic European Projects
Name and address of employer	Universidad de Zaragoza c/ Pedro Cerbuna,12 50009 Zaragoza-Spain

### Education and training

2000	Degree in Social Work (Univesidad de Zaragoza-Spain)
1986	Master in Politics an Contemporary History (Salford University-UK)
1983	Degree in Law (Universidad de La laguna-Spain)

### Personal skills and competences

Mother tongue(s) **Spanish**

Other language(s)

Self-assessment  
European level (\*)

**English**

**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient User	C2	Proficient User	C2	Proficient User	C2	Proficient User	C2	Proficient User
C2	Proficient User	C2	Proficient User	C2	ProficientUser	C2	Proficient User	C2	Proficient User

(\*) *Common European Framework of Reference for Languages*

Organisation of courses and  
conferences

Research activities

Teaching

**Additional information**

I have experience living, studying and working abroad, 2 years in UK, 6 months in USA, 2 months in Ecuador.

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s) **Matthias Wessling**  
Address(es) 5 Drienerlolaan, 7522 NB, University of Twente, Enschede, The Netherlands  
Telephone(s) +31 53 4892950 Mobile:  
Fax(es) +31 53 4894611  
E-mail m.wessling@tnw.utwente.nl  
Nationality German  
Date of birth 03-03-1963  
Gender male

### Work experience

Dates Since 12/2009  
Occupation or position held **Alexander-von-Humboldt Professor**  
Name and address of employer RWTH Aachen University, Germany  
Type of business or sector Institute for higher education  
Dates Since 11/1999  
Occupation or position held **Professor and Head of the Membrane Technology Group**  
Name and address of employer University of Twente, Enschede, The Netherlands  
Type of business or sector Institute for higher education  
Dates 11/2007 – 8/2008  
Occupation or position held **Dean Faculty of Science and Technology**  
Name and address of employer University of Twente, Enschede, The Netherlands  
Type of business or sector Institute for higher education  
Dates 9/1997 – 11/2009  
Occupation or position held **Head of group 'Separation Process Technology'**  
Name and address of employer Akzo Nobel Chemicals Research, Arnhem, NL  
Type of business or sector Industrial research  
Dates 9/1994-9/1996  
Occupation or position held **Assistant Professor of the Membrane Technology group**  
Name and address of employer University of Twente, Enschede, The Netherlands  
Type of business or sector Institute for higher education  
Dates 4/1993-8/1994  
Occupation or position held **Senior research scientist**  
Name and address of employer MTR Inc., Menlo Park, CA, USA  
Type of business or sector Industrial research

### Education and training

Dates 1989-1993

Title of qualification awarded **Ph.D. in Chemical Engineering**  
 Name and type of organisation providing education and training University of Twente, Enschede, The Netherlands  
 Level in national or international classification Dr

Dates 1988-1989

Title of qualification awarded **Research Fellow**  
 Name and type of organisation providing education and training University of Cincinnati, Cincinnati, USA

Dates 1989

Title of qualification awarded **M.Sc. in Chemical Engineering**  
 Name and type of organisation providing education and training University of Dortmund, Dortmund, Germany

Level in national or international classification Dipl.-Ing

### Scientific and technical achievements

Promotor of 30 Ph.D. students, Assistant promotor of 4 Ph.D. students  
 Ca. 200 scientific papers published, h-index: 25 (based on ISI) 15 published patent (applications)  
 Best Lecturer Award Chemical Engineering 2006, University of Twente  
 Best Thesis Award of the European Membrane Society, 1995.  
 Honorary Scientific member of the Russian Academy of Science Institute TIPS (Topchiev Institute of Petrochemical Sciences), Moscow  
 Founder and chief scientific officer of Mosaic System bv. (Since 9/2003)  
 Editor Journal of Membrane Science (since 1/2006)

### Key Publications

*Medical applications of membranes: Drug delivery, artificial organs and tissue engineering*, Stamatialis, D.F. Papenburg, B.J., Girones, M., Saiful, S. Bettahalli, S.N.M. Schmitmeier, S., Wessling, M., (2008) J.Membrane Sci., 308, 1-34.  
*Spontaneous breakdown of superhydrophobicity*, Sbragaglia M, Peters AM, Pirat C, Borkent BM, Lammertink RGH Wessling M, Lohse D, (2007) Phys.Rev.Let. 99(15).  
*Nanofluidics - Silicon for the perfect membrane*, den Berg A., Wessling M., (2007) Nature 445 (7129): 726-726  
*Membranes and microfluidics: A review*, De Jong, J., Lammertink, R.G.H., Wessling, M., (2006) Lab on a Chip - Miniaturisation for Chemistry and Biology, 6 (9), pp. 1125-1139.  
*Phase separation micromolding: A new generic approach for microstructuring various materials*, Vogelaar L., Lammertink R.G.H., Barsema J.N., Nijdam W., Bolhuis-Versteeg L.A.M., van Rijn C.J.M., Wessling M., (2005) Small 1 (6): 645-655.

Mother tongue(s) **German**

Other language(s) **English and Dutch**

Self-assessment  
 European level (\*)

**English**

**Dutch**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	A2	Basic

(\*) Common European Framework of Reference for Languages

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s) **Henny J.M. Bouwmeester**  
Address(es) 5 Drienerlolaan, 7522 NB, University of Twente, Enschede, The Netherlands  
Telephone(s) +31 53 4892202 Mobile: +31 647 386471  
Fax(es) +31 53 4894611  
E-mail h.j.m.bouwmeester@tnw.utwente.nl  
Nationality Dutch  
Date of birth 03-09-1954  
Gender male

### Work experience

Dates Since 1988  
Occupation or position held **Associate Professor**, Membrane Technology group/Inorganic Membranes (Since 2006)  
**Associate Professor**, Inorganic Materials Science (2003-2006)  
**Assistant Professor**, Inorganic Materials Science (1988-2003)  
Name and address of employer University of Twente, PO Box 217, 7500 AE, Enschede, The Netherlands  
Type of business or sector Institute for higher education  
Dates 1985-1988  
Occupation or position held **Senior research Scientist**  
Name and address of employer Sentron v.o.f., Roden, The Netherlands  
Type of business or sector Medical industrial research

### Education and training

Dates 1983-1985  
Title of qualification awarded **Ph.D. in Inorganic Chemistry/Solid State Chemistry**  
Name and type of organisation providing education and training University of Groningen, Groningen, The Netherlands  
Level in national or international classification Dr  
Dates 1975-1982  
Title of qualification awarded **M.Sc in Inorganic Chemistry/Solid State Chemistry (cum laude)**  
Name and type of organisation providing education and training University of Groningen, Groningen, The Netherlands  
Level in national or international classification Drs

## Scientific and technical achievements

Assistant promoter of 20 Ph.D. students

Ca. 120 scientific papers published, h-index: 30 (based on ISI)

Co-Editor of the CRC Handbook of Solid State Electrochemistry.

Most cited author 2003-2007 and 2004-2008 awards, Elsevier Journals

Memberships of international advisory boards and committees of European research projects, conferences and journals.

## Key Publications

*A novel pulse isotopic exchange technique for rapid determination of the oxygen surface exchange rate of oxide ion conductors*, H.J. M. Bouwmeester, C. Song, J.J. Zhu, J. Yi, M. van Sint Annaland, B.A. Boukamp, Phys. Chem. Chem. Phys., 11 (2009) 9640 – 9643.

*Oxygen stoichiometry and chemical expansion of  $Ba_{0.5}Sr_{0.5}Co_{0.8}Fe_{0.2}O_{3-5}$  measured by in-situ neutron diffraction*, S. McIntosh, J.F. Vente, W.G. Haije, D.H.A. Blank, H.J.M. Bouwmeester, Chem. Mater. 18 (2006) 2187-2193.

*A linear free energy relation for gas-solid interactions: the correlation between surface rate constant and diffusion coefficient of oxygen tracer exchange for electron-rich perovskites*, R. Merkle, J. Maier and H. J. M. Bouwmeester, Angew. Chem. Int. Edit., 43 (2004) 5069-73.

*Dense ceramic membranes for methane activation*, H.J.M. Bouwmeester, Cat. Today 82 (1-4) (2003) 141-150.

*Conversion of Methane to Syngas by a Membrane-Based Oxidation-Reforming Process*, C.S. Chen, S.J. Feng, S. Ran, D.C. Zhu, W. Liu and H. J. M. Bouwmeester, Angew. Chem. Int. Ed. 42 (2003) 5196.

Mother tongue(s) **Dutch**

Other language(s) **English and German**

Self-assessment

European level (\*)

**English**

**German**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
B2	Independent	B2	Independent	B2	Independent	B2	Independent	A2	Basic

(\*) Common European Framework of Reference for Languages

## Europass Curriculum Vitae

### Personal information



First name(s) / Surname(s)

**Karin F. Paardenkooper**

Address

Goudenregenstraat 36, 7545 JZ Enschede Netherlands

Telephone(s)

+31 (0)53 489 4696

Mobile

+31 6 22 12 77 35

Fax(es)

+31 (0)53 489 3844

E-mail(s)

k.f.paardenkooper@utwente.nl

Nationality

Dutch

Date of birth

16/07/1959

Gender

Female

### Work experience

Dates

04/2006 →

Occupation or position held

Head International Office

Main activities and responsibilities

- Manager of the UTwente International Office, consisting of a finance department (scholarships and department budget), incoming and outgoing student exchange, visa, housing and communication & information departments for incoming and outgoing (inter-)national students
- Member of international education organisations (EAIE, NAFSA, ACA, Nether, VSNU-UPI), participation in annual conferences
- University contact person for Dutch Higher Education organisations (Nuffic, Neso, PIE)
- Member of 3TU Federation group on Internationalisation Policies
- Chair of the Student Mobility Group, European Consortium of Innovative Universities (ECIU)
- Initiator and chair Internationalisation Policy workgroup in direct cooperation with UTwente Strategic Department-International Affairs staff
- Initiator and secretary of the foundation University of Twente Scholarship Programme; responsible of scholarship policies
- Academic cooperation and projects within the university and with international partner universities
- Negotiation of non-EU interinstitutional agreements
- Negotiation scholarships with external providers
- Representative of the University of Twente at student recruitment fairs on the American continent

Name and address of employer

University of Twente  
P.O. Box 217 Enschede (Netherlands)

Type of business or sector

Education

Dates

09/2002 - 10/2005

Occupation or position held

Coordinator Exchange & Study Abroad Programmes

Main activities and responsibilities

- Initiator of the department
- Member of the Academic Committee Undergraduate Studies

Name and address of employer

International University of Monaco  
(Monaco)

Type of business or sector

Education

Dates

09/1995 - 07/2005

Occupation or position held

Professor of Spanish as a second language (ELE)

Main activities and responsibilities

- Head of department foreign languages
- Second language acquisition, from beginners to advanced, students from 20 different nationalities

• Thesis guidance Undergraduate Business and Management studies

Name and address of employer International University of Monaco  
(Monaco)

Type of business or sector Education

Dates 02/1992 - 12/2002

Occupation or position held Coordinator English and Spanish language

Main activities and responsibilities

- Adult education to SME entrepreneurs
- Coordinator intensive language programs
- Selection of training materials and course content
- Intake interviews and level evaluation
- Preparation sessions official examinations (European Certificate, TOEIC, DELE)
- Official TOEIC and European Certificate examiner

Name and address of employer Chamber of Commerce and Industry  
Nice (France)

Type of business or sector Education

Dates 09/1990 - 12/1991

Occupation or position held Owner Language Institute

Main activities and responsibilities

- Foundation of private language institute with a Canadian colleague
- Organisation, marketing and teaching of English and Spanish language courses
- Translation assignments in tertiary sector (mainly tourism and hotel industry)

Name and address of employer Pointe-a-Pitre (Guadeloupe)

Type of business or sector Education

### Education and training

Dates 1988

Title of qualification awarded Doctorandus (Drs) = Master of Arts

Principal subjects / occupational skills covered Spanish Linguistics and Literature, major Education and Didactics, double minor in English and American contemporary literature and Medieval History

Name and type of organisation providing education and training University of Amsterdam (University)  
(Netherlands)

### Personal skills and competences

Mother tongue(s) **Dutch**

Other language(s)

Self-assessment  
*European level (\*)*

**English**  
**French**  
**Spanish / Castilian**  
**German**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User

(\*) *Common European Framework of Reference (CEF) level*

Social skills and competences

- communicative
- highly multicultural and diversity aware
- creative negotiator
- team worker



Organisational skills and competences

- skilled change manager
- leadership (resp. of a team of 17 people)
- specialist in developing internationalization of higher education organizations
- creating and implementing growth strategies
- strategic planner

**Additional information**

- Study Abroad: Madrid, Spain, 1982-1983
- First foreign work experience: Taipei, Taiwan, March-June 1986
- Official certified translator and interpreter Spanish-Dutch Arrondissementsrechtbank (Court of Justice,) City of Amsterdam

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** **Ivo Frans Johanna Vankelecom**  
**Address(es)** COK, FBIW, Kasteelpark Arenberg 23, 3001 Leuven, Belgium  
**Telephone(s)** +32-16-32.15.94 **Mobile:**  
**Fax(es)** +32-16-32.19.98  
**E-mail** Ivo.vankelecom@biw.kuleuven.be  
**Nationality** Belgian  
**Date of birth** 06/10/1967  
**Gender** M

### Employment / Occupational field

#### Professor at K.U.Leuven

#### Work experience

<b>Dates</b>	<b>Since 2001</b>
Occupation or position held	Professor K.U.Leuven
Main activities and responsibilities	Research (110 A1-papers, 12 patents, 5 book chapters, 3 edited books) Teaching (Membrane technology, chromatography, adsorption, project work interface chemistry, capita selecta catalytic technology) Administration
Name and address of employer	K.U.Leuven, Krakenstraat 3, 3000 Leuven
Type of business or sector	University
<b>Dates</b>	<b>1994 - 2001</b>
Occupation or position held	Postdoc K.U.Leuven with 2x a 6-months postdoctoral stay at Imperial College (1999, Prof. Livingston, London, UK) and Ben Gurion University (2001, Prof. Herskovitz, Beersheva, Israel)
Main activities and responsibilities	Research
Name and address of employer	K.U.Leuven, Krakenstraat 3, 3000 Leuven
Type of business or sector	University

### Education and training

<b>Dates</b>	<b>1990-1994</b>
Title of qualification awarded	PhD in Applied Biological Sciences
Principal subjects/occupational skills covered	Research
Name and type of organisation providing education and training	K.U.Leuven
<b>Dates</b>	<b>1985-1990</b>
Title of qualification awarded	Bio-engineer

Principal subjects/occupational skills covered Engineering, chemistry, biology, mathematics, physics, geology, philosophy

Name and type of organisation providing education and training K.U.Leuven

**Personal skills and competences**

Mother tongue(s) **Dutch**

Other language(s) **French, English, German, Danish, Spanish, Portuguese**

Self-assessment  
*European level (\*)*

**Dutch**  
**French**  
**German**  
**Danish**  
**Spanish**  
**Portuguese**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	A2	Basic User	C1	Proficient User
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	C1	Proficient User	C1	Proficient User	A2	Basic User	A2	Basic User
A2	Basic User	C1	Proficient User	C1	Proficient User	A2	Basic User	A2	Basic User
C1	Proficient User	C1	Proficient User	A2	Basic User	A2	Basic User	A2	Basic User
A2	Basic User	C1	Proficient User	A2	Basic User	A2	Basic User	A2	Basic User

(\*) *Common European Framework of Reference for Languages*

Scientific skills and competences Membrane technology, polymer chemistry, catalysis

Organisational skills and competences

- Co-organiser Euromembrane 1999, Organiser Summerschool on Solvent resistant nanofiltration 2008
- Manager of 25 researchers
- Manager of European and national projects, as well as bilateral projects with companies

Technical skills and competences Techniques for membrane and catalyst characterisation

Computer skills and competences Current office software

Driving licence Car

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** **Saad ALAMI YOUNSSI**  
**Address(es)** Faculty of Sciences and Techniques of Mohammedia PO Box 146 Morocco  
**Telephone(s)** (212) 0523315352  
**Fax(es)** (212) 0523315353  
**E-mail** [alamiyounssisaad@yahoo.fr](mailto:alamiyounssisaad@yahoo.fr)  
**Nationality** Moroccan  
**Date of birth** 29 October 1965  
**Gender** MALE

### Employment / Occupational field

**Vice dean of the Faculty of Sciences and Technology of Mohammedia**

### Work experience

<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p> <p>Name and address of employer</p> <p>Type of business or sector</p>	<p><b>Since 2007</b></p> <p>Vice dean responsible for Academic and Educational Affairs of the FST Mohammedia of the Faculty of Sciences and Technology of Mohammedia</p> <p>Responsible for Academic and Educational Affairs</p> <p>Faculty of Sciences and Technology of Mohammedia University Hassan II</p> <p>Academic</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p> <p>Name and address of employer</p> <p>Type of business or sector</p>	<p><b>2006-2007</b></p> <p>Vice dean for scientific research and cooperation</p> <p>Responsible for scientific research and cooperation</p> <p>Faculty of Sciences and Technology of Mohammedia University Hassan II</p> <p>Academic</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p>	<p><b>Since 1996</b></p> <p>Research Professor</p> <p>Research and teaching</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p>	<p><b>Research</b></p> <p>- Main topics: Synthesis and characterisation of inorganic membranes , Microfiltration/ Ultrafiltration and nanofiltration Process</p> <p>- Publications: more than 30, in international scientific journals</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p>	<p><b>Teaching</b></p> <p>- Material chemistry, Separation process and Membrane Science at the Faculty of Sciences and Technology of Mohammedia</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p>	<p>Faculty of Sciences and Technology of Mohammedia University Hassan II</p> <p>Academic</p>

### Education and training

<p><b>Dates</b></p> <p>Title of qualification awarded</p> <p>Principal subjects/occupational skills</p> <p>Name and type of organisation providing education and training</p>	<p><b>2001</b></p> <p>Dh.P state</p> <p>Physico-chemistry of materials</p> <p>University Sidi Mohammed Ben Abdellah, Fes, Morocco</p>
<p><b>Dates</b></p> <p>Title of qualification awarded</p> <p>Principal subjects/occupational skills</p>	<p><b>1994</b></p> <p>Dh.P state</p> <p>Analytical Chemistry Theoretical Physics</p>

Name and type of organisation providing education and training

University of Montpellier II , France

**Dates**

1991

Title of qualification awarded

Diplôme d'Etude Approfondie

Principal subjects/occupational skills

Polymer interface amorphous

Name and type of organisation providing education and training

University of MontpellierII, France

**Personal skills and competences**

Mother tongue(s)

Arabic

Other language(s)

Self-assessment

European level (\*)

**French**

**English**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User

(\*) Common European Framework of Reference for Languages

Scientific skills and competences

Inorganic materials chemistry, synthesis and characterisation of oxide by the sol-gel route, development of new inorganic membranes, filtration process.

Organisational skills and competences

\* Chairman of the Organizing Committee of the 1st Summer School - French Maghreb Membrane Science and Technology at Casablanca, November 2004.

\* Organization of international conferences

\* Supervision of Ph.D. students

Technical skills and competences

Absorption atomic, porosimetry, XRD, ect

Computer skills and competences

Good command of the tool, current use of various software and Internet technologies (NIT).

Driving licence

car (B)

## Europass Curriculum Vitae



### Personal information

**First name(s) / Surname(s)** OUAMMOU Mohamed  
**Address(es)** BP 8891 Rabat Agdal 10100 MOROCCO  
**Telephone(s)** (212) 523-315-253  
**Fax(es)** (212) 523-315-353  
**E-mail** mouammou@yahoo.fr  
**Nationality** MOROCCAN  
**Date of birth** 15 April 1962  
**Gender** MALE

### Employment / Occupational field

**Professor at the Faculty of Sciences and Techniques, University HASSAN 2, Mohammedia, Teaching and Research in Materials Science, Membrane Materials and Processes**

### Work experience

**Dates**  
 Occupation or position held  
 Main activities and responsibilities

**Since 2000**

Professor

#### Research

- Main topics: Synthesis of NaA Zeolithe or apatite membrane on Clay and phosphate supports by hydrothermal method and Grinding and Characterization of Natural Phosphate for Direct Application.  
 - Publications: more than 20, in international and national scientific journals.

#### Teaching

- Teaching of Industrial Chemistry, Analysis Techniques and Mineral Chemistry at the Faculty of Sciences and Techniques, University Hassan 2 Mohammedia (Licence and Master levels).  
 - Participate of the professional master « PROMAT - Physicochimie appliquée des Matériaux » at the University Montpellier 2.

#### Administration

- Responsible of the Department of Chemistry at the Faculty of Sciences and Techniques, University Hassan 2 Mohammedia (2008-2011).  
 - Member of the laboratory Material catalysis and Environnement.  
 - Member of the executive committee in the faculty of Sciences and Techniques Mohammedia

Name and address of employer  
 Type of business or sector

Faculty of Sciences and Techniques, BP146, 20650 Mohammadia MOROCCO

#### Dates

**1996-2000**

Occupation or position held  
 Main activities and responsibilities

Hability Professor

Research and Teaching

Name and address of employer  
 Type of business or sector

Faculty of Sciences and Techniques, BP146, 20650 Mohammadia MOROCCO

#### Dates

**2000-2010**

Occupation or position held  
 Main activities and responsibilities

Professor

Research and Teaching

Name and address of employer  
 Type of business or sector

Faculty of Sciences and Techniques, BP146, 20650 Mohammadia MOROCCO

Academic

### Education and training

**Dates**  
 Title of qualification awarded  
 Principal subjects/occupational skills

**1995**

Doctorat d'Etat

Materials and Processes

Name and type of organisation providing education and training

School Of Mines, Ales FRANCE

**Dates** 1988

Title of qualification awarded

Ph.D.

Principal subjects/occupational skills

Chimie des Matériaux

Name and type of organisation providing education and training

University Montpellier 2 FRANCE

**Dates** 1986

Title of qualification awarded

Diplôme d'Etude Approfondie

Principal subjects/occupational skills

Materials Science

Name and type of organisation providing education and training

University Montpellier 2 FRANCE

**Dates** 1985

Title of qualification awarded

Maitrise

Principal subjects/occupational skills

Physics and Chemical

Name and type of organisation providing education and training

Sidi Mohamed Ben Abdellah University, Fes, MOROCCO

### Personal skills and competences

Mother tongue(s)

Arabic

Other language(s)

Self-assessment

European level (\*)

**French**

**English**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Medium User	A2	Medium User	A2	Medium User	A2	Medium User	A2	Medium User

(\*) Common European Framework of Reference for Languages

Scientific skills and competences

Inorganic materials chemistry, development of inorganic membranes on the natural support clay and natural phosphate.

