



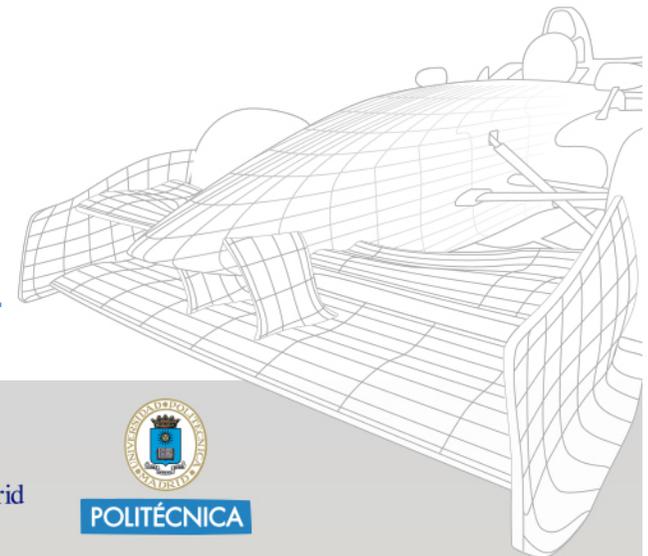
Master in Industrial Mathematics (M2i):  
An experience with cross-institutional education  
in industrial mathematics



MASTER IN  
INDUSTRIAL  
MATHEMATICS



Success stories from the ECMI Educational Programme.  
Online Industrial Mathematics.



UNIVERSIDADE DA CORUÑA

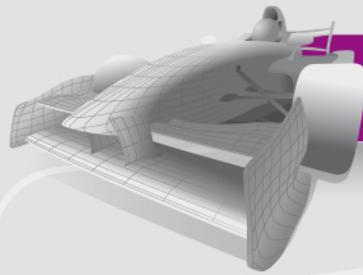
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Universidad  
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POLITÉCNICA



# M2i

MASTER IN  
INDUSTRIAL  
MATHEMATICS

[www.m2i.es](http://www.m2i.es)

The **Master in Industrial Mathematics (M2i)** is an official degree jointly delivered by

- University of Santiago de Compostela (USC)
- University of A Coruña (UDC)
- University of Vigo (Uvigo)
- Carlos III University of Madrid (UC3M)
- Technical University of Madrid (UPM)



Since the current academic year **2013/2014**.

The M2i duration is **3 semesters**

Offers **two specializations**:

- Modelling
- Numerical Simulation

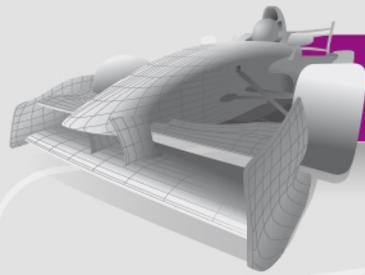


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The coordinators of **Master in Industrial Mathematics (M2i)**

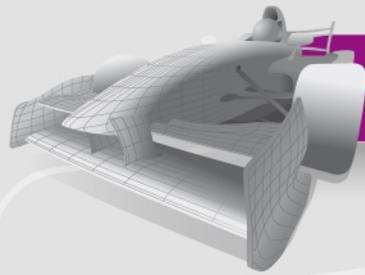
- University of Santiago de Compostela (USC<sup>1</sup> + <sup>1</sup>ª Global coordinator)
- University of A Coruña (UDC<sup>2</sup>)
- University of Vigo (Uvigo<sup>3</sup>)
- Carlos III University of Madrid (UC3M<sup>4</sup>)
- Technical University of Madrid (UPM<sup>5</sup>)



A. Bermúdez<sup>1ª</sup>, L. Bonilla<sup>4</sup>, A. Liñán\*, J.M. Vega<sup>5</sup>, E. V-C<sup>1</sup>, C. Vázquez<sup>2</sup>, J. Durany<sup>3</sup>

\* Life Honorary Member, ECMI 2006

Master in Industrial mathematics (M2i): Providing a specific education to solve real problems in industry.  
*ECMI Newsletter N 55*, pg 15-17, March 2014



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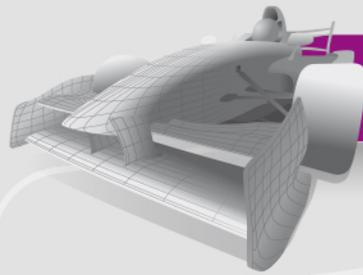
## Progressive learning

M2i arises from the fusion of two official degrees:

- Master in Mathematical Engineering (MIM), by the universities USC, UDC and UVigo (7 editions from 2006/2007)
- Master in Mathematical Engineering (4 editions from 2006/2007) / Master in Industrial Mathematics (2 editions from 2010/20011), by the UC3M ECMI Teaching Center

[http://www.ecmi-indmath.org/?page\\_id=151](http://www.ecmi-indmath.org/?page_id=151)

The main aim of the M2i is to unify subjects of high applied mathematical contents and already taught in specific engineering masters.



# M2i

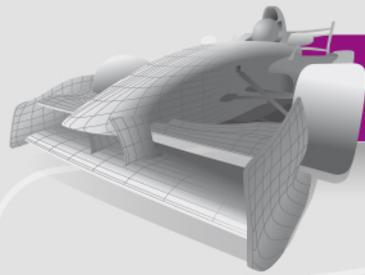
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Some ideas for this master are taken from the report by the Organization for Economic Co-operation and Development (OECD) “Global Science Forum. Report on Mathematics in Industry”. ECMIMIM and the tradition of ECMI.

The **scientific and technological interests** of the M2i mainly focus on four basic aims:

1. Expand the analytical skills and knowledge of graduate students who will be part of **future** research groups and professional teams.
2. Instruct the students in mathematical **modelling** for applications in **industry**.
3. Provide specific skills in relation to the design, construction and management of **specific software** of at least one industrial sector.
4. Introduce students to the **research** topics and development related to the subjects of the program.



# M2i

## MASTER IN INDUSTRIAL MATHEMATICS

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### Welcoming Ceremony



M2i degree promotes a strong dynamic relationship among our main stakeholders:

- Students
- Alumni
- Faculty members
- Professionals from industry

Mentoring course



Applied mathematics and industry interaction forums



<http://www.itmati.com/en/node/12544>

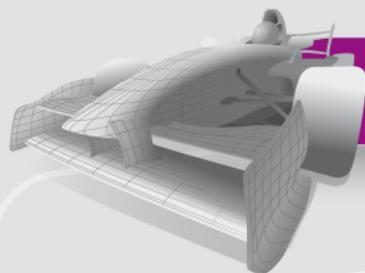


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## Students & Alumni

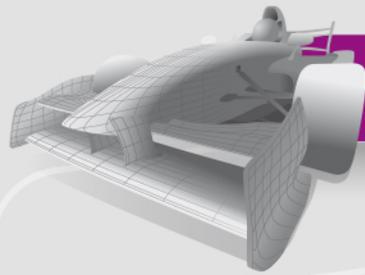


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## Entry requirements

Degrees/academic transcripts:

1. Maths, physics, engineering
2. Architecture, sciences
3. Economics, business administration



Welcoming Ceremony, September 2012