Organisational skills and competences

- Management of education programs
- Management of research team and of research laboratory
- Management of projects ( industrial, national, European programs (AECI))
- Organization of national and international conferences
- Supervision of Ph.D. students

Technical skills and competences

Main techniques of materials characterisation (DTA/GTA, Granulometry, BET, Porosimetry, etc)

Computer skills and competences

Current office software

Driving licence

car (B)

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s) Mohamed RAFIQ  
 Address(es) Faculty of Sciences and Techniques of Mohammedia PO Box 146 Morocco  
 Telephone(s) (212) 0523315352  
 Fax(es) (212) 0523315353  
 E-mail [doyen@fstm.ac.ma](mailto:doyen@fstm.ac.ma)  
 Nationality Moroccan  
 Date of birth 28 June 1951  
 Gender MALE

### Employment / Occupational field

Dean of Faculty of Sciences and Technology of Mohammedia

#### Work experience

<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p> <p>Name and address of employer</p> <p>Type of business or sector</p>	<p><b>Since 2003 - ...</b></p> <p>Dean of Faculty of Sciences and Technology of Mohammedia</p> <p>Responsible for managing administrative, financial and academic faculty and stimulates the implementations of decisions of faculty council.</p> <p>Faculty of Sciences and Techniques of Mohammedia, University Hassan II Mohammedia Casablanca</p> <p>Academic</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p> <p>Name and address of employer</p> <p>Type of business or sector</p>	<p><b>1981-2003</b></p> <p>Research Professor</p> <p>Research and teaching</p> <p>Academic</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p> <p>Name and address of employer</p> <p>Type of business or sector</p>	<p><b>1982-1986</b></p> <p>Head of Department of Chemistry</p> <p>Academic</p>
<p><b>Dates</b></p> <p>Occupation or position held</p> <p>Main activities and responsibilities</p> <p>Name and address of employer</p> <p>Type of business or sector</p>	<p><b>Since 1982</b></p> <p>Director of the Laboratory of Applied Inorganic Chemistry, Laboratory of Materials and Environmental Protection and Department of Curriculum and Pedagogy in the Teaching of Chemistry</p> <p>Academic</p>

#### Education and training

<p><b>Dates</b></p> <p>Title of qualification awarded</p> <p>Principal subjects/occupational skills</p> <p>Name and type of organisation providing education and training</p> <p><b>Dates</b></p>	<p><b>1981</b></p> <p>Ph.D state</p> <p>Physical Sciences</p> <p>University of Montpellier II, France</p> <p><b>1977</b></p>
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Title of qualification awarded *State Engineer*  
 Principal subjects/occupational skills Chemistry  
 Name and type of organisation National Higher School of Chemistry, Montpellier, France  
 providing education and training

**Dates** 1974

Title of qualification awarded Graduate Certificate in Organic Chemistry  
 Principal subjects/occupational skills Chemistry  
 Name and type of organisation University of Montpellier II, France  
 providing education and training

**Personal skills and competences**

Mother tongue(s) Arabic

Other language(s)

Self-assessment

European level (\*)

**French**

**English**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User	A2	Basic User

(\*) *Common European Framework of Reference for Languages*

Scientific skills and competences

- Engineering and Pedagogical University Reform
- Structuring scientific research
- Institutional Evaluation
- Sustainability and Environment
- New Technologies of Information and Communication
- Approach to leadership and decision support
- Human Resource Management and qualitative approach
- Energy and its impact on sustainable development
- Open University and distance education
- Management of water resources and provision of unconventional methods
- Moroccan banking system and support tools to investment
- National Initiative for Human Development and contribution of the university.
- Continuing education forum for promoting relations university - industry
- Quality Assurance and its applications in the field of food industry
- Democracy and Inter Cultural Dialogue

Organisational skills and competences

- Founding Member and Member of the Moroccan National Meetings on the Chemistry of Solid State since 1983
- Founding member of the Moroccan Society of Chemistry
- President of the Moroccan Association for Studies and Research for the Protection of Environment
- National Coordinator of the Network of Moroccan Membrane and Separation Processes (15 laboratories and teams, over 150 people)
- National Coordinator of the Moroccan Network of Educational Sciences (2000-2002), more than 20 institutions, human potential of about 300 people
- Vice President of the Moroccan Company of Membranes and Desalination, 2005
- Member of the International Conference of Heads of Universities and Scientific Institutions of French expression, 2007.

Technical skills and competences

Good knowledge of environmental issues (liquid effluents, solid waste and air pollution), nationally and internationally.

Computer skills and competences

Good command of the tool, current use of various software and Internet technologies (NIT).

Driving licence

car (B)



## Europass Curriculum Vitae

### Personal information

**First name(s) / Surname(s)** **Raffaele Arena**  
**Address(es)** Area Ricerca Scientifica e Rapporti Internazionali, Via P. Bucci 87036 Arcavacata di Rende (CS) Italy  
**Telephone(s)** +39 0984493749 **Mobile:** +39 346/3816036  
**Fax(es)** +39 0984493697  
**E-mail** [raffaele.arena@unical.it](mailto:raffaele.arena@unical.it)  
**Nationality** Italian  
**Date of birth** 22/11/1947  
**Gender** M

### Employment / Occupational field

**Director of the Scientific Research & International Affairs Office at the  
UNIVERSITY OF CALABRIA**

### Work experience

<b>Dates</b>	<b>Since 16/2/1998</b>
Occupation or position held	Manager
Main activities and responsibilities	Responsible for Scientific Research Area and International Affairs at the University of Calabria. Affluent Sectors: Direction Board secretariat, Doctoral School, Post-Doctoral fellowship holders, management of European Social Fund (ESF) , funding Young Researchers, International Relations Office, Socrates/Erasmus. Curricular and extra-curricular training/programs. Placement Office.
Name and address of employer	Area Ricerca Scientifica e Rapporti Internazionali, Via P. Bucci 87036 Arcavacata di Rende (CS) Italy
Type of business or sector	University
<b>Dates</b>	<b>1995 - 1998</b>
Occupation or position held	Head of Personnel (teaching and administrative) Division at the University of Calabria
Type of business or sector	University
<b>Dates</b>	<b>1991 - 1995</b>
Occupation or position held	Head of General Affairs Division at the University of Calabria
Type of business or sector	University
<b>Dates</b>	<b>1985 - 1991</b>
Occupation or position held	Head of Students' Secretariat Division at the University of Calabria
Type of business or sector	University
<b>Dates</b>	<b>1972 - 1985</b>
Occupation or position held	Director of Students' Secretariat Division at the University of Messina
Type of business or sector	University

**Selected additional management activities** 2008: elected member of CODAU (Permanent Council of Administrative Directors and Managers of the Italian Universities) with responsibility of International Affairs  
 2007: Administrative Director of the Program FixO(Training and Innovation for Employment)  
 2006: President of University Auditors  
 2005-2008: Administrative Director of the Superior Institute of Calabria for International Affairs (ISCAP)  
 2002: Administrative Delegate of UNICAL in the Commission of International Relations of CRUI (Conference of Rectors of the Italian Universities)  
 since 2001: Administrative Tutor of the Bilateral Agreements between UNICAL and CRUI for training programs: MAE, MAP, MEF, MEF IV DIPARTIMENTO, ASSOCAMERESTERO, DEMANIO, FARMINDUSTRIA, SENATO DELLA REPUBBLICA, CORTE COSTITUZIONALE etc.

**Selected training**

**Dates** 2006  
 Principal subjects/occupational skills covered Training Course " Leadership" I/II modules  
 Name and type of organisation providing education and training Milano Politecnico (Italy)

**Dates** 2004  
 Principal subjects/occupational skills covered Training Course "Present status and perspectives of the Doctorate School in Italy"  
 Name and type of organisation providing education and training Milano Politecnico (Italy)

**Dates** 2002  
 Principal subjects/occupational skills covered Training Course "Administration and management accounting of EU research projects" (APRE)  
 Training Course "Global Management Program"  
 Name and type of organisation providing education and training Roma, University "La Sapienza" (Italy)

**Dates** 2001  
 Principal subjects/occupational skills covered Training Course "Towards the economic accounting and management control of the Universities"  
 Name and type of organisation providing education and training Torino, Politecnico (Italy)

**Personal skills and competences**

Mother tongue(s) **Italian**

Self-assessment  
*European level (\*)*

**English**

**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User

(\*) *Common European Framework of Reference for Languages*

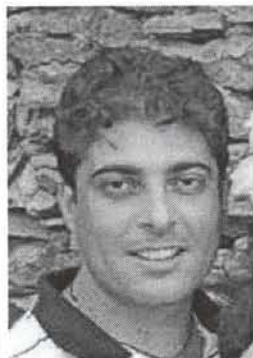
Organisational skills and competences Administrative management of several trans-national EU projects

Technical skills and competences Management of competitive tenders  
 Professional carriers consulting

Computer skills and competences Current office software

Driving licence Car

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s)

**Efreem Curcio**

Address(es)

Department of Chemical Engineering, Via P. Bucci Cubo 45A, 87036 Arcavacata di Rende (CS) Italy

Telephone(s)

+39 0984 496698/494013

Mobile: +39 3381537869

Fax(es)

+39 0984 496655

E-mail

e.curcio@unical.it

Nationality

Italian

Date of birth

25/08/1975

Gender

M

### Employment / Occupational field

**Assistant Professor at University of Calabria**

### Work experience

**Dates**

**Since 2005**

Occupation or position held

Assistant Professor at University of Calabria – Faculty of Engineering

Main activities and responsibilities

Research (50 papers, 1 book, about 80 publications on congress' proceedings prevalently international, more than 20 oral communications at national and international congresses and conferences)

Teaching : Chemistry, Electrochemistry, Membrane technology.

Name and address of employer

Department of Chemical Engineering, Via P. Bucci Cubo 45A, 87036 Arcavacata di Rende (CS) Italy

Type of business or sector

University

**Dates**

**Since 2005**

Occupation or position held

Associate Research at the "Institute on Membrane Technology", National Research Council of Italy ITM-CNR.

Main activities and responsibilities

Research

Name and address of employer

ITM-CNR, via P. Bucci cubo 17/C, 87036 Arcavacata di Rende (CS) Italy

Type of business or sector

R&D

### Education and training

**Dates**

**2003-2005**

Title of qualification awarded

PhD in Chemical Engineering and Materials

Principal subjects/occupational skills covered

Research on membrane engineering

Name and type of organisation providing education and training

University of Calabria

<b>Dates</b>	<b>1993-1999</b>																																								
Title of qualification awarded	Master Degree in Chemical Engineering and Materials																																								
Principal subjects/occupational skills covered	Chemical engineering, industrial engineering, chemistry, polymer science and technology																																								
Name and type of organisation providing education and training	University of Calabria																																								
<b>Prizes</b>	2001: EMS (European Membrane Society) Prize for the Best Student Oral Presentation at the International Congress 'Engineering with Membranes', Granada, SPAIN 2004: EMS AWARD 2004 for the best published paper in Membrane Science and Engineering 2004: Poster Award at EUROMEMBRANE 2004 - Hamburg, GERMANY. Session: "Application in Life Science" 2006: Poster Award at EUROMEMBRANE 2006 - Giardini Naxos, ITALY																																								
<b>Other academical merits</b>	Member of: European Membrane Society (EMS), American Filtration Society, Istituto Nazionale Scienza e Tecnologie dei Materiali (INSTM), American Filtration Society (AFS), European Federation of Chemical Engineering (EFCE). Referee of Journal of Membrane Science (ELSEVIER), Journal of Crystal Growth and Design (ACS), Desalination (ELSEVIER), Journal of Biotechnology (ELSEVIER). Member of the Editorial Board of "The Open Proteomic Journal" (BENTHAM OPEN).																																								
<b>Personal skills and competences</b>																																									
Mother tongue(s)	Italian																																								
Other language(s)	English, French																																								
Self-assessment																																									
<i>European level (*)</i>																																									
<b>English</b>																																									
<b>French</b>																																									
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	(*) Common European Framework of Reference for Languages																																								
Scientific skills and competences	- Integrated membrane systems for desalination and water treatment; - Membrane-crystallization devices: applications in structural proteomics, polymorphs and enantiomers selection. - Design and modelling of membrane bioreactors for cells culture																																								
Organisational skills and competences	- Member of the Organisation Committee of several Conferences in Membrane Science and Technology - Co-supervisor of 10 PhD students																																								
Computer skills and competences	Current office software																																								
Driving licence	Car																																								

## Europass Curriculum Vitae



### Personal information

First name(s) / Surname(s)

**Enrico Drioli**

Address(es)

Department of Chemical Engineering, Via P. Bucci Cubo 45A, 87036 Arcavacata di Rende (CS) Italy  
Institute on Membrane Technology ITM-CNR, Via P. Bucci Cubo 17C, 87036 Arcavacata di Rende (CS) Italy

Telephone(s)

+39 0984 492039

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Fax(es)

+39 0984 402103

E-mail

[e.drioli@unical.it](mailto:e.drioli@unical.it); [e.drioli@itm.cnr.it](mailto:e.drioli@itm.cnr.it)

Nationality

Italian

Date of birth

14/04/1941

Gender

M

### Employment / Occupational field

#### Full Professor at University of Calabria

### Work experience

**Dates**

**Since 1981**

Occupation or position held

Full Professor at the School of Engineering of the University of Calabria

Main activities and responsibilities

Research (Author of more than 520 scientific papers and 18 patents in the field of Membrane Science and Technology.)

Teaching : Chemistry, Electrochemistry, Membrane technology.

Name and address of employer

Department of Chemical Engineering, Via P. Bucci Cubo 45A, 87036 Arcavacata di Rende (CS) Italy

Type of business or sector

University

**Dates**

**2002-2008**

Occupation or position held

Director of the Institute on Membrane Technology, National Research Council of Italy (ITM-CNR)

Main activities and responsibilities

Research

Name and address of employer

ITM-CNR, via P. Bucci cubo 17/C, 87036 Arcavacata di Rende (CS) Italy

**Dates**

**1993-2002**

Occupation or position held

Institute on Membranes and Chemical Reactors, National Research Council of Italy (IRMERC-CNR)

Main activities and responsibilities

Research

Name and address of employer

ITM-CNR, via P. Bucci cubo 17/C, 87036 Arcavacata di Rende (CS) Italy

**Dates**

**1968-1981**

Occupation or position held

Professor of Chemistry and Electrochemistry at the School of Engineering of the University of Naples

Main activities and responsibilities

University

**Dates** 1982-1985  
**Occupation or position held** Dean of the Faculty of Engineering, University of Calabria

**Honours** Doctorate Honoris Causa in Chemistry at the University of "Paul Sabatier" Toulouse (2010). Doctorate Honoris Causa in Chemistry and Chemical Technology at the Russian Academy of Science (1992). Honorary Professor at the China Northwest University in Xi'an, Shaanxi, People's Republic of China (1991). Honorary Member of the A. V. Topchiev Institute of Petrochemical Synthesis at the Russian Academy of Sciences, Moscow (1999). Guest Professor at the Energy Engineering Department, Jiangsu Polytechnic University, China (2005). International Cooperation Honor Award on September 2005 given by the Membrane Industry Association of China (MIAC) for his special dedication to the International Cooperation between China and Europe in the field of membrane and science technology.

**Selected additional activities**

- President of the European Society of Membrane Science and Technology (today European Membrane Society) (1982 - 1998).
- Honorary President of the European Membrane Society (since 1999).
- Member of Executive Council of the European Federation of Chemical Engineering (1996 - 2004).
- Chairman of the Working Party on Membranes of the European Federation of Chemical Engineering (since 1985).
- Patron Member of the Indian Membrane Society
- Member of the Interim Board of Governors of the Middle East Desalination Research Center, Oman, Muscat (1994 - 1996).
- Member of the Advisor Board of the UNESCO Center on Membrane Science and Technology at the New South Wales University, Australia.
- Member of the International Scientific Advisory Committee of the Grand Water Research Institute at Technion - Israel Institute of Technology, Israel (since 2004).
- Member and Moderator of the Research Advisory Council of the Middle East Desalination Research Center, Oman, Muscat (since May 1997).
- Member of the NATO/CCMS Pilot Study on "Clean Products and Processes" (Phase II) (2002-2007)

[...]

**Personal skills and competences**

**Mother tongue(s)** Italian

**Other language(s)** English, French

**Self-assessment**  
*European level (\*)*

**English**  
**French**

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User
C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User	C1	Proficient User

(\*) Common European Framework of Reference for Languages

**Scientific skills and competences** Membrane engineering

**Organisational skills and competences**

- Organizer of several Conferences and Congresses in Membrane Science and Technology
- Coordinator and principal investigators of various EU-funded Research Projects

**Computer skills and competences** Current office software

## **Appendix 6: EM3E Degrees awarded and recognition documents**

1. UM2 / UPS - Master in Membrane Engineering
2. ICTP – Master of Sciences
3. UNIZAR – Master in Nanostructured Materials for Nanotechnology Applications
4. UTWENTE – Master of Science in Chemical Engineering
5. UNL – Master in Membrane Engineering



1. **UM2 / UPS - Master in Membrane Engineering : National Accreditation application form**

**Fiche Spécialité**

(Spécialité d'un Diplôme)

<b>DEFINITION</b>	
intitulé	<b>Membrane Engineering - ME - (Ingénierie des Membranes)</b>
Domaine	Sciences, Technologie, Santé
Mention	Mécanique, Energétique, Procédés
Spécialité	Procédés Physico-Chimiques
diplôme	<input type="checkbox"/> Licence *X Master M1 *X Master M2
	Code (ne pas remplir)

<b>STRUCTURATION EN PARCOURS</b>			
<i>code</i>	<i>libellé</i>	<i>Finalité (R / P)</i>	<i>Effectif attendu</i>
	Master Erasmus Mundus « Membrane Engineering »	R/P	30

<b>COHABILITATION</b>	
<i>Etablissement</i>	<i>Nom de la spécialité dans l'établissement cohabilité</i>
Université de Montpellier 2– UM2	Membrane Engineering - ME - (Ingénierie des Membranes)

<b>RESPONSABILITE</b>		
<i>nom</i>	<i>statut</i>	<i>Université UFR</i>
Dr. AYRAL André	PR	UM2, Faculté des Sciences
Dr. BACCHIN Patrice	PR	UT3, UFR Physique, Chimie, Automatique

La liste de l'ensemble des établissements partenaires du projet ainsi que les coordonnées des responsables du master dans ces établissements sont données en annexe 1.

<b>POSITIONNEMENT &amp; FINALITES</b>	
<b>Positionnement</b>	
Positionnement	<p><i>Positionnement de la spécialité vis-à-vis de l'offre de formation régionale ou nationale existant déjà en précisant pour chaque offre connexe : sa dénomination, l'université de rattachement et les points de positionnement</i></p> <p>Des pressions environnementales croissantes telles que la pollution massive de l'air et des ressources en eau ou encore l'épuisement accéléré des réserves en énergie fossile ont conduit au concept de développement durable et à des stratégies associées telles que l'intensification des procédés, le recyclage de l'eau et des solvants à leur point d'utilisation, l'utilisation de l'hydrogène comme vecteur énergétique (nécessité de production d'hydrogène et utilisation de piles à combustible comme générateurs électriques) ou encore à la capture et le stockage du CO<sub>2</sub>. Les membranes ont un rôle clef à jouer dans ces nouvelles technologies et dans les opérations de séparation associées. Elles occupent déjà une place cruciale dans des secteurs tels que l'industrie alimentaire, l'industrie pharmaceutique et la santé ainsi que dans la production d'eau potable. Les technologies de filtration membranaire ont</p>

ainsi été identifiées comme « Technologies Clés 2010 » par le Ministère de l'Economie, des Finances et de l'Industrie. La Fédération Européenne du Génie Chimique (EFCE) a d'autre part maintenant une section dédiée à la thématique « Membrane Engineering ».

Un Réseau d'Excellence Européen NanoMemPro « Expanding membrane macroscale applications by exploring nanoscale material properties » (Annexe 2) a été labellisé pour 4 ans et demi (2004-2009) dans le cadre du 6<sup>ième</sup> PCRD. Il est coordonné par le partenaire français CNRS via les deux laboratoires porteurs du projet de master, l'Institut Européen des Membranes de l'Université Montpellier 2 et le Laboratoire de Génie Chimique de l'Université Paul Sabatier (Toulouse 3). Il a pour vocation d'établir des synergies durables entre formateurs, chercheurs, industriels et utilisateurs finaux en vue de surmonter les difficultés techniques et de résoudre des problèmes liés à la nature multifonctionnelle et multidisciplinaire de la Science et de l'Ingénierie des Membranes.

Un groupe de travail « Education » oeuvre au cours de ce programme à la mise en place de structures européennes de formation en ingénierie des membranes, avec notamment la création d'un Haut Comité d'Education et d'un label européen en « Membrane Engineering », actions menées en partenariat avec l'European Membrane Society (Annexe 3). La spécialité de master présentée dans ce document résulte de la volonté des différents partenaires du réseau NanoMemPro de mettre en place un master européen de type Erasmus Mundus « Membrane Engineering » (procédure de labellisation européenne en cours). Cette démarche a été également soutenue par le Club d'Intérêt formé par les partenaires industriels du réseau NanoMemPro (Annexe 4). C'est dans le cadre de la mise en place de ce master européen Erasmus Mundus, coordonné par l'Université Montpellier 2 et l'Université Paul Sabatier (Toulouse 3) qu'est demandée une habilitation au niveau français, afin de permettre la délivrance d'un diplôme de master portant le sceau de nos deux universités, aux étudiants qui auront acquis les crédits requis. **L'ouverture du master est conditionnée par l'obtention de la labellisation européenne Master Erasmus Mundus** (publication des résultats prévue au printemps 2009).

Au plan national, cette formation a reçu le soutien du Président du Club Français des Membranes. Sur le plan régional, pour ce qui est du site montpelliérain, elle bénéficie d'un environnement très favorable au travers des différentes structures que sont le Pôle Chimie Balard Languedoc-Roussillon « Une chimie au service de l'homme et de son environnement », l'Institut Carnot « Chimie, Environnement et Développement Durable », la chaire UNESCO « Sciences des Membranes appliquées à l'Environnement » et également le programme pluridisciplinaire transversal sur l'eau.

Cette nouvelle offre de formation réalisée en anglais et recrutant des étudiants au niveau mondial sur des critères d'excellence (conditionnant l'attribution des bourses européennes d'études) sera de notre point de vue, très bénéfique en terme d'image pour les établissements porteurs. Elle ne vient pas en concurrence mais bien en complémentarité et en synergie avec les spécialités existantes (la structure actuelle des masters mention Chimie de

	<p>l'UM2 et de l'UT3 est présentée dans les annexes 5 et 6). Nous souhaitons en effet en tirer avantage vis-à-vis de nos spécialités existantes de master dans des domaines connexes tels que celui des matériaux en mutualisant notamment différentes unités d'enseignement (U.E.). Certaines U.E. pourraient également être mutualisées avec l'option Matériaux de l'ENS Chimie de Montpellier.</p> <p>Il faut enfin noter notre volonté de mise en oeuvre du téléenseignement pour lequel nous possédons déjà une expérience via le programme international francophone PROMATINTER.</p>
Origine	<p><input checked="" type="checkbox"/> ex nihilo</p> <p><input type="checkbox"/> par transformation / regroupement de formations</p>

<b>Description</b>
<p><i>Description succincte</i></p> <p>L'enseignement de la science des membranes et des technologies membranaires nécessite l'expertise d'acteurs spécialisés dans des disciplines spécifiques et complémentaires afin de proposer une formation originale et compétitive dans le domaine de l'Ingénierie des Membranes. Le projet pédagogique émane d'un rapprochement au sein du Réseau d'Excellence NanoMemPro d'universités ayant acquis une reconnaissance internationale dans le domaine des membranes et susceptible de fournir des enseignements complémentaires de très haut niveau conduisant à une formation de premier plan au niveau mondial. Les étudiants inscrits pourront donc bénéficier d'une formation scientifique et technologique d'excellence associée à l'acquisition de compétences complémentaires diverses : linguistiques, communication, bonnes pratiques et réglementations nationales et européennes en matière de travail et d'environnement, gestion de projet et le management d'entreprise. Les débouchés naturels pour les diplômés seront soit une insertion directe dans l'entreprise soit une poursuite d'étude en thèse de doctorat.</p> <p><b>La première année de master</b> a été conçue pour permettre l'acquisition des bases théoriques requises. Les étudiants sélectionnés, issus d'une formation initiale en génie des procédés (la moitié de l'effectif, soit 15 étudiants), suivront un premier semestre (S1) à l'Université Montpellier 2 centré sur le génie des matériaux. Les étudiants sélectionnés, issus de formation initiale en chimie ou chimie-physique (l'autre moitié de l'effectif, soit 15 étudiants), suivront un premier semestre (S1) à l'Université de Toulouse 3 centré sur le génie des procédés. L'ensemble de la promotion (30 étudiants) se retrouvera pour le semestre S2 à l'Institut de Technologie Chimique de Prague (République Tchèque) pour acquérir les bases en modélisation des mécanismes et des procédés.</p> <p><b>La deuxième année de master</b> débutera par un semestre S3 dédié à un domaine d'application. Les étudiants seront répartis en 3 groupes de 10 (sur des critères de choix personnels et arbitrage au mérite) correspondant aux 3 domaines d'applications suivants :</p> <ul style="list-style-type: none"> <li>- Nanotechnologies et biosystèmes à l'Université de Saragosse (Espagne) ;</li> <li>- Energie et environnement à l'Université de Twente (Pays Bas) ;</li> <li>- Biotechnologies, Alimentation et Santé à l'Université Nouvelle de Lisbonne (Portugal).</li> </ul> <p>Leur dernier semestre (S4) sera consacré à un stage en laboratoire de recherche universitaire (pour les étudiants projetant une poursuite en thèse de doctorat) ou à un stage en entreprise (pour les étudiants ayant un objectif d'insertion professionnelle immédiate après le master).</p>

Mots clés (spécifiques à la spécialité)	1. Ingénierie des Membranes
	2. Génie des Matériaux
	3. Génie des Procédés
	4. Modélisation
	5. Nanotechnologies et Biosystèmes
	6. Energie et Environnement
	7. Biotechnologies, Alimentation et Santé

<b>Finalités</b>	
Objectifs (pédagogiques, scientifiques, professionnels)	L'objectif de cette formation est de donner aux étudiants une formation pluridisciplinaire de très haut niveau avec acquisition de connaissances scientifiques et technologiques approfondies en ingénierie de membranes, complétées de compétences linguistiques, en communication, sur les bonnes pratiques, sur les réglementations nationales et internationales, sur la gestion de projet et le management d'entreprise.
Compétences acquises (scientifiques, professionnelles, méthodologiques ...)	a. Compétences en génie des matériaux
	b. Compétences en génie des procédés
	c. Compétences en modélisation
	d. Compétences en application des technologies membranaires
	e. Compétences en gestion de projets et d'installations
Débouchés	1. Emploi de niveau ingénieur
	2. Doctorat - Recherche Universitaire
	3. Recherche et Développement dans l'industrie
	4. Bureaux d'études

## **RECRUTEMENT**

<b>Public Cible</b>	
Formations	Chimie, Physique-Chimie, Matériaux et Génie des Procédés
Bassin de recrutement	L'effectif visé pour ce master se situe autour de 30. Cette prévision est basée sur le mode mondial de recrutement et l'attribution de bourses européennes d'études sur critères d'excellence.

<b>Conditions d'accès selon les niveaux de la spécialité</b>	
<i>niveau</i>	<i>Pré-requis</i>
M1	Licence (Bachelor) en Chimie, Physique-Chimie, Matériaux, ou Génie des Procédés Recrutement éventuel par la voie de la formation continue et validation des acquis.
M2	Le recrutement en M2 devrait être très rare au vu de la forte intégration M1+M2 et du mode principal de recrutement (bourses d'études sur deux années).

### **Orientation / réorientation / soutien**

*(mettre ici les initiatives et mesures prises en matière d'orientation et de réorientation ainsi que d'accompagnement et soutien pédagogique de l'étudiant)*

#### **Un comité de pilotage :**

Ce comité comprendra les personnes suivantes (ou leurs représentants) :

- Le Chef de Département d'Enseignement de Chimie de la Faculté des Sciences de l'Université Montpellier 2
- Le Chef de Département Recherche Chimie de l'Université Montpellier 2
- Le Directeur de l'UFR PCA de l'Université Toulouse 3
- Les deux responsables du Master (UM2 et UT3)
- Les correspondants du Master pour les partenaires principaux et les partenaires secondaires (cf annexe 1).
- Le responsable du Master Professionnel PROMAT
- Le responsable Formation du Pôle Chimie Balard.

Réuni une fois par an, ce comité de pilotage examinera notamment :

- Le contenu et la bonne adaptation des programmes pour une formation de qualité.
- Le bilan des projets et des stages des étudiants de première et deuxième année dans les différents laboratoires.

#### **Un conseil des études :**

Il sera composé, en plus du comité de pilotage du Master, des enseignants responsables des unités d'enseignement, de représentants des élèves (2 du niveau M1 et 2 du niveau M2). Ce conseil se réunira une fois par an (via les moyens disponibles de visioconférence) pour examiner les problèmes pratiques liés au bon déroulement de la formation, en particulier des enseignements, des examens et des stages. Il sera chargé de la politique d'orientation et de réorientation de la formation ainsi que de l'accompagnement et du soutien pédagogique des étudiants.

### **STRUCTURES D'APPUI**

#### **Unités de Recherches appuyant la spécialité**

Unité 1	Institut Européen des Membranes (IEM), UM2
Unité 2	Laboratoire de Génie Chimique (LGC), UT3
Unité 3	Tous les autres laboratoires européens identifiés dans l'annexe 2

#### **Partenariats professionnels appuyant la spécialité**

Organisme 1	Tous les membres du Club d'Intérêt du réseau NanoMemPro (annexe 4)
Organisme 2	

#### **Partenariat avec d'autres établissements de formation**

Organisme 1	Tous les établissements membres du réseau NanoMemPro (annexe 1)
Organisme 2	

## EQUIPE ENSEIGNANTE

### Responsable 1

Nom	AYRAL André	
Discipline	Chimie	section CNU : 31
fonction	X Enseignant-chercheur <input type="checkbox"/> Chercheur	
HDR	X oui <input type="checkbox"/> non	
Date de naissance	20 janvier 1960	
Université - UFR	UM 2, Faculté des Sciences	
Equipe de recherche	IEM (UMR 5635) Equipe SGP (Membranes céramiques et hybrides par voie sol-gel et plasma).	
téléphone	04 67 14 91 43	
E-mail	andre.ayral@univ-montp2.fr	

### activités

administratives	<ul style="list-style-type: none"> <li>- Directeur – adjoint du Département Enseignement Chimie de la Faculté des Sciences à l'UM 2 ;</li> <li>- Co-responsable du master professionnel PROMAT ;</li> <li>- Responsable du programme international PROMATINTER de coopération interuniversitaire francophone par enseignement à distance ;</li> <li>- Co-responsable du master recherche Chimie Séparative, Matériaux et Procédés, co-habilité UM2- ENS Chimie Montpellier et Institut National des Sciences et Techniques Nucléaires ;</li> <li>- Membre de Haut Comité Européen pour l'Education en Ingénierie des Membranes.</li> </ul>	
Membre de	Commission de spécialistes	X oui <input type="checkbox"/> non
	Conseil scientifique	<input type="checkbox"/> oui X non
scientifiques	PEDR	
internationales	Organisateur de différents congrès internationaux récents Membre de l'Editorial Board du Journal of Porous Materials	

### Sélection de 5 publications récentes

1. YACOU, C; FONTAINE, M-L; AYRAL, A; LACROIX-DESMAZES, P; ALBOUY, P-A; JULBE, A. **One pot synthesis of hierarchical porous silica membrane material with dispersed Pt nanoparticles using a microwave-assisted sol-gel route.** *Journal of Materials Chemistry* (2008), 18(36), 4274-4279.
2. HENG, S; YEUNG, K L; JULBE, A; AYRAL, A; SCHROTTER, J-C. **Preparation of composite zeolite membrane separator/contactor for ozone water treatment.** *Microporous and Mesoporous Materials* (2008), 115(1-2), 137-146
3. JULBE, A; ROUESSAC, V; DURAND, J; AYRAL, A. **New approaches in the design of ceramic and hybrid membranes.** *Journal of Membrane Science* (2008), 316(1+2), 176-185.
4. ROUESSAC, V; VAN DER LEE, A; BOSCH, F; DURAND, J; AYRAL, A. **Three characterization techniques coupled with adsorption for studying the nanoporosity of supported films and membranes.** *Microporous and Mesoporous Materials* (2008), 111(1-3), 417-428
5. NASZALYI, L; BOSCH, F; EL MANSOURI, A; VAN DER LEE, A; COT, D; HORVOLGYI, Z; AYRAL, A. **Sol-gel-derived mesoporous SiO<sub>2</sub>/ZnO active coating and development of multifunctional ceramic membranes.** *Separation and Purification Technology* (2008), 59(3), 304-309.

### Ouvrages et chapitres d'ouvrages récents

- "Microporous silica membrane: basic principles and recent advances". AYRAL, A; JULBE, A; ROUESSAC, V; ROUALDES, S; DURAND, J. Membrane Science and Technology Series (2008), 13(Inorganic Membranes), 33-79.
- "Recent Advances in Membrane Materials". AYRAL, A; Editor. [In: Ann. Chim. (Cachan, Fr., 2007; 32(2)). (2007), 141 pp.

"Sol-gel processed membranes", C. GUIZARD, A. AYRAL, M. BARBOIU, A. JULBE, Handbook of Sol-Gel Science and Technology- Vol 3: Application of sol-gel technology, Sumio Sakka (Ed), 2005, Kluwer Academic Publishers (ISBN: 1-4020-7979-9) Chapter 7, pp: 139-178.

"Ceramic Membrane Processing; New approaches in their design and applications", A. AYRAL, A. JULBE, C. GUIZARD, in Chemical Processing of Ceramics, *Second edition* B.I. Lee S. Komarneni (Eds), 2005, Taylor and Francis Group, Boca Raton, USA, (ISBN: 1-57444-648-7) Chapter 25, pp: 629-666.

"Synthesis, Characterization and Applications of Mesostructured Thin Layers" A. AYRAL, H.W. HILLHOUSE, M. KLOTZ, M. OGAWA, E. RUIZ-HITZKY Editors, EMRS Symposia Proceedings 179 (Elsevier, Amsterdam, 2006) (ISBN 0040-6090).

"Techniques innovantes pour la caractérisation optique microstructurale de couches minces", coordonnateurs de l'ouvrage, V. ROUESSAC et A. AYRAL, CNRS Editions, Paris (2006).

<b>Responsable 2</b>	
Nom	BACCHIN Patrice
Discipline	Génie des procédés <span style="float: right;">Génie des procédés</span>
fonction	<input checked="" type="checkbox"/> Enseignant-chercheur <input type="checkbox"/> Chercheur
HDR	<input checked="" type="checkbox"/> oui <input type="checkbox"/> non
Date de naissance	08/06/68
Université - UFR	UT3, UFR PCA
Equipe de recherche	Laboratoire de Génie Chimique
téléphone	05 61 55 81 63
E-mail	<a href="mailto:bacchin@chimie.UT3-tlse.fr">bacchin@chimie.UT3-tlse.fr</a>
<b>activités</b>	
administratives	- Responsable du parcours séparation du master professionnel « Procédés physico-chimiques » à l'UT3; - Co-responsable du master recherche « génie des procédés et de l'environnement » (UT3/INP/INSAT/ENSTIMAC); - Membre de Haut Comité Européen pour l'Education en Ingénierie des Membranes.
Membre de	Commission de spécialistes <input checked="" type="checkbox"/> oui <input type="checkbox"/> non Conseil scientifique <input type="checkbox"/> oui <input checked="" type="checkbox"/> non
scientifiques	PEDR
internationales	Membre de comités d'organisation et de comités scientifiques de congrès internationaux, 4 publications co-signées avec des chercheurs étrangers (University of Oxford –UK-, University of Sydney –Australia-, University of Cranfield –UK-, Loughborough University –UK-), Participation à un programme de recherche Australien
<b>Sélection de 5 publications récentes</b>	
1. BESSIERE, Y; FLETCHER, D. F.; BACCHIN, P. <b>Numerical simulation of colloid dead-end filtration: Effect of membrane characteristics and operating conditions on matter accumulation.</b> <i>Journal of Membrane Science</i> (2008), 313(1+2), 52-59.	
2. ESPINASSE, B; BACCHIN, P; AIMAR, P. <b>Filtration method characterizing the reversibility of colloidal fouling layers at a membrane surface: Analysis through critical flux and osmotic pressure.</b> <i>Journal of Colloid and Interface Science</i> (2008), 320(2), 483-490.	
3. CASTILLO, S.; CIENFUEGOS, R. F.; FONTAINE, M. L.; LENORMAND, P.; BACCHIN, P.; ANSART, F. <b>Influence of the processing parameters of slurries for the deposit of nickelate thick films.</b> <i>Materials Research Bulletin</i> (2007), 42(12), 2125-2131.	
4. BACCHIN, P.; AIMAR, P.; FIELD, R. W. <b>Critical and sustainable fluxes: Theory, experiments and applications.</b> <i>Journal of Membrane Science</i> (2006), 281(1+2), 42-69.	
5. BACCHIN, P; ESPINASSE, B; BESSIERE, Y; FLETCHER, D F.; AIMAR, P. <b>Numerical simulation of colloidal dispersion filtration: description of critical flux and comparison with experimental results.</b> <i>Desalination</i> (2006), 192(1-3), 74-81.	

<b>Equipe de pilotage</b>		
Nom & prénom	profession	Employeur - service
Voir ci-dessus, le paragraphe : Orientation/ Réorientation/ Soutien		

<b>Equipe pédagogique : universitaire</b>			
Nom & prénom	grade	Section CNU	Unité / service
AYRAL André	PR	31	UM2, Faculté des Sciences
QUEMENER Damien	MCF	33	UM2, Faculté des Sciences
ROUALDES Stéphanie	MCF	31	UM2, Faculté des Sciences
BOSC ROUESSAC Florence	MCF	33	UM2, Faculté des Sciences
CERNEAUX Sophie	MCF	33	ENSCM
HULEA Vasile	PR	31	ENSCM
JULBE Anne	DR	Section 15	CNRS
BACCHIN Patrice	PR	62	UT3, UFR PCA
CAUSSERAND Christel	PR	62	UT3, UFR PCA
GALIER Sylvain	MCF	62	UT3, UFR PCA
REMIGY Jean Christophe	MCF	62	UT3, UFR PCA
LAHITTE Jean François	MCF	62	UT3, UFR PCA

<b>Equipe pédagogique : intervenants extérieurs</b>			
Nom & prénom	profession	employeur	Unité / service
Enseignants des différents partenaires européens impliqués dans ce master.			



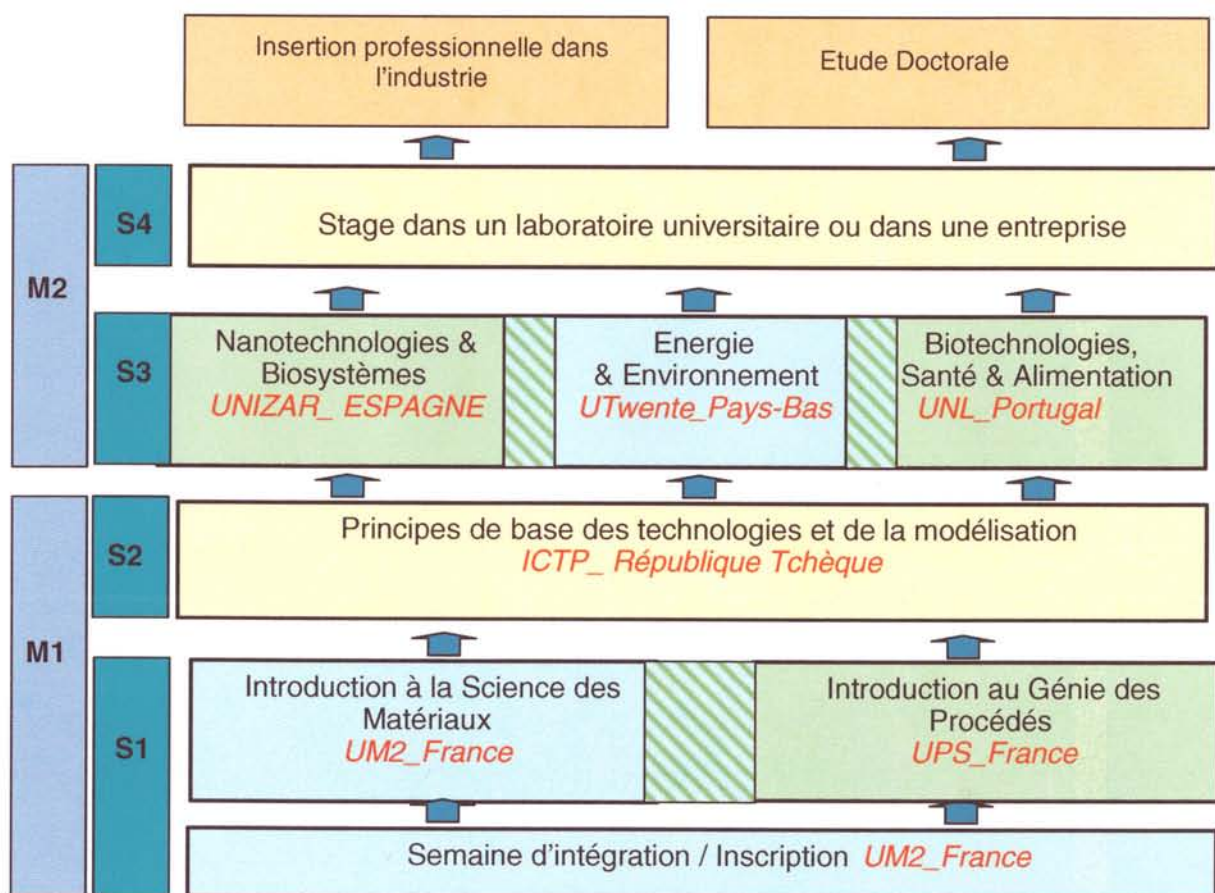
## SCHEMA GENERAL DE L'ENSEIGNEMENT

Le programme d'enseignement du master est divisé en quatre semestres, chacun correspondant à 30 ECTS. Les trois premiers semestres sont dédiés aux enseignements théoriques et pratiques alors que le dernier semestre est réservé au stage de master.

Le master débute par une semaine d'intégration des étudiants en septembre, à Montpellier. L'objectif principal de cette semaine est d'accueillir les nouveaux arrivés et de régler tous les aspects administratifs, notamment les inscriptions universitaires et les hébergements, et également, d'expliquer les détails du déroulement des deux années. Le master termine en septembre de la seconde année avec la soutenance à Montpellier (ou par visioconférence) de leur stage de master.

Les enseignements délivrés en anglais permettront aux étudiants d'explorer le domaine des membranes dans son ensemble, de la chimie aux procédés membranaires, de la recherche académique de pointe aux derniers développements industriels.

Le schéma général suivant présente les parcours offerts aux étudiants :



La formation proposée est composée d'unités d'enseignement en présentiel et de projets et stages en laboratoire. Le total horaire d'enseignement théorique en présentiel est de 400 heures pour la première année (M1) et de 250 heures pour la deuxième année (M2, Semestre 3). Pour chaque UE, un responsable pédagogique est désigné. Il a la charge de veiller à la cohérence pédagogique de l'UE et au bon déroulement des enseignements théoriques et appliqués proposés.

**La première année (M1)** du Master sera constituée de 2 semestres, chacun comptant pour 30 ECTS. Lors du premier semestre (S1), les étudiants seront répartis entre les deux universités françaises. En fonction de leur connaissance, ils seront orientés soit vers le Génie des Matériaux à l'Université

Montpellier 2, soit vers le Génie des Procédés à l'Université Paul Sabatier (UT3). Dans les deux cas, le semestre S1 sera constitué de trois modules d'enseignements théoriques et pratiques (modules 1, 2 et 3).

Le second semestre (S2) rassemblera la promotion entière à l'ICTP en République Tchèque. Ce semestre, divisé en trois modules d'enseignements théoriques et pratiques (modules 4, 5 et 6), abordera les bases fondamentales des technologies chimiques, de la modélisation des procédés et de leur optimisation.

**La deuxième année (M2)** du Master sera constituée de 2 semestres. Le troisième semestre (S3) sera dédié à la spécialisation du parcours vers trois grands domaines d'application des membranes :

- Nanotechnologies et Biosystèmes (UNIZAR, Espagne)
- Energie et Environnement (UTwente, Pays-Bas)
- Biotechnologies, Santé et Alimentation (UNL, Portugal)

Le quatrième semestre (S4) sera réservé au stage dans l'un des laboratoires d'accueil des universités participantes ou dans une entreprise européenne.

Les enseignements théoriques seront sanctionnés par un contrôle terminal tandis que le stage donnera lieu à un rapport écrit et à une soutenance orale.

Le descriptif détaillé des modules constituant les différents semestres est proposé dans le tableau suivant, avec le détail des attributions de crédits ECTS par module.

**M 1 : 60 ECTS – 400 h cours + TD + TP**  
**Semestre 1 : UM2 (30 ECTS)**

**Module 1M – 6 UE obligatoires (3ECTS, 25 Heures) – 18 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Matériaux Inorganiques	Obl.	UM2	Master PROMAT, ENSCM
Matériaux Polymères	Obl.	UM2	Master PROMAT, ENSCM
Matériaux Hybrides et Composites	Obl.	UM2	Master PROMAT, ENSCM
Caractérisation Structurale du Solide	Obl.	UM2-UT3	Master PROMAT et CPCM, ENSCM, UT3 - Toulouse
Caractérisation des Matériaux Poreux	Obl.	UM2	Master PROMAT et CPCM, ENSCM
Matériaux pour la réaction chimique et la catalyse hétérogène	Obl.	UM2	Master PROMAT, ENSCM

**Module 2M – 1 UE obligatoire (2 ECTS) et 2 UE optionnelles à choisir parmi les 3 proposées (2 ECTS) – 6 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl. /Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Cours de langues (Anglais/Français)	Obl.	UM2	-
Qualité, Sécurité et Environnement	Opt.	UM2	Master PROMAT
Règles de Bonnes Pratiques de Laboratoire	Opt.	UM2	Master PROMAT
Droit Européen et International du Travail	Opt.	UM2	Master PROMAT

**Module 3Mo – 1 UE obligatoire - 6 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl. /Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Projet individuel (travail bibliographique et expérimental)	Obl.	UM2	-

### Semestre 1 : UT3, Toulouse (30 ECTS)

#### Module 1T – 6 UE obligatoires (3ECTS, 25 Heures) – 18 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Phénomènes de Transport. Partie I : conséquences sur les procédés	Obl.	UT3	-
Transfert de masse et de chaleur : application aux réacteurs/séparateurs	Obl.	UT3	-
Ingénierie des colloïdes et des surfaces	Obl.	UT3	-
Réactivité de surface	Obl.	UT3	-
Chimie générale et analytique	Obl.	UT3	-
Caractérisation Structurale du Solide	Obl.	UT3-UM2	UM2, Montpellier

#### Module 2T – 1 UE obligatoire (2 ECTS) et 2 UE optionnelles à choisir parmi les 3 proposées (2 ECTS) – 6 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Cours de langues (Anglais/Français)	Obl.	UM2	-
Qualité, Sécurité et Environnement	Opt.	UM2	-
Règles de Bonnes Pratiques de Laboratoire	Opt.	UM2	-
Droit Européen et International du Travail	Opt.	UM2	-

#### Module 3T – 1 UE obligatoire - 6 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Projet individuel (travail bibliographique et expérimental)	Obl.	UT3	-

### Semestre 2 : ICTP, Prague, République Tchèque (30 ECTS)

#### Module 4P – 6 UE obligatoires (3 ECTS, 25 Heures) – 18 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Phénomènes de Transport (Partie II)	Obl.	ICTP	-
Procédés Membranaires	Obl.	ICTP	-
Conception de procédés	Obl.	ICTP	-
Techniques de laboratoire	Obl.	ICTP	-
Cinétique de réaction	Obl.	ICTP	-
Approfondissements en Génie des Procédés	Obl.	ICTP	-

#### Module 5P – 1 UE obligatoire (2 ECTS) et 2 UE optionnelles à choisir parmi les 3 proposées (2 ECTS) – 6 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Cours de langues (Anglais/Tchèque)	Obl.	ICTP	-
Qualité, Sécurité et Environnement	Opt.	ICTP	-
Règles de Bonnes Pratiques de Laboratoire	Opt.	ICTP	-
Droit Européen et International du Travail	Opt.	ICTP	-

<b>Module 6P – 1 UE obligatoire - 6 ECTS</b>			
<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Projet individuel (travail bibliographique et expérimental)	Obl.	ICTP	-

**M 2 : 60 ECTS – 250 h cours + TD+TP**  
**Semestre 3 : UNL, Lisbonne, Portugal (30 ECTS)**

**Module 7L – 4 UE obligatoires (4ECTS, 30 Heures) – 16 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Bioréacteurs et Contacteurs membranaires	Obl.	UNL	-
Membranes et procédés de purification de molécules issues de biotechnologies	Obl.	UNL	-
Membranes barrières pour le domaine de l'alimentaire	Obl.	UNL	-
Culture tissulaire et organes artificiels	Obl.	UNL	-

**Module 8L – 2 UE obligatoires (6 ECTS)**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Cours de langues (Anglais/Portugais)	Obl.	UNL	-
Séminaires	Obl.	UNL	-

**Module 9L – 1 UE obligatoire - 8 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Projet individuel (travail bibliographique et expérimental)	Obl.	UNL	-

**Semestre 3 : UNIZAR, Espagne (30 ECTS)**

**Module 7Z – 6 UE obligatoires (3 ECTS, 25 Heures) – 18 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Propriétés fondamentales des Matériaux nanostructurés	Obl.	UNIZAR	-
Préparation des Matériaux nanostructurés	Obl.	UNIZAR	-
Techniques de Microscopies avancées	Obl.	UNIZAR	-
Conception et Application de Nanoéquipements	Obl.	UNIZAR	-
Etudes de cas et applications industrielles	Obl.	UNIZAR	-
NanoBioMédecine	Obl.	UNIZAR	-

**Module 8Z – 2 UE obligatoires (6 ECTS)**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Cours de langues (Anglais/Espagnol)	Obl.	UNIZAR	-
Séminaires	Obl.	UNIZAR	-

**Module 9Z – 1 UE obligatoire - 6 ECTS**

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
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Projet individuel (travail bibliographique et expérimental)	Obl.	UNIZAR	-
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### Semestre 3 : UTwente, Pays-Bas (30 ECTS)

#### Module 7E – 6 UE obligatoires (3 ECTS, 25 Heures) – 18 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Energie et biomasse	Obl.	UTwente	-
Piles à combustible et électrolyseur	Obl.	UTwente	-
Séparation et traitement des gaz	Obl.	UTwente	-
Traitement et recyclage des effluents liquides	Obl.	UTwente	-
Traitement de l'eau	Obl.	UTwente	-
Microsystèmes et capteurs	Obl.	UTwente	-

#### Module 8E – 2 UE obligatoires (6 ECTS)

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Cours de langues (Anglais/Néerlandais)	Obl.	UTwente	-
Séminaires	Obl.	UTwente	-

#### Module 9E – 1 UE obligatoire - 6 ECTS

<i>Intitulé de l'U.E.</i>	<i>Obl./Opt.</i>	<i>Responsable</i>	<i>Mutualisation</i>
Projet individuel (travail bibliographique et expérimental)	Obl.	UTwente	-

### Semestre 4 : 30 ECTS

#### Module 10

24 semaines, stage en laboratoire universitaire ou industriel

### **Commentaires particuliers**

#### **Modalités de contrôle des connaissances**

Les enseignements théoriques sont sanctionnés par un contrôle terminal. Les travaux tuteurés ainsi que les stages donnent lieu à des rapports écrits et à des soutenances orales.

1) *Délivrance du diplôme intermédiaire : oui*

L'acquisition des 60 premiers ECTS permet d'obtenir le titre de Maître es Sciences.

2) *Calendrier des sessions d'examen :*

Les examens écrits sont prévus en fin de chaque module d'enseignement théorique. Il est prévu des sessions de rattrapage dans un délai minimum de six semaines après la première session.

3) *Règles de capitalisation et de compensation des U.E. :*

Les U.E. proposées sont capitalisables. La compensation s'effectue par groupes d'épreuves en accord avec les règles définies par le Conseil des Etudes et de la Vie Universitaire (CEVU) de l'Université Montpellier 2.

#### **Evaluation des enseignements**

Les modalités d'évaluation des enseignements communes à tous les masters de l'Université Montpellier 2 sont définies chaque année par le CEVU.

## ANNEXE 1

### **1.1. ETABLISSEMENTS PRINCIPAUX (FULL PARTNERS)**

- |   |         |             |                    |
|---|---------|-------------|--------------------|
| • Université Montpellier 2                | UM2     | Montpellier | France             |
| • Université Paul Sabatier (Toulouse 3)   | UT3     | Toulouse    | France             |
| • Institute of Chemical Technology Prague | ICTP    | Prague      | République Tchèque |
| • University of Twente                    | UTwente | Enschede    | Pays Bas           |
| • Universidad de Zaragoza                 | UNIZAR  | Saragosse   | Espagne            |
| • Universidade Nova de Lisboa             | UNL     | Lisbonne    | Portugal           |

### **1.2. ETABLISSEMENTS SECONDAIRES (EXPERT PARTNERS)**

- |                                  |          |            |          |
|----------------------------------|----------|------------|----------|
| • Katholieke Universiteit Leuven | KULeuven | Louvain    | Belgique |
| • Danmarks Tekniske Universitet  | DTU      | Copenhague | Danemark |
| • Universitat della Calabria     | UNICAL   | Rende      | Italie   |

### **1.3. RESPONSABLES ET CO-RESPONSABLES DE LA FORMATION**

#### **Université Montpellier 2**

Prof. André AYRAL (responsable)

Tel : +33 (0)467 149 143

Andre.Ayral@iemm.univ-montp2.fr

#### **Université Paul Sabatier (UT3)**

Dr. Patrice BACCHIN (responsable)

Tel: +33 (0)561558163

bacchin@chimie.UT3-tlse.fr

#### **Institute of Chemical Technology Prague**

Dr. Karel BOUZEK (co- responsable)

Tel: +420 220 444 109

Karel.Bouzek@vscht.cz

#### **University of Twente**

Prof. H.J. M. BOUWMEESTER (co- responsable)

Tel : +31 534 892 202

Tel: H.J.M.Bouwmeester@utwente.nl

#### **Universidad de Zaragoza**

Dr. Reyes MALLADA (co- responsable)

Tel : +34 976 762 392

rmallada@unizar.es

#### **Universidade Nova de Lisboa**

Prof. Joao CRESPO (co- responsable)

Tel : +351 212 948 385

jgc@dq.fct.unl.pt




## ANNEXE 2

### EQUIPES DE RECHERCHE EN SOUTIEN AU MASTER – PARTENAIRES DU RESEAU D'EXCELLENCE EUROPEEN NANOMEMPRO

#### Laboratoires membres du réseau d'excellence NanoMemPro

Institut Européen des Membranes Unité Mixte de Recherche N° 5635 CNRS - INSCM - UM II	Institut Européen des Membranes	France, Montpellier
le LABO LABORATOIRE DE GÉNIE CHIMIQUE	Laboratoire de Génie Chimique	France, Toulouse
INSTITUTE OF CHEMICAL TECHNOLOGY PRAGUE	Institute of Chemical Technology Prague	République Tchèque, Prague
University of Twente The Netherlands	Membrane Technology Group	Pays Bas, Enschede
Universidad de Zaragoza - Departamento de Ingeniería Química y Tecnologías del Medio Ambiente	Universidad de Zaragoza - Departamento de Ingeniería Química y Tecnologías del Medio Ambiente	Espagne, Saragosse
Universidade Nova de Lisboa - Chemical Engineering Department Instituto de Biologia Experimental e Tecnologica (IBET)	Universidades Nova de Lisboa - Chemical Engineering Department Instituto de Biologia Experimental e Tecnologica (IBET)	Portugal, Lisbonne
Imperial College London	Imperial College of Science, Technology and Medicine - Department of Chemical Engineering	Royaume Uni, Londres
VITO	Flemish Institute for Technological Research VITO	Belgique, Mol
GKSS FORSCHUNGSZENTRUM	GKSS Forschungszentrum Geesthacht GmbH	Allemagne, Geesthacht
ITM	Istituto per la Tecnologia delle Membrane	Italie, Rende
FORTH/ICE-HT	Institute of Chemical Engineering and High Temperature Chemical Processes - Foundation for Research and Technology, Hellas – FORTH/ICE-HT	Grèce, Patras
SINTEF	Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology - SINTEF	Norvège, Trondheim

 <p>LAPPEENRANNAN TEKNILLINEN YLIOPISTO</p>	Lappeeranta University of Technology LUT – Laboratory of Membrane Technology and Technical Polymer Chemistry	<b>Finlande, Lappeeranta</b>
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### **2.1. Les laboratoires de 6 établissements principaux impliqués dans le master**

- Montpellier : Institut Européen de Membranes (IEM) UMR5635
- Toulouse : Laboratoire de Génie Chimique (LGC) UMR5503
- Prague : Department of Inorganic Technology
- Enschede : Membrane Technology Group
- Saragosse : Departamento de Ingeniería Química y Tecnologías del Medio Ambiente (IQTMA)
- Lisbonne : Chemical Engineering Department

### **2.2. Les laboratoires de 3 établissements secondaires impliqués dans le master**

- Louvain : Department of Interface Chemistry
- Copenhagen : Department of Chemical Engineering – Membrane Group
- Rende: Department of Chemical Engineering and Materials

### **2.3. Les laboratoires des autres partenaires du Réseau d'Excellence NanoMemPro**

- Imperial College London, Department of Chemical Engineering (Londres, Royaume Unie).
- Flemish Institute for Technological Research - Vito (Mol, Belgium)
- Instituto de Biologia Experimental e Tecnológica – IBET (Lisbonne, Portugal)
- GKSS Forschungszentrum Geesthacht GmbH (Geesthacht, Allemagne)
- Istituto per la Tecnologia delle Membrane – ITM-CNR (Rende, Italy)
- Institute of Chemical Engineering and High Temperature Chemical Processes - Foundation for Research and Technology, Hellas – FORTH/ICE-HT (Patras, Grèce)
- Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology – SINTEF (Trondheim, Norvège)
- Lappeeranta University of Technology (LUT) - Laboratory of Membrane Technology and Technical Polymer Chemistry (Lappeenranta, Finlande)

Ces laboratoires pourront accueillir des étudiants lors du Semestre 4 (stage).

## ANNEXE 3

### 3.1. European Membrane Education Committee

Comité d'éducation créé dans le cadre du réseau NanoMemPro. Ce comité est responsable de la coordination des actions d'éducation développées par le réseau NanoMemPro. Il est formé par :

- quatre membres NanoMemPro (le leader du workpackage Education, et les sous-responsables des opérations Master, PhD et formation continue du réseau), et
- quatre membres de l'association **European Membrane Society (EMS)**. The EMS est une association savante créée dans les années 1970 pour promouvoir les connaissances et l'utilisation des membranes et des procédés membranaires dans les Universités et dans l'industrie. Son premier objective est de promouvoir des contacts entre étudiants, chercheurs et industriels à travers l'organisation de congrès scientifiques de haut niveau et des séminaires consacrés à l'éducation.

### 3.2. Label in Membrane Engineering at Master level

Dans le cadre du réseau NanoMemPro, et avant la mise en place du Master commun, il a été établi un label. Ce label est délivré par l'**European Membrane Education Committee** en addition aux diplômes actuellement existants dans les universités associées. Il est délivré aux étudiants accomplissant un master dans les conditions suivantes :

- obtention d'un diplôme de Master en Sciences réalisé dans une université européenne,
- avoir réalisé un programme d'études Master comprenant au moins 60 heures (6 ECTS) de cours théoriques directement liés à la science et la technologie de membrane.
- réaliser une mobilité d'au moins un semestre (30 ECTS) dans un laboratoire de recherche ou une entreprise, reconnu dans la technologie de membrane et localisé dans un pays autre que celui de l'université.

Actuellement deux appels à ce label ont été déjà publiés : septembre 2007 (3 labellisations) et octobre 2008 (en cours).

## ANNEXE 4

### Club d'Intérêt de NanoMemPro

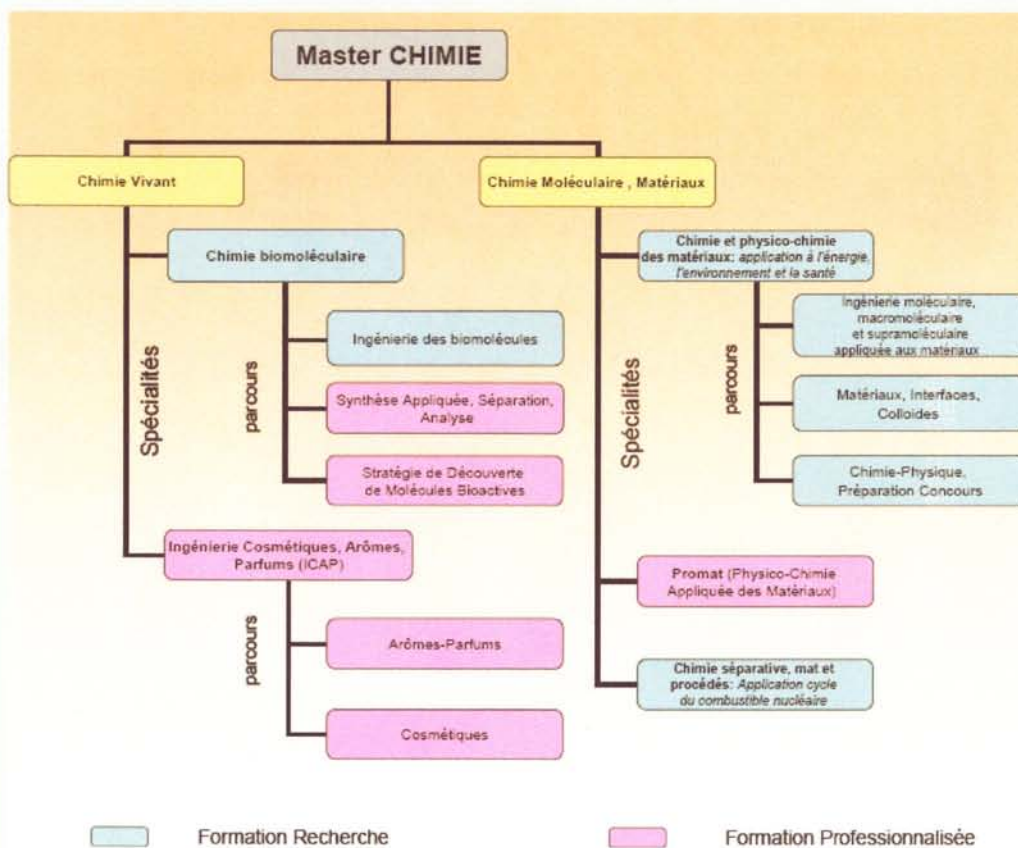
Groupe d'industriels créé dans le cadre du réseau NanoMemPro. Ses membres représentent les champs et les besoins industriels principaux liés aux technologies de membrane en Europe. 49 PME, fabricants et utilisateurs se sont enregistrés jusqu'ici. De manière permanente, il est ouvert à des nouveaux membres. Certains des ces industriels ont accueilli des étudiants NanoMemPro et ont établi des liens privilégiés avec les membres du réseau. Les étudiants du Master pourront y bénéficier du soutien des membres du Club d'Intérêt pendant leur formation (cours spécifiques, stage) et pour un parrainage dans les démarches d'insertion professionnelle.

#### NanoMemPro - CLUB OF INTEREST

	Industry	Country	Activity - Interest in NanoMemPro
<b>Membrane Production and Equipment</b>	1 GVS (SME)	I	Filter components for medical, pharmaceuticals, automotive sectors
	2 Tropical SA (SME)	GR	Polymeric membranes for fuel cell applications
	3 CTI (SME)	F	Ceramic and nanomaterial coatings, liquid metals filtration, catalysis
	4 FUMA Tech	D	Polymeric membranes, Membrane equipment
	5 Membraflow (SME)	D	Manufacturer of filter units based on ceramic membranes
	6 Polymen (SME)	F	Polymeric membranes, design for water end effluent treatment
	7 RHODIA ORELIS	F	Treatment of effluents, membrane ultrafiltration
	8 ALFA LAVAL	DK	Membrane modules, equipment
	9 MAST CARBON (SME)	UK	Carbon material membrane
	10 NANOMI (SME)	NL	Manufacturer of nano and micro-fabricated membranes
	11 SOLVAY	BE	New Business development of ionic membranes
	12 Johnson Matthey	UK	Design and fabrication of membrane-based equipment
	13 Eurodia	F	Membrane modules, equipment
	14 Applexion	F	Membrane modules, equipment
	15 Kemira	FI	Powder ceramic production
	16 KeraNor	NO	Ceramic filters and membranes producers
	17 Wallace&Fierman GmbH - Germany	DE	Producers/suppliers of ultrafiltration systems for water treatment
	18 MEGA a.s.	CZ	
<b>End-Users</b>	19 DANONE	F	Food industry processes
	20 SAFINA a.s (SME)	CZ	Chemical and medical materials, waste treatment
	21 Hellenic Petroleum S.A.	GR	Separation of gas and volatile hydrocarbon mixtures
	22 VIVENDI WATER / Générale des Eaux	F	Treatment of water, effluents, air pollutants, filtration
	23 DANISCO	DK	Food technology process
	24 AIRLIQUIDE	F	Industrial gas, energy production
	25 STANDA INDUSTRIE (SME)	F	Bio-Additive for food industry, packaging
	26 TOTAL	F	Oil production, carbon mixtures, chemistry, energy
	27 PERNOD-RICARD	F	Beverage industry, technology and processes
	28 BASF	D	Chemistry and industrial process
	29 GlaxoSmithKline	UK	Medicine, pharmacology, cellular membranes
	30 Rhodia	F	Fine chemistry
	31 Akzonobel	NL	Chemistry and industrial process
	32 Aquasource - Degremont	F	Treatment of water, effluents
	33 ESA	EU	Aeronautic and Space
	34 Energy research Centre of the Netherlands (ECN)	NL	Applied energy research
	35 EKB Technology Ltd - UK	UK	End Users of Ion-selective membranes for Reverse electro dialysis, Electro separation
<b>Expertise</b>	36 Membr. Extract. Techn. (MET) (SME)	UK	Chemical/biomedical separations, wastewater treatment, re-use of materials, Managing academia to industry technology transfer
	37 MIKROPUR s.r.o. (SME)	CZ	Filtration and membrane separation
	38 Technomembranes (SME)	F	Membrane separation processes experimental and theoretical expertise
	39 Germanos SA (SME)	GR	Purification of hydrogen rich gases for fuel cell applications
	40 UPT (SME)	D	Effluents treatment
	41 ACCELERYS (SME)	UK	Software for pharmaceutical, chemical, and materials research
42 POROTEC GmbH	D	Development of scientific instruments for characterisation of finely divided and porous materials	
<b>Networks</b>	43 IMT	RO	CENOBITE nanobio network
	44 EBN	EU	European business and innovation network
	45 Deutsche Gesellschaft für Membrantechnik e.V. (DGMT)	DE	German society of membranes
	46 European Membrane Society (EMS)		
	47 Club Français des Membranes	F	
	48 SVILUPPO ITALIA	I	
49 EUROQUALITY	F	NanoMAT Project	

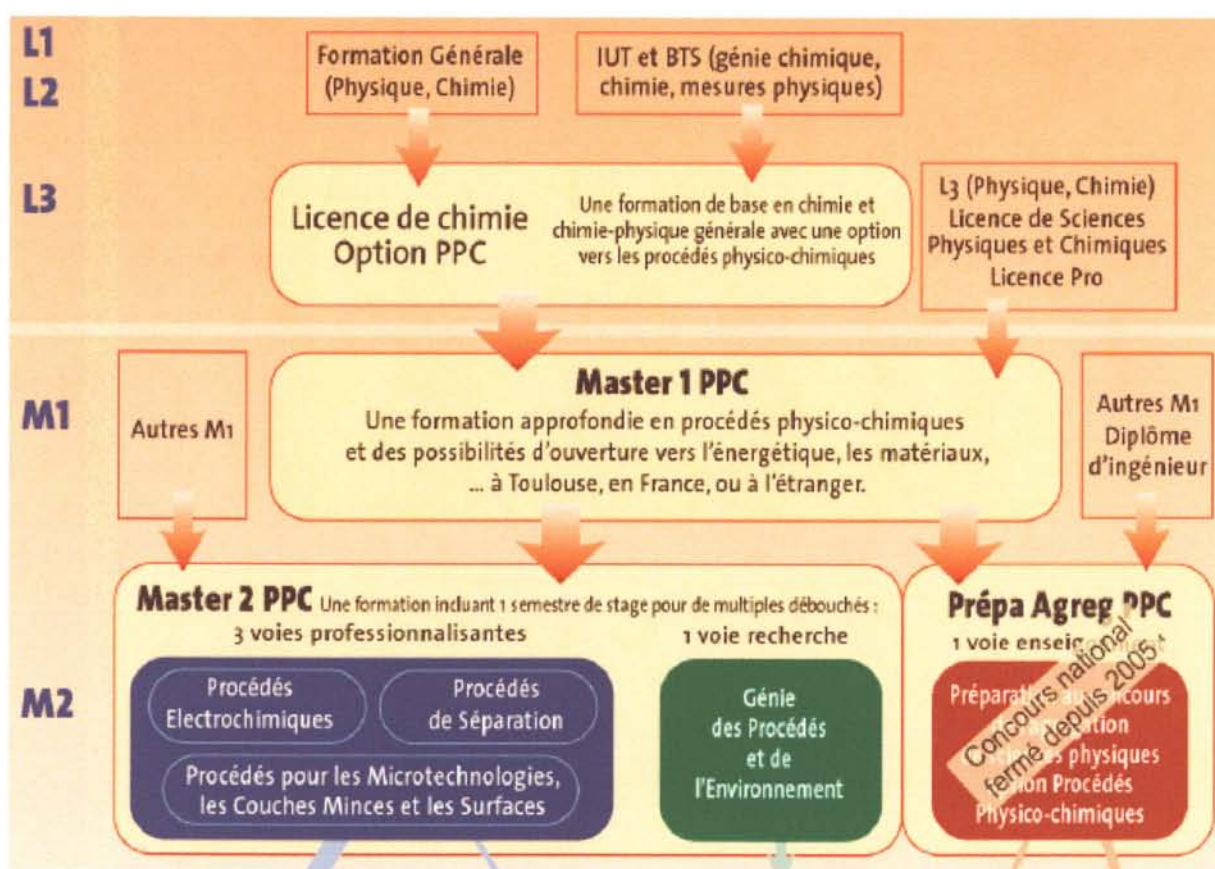
## ANNEXE 5

### Structure actuelle du master mention Chimie à la Faculté des Sciences de l'Université Montpellier 2



## ANNEXE 6

### Structure actuelle de la licence et du master mention Chimie spécialité Procédés Physico-chimiques de l'Université Paul Sabatier (Toulouse 3)



**UM2 / UPS - Master in Membrane Engineering : Proof of National  
accreditation**

I, the undersigned Danièle HERIN, President of the following institution l'Université Montpellier 2 Sciences et Technique certify that the final degree awarded to the Erasmus Mundus students by my institution at the end of their Erasmus Mundus Master study program, which title is:

**« Erasmus Mundus Master in Membrane Engineering »**

will be a multiple degree (degrees issued by institutions of more than 2 different countries).

Its eligibility in my country derives from our Master degree (or degree giving rank of Master) which title is:

“Master in Membrane Engineering (ingénierie des Membranes)”

Domain : Sciences, Technology, Health

Mention : Chemistry

Speciality : Membrane engineering

Co-diplomation : with *Université Paul Sabatier de Toulouse* (Toulouse3)

Date and reference of formal and legal approval of the degree:

Date start and end of accreditation: June 2009 / September 2011

Approved by:« Ministère de l'Enseignement supérieur et de la recherche »  
(arrêté du 28/09/2009)

Duration and ECTS: 2 years (120 ECTS)

Signed at Montpellier, on 24<sup>th</sup> February 2010

Name, Function: Danièle HERIN, President  
(Signature and Seal of the Institution)



A handwritten signature in black ink, written over the seal. The signature is cursive and appears to read 'D. Herin'.



Toulouse, the 15th April 2010

I, the undersigned **Gilles Fourtanier**, President of the following institution **Université Paul Sabatier** certify that the final degree awarded to the Erasmus Mundus students by my institution at the end of their Erasmus Mundus Master study program, which title is:

« **Erasmus Mundus Master in Membrane Engineering** »

will be a multiple degree (degrees issued by institutions of more than 2 different countries).

Its eligibility in my country derives from our Master degree (or degree giving rank of Master) which title is:

“Master in Membrane Engineering (ingénierie des Membranes)”

- Domain: Sciences, Technologies, Santé
- Mention: Procédés Physico-Chimiques
- Speciality : Membrane engineering
- Co-diplomation : with *Université de Montpellier 2*

Date and reference of formal and legal approval of the degree:

Date start and end of accreditation: June 2009 / September 2011

Approved by: « Ministère de l'Enseignement supérieur et de la recherche » (arrêté du 28/09/2009)

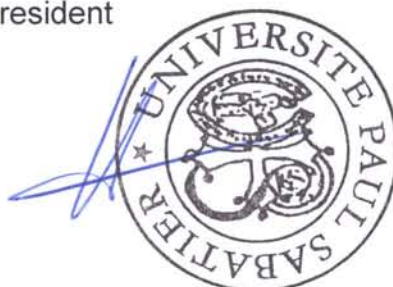
Duration and ECTS: 2 years (120 ECTS)

Signed at Toulouse. on the 15<sup>th</sup> of April 2010

Name, Function: Gilles Fourtanier, President  
(Signature and Seal of the Institution)

**Le Président**

**Gilles FOURTANIER**



MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR  
ET DE LA RECHERCHE

Direction générale pour l'enseignement supérieur et l'insertion professionnelle

ARRÊTÉ du 23 septembre 2009  
relatif aux habilitations  
de l'Université Montpellier 2  
à délivrer les diplômes nationaux

La Ministre de l'enseignement supérieur et de la recherche

VU le code de l'éducation,

VU le décret n° 56-348 du 30 mars 1956 modifiant le régime des études et des examens en vue du certificat de capacité en droit,

VU le décret n° 84-573 du 5 juillet 1984 modifié relatif aux diplômes nationaux de l'enseignement supérieur,

VU le décret n° 84-723 du 17 juillet 1984 modifié fixant la classification d'établissements publics à caractère scientifique, culturel et professionnel,

VU le décret n° 85-906 du 23 août 1985 fixant les conditions de validation des études, expériences professionnelles ou acquises personnelles en vue de l'accès aux différents niveaux de l'enseignement supérieur,

VU le décret n° 2002-481 du 8 avril 2002 relatif aux grades et titres universitaires et aux diplômes nationaux,

VU le décret n° 2002-482 du 8 avril 2002 portant application au système français d'enseignement supérieur de la construction de l'espace européen de l'enseignement supérieur,

VU le décret n° 2002-529 du 16 avril 2002 pris pour l'application des articles L 613-3 et L 613-4 du code de l'éducation et relatif à la validation d'études supérieures accomplies en France ou à l'étranger,

VU le décret n° 2002-590 du 24 avril 2002 pris pour l'application du premier alinéa de l'article L 613-3 et de l'article L 613-4 du code de l'éducation et relatif à la validation des acquis de l'expérience par les établissements d'enseignement supérieur,

VU l'arrêté du 9 avril 1997 relatif au diplôme d'études universitaires générales, à la licence et à la maîtrise,

VU l'arrêté du 25 avril 2002 relatif au diplôme national de master,

VU l'arrêté du 25 avril 2002 relatif au diplôme d'études supérieures spécialisées,

VU l'avis du conseil national de l'enseignement supérieur et de la recherche,

ARRÊTE :

Art. 1 À compter de l'année universitaire 2009-2010, l'établissement désigné ci-dessus est habilité à délivrer les diplômes figurant en annexe.

Art. 2 Il est habilité à délivrer les diplômes intermédiaires du master ou de la mention de master correspondant.

Art. 3 Le directeur général pour l'enseignement supérieur et l'insertion professionnelle, le recteur de l'académie de Montpellier et la présidente de l'université Montpellier 2 sont chargés de l'exécution du présent arrêté.

Pour la ministre et par délégation,  
Pour le directeur général pour l'enseignement supérieur  
et l'insertion professionnelle,  
Pour le directeur du pôle de contractualisation et de financement  
des établissements de formation et de recherche,  
Le sous-directeur de l'analyse de la performance  
et du dialogue contractuel - DGESEP PÔLE A

Gérard MAILLET

**ANNEXE** de l'arrêté du 28 septembre 2009

**ACADÉMIE DE MONTPELLIER**

Université Montpellier 2

L' établissement susvisé est habilité à délivrer, à compter de l'année universitaire **2009-2010**, les diplômes nationaux suivants :

**Master DROIT, ECONOMIE, GESTION**

(finalité: R=recherche, P=professionnelle)

mention(s)	finalité	établissement(s) partenaire(s)	date de création	date d' habilitation	durée	date d' échéance
[20080533] ADMINISTRATION DES ENTREPRISES			2008-2009	2008-2009	3 ans	2010-2011
<u>spécialité(s):</u>						
01 CADRE MANAGER	P		2008-2009	2008-2009	3 ans	2010-2011
02 CADRE DU SECTEUR AGROALIMENTAIRE	P		2008-2009	2008-2009	3 ans	2010-2011
03 BANQUE ET ASSURANCE	P		2008-2009	2008-2009	3 ans	2010-2011
[20080550] MANGEMENT DES TECHNOLOGIES			2008-2009	2008-2009	3 ans	2010-2011
<u>spécialité(s):</u>						
01 MANAGEMENT DES TECHNOLOGIES DE L'INFORMATION	P		2008-2009	2008-2009	3 ans	2010-2011
02 CHARGE D'AFFAIRES INTERNATIONAL	R & P		2008-2009	2008-2009	3 ans	2010-2011
03 CONTROLE DE GESTION ET NOUVEAUX SYSTEMES TECHNOLOGIQUES	R & P	UM1	2008-2009	2008-2009	3 ans	2010-2011
04 CREATION DE JEUNES ENTREPRISES INNOVANTES ET MANAGEMENT DE PROJETS	R & P		2008-2009	2008-2009	3 ans	2010-2011
05 MANAGEMENT DES TECHNOLOGIES DE L'INFORMATION	R & P		2008-2009	2008-2009	3 ans	2010-2011
06 GESTION DES RESSOURCES HUMAINES	R & P	UM1, UM3	2009-2010	2009-2010	2 ans	2010-2011

**Master SCIENCES, TECHNOLOGIES, SANTE**

(finalité: R=recherche, P=professionnelle)

mention(s)	finalité	établissement(s) partenaire(s)	date de création	date d' habilitation	durée	date d' échéance
[20041508] BIOLOGIE SANTE			2004-2005	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>						
01 BIO-MED	R	UM1, ENSCM	2004-2005	2007-2008	4 ans	2010-2011
02 INGENIERIE POUR LA SANTE	P	UM1	2004-2005	2007-2008	4 ans	2010-2011
03 BIOTECHNOLOGIES	P	UM1, U NIMES, EMA	2004-2005	2007-2008	4 ans	2010-2011
04 NUTRITION, AGRO-VALORISATION EN SANTE PUBLIQUE	P	UM1, SUPAGRO	2004-2005	2007-2008	4 ans	2010-2011
05 BIODIVERSITE ET INTERACTIONS MICROBIENNES ET PARASITAIRES	R & P	UM1	2007-2008	2009-2010	2 ans	2010-2011
06 PHARMACIE INDUSTRIELLE	P	UM1	2007-2008	2009-2010	2 ans	2010-2011
07 STATISTIQUES POUR LES SCIENCES DE LA VIE ET DE LA SANTE	R & P	UM1	2007-2008	2007-2008	4 ans	2010-2011
08 CHIMIE BIOMOLECULAIRE	R & P	UM1, ENSCM	2007-2008	2007-2008	4 ans	2010-2011
09 HISTOIRE DE LA MEDECINE, DE LA PHARMACIE, DE L'ART DENTAIRE ET DES HOPITAUX DANS L'ESPACE EURO-MEDITERRANEEN, DES ORIGINES AU XXIEME SIECLE	R	UM1, UM3	2007-2008	2007-2008	4 ans	2010-2011
10 SCIENCES DE L'EAU DANS L'ENVIRONNEMENT CONTINENTAL	R & P	UM1, SUPAGRO, AGRO PARIS TECH	2009-2010	2009-2010	2 ans	2010-2011
[20070827] BIOLOGIE, GEOSCIENCES, AGRORESSOURCES ET ENVIRONNEMENT			2007-2008	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>						
01 BIOLOGIE, ECOLOGIE, EVOLUTION, ENVIRONNEMENT	R & P	SUPAGRO	2007-2008	2009-2010	2 ans	2010-2011
02 BIOLOGIE ET EVOLUTION DES PLANTES	R	SUPAGRO	2007-2008	2009-2010	2 ans	2010-2011
03 BIODIVERSITE ET INTERACTIONS MICROBIENNES ET PARASITAIRES	R & P	UM1	2007-2008	2009-2010	2 ans	2010-2011

04	SCIENCES DE L'EAU DANS L'ENVIRONNEMENT CONTINENTAL	R & P	UM1, SUPAGRO, AGRO PARIS TECH	2007-2008	2009-2010	2 ans	2010-2011
05	ECOLOGIE FONCTIONNELLE ET DEVELOPPEMENT DURABLE	R & P		2007-2008	2009-2010	2 ans	2010-2011
06	DEVELOPPEMENT ET AMENAGEMENT INTEGRE DES TERRITOIRES	R & P	MNHNP	2007-2008	2009-2010	2 ans	2010-2011
07	PALEONTOLOGIE, PHYLOGENIE ET PALEOBIOLOGIE	R	POITIERS, RENNES 1	2007-2008	2009-2010	2 ans	2010-2011
08	GESTION DES LITTORAUX ET DES MERS	P	UM1, UM3	2007-2008	2007-2008	4 ans	2010-2011
09	GEOSCIENCES	R & P		2007-2008	2009-2010	2 ans	2010-2011
10	BIO INGENIERIE	R & P	SUPAGRO	2007-2008	2009-2010	2 ans	2010-2011
[20070822] CHIMIE				2007-2008	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>							
01	INGENIERIE COSMETIQUES, AROMES ET PARFUMS	P		2007-2008	2007-2008	4 ans	2010-2011
X 01	INGENIERIE DES MEMBRANES	R	U TOULOUSE 3	2009-2010	2009-2010	2 ans	2010-2011
02	CHIMIE BIOMOLECULAIRE	R & P	UM1, ENSCM	2007-2008	2007-2008	4 ans	2010-2011
03	CHIMIE ET PHYSICOCHIMIE DES MATERIAUX : APPLICATION AUX DOMAINES DE L'ENERGIE, DE L'ENVIRONNEMENT ET DE LA SANTE	R	EC NAT SUP CHIMIE MONTP	2007-2008	2007-2008	4 ans	2010-2011
04	PHYSICOCHIMIE APPLIQUEE DES MATERIAUX	P		2007-2008	2007-2008	4 ans	2010-2011
05	CHIMIE SEPARATIVE MATERIAUX ET PROCEDES	R & P	EC NAT SUP CHIMIE MONTP, INSTN GIF	2007-2008	2007-2008	4 ans	2010-2011
[20070826] ELECTRONIQUE, ELECTROTECHNIQUE, AUTOMATIQUE				2007-2008	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>							
01	CAPTEURS ET SYSTEMES ASSOCIES	R & P		2007-2008	2007-2008	4 ans	2010-2011
02	COMPOSANTS ELECTRONIQUES ET FIABILITE	R & P		2007-2008	2007-2008	4 ans	2010-2011
03	ENERGIE ET FIABILITE	R & P		2007-2008	2007-2008	4 ans	2010-2011
04	OPTOELECTRONIQUE - HYPERFREQUENCE	R & P		2007-2008	2007-2008	4 ans	2010-2011
05	ROBOTIQUE AUTOMATIQUE	R & P		2007-2008	2007-2008	4 ans	2010-2011
06	SYSTEMES MICROELECTRONIQUES	R & P		2007-2008	2007-2008	4 ans	2010-2011
[20042241] HISTOIRE, PHILOSOPHIE ET DIDACTIQUE DES SCIENCES				2004-2005	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>							
01	HISTOIRE, PHILOSOPHIE ET DIDACTIQUE DES SCIENCES, SCIENCES DE LA COMMUNICATION	R	LYON 1, ENS-LSH LYON	2007-2008	2007-2008	4 ans	2010-2011
02	DIDACTIQUE, EPISTEMOLOGIE ET HISTOIRE DES SCIENCES	P	LYON 1, GRENOBLE 1	2007-2008	2007-2008	4 ans	2010-2011
[20070824] INFORMATIQUE				2007-2008	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>							
01	INFORMATIQUE A FINALITES PROFESSIONNALISANTE ET RECHERCHE UNIFIEE	R & P		2007-2008	2007-2008	4 ans	2010-2011
02	INTEGRATION DE COMPETENCES	R & P		2007-2008	2007-2008	4 ans	2010-2011
[20070823] MATHEMATIQUES, BIOSTATISTIQUES				2007-2008	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>							
01	MATHEMATIQUES, STATISTIQUES ET APPLICATION	R & P	U AVIGNON, SUPAGRO	2007-2008	2007-2008	4 ans	2010-2011
02	STATISTIQUES POUR LES SCIENCES DE LA VIE ET DE LA SANTE	R & P	UM1	2007-2008	2007-2008	4 ans	2010-2011
[20070825] MECANIQUE ET INGENIERIE				2007-2008	2007-2008	4 ans	2010-2011
[20070821] PHYSIQUE				2007-2008	2007-2008	4 ans	2010-2011
<u>spécialité(s):</u>							
01	PHYSIQUE ET INGENIERIES	R & P		2007-2008	2007-2008	4 ans	2010-2011

## 2. ICTP – Master of Sciences : National Accreditation and Diploma model



**INSTITUTE OF CHEMICAL TECHNOLOGY, PRAGUE**

Ref. Nr. 10/961/0105

I, the undersigned Josef Koubek, Rector of the Institute of Chemical Technology, Prague, certify that the final degree awarded to the Erasmus Mundus students by my institution at the end of their Erasmus Mundus Master study program, which title is:

« **Erasmus Mundus Master in Membrane Engineering** »

will be a multiple degree (degrees issued by institutions of more than 2 different countries).

Its eligibility in my country derives from our Master degree (or degree giving rank of Master) which title is:

Inženýr – Ing.      Master of Science – MSc

Domain:      Chemistry and Chemical Technologies

Mention:      Fundamental and Special Inorganic Technologies

Date and reference of formal and legal approval of the degree:

20. 2. 2006, MŠMT č.j. 3 979/2006-30/1

Duration and ECTS: 2 years (120 ECTS)

Signed at Prague, 25. 3. 2010

Assoc. Prof. Josef Koubek, MSc, PhD.  
Rector

VYSOKÁ ŠKOLA  
CHEMICKO-TECHNOLOGICKÁ V PRAZE  
Technická 5, 166 28 Praha 6  
9612

Phone: +420 220 444 144, fax: +420 220 445 018, e-mail: josef.koubek@vscht.cz, www.vscht.cz

Institute of Chemical Technology, Prague; public university established by Act No. 111/1998 Coll. in the wording of subsequent regulations; based in Technická 5, 166 28 Praha 6 – Dejvice, Czech Republic; IČ: 60461373, DIČ: 006-60461373, bank account: ČSOB, 1301972940000.



Ref. Nr. 10/961/0105

I, the undersigned Josef Koubek, Rector of the Institute of Chemical Technology, Prague, certify that the final degree awarded to the Erasmus Mundus students by my institution at the end of their Erasmus Mundus Master study program, which title is:

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Rector

VYSOKÁ ŠKOLA  
CHEMICKO-TECHNOLOGICKÁ V PRAZE  
Technická 5, 166 28 Praha 6  
961/2



MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

Ministerstvo školství, mládeže  
a tělovýchovy

Karmelitská 7  
118 12 Praha 1 - Malá Strana

V Praze dne 20. února 2006  
Č. j.: 3 979 / 2006 -30/1

### Rozhodnutí

Ministerstvo školství, mládeže a tělovýchovy rozhodlo podle čl. II bodu 4 zákona č. 552/2005 Sb., kterým se mění zákon č. 111/1998 Sb., o vysokých školách a o změně a doplnění dalších zákonů (zákon o vysokých školách), ve znění pozdějších předpisů, a některé další zákony, o

#### prodloužení platnosti akreditace

- a) bakalářského studijního programu *Aplikovaná chemie a materiály* se studijními obory *Chemie a chemické technologie, Chemie a technologie materiálů* do 30. května 2013, forma studia je prezenční a kombinovaná, standardní doba studia 3 roky,
- b) bakalářského studijního programu *Applied Chemistry and Materials* se studijními obory *Chemistry and Chemical Technologies, Chemistry and Technology of Materials* do 30. května 2013, forma studia je prezenční a kombinovaná, výuka probíhá v anglickém jazyce, standardní doba studia je 3 roky
- c) bakalářského studijního programu *Aplikovaná chemie a materiály* se studijním oborem *Informatika a chemie* do 15. ledna 2014, forma studia je prezenční, standardní doba studia 3 roky,
- d) bakalářského studijního programu *Applied Chemistry and Materials* se studijním oborem *Informatics and Chemistry* do 15. ledna 2014, forma studia je prezenční, výuka probíhá v anglickém jazyce, standardní doba studia je 3 roky,
- e) navazujícího magisterského studijního programu *Chemie a chemické technologie* se studijními obory *Technologie organických látek a chemické speciality, Základní a speciální anorganické technologie* do 30. května 2013, forma studia je prezenční a kombinovaná, standardní doba studia 2 roky,
- f) navazujícího magisterského studijního programu *Chemie materiálů a materiálové inženýrství* se studijními obory *Anorganické nekovové materiály, Kovové materiály, Materiály pro elektroniku, Polymerní materiály* do 30. května 2013, forma studia je prezenční a kombinovaná, standardní doba studia 2 roky,

pro Fakultu chemické technologie Vysoké školy chemicko-technologické v Praze.

#### **Odůvodnění**

Studijní programy uskutečňované Fakultou chemické technologie Vysoké školy chemicko-technologické v Praze, pro které se vydává toto rozhodnutí, splňují podmínky stanovené v čl. II bodu 4 zákona č. 552/2005 Sb.

#### **Poučení**

Protí tomuto rozhodnutí lze podle § 105 zákona č. 111/1998 Sb., o vysokých školách a o změně a doplnění dalších zákonů (zákon o vysokých školách), ve znění pozdějších předpisů, a § 152 odst.1 zákona č. 500/2004 Sb., správní řád, podat rozklad do 15 dnů ode dne jeho doručení k Ministerstvu školství, mládeže a tělovýchovy, Karmelitská 7, 118 12 Praha 1 - Malá Strana.



Ing. Josef Beneš, CSc.  
ředitel odboru vysokých škol



ČESKÁ REPUBLIKA

VYSOKÁ ŠKOLA CHEMICKO - TECHNOLOGICKÁ V PRAZE

Číslo diplomu HL 0003894

Číslo protokolu 7453

## DIPLOM

**Petra VECONOVÁ**

(Jméno a příjmení)

**29.03.1982, Praha**

(Datum a místo narození)

získal/získala vysokoškolské vzdělání studiem v magisterském studijním programu

*Chemie a chemické technologie*

ve studijním oboru *Technologie anorganických látek*

na Fakultě *chemické technologie Vysoké školy chemicko-technologické v Praze*

Podle § 46 odst. 4 zákona č. 111/1998 Sb., o vysokých školách a o změně a doplnění dalších zákonů (zákon o vysokých školách), se mu/ji uděluje

akademický titul **inženýr** ve zkratce **„Ing.“** uváděné před jménem.

V Praze dne **04.06.2008**

*Josef Koubek*

**Doc. Ing. Josef Koubek, CSc.**

rektor

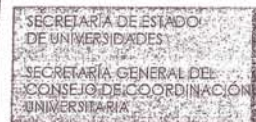
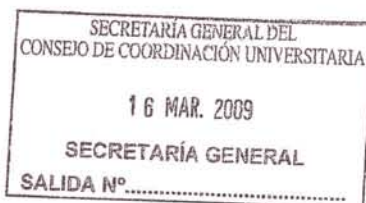


*Aleš Helebrant*

**Prof. Ing. Aleš Helebrant, CSc.**

děkan

### 3. UNIZAR – Master in Nanostructured materials for Nanotechnology Applications : National Accreditation



Como Secretaria General del Consejo de Coordinación Universitaria, le comunico que, en su sesión del día 3 de marzo de 2009, el Pleno del Consejo de Universidades ha adoptado la siguiente resolución:

*"De conformidad con lo dispuesto en el artículo 25.7 del Real Decreto 1393/2007, de 29 de octubre, por el que se establece la ordenación de las enseñanzas universitarias oficiales, y una vez recibido el informe de evaluación de la Agencia Nacional de Evaluación de la Calidad y Acreditación.*

*Comprobada la denominación propuesta para el título de Máster Universitario en Materiales Nanoestructurados para Aplicaciones Nanotecnológicas por la Universidad de Zaragoza.*

*Comprobado que el plan de estudios propuesto cuenta con el informe de evaluación favorable, que se adecua a las previsiones del Real Decreto 1393/2007, de 29 de octubre, y que es coherente con la denominación del título propuesto.*

*Considerando que se cumplen las condiciones establecidas por la legislación vigente y de acuerdo con las atribuciones que esta le confiere, el Consejo de Universidades, en la sesión celebrada el día 3 de marzo de 2009, dicta la siguiente*

#### RESOLUCIÓN

*Se verifica positivamente la propuesta de título de Máster Universitario en Materiales Nanoestructurados para Aplicaciones Nanotecnológicas por la Universidad de Zaragoza.*

*Comuníquese esta resolución de verificación positiva a la universidad, a la comunidad autónoma y al Ministerio de Ciencia e Innovación."*

El Pleno del Consejo de Universidades ha hecho suyas las recomendaciones que la Agencia Nacional de Evaluación de la Calidad y Acreditación menciona en el informe que se adjunta. Se establece un plazo de 15 días naturales para que la Universidad comunique a esta Secretaría General si asume y se compromete a incorporar las recomendaciones al plan de estudios.

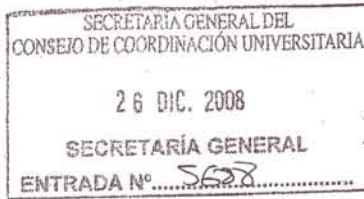
Contra esta resolución podrá interponer reclamación ante la Presidencia del Consejo de Universidades, de acuerdo con lo dispuesto en el artículo 25.9 del Real Decreto 1393/2007, de 29 de octubre, por el que se establece la ordenación de las enseñanzas universitarias oficiales.

En Madrid, a 6 de marzo de 2009  
LA SECRETARIA GENERAL DEL CONSEJO  
DE COORDINACIÓN UNIVERSITARIA

Carmen Fenoll Comes

Universidad de Zaragoza. Rectorado.

C/ ALBACETE, 5; 6.ª planta  
28027 MADRID  
TEL: 91 6037195  
FAX: 91 6037009



EXPEDIENTE N°

## EVALUACIÓN DE LA SOLICITUD DE VERIFICACIÓN DE TÍTULO OFICIAL

Denominación del Título	Máster Universitario en Materiales Nanoestructurados para Aplicaciones Nanotecnológicas
Universidad o universidades solicitantes	Universidad de Zaragoza

ANECA, conforme a lo establecido en el artículo 25 del R.D. 1393/2007, de 29 de octubre, ha procedido a evaluar el plan de estudios que conduce al Título oficial arriba citado de acuerdo con el *Protocolo de evaluación para la verificación de Títulos Oficiales*.

La evaluación del plan de estudios se ha realizado por la Comisión de evaluación de Rama de Conocimiento de Ingeniería y Arquitectura, formada por expertos nacionales e internacionales del ámbito académico, profesionales del título correspondiente y estudiantes. En dicha evaluación también han participado expertos externos a la Comisión que han aportado informes adicionales a la misma. Los miembros de la Comisión y los expertos externos han sido seleccionados y nombrados según el procedimiento que se recoge en la Web de dicha agencia dentro del programa VERIFICA.

Dicha Comisión de evaluación, de forma colegiada, ha valorado el plan de estudios de acuerdo con los criterios recogidos en el mencionado Protocolo de evaluación para la verificación.

De acuerdo con el procedimiento, se envió una propuesta de informe provisional a la Universidad, la cual ha remitido las observaciones oportunas. Una vez finalizado el periodo de alegaciones a dicho informe, la Comisión de Evaluación, en nueva sesión, emite un informe de evaluación **FAVORABLE**, considerando que:

### MOTIVACIÓN

#### El Proyecto de Título presentado:

#### Criterio 1: Descripción del Título

Recoge una descripción del plan de estudios adecuada y coherente con la denominación propuesta. Asimismo, dicha Memoria aporta información suficiente y precisa sobre los efectos académicos del Título y sobre otros datos que facilitan el conocimiento de sus características básicas, así como sobre los procesos de matriculación y de expedición del Suplemento Europeo al Título.



EXPEDIENTE N°

**Criterio 2: Justificación**

Aporta evidencias que ponen de manifiesto su interés y relevancia académica.

**Criterio 3: Objetivos**

Define unos objetivos pertinentes con la denominación del Título que se concretan en competencias a lograr por los estudiantes propias del mismo.

**Criterio 4: Acceso y admisión de estudiantes**

Propone mecanismos y procedimientos accesibles para regular e informar con claridad al estudiante acerca de las diferentes vías de acceso y admisión al Título y de los sistemas de orientación al inicio de sus estudios.

**Criterio 5: Planificación de las enseñanzas**

Presenta una planificación de la formación diseñada en coherencia con las competencias que se pretenden lograr, adecuada a la dedicación estimada de los estudiantes y ajustada a los sistemas de evaluación y calificación previstos.

**Criterio 6: Personal académico**

Especifica el personal académico y de apoyo necesario para desarrollar el plan de estudios.

**Criterio 7: Recursos materiales y servicios**

Concreta los recursos materiales y servicios necesarios para el desarrollo de las actividades formativas previstas y adecuados para la consecución de las competencias que pretenden lograrse.

**Criterio 8: Resultados previstos**

Establece los resultados previstos del Título en forma de indicadores de rendimiento, explicando el procedimiento general para valorar el progreso y los resultados de aprendizaje de los estudiantes.

**Criterio 9: Sistema de Garantía de la Calidad**

Incluye un sistema de garantía de la calidad para la recogida y análisis de información sobre el desarrollo del plan de estudios.

**Criterio 10: Calendario de implantación**

Identifica un calendario adecuado de implantación del Título, así como el mecanismo que permitirá a los estudiantes la superación de las enseñanzas una vez extinguidas. Del mismo modo, detalla las enseñanzas que se extinguen con la implantación del Título.

Por otro lado, también se proponen las siguientes recomendaciones sobre el modo de mejorar el plan de estudios.



EXPEDIENTE Nº

**RECOMENDACIONES**

**Criterio 4: Acceso y admisión de estudiantes**

Se recomienda concretar las denominadas titulaciones "asimilables" en los procedimientos y requisitos de admisión de los alumnos.

**Criterio 6: Personal académico**

Sería conveniente ajustar las necesidades de profesorado pues se han sobrevalorado, estableciéndolas en 54 profesores para dar 54 ECTS y para dirigir un máximo de 25 Trabajos Fin de Máster. En algunos casos no queda patente la relación con el campo de la Nanotecnología. No se matiza la dedicación del profesorado en la memoria.

Madrid, a 3 de diciembre de 2008:

LA DIRECTORA DE ANECA

Gemma Rauret Dalmáu

**4. UTWENTE – Master of Science in Chemical Engineering : National Accreditation and Diploma model**

<b>PARAAF</b> <small>contact t.a.v. routing nummer 4000</small>		<b>DATUM:</b> 15-2-2008	<b>KANTRIEF:</b> 381743 A+B
<b>AFZENDER:</b> TUAO			
<b>ONDERWERP:</b> Voorname tot besluit			
<b>Bestuurlijk verantwoordelijk:</b> <input type="radio"/> Fierman <input type="radio"/> Van Ast <input checked="" type="radio"/> Zijm	<b>Ambtelijk verantwoordelijk:</b> S&C I.s.m. S&O	<b>Kopie aan:</b> <input type="radio"/> Fierman <input type="radio"/> Van Ast <input checked="" type="radio"/> Zijm <input checked="" type="radio"/> Secretaria UT <input type="radio"/> Eenheid Secretaris <input checked="" type="radio"/> Concedir. S&C <input type="radio"/> Concedir. FEZ <input type="radio"/> Concedir. PA&O <input type="radio"/> Servicecentr. ICTS <input type="radio"/> Servicecentr. B&A <input checked="" type="radio"/> S&O Servicecentr. <input type="radio"/> FB <input type="radio"/> <input type="radio"/> HTT	<input checked="" type="radio"/> Faculteitsdecaan TUAO <input type="radio"/> Wetensch. dir. <input type="radio"/> P-adviseur <input type="radio"/> Instutien <input type="radio"/> Faculteiten <input type="radio"/> Circulatiemap CvB <input type="radio"/> <input type="radio"/> ITC <input type="radio"/> <input type="radio"/>
<b>Secundus:</b> <input checked="" type="radio"/> Fierman <input type="radio"/> Van Ast <input type="radio"/> Zijm			
<b>Met verzoek:</b> <input type="radio"/> een antwoord namens het CvB voor te bereiden uiterlijk op: <input type="radio"/> een reactie aan bestuurlijk verantwoordelijke. <input checked="" type="radio"/> ter informatie / behandeling over te nemen. <input type="radio"/> behandeling in CvB op: <input type="radio"/> behandeling in SB op: <input type="radio"/> behandeling in CvP op: <input type="radio"/> geen antwoord nodig.			
<b>Toelichting/commentaar:</b>			
<b>Aan AUT:</b> deze brief is als volgt afgehandeld: <small>(Cok indien afhandeling niet schriftelijk is gebeurd)</small>			

Faculteit de Technische Natuurkunde  
 Bureau faculteitsdecaan

21/02 '08 08/0139

afhandeling + OLD, - CT  
 informatie + BFD, DOV, BOZ



15 FEB. 2008 381743 ATR

copie: S+C (tbl) i.s.m.  
CK S+O  
Zijn  
Sec. UT  
Fac. Dec. TNU

Universiteit Twente  
College van bestuur  
Postbus 217  
7500 AE ENSCHEDE

08/0138  
08/0139

Geacht college,

datum 14 februari 2008  
onderwerp Voornemens tot besluit (#1870 en #1871)  
uw kenmerk  
ons kenmerk NVAO/20080418/vh  
bijlage: 1  
2 voornemens tot besluit

Hierbij ontvangt u twee 'Voornemens tot besluit' met een positieve beoordeling van uw aanvragen om accreditatie van de volgende opleidingen:

- wo-bachelor Scheikundige Technologie (# 1870);
- wo-master Chemical Engineering (# 1871).

De besluiten van de NVAO zijn als voornemen geformuleerd. U hebt overeenkomstig de Wet op het hoger onderwijs en wetenschappelijk onderzoek het recht om binnen veertien dagen na dagtekening van dit schrijven op deze voornemens te reageren. Na deze termijn neemt de NVAO definitieve besluiten.

Wij hopen u hiermee voldoende te hebben geïnformeerd en wachten uw eventuele reactie af.

Met vriendelijke groet,

Guy Aelterman  
(vicevoorzitter)



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Universiteit Twente  
College van bestuur  
Postbus 217  
7500 AE ENSCHEDE

**Voorname tot besluit strekkende tot een positieve beoordeling van een aanvraag om  
accreditatie van de opleiding wo-master Chemical Engineering van de Universiteit  
Twente**

datum  
12 februari 2008  
onderwerp  
Voorname tot besluit  
accreditatie  
wo-master  
Chemical Engineering  
Universiteit Twente  
(#1871)  
uw kenmerk  
oms kenmerk  
NVAO 20080410/VH  
bijlagen  
2

### 1. Inleiding

Bij brief van 8 december 2008 heeft drs. P.A. Binsbergen, secretaris van de universiteit namens het college van bestuur van de Universiteit Twente (UT) te Twente, bij de Nederlands-Vlaamse Accreditatieorganisatie (NVAO) een aanvraag ingediend om accreditatie, als bedoeld in artikel 5a.9 van de Wet op het hoger onderwijs en wetenschappelijk onderzoek (WHW, Stb. 2002, 302) voor de opleiding wo-master Chemical Engineering.  
Het betreft een voltijdse opleiding die blijkens de aanvraag te Enschede wordt verzorgd.

Ter ondersteuning van de aanvraag heeft UT een rapport overgelegd van een door haar ingeschakelde Visiterende en Beoordelende Instantie (VBI): Quality Assurance Netherlands Universities (QANU). De visitatie van de opleiding heeft plaatsgevonden op 7 en 8 december 2008. Het rapport van QANU (VBI-rapport) dateert van mei 2007.

Het VBI-rapport is opgebouwd aan de hand van het Accreditatiekader bestaande uit opleidingen hoger onderwijs (wo-master) van de NVAO (Accreditatiekader; Stcrt. 2003, 120).

### 2. Bevindingen

Op grond van het toepasselijke Accreditatiekader wordt een opleiding beoordeeld aan de hand van zes onderwerpen, te weten: doelstellingen van de opleiding, programma, inzet van personeel, voorzieningen, interne kwaliteitszorg en resultaten.

#### Doelstellingen opleiding

Het QANU-paneel (panel) komt tot de volgende bevindingen en overwegingen. Het paneel concludeert dat de doelstellingen van de opleiding voldoen aan de domeinspecifieke eisen, zoals omschreven in het referentiekader dat door het paneel gehanteerd wordt. De eindkwalificaties van de opleiding zijn landelijk overeengekomen in het overleg tussen de technische universiteiten. De eindkwalificaties verschillen dan ook niet wezenlijk van die van andere opleidingen Scheikundige Technologie. De eindkwalificaties komen overeen met de nationale eindkwalificaties die zijn opgesteld door de Kamer Scheikunde van de VSNU.

inlichtingen  
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pagina 2 van 9 Het panel constateert dat de eindkwalificaties van de opleiding in voldoende mate het niveau aangeeft dat volgens de Dublin descriptoren verwacht kan worden van een student. Het panel ziet voldoende overeenkomsten tussen de eindkwalificaties en de Dublin descriptoren om de opleidingsgraad te rechtvaardigen. Naar het oordeel van het panel biedt de opleiding een brede en academische oriëntatie voor de studenten. Voor de masteropleiding komen naar het oordeel van het panel de eisen van de wetenschappelijke discipline tot uiting in de eindkwalificaties van de opleiding. De eisen vanuit de relevante praktijk in het toekomstige beroepsveld zijn omschreven. Naar het oordeel van het panel biedt de opleiding een brede en academische oriëntatie voor de studenten. De bacheloropleiding geeft onvoorwaardelijk toelating tot de masteropleiding Chemische Technologie.

De NVAO stelt vast dat in het VRI-rapport deugdelijk en kenbaar is gemotiveerd op welke gronden QANU dit onderwerp positief heeft bevonden.

De NVAO oordeelt derhalve het onderwerp 'doelstellingen opleiding' als voldoende.

#### *Programma*

Het panel komt tot de volgende bevindingen en overwegingen.

In de masteropleiding is naar het oordeel van het panel een geregelde interactie tussen onderwijs en onderzoek, door de deelname van de studenten aan onderzoek van de afdeling uitmondend in de masterthesis. In de verplichte cursussen die de studenten volgen komt schriftelijk onderzoek naar het oordeel van het panel voldoende aan de orde. Er wordt aandacht besteed aan de ontwikkeling van academische vaardigheden. Het panel is zeer positief over het effectieve beleid van de faculteit om studenten te stimuleren hun stage in het buitenland te doen. De stages zijn in het algemeen een goede bijdrage aan de ontwikkeling van de student.

Het panel is van oordeel dat het programma van de opleiding een adequate concretisering is van de eindkwalificaties, qua niveau, oriëntatie en domeinspecifieke eisen. De eindkwalificaties zijn vertaald in leerdoelen van programma-onderdelen. De inhoud van het programma biedt de studenten de mogelijkheid aan de eindkwalificaties te voldoen.

Naar de mening van het panel is het onderwijs nog wat weinig georganiseerd en gestructureerd. Het panel adviseert een mastercoördinator aan te stellen die een intakegesprek heeft met de instromende studenten en met hen het programma en het rooster doornemeert. De mastercoördinator kan dan ook toezicht houden op de voortgang van de student. Niettemin oordeelt het panel dat de samenhang in het programma aan de maat is.

Het panel heeft de informatie in de zelfstudie geverifieerd in gesprekken met studenten. Deze bevestigden de in de zelfstudie gepresenteerde evaluatieresultaten. Het programma is naar hun mening studeerbaar, en de studielast is gemiddeld 30-35 uur per week. De meeste studenten doen weliswaar langer dan de nominale duur over hun studie, maar de vertraging wordt volgens de studenten zelf voornamelijk veroorzaakt door andere werkzaamheden.

De masterstudenten, ook degenen die uit het hbo afkomstig zijn, merken dat de aansluiting tussen bachelor- en masteropleiding goed is verlopen. Het panel is echter van mening dat de overstap van de eigen bacheloropleiding naar de masteropleiding te soepel is en dat er striktere voorwaarden gesteld zouden moeten worden aan de afronding van de bacheloropleiding om deel te kunnen nemen aan de masteropleiding, zodat de bacheloropleiding meer als een afgerond geheel beschouwd gaat worden.

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pagina 3 van 9 Het programma van de masteropleiding Chemische Technologie omvat 120 ECTS-studiepunten en voldoet daarmee aan de formele eisen met betrekking tot de omvang van het curriculum.

De opleiding is, zo is het panel gebleken, nog nieuw. Het panel kreeg de indruk dat er in het programma van de opleiding veel geïmproviseerd wordt en dat er nog aan de vormgeving van het cursusgedeelte van de opleiding gewerkt zou moeten worden. Een groot deel van de masteropleiding bestaat echter uit afstudeeropdracht en stage, zodat daarmee een degelijke opleiding wordt geboden die aansluit op de doelstellingen. Het panel waardeert het heel positief dat veel studenten voor hun stage naar het buitenland gaan. De stages zien zij als een goede bijdrage aan de ontwikkeling van de student, veel studenten houden er ook een baan aan over.

Een aantal van de theses, die het panel bekeken heeft, bevat uitgebreide tekstboekachtige inleidingen, die beter en efficiënter door middel van een referentie konden worden aangegeven. De senior begeleider moet eerder en intensiever bij de afstudeeropdracht en verslaggeving betrokken worden. Het feit dat de afstudeerverslagen door een commissie beoordeeld worden en de wijze waarop de afstudecommissie wordt samengesteld, hebben de waardering van het panel, dit bevordert de objectiviteit, consistentie en eenduidigheid.

De NVAO stelt vast dat in het VBI-rapport deugdelijk en kenbaar is gemotiveerd op welke gronden QANU dit onderwerp positief heeft bevonden.

De NVAO beoordeelt derhalve het onderwerp 'programma' als voldoende.

#### *Inzot van personeel*

Het panel komt tot de volgende bevindingen en overwegingen.

Het panel heeft geconstateerd dat alle leden van de vaste staf die onderwijs verzorgen in de opleiding gepromoveerd zijn en betrokken zijn bij onderzoeksprojecten van de faculteit. Op basis van haar eigen expertise in het wetenschappelijke veld concludeert het panel dat het onderzoek van de afdeling voldoet aan internationale wetenschappelijke maatstaven. Het panel hoeft kunnen vaststellen dat het onderwijs hoofdzakelijk verzorgd wordt door onderzoekers die bijdragen aan de ontwikkeling van het vakgebied.

De kwantiteit van de staf, zoals gepresenteerd in de zelfstudie, is naar de mening van het panel voldoende om het programma goed te verzorgen. De laatste jaren is er sprake van een afnemende student-stafratio door het teruglopende studentenaantal bij gelijkblijvende omvang van de staf. In 2005 was de ratio 7,5 student op 1 onderwijs fulltime eenheid. De organisatie van het onderwijsprogramma wordt ondersteund door een kleine staf. Tijdens het bezoek werd echter aangekondigd dat er een reorganisatie plaatsvindt, die zou moeten leiden tot een teruggang in leerstoelen. Of er na reorganisatie voldoende capaciteit over is, kan nu nog niet beoordeeld worden. De zorgen die het panel hieromtrent heeft zijn aan de opleiding doorgegeven. De decaan van de faculteit heeft het panel verzekerd dat dit aspect zijn volledige aandacht heeft. Het oordeel van het panel bij dit facet is gebaseerd op de situatie die zij heeft aangetroffen.

Het panel constateert mede op basis van de informatie die tijdens het bezoek verstrekt is dat de reorganisatie tot een teruggang zal leiden in leerstoelen op het gebied van de Procestechologie. Het panel maakt zich zorgen dat in de toekomst de expertise om het procestechnologisch onderwijs te verzorgen onvoldoende aanwezig zal zijn. De wijze waarop de leerstoelen en het onderzoek wordt gefinancierd, legt naar het oordeel van het panel een te zware druk op de wetenschappelijke staf om voorstellen te schrijven en zoveel

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pagina 4 van 9 mogelijk promovendi uit de tweede en derde geldstroom binnen te halen. Daardoor dreigt het onderwijs in de verdrukking te komen. Steeds meer onderwijs en begeleiding wordt, zo is het panel getreken, aan de promovendi overgelaten. Het commitment met onderwijs van de vaste wetenschappelijke staf neemt daardoor af. Het panel heeft met de decaan over dit onderwerp gesproken en was blij te vernemen dat hij het probleem onderkent en maatregelen wil voorstellen om daar verbeteringen in aan te brengen.

De NVAO stelt vast dat in het VBI-rapport deugdelijk en kenbaar is gemotiveerd op welke gronden QANU dit onderwerp positief heeft bevonden.

De NVAO deelt de zorgen van het panel met betrekking tot 'inzet van personeel'. De NVAO wil benadrukken dat verbetermaatregelen het gesignaleerde probleem effectief kunnen voorkomen.

De NVAO oordeelt derhalve het onderwerp 'inzet van personeel' als voldoende.

#### *Voorzieningen*

Het panel komt tot de volgende bevindingen en overwegingen.

Het panel heeft geconstateerd dat de practicumruimten en de uitrusting daarvan aan modernisering toe zijn, zo is door de opleiding zelf ook opgemerkt. De opleiding investeert in apparatuur voor onderwijsdoelinden om aan alle eisen van deze tijd te kunnen voldoen. Het is het panel duidelijk geworden dat er aan de huisvesting echt wat gaat veranderen, dat is ook zeker nodig. De ICT-voorzieningen zijn naar de meningen van het panel goed. Positief is vooral de maatregel dat er laptops en toetsenborden ter beschikking worden gesteld door de opleiding.

Het panel heeft met instemming vernomen van het studentenmentoraat dat door de studievereniging Alambic georganiseerd wordt. Dit is naar haar mening een waardevolle aanvulling op de studiebegeleiding die door de opleiding wordt verzorgd. Het systeem van docentmentoren voor de eerste jaren van de studie zou volgens het panel goed kunnen werken, maar mist nu coördinatie en afstemming. Inmiddels zo is aan het panel meegedeeld is er een studieadviseur/mentorcoördinator aangesteld. Het panel adviseert exitgesprekken in te voeren met die studenten die tussentijds uitvallen. Exitgesprekken bij de afronding van de studie kunnen eventueel overgelaten worden aan de begeleidende hoogleraar.

De NVAO stelt vast dat in het VBI-rapport deugdelijk en kenbaar is gemotiveerd op welke gronden QANU dit onderwerp positief heeft bevonden.

De NVAO oordeelt derhalve het onderwerp 'voorzieningen' als voldoende.

#### *Interne kwaliteitszorg*

Het panel komt tot de volgende bevindingen en overwegingen.

Het systeem van evaluatie zit op zich goed in elkaar en is goed beschreven in het kwaliteitshandboek. Echter de uitvoering van de evaluatiecyclus en de verantwoordelijkheidsverdeling zijn aan het panel niet duidelijk geworden. Tijdens de gesprekken over dit onderwerp gedurende het bezoek werd de situatie or slechts onduidelijker op. De opleiding heeft vervolgens aanvullende informatie verstrekt over de

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pagina 5 van 9 verantwoordelijkheidsverdeling. Het panel beveelt de opleiding aan er op toe te zien dat afspraken worden nagekomen.

Het panel heeft geconstateerd dat de uitkomsten van de evaluatie de basis vormen voor aantoonbare verbetermaatregelen die bijdragen aan de realisatie van streefdoelen. De opleiding is in haar zelfstudierapport ook ingegaan op de aanbevelingen van de vorige evaluatiecommissie en de maatregelen die zij daarop heeft genomen. Dit wordt door het panel positief beoordeeld.

Docenten en studenten zijn actief betrokken bij de kwaliteitszorg. Er zijn plannen om de contacten met de alumni te versterken. Contacten met het afnemend beroepenveld zijn aanwezig, maar nog niet structureel. Hier is verbetering mogelijk. Bijvoorbeeld door het instellen van een adviesraad uit het beroepenveld.

De NVAO stelt vast dat in het VRI-rapport deugdelijk en kanbaar is gemotiveerd op welke gronden QANU dit onderwerp positief heeft bevonden.

De NVAO beoordeelt derhalve het onderwerp 'interne kwaliteitszorg' als voldoende.

#### *Resultaten*

Het panel komt tot de volgende bevindingen en overwegingen.

Ter beoordeling van de resultaten die bereikt worden door de opleiding heeft het panel enkele afstudeerverslagen beoordeeld. Daarnaast heeft het panel enkele tentamens en tussentijdse opdrachten bekeken. Het niveau van de bestudeerde mastertheses was ook sterk wisselend. Uit het gesprek met de alumni heeft het panel overigens de indruk gekregen dat de opleiding capabele studenten aflevert, die snel hun plek in de arbeidsmarkt vinden en daar goed werk verrichten. Het panel constateert dat er weliswaar enkele verbeterpunten te noemen zijn met betrekking tot de afstudeerverslagen, maar dat de afgestudeerden van de opleiding voldoen aan de kwalificaties die nagestreefd worden door de opleiding.

De resultaten van de masteropleiding zijn naar het oordeel van het panel voldoende.

De NVAO stelt vast dat in het VBI-rapport deugdelijk en kanbaar is gemotiveerd op welke gronden QANU dit onderwerp positief heeft bevonden.

De NVAO beoordeelt derhalve het onderwerp 'resultaten' als voldoende.

# MASTER'S DEGREE

ACADEMIC HIGHER EDUCATION

THE BOARD OF EXAMINERS FOR THE MASTERS DEGREE PROGRAMME IN CHEMICAL  
ENGINEERING AT THE FACULTY OF SCIENCE AND TECHNOLOGY AT THE UNIVERSITY OF  
TWENTE IN ENSCHEDE DECLARES THAT

HAS PASSED THE FINAL AUDIT OF THE MASTERS DEGREE PROGRAMME IN  
CHEMICAL ENGINEERING  
CHEMISTRY AND TECHNOLOGY OF MATERIALS

In accordance with section 7.10 of the higher  
education and research act. The examination was  
based on the subjects listed in the certified  
appendix.

In accordance with section 7.10a of the higher  
education and research act. The executive board  
of the University of Twente grants the examinee  
the degree of

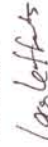
Master of Science

ENSCHDE, 26 JANUARY 2010

EXAMINEE



BOARD OF EXAMINERS



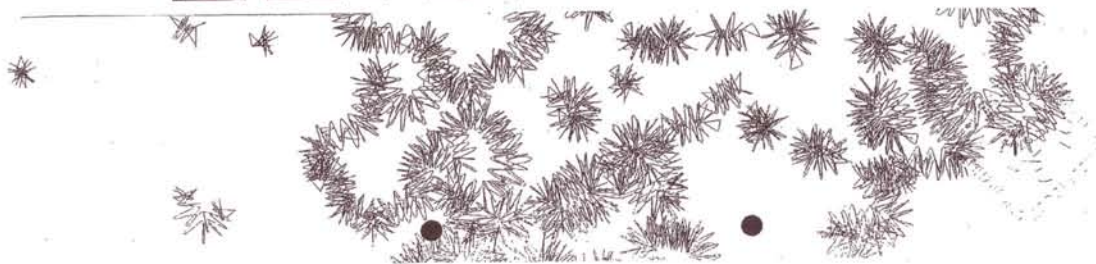
CHAIRMAN OF BOARD OF EXAMINERS



The chemical engineering programme received  
accreditation in 2008.

UNIVERSITY OF TWENTE.

UTwente : National Diploma degree



## 5. UNL – Master in Membrane Engineering : National recognition application form



I, the undersigned Fernando Santana, Dean of the Faculty of Sciences and Technology / UNL, certify that the final degree awarded to the Erasmus Mundus students by my institution at the end of their Erasmus Mundus Master study program, which title is:

« **Erasmus Mundus Master in Membrane Engineering** »

will be a multiple degree (degrees issued by institutions of more than 2 different countries).

Its eligibility in my country derives from our Master degree (or degree giving rank of Master) which title is:

**Mestrado Erasmus Mundus em Engenharia de Membranas**

Domain: Chemical Engineering

Speciality: Membrane Engineer

Expected recognition date: Fall 2010

Duration and ECTS: 2 years (120 ECTS)

Signed at Caparica on, 22<sup>nd</sup> March 2010.

Professor Fernando Santana  
Dean



I, the undersigned Fernando Santana, Dean of the Faculty of Sciences and Technology / UNL, certify that the final degree awarded to the Erasmus Mundus students by my institution at the end of their Erasmus Mundus Master study program, which title is:

« **Erasmus Mundus Master in Membrane Engineering** »

will be a multiple degree (degrees issued by institutions of more than 2 different countries).

Its eligibility in my country derives from our Master degree (or degree giving rank of Master) which title is:

**Mestrado Erasmus Mundus em Engenharia de Membranas**

Domain: Chemical Engineering

Speciality: Membrane Engineer

Expected recognition date: Fall 2010

Duration and ECTS: 2 years (120 ECTS)

Signed at Caparica on, 22<sup>nd</sup> March 2010.

Professor Fernando Santana  
Dean

## ***Erasmus Mundus Master in Membrane Engineering - EM3E*** **Diploma Supplement**

*This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgements, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.*

### **1. Information identifying the holder of the qualification**

- 1.1 *Family name(s)*
- 1.2 *First name(s)*
- 1.3 *Date of birth*
- 1.4 *Student identification number:* Student card number at UM2

### **2. Information identifying the qualification**

2.1 *Name of qualification and title conferred with official abbreviation (in original language)*  
Master of Science in Membrane Engineering / M Sc

2.2 *Main fields of study for the qualification*  
Material science, physics & chemistry, engineering & processes, modelling, nanoscience and nanotechnology, industrial and chemical processing, energy, environmental control, food industry, pharmaceutical industry, biomedical applications, biotechnology.

2.3 *Name and status of the awarding institution (in original language)*  
Université Montpellier 2, France  
Université Paul Sabatier, Toulouse III, France  
Vysoká Škola Chemicko-Technologická v Praze, Czech Republic  
Universidad de Zaragoza, Spain  
Universiteit Twente, The Netherlands  
Faculdade de Ciências e Tecnologia – Universidade Nova de Lisboa, Portugal

2.4 *Name and status of institution (if different from 2.3) administering studies*  
Université Montpellier 2, France

2.5 *Languages of instruction/examination*  
English



### 3. Information on the level of the qualification

#### 3.1 Level of the qualification

Master: Second academic degree

#### 3.2 Official length and workload of studies

Master 120 ECTS credits = 4 semesters of full-time study

#### 3.3 Access requirements

Bachelor's degree

- Candidates must hold a Bologna 1<sup>st</sup> cycle degree or a bachelor degree in Chemistry, Physics, Materials Engineering, Chemical Engineering, Bio Engineering, related Bioscience or equivalent degrees from a College, University or Technical School with a recognised standing. Alternatively, candidates without a Bologna 1<sup>st</sup> cycle degree or a bachelor degree in the above mentioned areas must have a recognised professional experience. Students in the final year of a degree may be admitted as long as they present the certificate and official transcripts before they enrol.
- Candidates are evaluated on the basis of their academic grades, professional experience, and motivation letter explaining their education and professional objectives and letters of recommendation.
- As all courses are conducted in English, the candidates have a phone interview or a teleconference to assess their skills in English by the members of the Admission and Examination Committee.

### 4. Information on the contents of the programme and results gained

#### 4.1 Mode of study

1.5 year full-time (semesters S1, S2 and S3; 90 ECTS credits) followed by a master thesis (semester S4; 30 ECTS credits).

#### 4.2 Programme requirements

The master degree is given to a student who has individually validated each of the four semesters (S1, S2, S3 and S4).

A semester validation requires to get an average grade superior or equal to E without any grade F for one of the semester's courses. The average grade for one semester is calculated from the individual course grades weighted by the number of attributed ECTS.

An individual course validation requires to get a grade superior or equal to E. This grade results from the combination of the continuous assessment along the related semester (if a continuous assessment is performed for this course) and of the mark obtained during the final examination. The failing students (grade FX or F), a second examination session is organised at least 6 weeks after the first examination session. The marks obtained for the second examination session replace those from the first session (and the possible contribution of continuous assessment).

**Concerning the fourth semester (S4 – master thesis)**, the grade is attributed from the assessments of the written report (one third of the final mark), of the oral defence (one third of the final mark) and of the general behaviour of the student during his internship period (one third of the final mark, provided by his supervisor).

#### 4.3 Programme details and individual grades/marks obtained

The programme details are given below which a column dedicated to the grade obtained for each individual course.

SEMESTER S1				
Semester S1 at UM2 or UPS, France (30 ECTS)				
Module 1.A.1 – 24 ECTS				
Course	Type	ECTS	Grade	Examination session
Characterization of porous materials	Mandatory	3	from A to F	1 or 2
Colloid and surface engineering	Optional	3		
Structural characterization of solids	Mandatory	3		
Speciality 1 – Materials Science				
Inorganic materials	Mandatory	3		
Polymer materials	Mandatory	3		
Hybrid and composite Materials	Mandatory	3		
Materials for chemical reactions/ heterogeneous catalysis	Mandatory	3		
or				
Speciality 2 – Chemical Engineering				
Transport phenomena	Mandatory	3		
Thermodynamics, kinetics and reactivity	Mandatory	3		
General chemistry and physico-chemical analytical methods	Mandatory	3		
Separation science	Mandatory	3		
Individual project (bibliographic and experimental study)	Mandatory	6		
Module 1.A.2 – 6 ECTS				
Course	Type	ECTS	Grade	Examination session
Safety, Security, Health and Environmental Law	Mandatory	2	from A to F	1 or 2
Quality Assurance and Laboratory Practice	Mandatory	2		
International and European Working Law	Mandatory	2		
French language and culture	Mandatory*	-		
Average grade for the semester				

#### SEMESTER S2

Semester S2 at ICTP, Czech Republic (30 ECTS)				
Module 2.1 – 24 ECTS				
Course	Type	ECTS	Grade	Examination session
Membrane processes	Mandatory	4	from A to F	1 or 2
Process design	Mandatory	5		
Applied reaction kinetics	Mandatory	4		
Separation Technology	Mandatory	5		
Individual project (bibliographic and experimental study)	Mandatory	6		
Module 2.2 – 6 ECTS				
Course	Type	ECTS	Grade	Examination session
Czech language and culture	Mandatory*	-	from A to F	1 or 2
Intellectual capital management	Mandatory	3		
Valorisation, commercialisation and entrepreneurship	Mandatory	3		
Average grade for the semester				

SEMESTER S3				
Semester S3 at UNL, Portugal (30 ECTS)				
Module 3.A.1 – 30 ECTS				
Course	Type	ECTS	Grade	Examination session
Membrane contactors and bioreactors	Mandatory	6	from A to F	1 or 2
Membranes in downstream processing	Mandatory	6		
Barrier membranes for food applications	Mandatory	6		
Membranes in regenerative medicine	Mandatory	6		
Individual project (bibliographic and experimental study)	Mandatory	6		
Module 3.A.2 – - ECTS				
Course	Type	ECTS	Grade	Examination session
Portuguese language and culture	Mandatory*	-	from A to F	1 or 2
Average grade for the semester				
or				
Semester S3 at UNIZAR, Spain (30 ECTS)				
Module 3.B.1– 30 ECTS				
Course	Type	ECTS	Grade	Examination session
Fundamental properties of nanostructured materials	Mandatory	6	from A to F	1 or 2
Preparation of nanostructured materials	Mandatory	6		
Assembly and fabrication of nanostructures	Mandatory	6		
Case studies of industrial applications	Mandatory	6		
Individual project (bibliographic and experimental study)	Mandatory	6		
Module 3.B.2 – - ECTS				
Course	Type	ECTS	Grade	Examination session
Spanish language and culture	Mandatory*	-	from A to F	1 or 2
Average grade for the semester				
or				
Semester S3 at UTwente, The Netherlands (30 ECTS)				
Module 3.C.1 – 30 ECTS				
Course	Type	ECTS	Grade	Examination session
Batteries, fuel cells and electrolyzers	Mandatory	5	from A to F	1 or 2
Gas separation membranes and gas treatment	Mandatory	5		
Water treatment	Mandatory	5		
Membrane process plant design	Mandatory	5		
Microdevices and sensors	Mandatory	4		
Individual project (bibliographic and experimental study)	Mandatory	6		
Module 3.C.2 – - ECTS				
Course	Type	ECTS	Grade	Examination session
Dutch language and culture	Mandatory*	-	from A to F	1 or 2
Average grade for the semester				

SEMESTER S4		
Semester S4: 30 ECTS		
Module 4		
24 weeks, research assignment in industry or university		
Average grade for the semester		

(\*) Mandatory for at least one of first three semesters and associated with an oral presentation of the individual project in the corresponding national language.

### Acquired skills

The EM3E master program centred on membrane engineering should give highly valuable competencies and professional outcomes for the graduate student both for future academic and/or professional careers:

- in Materials Science and in Chemical Engineering ,
- in Technologies and Modelling,
- in Biotechnology, Food, Pharmaceutical and Biomedical Technologies for a student who has performed the semester S3 in UNL, in Nanoscience and Nanotechnology for a student who has performed the semester S3 in UNIZAR, or in Energy and Environmental Control for a student who has performed the semester S3 in UTwente.

The graduate student is able:

- to understand the main concepts and knowledge in membrane engineering,
- to synthesise the state-of-the-art of the research in a specific area in membrane engineering,
- to choose the adequate methodological and integration strategies for the implementation of membrane technologies,
- to use its practical experience to run membrane technologies within a broad range of applications,
- to conduct a research or industry project with specific skills to analyse, to discuss and to communicate the results,
- to work autonomously and within teams, demonstrating a capability for both taking and critically reflecting on roles and responsibilities.
- to take all position of engineer or researcher in industry or in an academic laboratory;

#### 4.4 Grading scheme and (if available) grade distribution guidance

The used grading scale is the ECTS grading system defined in the ECTS framework by the European Commission which can as follows:

Grade	Best	National grade equivalents				
		France	Czech Republic	Spain	The Netherlands	Portugal
A	10 %	20 -> 18	A	20 -> 18	10-9	10 -> 9
B	25 %	18 -> 16	B	18 -> 16	9-8	9 -> 10
C	30 %	16 -> 14	C	16 -> 14	8-7	8 -> 9
D	25 %	14 -> 12	D	14 -> 12	7-6	7 -> 6
E	10 %	12 -> 10	E	12 -> 10	6-5	6 -> 5.5
FX	Fail - some more work required before the credit can be awarded	10 -> 8	FX	10 -> 8	Fail	5.5 -> 5
F	Fail - considerable further work is required	< 8	F	< 8	Fail	<5

#### 4.5 Overall classification of the qualification

As a function of the average grade obtained for the four semesters, the students obtain their master degree with the following distinction:

Average grade	Distinction
A	Excellent
B	Very good
C	Good
D	Quite good
E	Pass

### 5. Information on the function of the qualification

#### 5.1 Access to further studies

Master: Access to doctoral studies

#### 5.2 Professional status

This master degree enables to access to a position of engineer or researcher in industry or in an academic laboratory but doesn't provide a qualification according to the recognition directive of the EU 89/48/EEC.

### 6. Additional information

#### 6.1 Additional information

Each student who validated the fourth semesters get a triple diploma from:

- University Montpellier 2, France, and University Paul Sabatier, Toulouse III, France (joint national diploma);
- Vysoká Škola Chemicko-Technologická v Praze, Czech Republic;
- Faculdade de Ciências e Tecnologia - Universidade Nova de Lisboa, Portugal, or, Universidad de Zaragoza, Spain, or, Universiteit Twente, The Netherlands, as a function of his stay during the Third semester (S3).

#### 6.2 Further information sources

The web site of the master: <http://www.em3e.eu/>

### 7. Certification of the supplement

#### 7.1 Date

#### 7.2 Signatures

The diploma supplement and a success certificate are delivered by University Montpellier 2, France, and signed by the head of Executive Board of the master EM3E.

The official triple diploma is delivered and signed by the heads of the three universities visited during the three first semesters (S1: University Montpellier 2, France, or University Paul Sabatier, Toulouse III, France; S2: Vysoká Škola Chemicko-Technologická v Praze, Czech Republic; S3: Universidad de Zaragoza, Spain, or, Universiteit Twente, The Netherlands, or, Faculdade de Ciências e Tecnologia – Universidade Nova de Lisboa, Portugal).

### 7.3 *Capacity*

Full Professor, head of the Executive Board of the master EM3E, elected among the local coordinator of each involved university.

### 7.4 *Seal*

Official stamp of University Montpellier 2, France.

<b>8. Information on the National Higher Education Systems</b>
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France: <http://www.enseignementsup-recherche.gouv.fr>

Czech Republic: <http://www.msmt.cz>

Spain: <http://www.educacion.es>

The Netherlands: <http://www.minocw.nl/>

Portugal: <http://www.mctes.pt>

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## **Appendix 9: Registration fees and management budget distribution among the partners**

### **1. Cost covered by the student participation costs**

<u>EM3E Participation costs</u>	non-EU students (cat. A)	4 000 €/semester
	EU students (cat. B)	2 000 €/semester
	Where Tuition fees	1 000 €/semester

	COST BY YEAR		Cost managed by
	Category A (non-EU)	Category B (EU)	
<b>Tuition fees</b>	2 000	2 000	Host university
Insurance	500	500	Coordinator
Attendance integration week	250	250	Coordinator
Library/Phone/Fax	200	200	Host university
Fieldwork	500	500	Host university
Specific services host, tutoring and academic support	4 550	150	Host university
<b>Total</b>	<b>8 000</b>	<b>4 000</b>	

### **2. Distribution of the participation costs between the consortium for the 5 editions**

Total sum recovered by the consortium from the participation cost by semester:

Type	Nb of students	Participation cost (€/sem/stud)	Total participation costs (€/sem)	Tuition fees (€/sem/stud)	Total tuition fees (€/sem)	Other participation costs (€/sem/stud)	Total other costs (€/sem)
Category A (non-EU)	16	4 000	64 000	1 000	16 000	3 000	48 000
Category B (EU)	14	2 000	28 000	1 000	14 000	1 000	14 000
<i>Total (€/sem)</i>	30		<b>92 000</b>		<b>30 000</b>		<b>62 000</b>
<b>Total all project (5 Edition * 4 semesters)</b>			<b>1 840 000</b>		<b>600 000</b>		<b>1 240 000</b>

Total participations costs for 30 students = 92.000 €/semester

Where:

- tuition fees costs for 30 students = 30.000 €/semester = 60.000 €/year

- others participation costs for 30 students = 62.000 €/semester. From this sum, the costs for assurance and attendance of integration week will be managed directly by UM2 (coordinating institution) (Total 325 €/students/semester\* 30 students = 11.250 €/semester). The sum for distributing between the consortium is 62.000 – 11.250 = 50.750 €/semester = 101.500 €/year.

The distribution of the fees among the partner universities will be realised as follows:

- the tuition fees will be allocated proportionally to the number of students registered at each university for each semester.
- the other participation costs will be equally distributed to each university. The fees will be used by each university to finance a part of the functional and specific expenses for the EM3E Master (see A.3.3 section).



		Distribution of Tuition fees sum						
Partner	Student number	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	TOTAL
UM2	15	15 000	15 000	15 000	15 000	15 000	0	75 000
UPS	15	15 000	15 000	15 000	15 000	15 000	0	75 000
ICTP	30	30 000	30 000	30 000	30 000	30 000	0	150 000
UNIZAR	10	0	10 000	10 000	10 000	10 000	10 000	50 000
UNL	10	0	10 000	10 000	10 000	10 000	10 000	50 000
UTwente	10	0	10 000	10 000	10 000	10 000	10 000	50 000
Training course	30	0	30 000	30 000	30 000	30 000	30 000	150 000
<b>TOTAL</b>								<b>600 000</b>

		Distribution of other participation costs sum						
Partner		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	TOTAL
UM2 Coordinator*		22 500	45 000	45 000	45 000	45 000	22 500	225 000
UM2		16 917	33 833	33 833	33 833	33 833	16 917	169 166
UPS		16 917	33 833	33 833	33 833	33 833	16 917	169 166
ICTP		16 918	33 833	33 833	33 833	33 833	16 917	169 167
UNIZAR		16 917	33 833	33 833	33 833	33 833	16 918	169 167
UNL		16 917	33 833	33 833	33 833	33 833	16 918	169 167
UTwente		16 917	33 833	33 833	33 833	33 833	16 918	169 167
Training course		0	0	0	0	0	0	0
<b>TOTAL</b>								<b>1 240 000</b>

\* As indicated below in addition UM2 will manage the costs for assurance and attendance of integration week as coordinating institution: Total: 325 €/students/semester\* 30 students = 11.250 €/semester (22 500€/year).

		TOTAL distribution of tuition fees + other costs sums						
Partner		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	TOTAL
UM2		54 417	93 833	93 833	93 833	93 833	39 417	469 166
UPS		31 917	48 833	48 833	48 833	48 833	16 917	244 166
ICTP		46 918	63 833	63 833	63 833	63 833	16 917	319 167
UNIZAR		16 917	43 833	43 833	43 833	43 833	26 918	219 167
UNL		16 917	43 833	43 833	43 833	43 833	26 918	219 167
UTwente		16 917	43 833	43 833	43 833	43 833	26 918	219 167
Training course		0	30 000	30 000	30 000	30 000	30 000	150 000
<b>TOTAL</b>								<b>1 840 000</b>

### 3. Distribution of the management budget (30.000 €/edition)

From the Erasmus Mundus financial contribution to the internal management costs of the EM3E consortium (30,000 €/edition), UM2 as co-ordinating institution will receive a higher financial contribution (6,000 €/edition). The remaining sum (24,000 €/edition) will be equally divided among the partner universities (4,000 €/edition and university). The remaining expenses not covered by the fees will be covered by each university and with local support.

	Total (€/promotion)	Total (€/year)	Total for 5 promotion
Coordinator	6 000	3 000	30 000
UM2	4 000	2 000	20 000
UPS	4 000	2 000	20 000
ICTP	4 000	2 000	20 000
UNIZAR	4 000	2 000	20 000
UNL	4 000	2 000	20 000
UTwente	4 000	2 000	20 000
<b>TOTAL</b>	<b>30 000</b>	<b>15 000</b>	<b>150 000</b>

## CONSORTIUM AGREEMENT

Between,

**Université Montpellier 2 Sciences et Techniques** - France

**Université Paul Sabatier** - France

**Vysoká Škola Chemicko-Technologická v Praze** (Institute of Chemical Technology Prague) - Czech Republic

**Faculdade de Ciências e Tecnologia – Universidade Nova de Lisboa** – Portugal

**Universidad de Zaragoza** - Spain

**Universiteit Twente** - The Netherlands

as full partners of the consortium, and :

**Katholieke Universiteit Leuven** – Belgium

**Università della Calabria** - Italy

**Faculté des Sciences et Techniques – Université Hassan II Mohammedia** - Morocco

as associated partners of the consortium:

Whereas

The eight universities have joined their efforts to create an Erasmus Mundus Master degree in Membrane Engineering (EM3E) in order to promote excellence, innovation, mobility and diversity in courses of quality related to membrane science and engineering at the interface with material science and chemical engineering.

The EM3E partners will first provide a multiple degree (from the three universities visited during the semesters S1, S2 and S3) and a Diploma Supplement. The qualification and diplomas obtained in each university are:

- *Master en Ingenierie des Membranes, Master in Membrane Engineering* in France,
- *Inženýr – Ing. Master of Science – MSc.* In Czech Republic,
- *Master Engenharia de Membranas, Master in Membrane Engineering* in Portugal,
- *Máster en Ingeniería de Membranas, Master in Membrane Engineering* in Spain,
- *Master of Science in Chemical Engineering* in The Netherlands.

The final objective of the consortium is to be able to offer a joint degree throughout all the universities participating from the consortium.

### **Article 1. Curriculum and teaching training**

The Master programme takes 2 years (120 ECTS) of normal study. The courses provided in the four semesters, S1-S4, bridge different scientific domains like material science, physics & chemistry,

engineering & processes, while keeping a focus on relevant applications of membranes in food and health industry, industrial and chemical processing, energy, environmental control, pharmaceutical industry, biomedical applications, etc.

**In the first semester S1** dedicated to Materials Science and Chemical Engineering, the students will be directed to the University of Montpellier (UM2), France, or the University of Toulouse (UPS), France (the location will be swapped every other academic year between the two universities). The **semester S2** on fundamentals of process modeling and technologies will be organized at the Institute of Chemical Technology of Prague (ICTP), Czech Republic. The courses offered in the first year, semesters S1 and S2, will provide a broad and flexible orientation in the field of science and technology of membranes.

In the second year, **semester S3**, the students can specialize in one of the following three tracks:

- Biotechnologies, Food and Health, at the University of Lisboa (UNL), Portugal
- Nanoscience and Nanotechnology, at the University of Zaragoza (UNIZAR), Spain
- Energy and Environment, at the University of Twente (UTwente), The Netherlands

In the final semester, S4, the students prepare the Master Thesis.

The common curriculum of the Master programme per semester is given in Annex 1.

The grading scale of the students will be done at the end of the 2 years by the “Admission and Examination Committee” of the Master taking into account all the marks obtained by the students in the different universities involved in their selected courses.

## **Article 2. Management and Administration of the Master**

In order to assure the academic co-operation, the Parties agree to establish a EM3E management structure, which is composed by:

**Executive Board** has a highest advisory, strategic and decisional role. It is composed by the local coordinator of each involved institutions (one representative per university – 6 members). The head of the Executive Board is elected by its members for a period of 2 years. It gathers 4 times a year by teleconference or in one of the partner universities. The Programme Coordinator, member of the executive board, will insure the interface with the Executive Agency (EC-EACEA) and with the Executive Board of the Erasmus Mundus Doctorate in Membrane Engineering (EUDIME).

**Admission and Examination Committee** is responsible for Admission and Examination procedures and to advise Executive Board and teachers. It is composed of 1 staff member per partner university. The head of the Committee is elected by its members for a period of 2 years. It gathers 4 times a year by teleconference or in one of the partner universities.

**Evaluation Committee** is coordinating evaluation activities and curriculum modifications and is in charge of advising the *Executive Board* and the *External quality and Evaluation Board*. It is composed of 1 staff member per Partner University and associated university and 2 students’ representatives (1 first-year students and 1 second-year students). The head of the Committee is elected by its members for a period of 2 years. It gathers twice a year by teleconference or in one of the partner universities.

Within the Programme Committee, **each partner institution has a specific role:**

- **UM2** as coordinating institution: organisational arrangements and cooperation mechanism within the consortium.
- **UPS**: implementation and management of the e-learning platform.
- **ICTP**: relationships with industries and cooperation programme of Master.
- **FCT-UNL**: exploring and monitoring of extra-funding for assuring the sustainability of the Master
- **UNIZAR**: information and promotion of the Master.

- **UTwente:** monitoring of the quality aspects.
- **UNICAL:** assuring link with “Erasmus Mundus Doctorate in Membrane Engineering – EUDIME” and Bachelor programmes.
- **K.U.Leuven:** monitoring evolution of the curriculum.
- **FSTM:** relationship and evolution with African Third-Countries.

**External Quality and Evaluation Board:** this board is in charge of the external evaluation of the programme and to control the quality of the Master EM3E. It analyses the evaluations on the educational programme, courses and semester evaluation (panel discussion). Every year, it has to submit a report based on information obtained from the evaluation committee, academic staff, students, and the EM3E management office and team. It provides its feedback to the Executive Board in order to improve administrative, pedagogical and scientific quality of the Master EM3E and to define strategic developments in terms of future research trends and employment opportunities in Europe.

It is constituted by 6 representatives nominated by the executive board for 2 years: 2 industrialists, 2 external academics working in the field of Membrane Science and Engineering and 2 experts representative of one of the 3 following organisations: North America Membrane Society (NAMS), Membrane Society of Japan (MSJ), and European Membrane Society (EMS). An equilibrated number of representatives from Europe, North America and Asia will be respected.

The head of the Committee is elected by its members for a period of 2 years. It gathers one a year by teleconference or in one of the partner universities:

**EM3E Management Office:** it's composed by 6 offices in each partner universities, coordinated by the management office in Montpellier 2 University. Each management office facilitates the implementation of the Master. It is the link between the administrative organisation of the university (international relations office, registration office, accounting service...), the students life and the Master programme (students, teachers, committees)

### **Article 3. Registration fees**

Article 3.1 The Parties agree to an initial registration fees of 8,000 €/year for non-EU students and 4,000 €/year for EU students. The registration fees will be paid by the student to the University of Montpellier in September of each year and subsequently distributed among the Parties organisation. The registration fees include the tuition fees (common for all students of 1,000 €/semester) and other costs corresponding to insurance costs, fieldwork costs, library and phone costs, attendance integration week, etc).

The Parties will attempt to keep a reasonable balance in the number of students registered at each University in semesters 1 and 3.

Article 3.2 The Parties agree to realise the distribution of the fees among the partner universities as follows:

- the tuition fees will be allocated proportionally to the number of students registered at each university for each semester,
- the other participation costs will be equally distributed to each university. The fees will be used by each university to finance a part of the functional and specific expenses for the EM3E Master.

### **Article 4. Diploma delivery**

When the condition described in article 1 and 2 are met, and if the students:

- has collected 120 ECTS (30 ECTS per semester) within the 2 years of the Master Programme (a semester validation will require to get an average grade superior or equal to E without any grade F for one of the semester's courses. The average grade for one semester will be calculated from the individual course grades weighted by the number of attributed ECTS,
- when results have been validated by the Admission and Examination Committee,

Then each signatory University will deliver the diploma to the students.

**Article 5. Agreement duration**

This agreement is valid for 2 academic years 2011-2013, with tacit renewal for another equivalent period of time except notice of termination by at least one of the partner Universities, by registered by post-mail sent 6 months before the end of the current period of agreement

Date, Signature

## Appendix 11: Sustainability Plan : Evaluation of additional student scholarships

### 1. Estimation of the number of student scholarship :

Scholarship amount : CatA = 1000€/month \*2years - CatB = 500€/month\*2years

Student distribution : 16 CatA + 14 CatB per promotion

	Distribution per promotion					
	Promotion 1	Promotion 2	Promotion 3	Promotion 4	Promotion 5	Next Promotions
<b>Nb of students</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>
<b>Nb EU Grants</b>	<b>17</b>	<b>15</b>	<b>12</b>	<b>10</b>	<b>7</b>	<b>0</b>
CAT A	9	8	7	6	4	0
CAT B	8	7	5	4	3	0
Total EU	312 000 €	276 000 €	228 000 €	192 000 €	132 000 €	0 €
<b>Nb additional grants</b>	<b>13</b>	<b>15</b>	<b>18</b>	<b>20</b>	<b>23</b>	<b>30</b>
CAT A	7	8	9	10	12	16
CAT B	6	7	9	10	11	14
<b>Additional budget</b>	<b>240 000 €</b>	<b>276 000 €</b>	<b>324 000 €</b>	<b>360 000 €</b>	<b>420 000 €</b>	<b>552 000 €</b>
<b>TOTAL BUDGET</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>

	Distribution per year						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Next Years
<b>Nb of students</b>	<b>30</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>
<b>Nb EU Grants</b>	<b>17</b>	<b>32</b>	<b>27</b>	<b>22</b>	<b>17</b>	<b>7</b>	<b>0</b>
CAT A	9	17	15	13	10	4	0
CAT B	8	15	12	9	7	3	0
Total EU	156 000 €	294 000 €	252 000 €	210 000 €	162 000 €	66 000 €	0 €
<b>Nb additional grants</b>	<b>13</b>	<b>28</b>	<b>33</b>	<b>38</b>	<b>43</b>	<b>53</b>	<b>60</b>
CAT A	7	15	17	19	22	28	32
CAT B	6	13	16	19	21	25	28
<b>Additional budget</b>	<b>120 000 €</b>	<b>258 000 €</b>	<b>300 000 €</b>	<b>342 000 €</b>	<b>390 000 €</b>	<b>486 000 €</b>	<b>552 000 €</b>
<b>TOTAL BUDGET</b>	<b>276 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>	<b>552 000 €</b>

### 1. Sustainability : Additional scholarships

The Number of EU-funded scholarships will decrease during the 5 editions of EM3E Master course. The partnership have to find at least for the first year of the programme 13 additional grants for students, up to 60 at the end of the 5 editions.

The partners, through their networks and cooperation with associated organizations (see Appendix 2 - Letters of support), will finance at least 24 scholarship : Each partner guarantee a minimum of 4 scholarships per year, within 2 funded by public institutions and 2 by private organizations.



## Appendix 12: Communication and Promotion Material of EM3E Master: Website, E-learning platform and Leaflet.

- EM3E website: [www.em3e.eu](http://www.em3e.eu)

Welcome to the EM3E project web site - Windows Internet Explorer

http://www.em3e.eu/

Fichier Edition Affichage Favoris Outils ?

Horde :: My Portal Welcome to the EM3... National Science Found...

Search for an Erasmus diploma in a challenging domain

Home About the Master About the doctorate About the partners E-learning platform How to contact us ?

**GENERAL INFORMATION**

- Home
- What is Erasmus Mundus ?
- What is membrane engineering ?
- The master EM3E
- Practical information
- Organisation chart
- Poster and flyers
- FAQ
- The News

**STUDY PROGRAMME**

- Master programme
- Master Courses
- Master thesis
- PhD programme

**Welcome to the EM3E project web site**

The EM3E project

The **EM<sup>3</sup>E** project is a proposal of **Erasmus Mundus Master in Membrane Engineering**. This project will be submitted to the next Erasmus Mundus call at the end of April 2009. If the project is successful, the first students will be enrolled in the master in September 2010.

**LOGIN FORM**

Username

Password

Remember Me

LOGIN

- [Forgot your password?](#)
- [Forgot your username?](#)
- [Create an account](#)

**NOE Nanomempro**

The EM<sup>3</sup>E project has emerged from discussion between the partners of the [Network Of Excellence NOE Nanomempro](#): the European Network of Excellence on

**Logos for the projects**

We work to create the logos for the Erasmus Mundus Master (EM3E) and doctorate (EUDIME) and for the E-learning platform (EMEDU). The different logos want to be simple but relative to the

**POOL FOR THE LOGO**

What is the logo you prefer ? (images of the different version are shown in the homepage)

Version 1

démarrer 3 Expl... 3 Inta... 2 Mo2... Append... FR Internet 100% 2:59 AM

- E-learning platform: [www.emedu.eu](http://www.emedu.eu)

The screenshot shows a web browser window titled "EMEDU - EMEDU Platform Using Guide - Windows Internet Explorer". The address bar contains the URL: [http://www.emedu.eu/ilias/goto.php?target=wiki\\_142\\_The\\_EMEDU\\_Platform\\_Areas](http://www.emedu.eu/ilias/goto.php?target=wiki_142_The_EMEDU_Platform_Areas). The browser interface includes a menu bar (Fichier, Edition, Affichage, Favoris, Outils), a toolbar with navigation icons, and a tab bar with the active tab "EMEDU - EMEDU Plat...".

The website content features a header for "European Membrane Engineering Education platform" with a navigation menu: "Public Area", "Networking Area", "Erasmus Mundus", and "Life-Long Learning". A message states: "You must be logged in to access to these areas". Below the header is a login form with fields for "User name:" and "Password:", a "Login" button, and links for "Forgot user name?" and "Forgot password?". A "Last Visited" dropdown menu is also present.

The main content area displays the page title "The EMEDU Platform Areas" and a paragraph: "The EMEDU Platform counts 4 areas: the *Public Area*, the *Networking Area*, the *Erasmus Mundus Area* and the *Life-Long Learning Area*. If you are not logged-in, you are currently in the *Public Area*. You must be logged-in to access to the other areas. Some areas may or may not be available depending of your profile and associated rights. When you are logged-in, click on the tabs at the top-right of this page to access to available areas." Below the text is a navigation bar with buttons for "Public Area", "Networking Area", "Erasmus Mundus", and "Life-Long Learning".

A "Wiki Quick Navigation" sidebar on the right lists: "Start Page", "Info", "All Pages", "Recent Changes", "New Pages", "Popular Pages", and "Orphaned Pages". Below it is a "Wiki Search" box with a search input field and a "Search" button.

At the bottom of the page, a "Permanent Link" is provided: [http://www.emedu.eu/ilias/goto.php?target=wiki\\_142\\_The\\_EMEDU\\_Platform\\_Areas&client\\_id=EMEDU](http://www.emedu.eu/ilias/goto.php?target=wiki_142_The_EMEDU_Platform_Areas&client_id=EMEDU). A "Public Comments" section is also visible.

The Windows taskbar at the bottom shows the "démarrer" button, several open applications (3 Expl., 3 Inte..., 2 Moz..., Append...), and the system tray with the date "FR" and time "3:01 AM".



- EM3E leaflet:

**Contacts**  
Applications should be submitted on-line:  
<http://www.em3e.eu/>  
Application period:  
For any question about EM3E, please contact us at:  
[e3me@nanomempro.com](mailto:e3me@nanomempro.com)

**EM3E Partners**

- umc - Université Montpellier 2 Sciences et Techniques
- Université Paul Sabatier
- ICT PRAGUE - Institute of Chemical Technology Prague
- Universidad de Zaragoza
- University of Twente Enschede - The Netherlands
- FCT - FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA
- FCT - Universidade Nova de Lisboa

**EM3E Associated Partners**

- UNIVERSITÀ CALABRIA - Università delle Calabria
- KATHOLIEKE UNIVERSITEIT LEUVEN - Katholieke Universiteit Leuven

**EM3E**  
Erasmus Mundus Master Membrane Engineering

**EM3E**  
"Membranes have a key role to play in the new technologies and in separation operations"

**Energy and Environment**

**Biotechnologies, Food and Health**

**Nanotechnologies & Nanoscience**

**EM3E: Erasmus Mundus Master Membrane Engineering**

Membrane engineering is a **growing field** that could provide solutions in different areas: energy, environment, health. **New opportunities** in different areas are constantly appearing.

You will travel around Europe studying in **top Universities** in the field of membranes, members of the Network of Excellence: Nanomempro. The teaching of membrane science and engineering needs the participation of experts having **knowledge and skills in the different scientific, technological and industrial fields**. The master courses correspond to 4 semesters of studies involving six different universities, and three possibilities of specialization.

**Admission criteria**  
Candidates must hold a first cycle degree, they will be evaluated on the basis of their academic grades, professional experience, motivation letter and letters of recommendation. All the courses are conducted in English, skills in English will be assessed by the Admission Committee.

**Tuition fees**  
1000 €/year, other participation costs (insurance, integration week and other costs related to student support) depend on EU or non-EU students.

**Scholarships**  
EU and non EU students could apply to a Erasmus Mundus scholarship that will cover all the participation costs a monthly allowance and for non-EU a payment for travel and installation.

		Job in Industry	Ph.D. EUDIME Coordinated by UNICAL, Italy	
M2	S4	Master thesis in an academic or industrial laboratory		
	S3	Nanoscience & Nanotechnology UNIZAR, Spain	Energy & Environment UTwente, Netherlands	Biotechnologies Food & Health FCT-UNL, Portugal
	S2	Fundamentals of technologies and modeling ICT, Czech Republic		
M1	S1	Fundamentals Material Science LM2, France	Fundamentals of Chemical Engineering UPS, France	
		Registration / Integration Week LM2, France		

# STUDENT AGREEMENT

## **1 Introduction**

This Agreement sets out the relationship between the EM3E consortium and its students. It is intended to provide a framework through which universities and its students can work together to create a positive environment for learning and academic achievement.

## **2 Agreement**

The standard enrolment conditions for Erasmus Mundus Master in Membrane Engineering are set out below. These conditions comprise part of the Agreement between you and the consortium about your programme of study. The other parts of the Agreement are:

- any documents referred to in these conditions;
- the enrolment form you have to complete when you arrive at the University of Montpellier for the first week of integration

The Agreement between you and the consortium starts when you tell the consortium in writing that you accept the offer of a place in the EM3E programme.

If the Agreement between you and the consortium is inconsistent with any other document prepared by or on behalf of the consortium, the Agreement will prevail. The Agreement comprises the entire understanding between you and the consortium about your programme and replaces any other undertakings or representations.

## **3 The Consortium's obligations**

The consortium will provide you with the tuition and learning support associated with your programme of study, subject to these conditions, with reasonable care and skill. Universities from the consortium will make all reasonable efforts to deliver your programme as described in the EM3E's prospectus for the appropriate academic year.

However, the consortium must manage its resources efficiently and shall be entitled:

- to alter the timetable, location, number of classes and method of delivery of your programme, provided such alterations are reasonable;
- to make reasonable variations to the content and syllabus of your programme;

The consortium will make available to you such learning support facilities and other services as it considers appropriate, but may vary what it provides from time to time (for example, the consortium may think it desirable to change the way it provides Library or IT support).

## **4 Your obligations**

You must comply with your obligations under these conditions and, in accordance with any reasonable instructions issued to you from time to time by or on behalf of the Consortium, you are required to:

- attend compulsory lectures, courses, tutorials, examinations and other activities which form part of your programme, subject to absence for medical or other agreed reasons;
- submit by required deadlines course work and other assignments required for your programme, subject to exceptional circumstances such as illness;
- reach the level of academic attainment required for your programme by the faculty board;
- behave appropriately while on the University's premises;
- be adequately prepared for any activity which you are required to undertake as part of your programme outside the University, at all times conducting yourself in a proper manner;
- comply with any professional standards applicable to your programme;
- abide by any special conditions relating to your programme set out in the prospectus, or otherwise notified to you by the University;
- provide to the Admission and Examination Committee with an emergency contact name and details which the Universities may use at its discretion;
- notify the Admission and Examination Committee of any changes to the information which you have submitted on application or enrolment, for example, if you change your address.

### **5 Fees and payment**

It is your responsibility to make sure your tuition fees and all other expenses relating to your programme are paid. The tuition fees will be as stated in fee regulations supplied to you and as reviewed and revised each academic year. These fees and expenses do not include any fees payable for residential accommodation provided to you by the University or by any third party, nor do they include travelling expenses or other course costs such as bench fees. If relevant, these will be the subject of separate agreements between you and the University.

### **6 Academic rules and regulations**

You must comply with all relevant regulations relating to your programme, as amended from time to time. These are available in each International/European offices of the consortium. They include the following;

- relevant statutes, ordinances and regulations;
- faculty rules on academic progress and the consequences of poor academic performance;
- regulations on suspension or extension of studies;
- examination regulations;
- health and safety regulations relating to your programme;
- codes of practice on research conduct and misconduct;
- the University's intellectual property policy;
- regulations on fitness to practise and professional standards and ethics;
- regulations on placements and electives undertaken outside the University;
- all codes, rules and regulations of any other relevant organisation or university, if attendance there is required as part of your programme.

### **7 Other University rules and regulations**

You must comply with all other relevant rules and regulations of the University, as amended from time to time. These are available in each International/European offices of the consortium. They include the following:

- health and safety regulations;
- student disciplinary regulations and codes of proper behaviour (which include the University's right to suspend or exclude a student in exceptional circumstances on disciplinary grounds);
- computing regulations;
- regulations on investigation of computers;
- library regulations;
- regulations on equal opportunities, discrimination, bullying and harassment and dignity at work and study;
- data protection information for students and data protection guidelines;
- provisions relating to confidential information;
- regulations on freedom of speech;
- regulations concerning students with mental health problems;
- public interest disclosure policy (whistleblowing);
- grievance and complaints procedures;
- use of student ID/library/swipe cards;
- regulations concerning conduct in University residences;
- rules on car parking on University premises.

### **9 Termination of Agreement**

This Agreement will end automatically, subject to your rights of internal appeal, if your studies with the University are terminated as a result of:

- action taken against you in accordance with the University's disciplinary or fitness to practise procedures;
- a decision of the executive board, based on your academic performance;
- non-payment of fees, in accordance with the Consortium's regulations on payment of fees.

If you are expelled or dismissed from any university or other organisation which you are required to attend or be a member of as part of your programme, the University may end this Agreement immediately by written notice to you.

In addition, the Consortium may end this Agreement by written notice to you in the following circumstances:

- if, between accepting an offer and starting your programme, there is a change in your circumstances which, in the reasonable opinion of the Admission and Examination Committee, makes it inappropriate for you to study on your programme;
- if the Consortium becomes aware of information about you which it did not know before (for example, unspent criminal convictions) which, in the reasonable opinion of the Consortium, makes it inappropriate for you to study on your programme;
- if, in the reasonable opinion of the Consortium, you have failed to provide the Consortium with all relevant information, or have supplied false or misleading information, relating to your application for your programme.

### **10 Requirements on termination of this Agreement**

If at any time this Agreement terminates:

- the Consortium shall be entitled to refuse to enrol you on your programme (if, at the date of termination, you have not already enrolled);
- the Consortium shall be entitled to require you to stop studying on your programme and to leave the University immediately (if, at the date of termination, you have enrolled);
- you are required to return to the faculty office the Student Identification Card issued to you on enrolment, together with all property owned by the University;
- you must pay all outstanding fees immediately;
- any contract you have for University accommodation will terminate in accordance with its written provisions.

Any action taken by the Consortium under the above provisions will not restrict its ability to take other action against you to which it may be entitled. Provided the action taken to terminate the Agreement is in accordance with these conditions or the University's procedures, the Consortium will not be liable for any loss or damage which you may suffer as a result.

### **11 Notices**

Any notice made under this Agreement shall be in writing. Letters will be addressed to you at your term time or home address as appropriate, at the last address you gave to the Admission and Examination Committee. Letters shall be deemed to have been properly served when delivered by hand to the address, or 48 hours after being posted to that address if sent by pre-paid first class post. Good service may also be given by email, to the last email address you gave to the Admission and Examination Committee.

### **12 General**

If any provision of these terms and conditions is or becomes illegal, invalid, void or unenforceable, that shall not affect the legality, validity or enforceability of the other provisions.

Neither you nor the Consortium shall be liable to each other for any failure or delay in performing obligations, if the failure or delay is due to any cause beyond that party's reasonable control, for example fire, flood or industrial dispute.

**I have read and understood the terms of the agreement named and agree to fully comply to the best of my doing.**

Date:.....

Name : .....

Signature:

---

#### **To be completed by the coordinator:**

I certify that the details are correct for the above mentioned student:

Name and faculty/school: .....

Date: .....Signature:

## Appendix 14 : Brief description of student services offered by each partner university

<p><b>UM2</b></p> 	<p>The UM2 International Relations Office, in relation with the PRES and CROUS of Montpellier, proposes assistance for obtaining visa, administrative support, housing facilities, languages courses, support residence permit (<a href="http://www.crous-montpellier.fr/international">http://www.crous-montpellier.fr/international</a> 118). UM2 campus offers a variety of services: psychologists, a medical centre, Cafeteria, sport services, library, WiFi zones, laboratories, cultural services, information services.. The registered students can use the infrastructures for artistic, cultural and sporting activities (<a href="mailto:suapsum2@univ-montp2.fr">suapsum2@univ-montp2.fr</a>). The CROUS proposes accommodations (150-300€/month) and 4 student restaurants (Meal at ~3€). More than 30 student associations are active in the Campus.</p>
<p><b>UPS</b></p> 	<p>The student house is the CROUS (<a href="http://www.crous-toulouse.com/">http://www.crous-toulouse.com/</a>). This organism manages an important number of university rooms, helping also students in finding others accommodations (guest rooms, shared accommodations ...). Two university restaurants for students are in the scientific campus, belonging to the Crous (<a href="http://www.crous-toulouse.com/">http://www.crous-toulouse.com/</a>); meals at ~3€. Sport practice (volley, tennis, rugby, soccer...): <a href="http://www.ufrstaps.ups-tlse.fr/">http://www.ufrstaps.ups-tlse.fr/</a>.</p>
<p><b>ICTP</b></p> 	<p>ICT Prague offers accommodation services in its halls of residence (<a href="http://www.vscht-suz.cz/suz/eng/recreationfacilities/default.asp">http://www.vscht-suz.cz/suz/eng/recreationfacilities/default.asp</a>). Meals for students are served at ~2 €. The ICT Prague Halls of Residence offer facilities for a wide range of students' leisure time activity, including student clubs, fitness centres, tennis courts, darkroom, etc. voluntary sport-courses organized by the Department of Physical Training focusing on the broad range of sports; participation of students is for free. Training and recreation facilities in Jachymov and Pec pod Snezkou (<a href="http://www.vscht-suz.cz/suz/eng/recreationfacilities">http://www.vscht-suz.cz/suz/eng/recreationfacilities</a>).</p>
<p><b>UNIZAR</b></p> 	<p>Spanish embassies worldwide have been instructed by the Spanish Ministry for Foreign Affairs to speed up visa procedures of EM candidates. Once in Zaragoza, the UNIZAR has specific support staff to help students with residence permit procedures. The UNIZAR owns four residence halls, works with other 6 private residence halls and has an "Accommodation Support Service" for students who want private accommodation. All registered students enjoy: sport services, libraries, WiFi zones, computers, laboratories, cultural services and clubs, information services, etc. All registered students are covered by a general accident insurance. Meals are served at the campus cafeterias (5€/meal). The Sports Activities Service organizes a variety of activities and services in different areas: sponsorship, competitions and natural environments (Servicio de Actividades Deportivas SAD, <a href="http://www.unizar.es/deportes/">http://www.unizar.es/deportes/</a>).</p>
<p><b>UTwente</b></p> 	<p>International Office/Housing helps international students in finding accommodation by coordinating supply and demand (<a href="mailto:housing@so.utwente.nl">housing@so.utwente.nl</a>). PhD students and employees should contact the Personnel Department of Foreign Affairs (<a href="http://www.utwente.nl/pao/en/">http://www.utwente.nl/pao/en/</a>) in order to arrange the visa and residence permit. Meals for students are served at ~5 €. The campus of the UTwente offers a variety of services: psychologists, a medical centre, counsellors, religious services, a hotel, restaurants, bars, etc.. With over 50 sports- and cultural associations available on campus, the University of Twente also offers a wide array of leisure activities.</p>
<p><b>UNL</b></p> 	<p>Student housing is managed by the Gabinete de Alojamento (<a href="mailto:cleite@unl.pt">cleite@unl.pt</a>); about 500 rooms (single/double) are available in three different university residences. Meals available at university restaurant (4 €/meal). Health center at Campus de Campolide. Two tennis courts, one beach volleyball field, one sports field, one running track and changing rooms.</p>

## **Appendix 15 : Insurance coverage**

The table below shows the refunding of the costs covered by the Insurance allocated to the student through the University of Montpellier:

1. General insurance for student
  - the “*Base sécurité social*” column shows the percentage/costs covered by the French student social security,
  - the “Tous soins” column shows the costs covered for the supplementary medical insurance with a policy “all-inclusive healthcare” (provided by a student mutual insurance French company). In this way the student benefits of an optimal coverage of all eventual healthcare needs.
  
2. Specific insurance for student studying abroad

1)

	Base Sécurité sociale	TOUS SOINS 198 €/an 16,50 €/mois
<b>PARCOURS DE SOINS</b>		
Médecin traitant (généraliste ou spécialiste)	70%	<b>100%</b>
Médecin correspondant (spécialiste y compris radiologue ou généraliste)	70%	
Médecin d'accès direct (100% si le médecin est votre médecin traitant ou un médecin correspondant) (gynécologue, ophtalmologue, psychiatre, neuropsychiatre, stomatologue)	70%	
Autre médecin (hors parcours de soins coordonné)	30%	
<b>AUTRES PRESTATIONS</b>		
Forfait journalier hospitalier (16 €), si séjour en psychiatrie (12 €) Participation assuré 18 €		Prise en charge nombre illimité
Pharmacie (vignettes bleues et blanches)	35% et 65%	<b>100%</b>
Consultation annuelle de prévention bucco-dentaire	70%	
Hospitalisation médicale ou chirurgicale	80% à 100%	
Transport (si lié à une l'hospitalisation)	65%	
Soins externes dans un établissement public hospitalier	60% à 100%	
Soins dans des établissements conventionnés à 100% avec LMDE	60% à 100%	
IVG hospitalière (médicamenteuse ou instrumentale)	80%	
IVG médicamenteuse en ville (100% si effectuée par votre médecin traitant ou un médecin correspondant)	70%	
Chirurgie sans hospitalisation (100% si effectuée par votre médecin traitant ou un médecin correspondant)	70% à 100%	
Soins dentaires et prothèses dentaires	70%	
Orthopédie / Prothèse	65% à 100%	
Optique	65%	
Laboratoire (100% si prescrit par votre médecin traitant ou un médecin correspondant)	60%	
Auxiliaires médicaux	60%	
Soins consécutifs à un accident garanti (400% accident)	35% à 100%	400%
<b>PRESTATIONS SOLIDARITÉ</b>		
Mutexam Allocation Mutualiste de Solidarité Fonds d'aide à la compensation du handicap		<b>OUI</b>
<b>RESPONSABILITÉ CIVILE</b>		
Responsabilité civile "Vie étudiante" et "Vie privée"		<b>OUI</b>
<b>ÉTUDIANTS SALARIÉS</b>		
Indemnité journalière hospitalière		15 €/jour
<b>FORFAITS OPTIQUES ET DENTAIRES</b>		
Forfait lunettes (opticiens conventionnés/opticiens non conventionnés) ou Forfait lentilles		40 €/an
Forfait dentaire : orthodontie		
Forfait dentaire (couronnes, prothèses conventionnés/hors conventionnés)		
<b>AUTRES FORFAITS</b>		
Forfait suivi psychologique (par consultations et par an)		8€ x 5
Forfait ostéopathe (dans la limite de 2 consultations par an - réseau conventionné)		
Forfait prothèse auditive		
Forfait naissance		
Forfait suivi nutrition (par consultations et par an)		
<b>PRÉVENTION</b>		
Vaccins, rappels remboursés par la Sécurité sociale	65%	<b>100%</b>
Détartrage dentaire annuel	70%	
Forfait contraception (pilules contraceptives "nouvelles générations", anneau vaginal & patchs contraceptifs non remboursés par la Sécurité sociale)		55 €/an
Forfait contraception d'urgence (pilule "du lendemain")		10 €/an
Forfait test de grossesse		10 €/an
Forfait préservatifs féminins		10 €/an
Forfait préservatifs masculins		15 €/an
Vaccins, rappels et traitements anti-paludéens (non remboursés par la Sécurité sociale)		90 €/an
Forfait arrêt tabac (substituts nicotiques ouvrant droit au forfait Sécurité sociale)	50 €/an	140 €/an <sup>10</sup>
Forfait équipements de sécurité		10 €/an
Forfait protections auditives (moulées, jetables ou réutilisables)		
Forfait sécurité routière (éthylotest)		10 €/an
<b>REMBOURSEMENT DES SOINS À L'ÉTRANGER</b>		
Remboursement de vos frais médicaux et assistance rapatriement 24h/24 - 7j/7 (stages et études) Remboursement de vos frais médicaux (tous séjours)		<b>OUI</b>





## Appendix 16 : Structure and learning objectives of the E-learning Platform

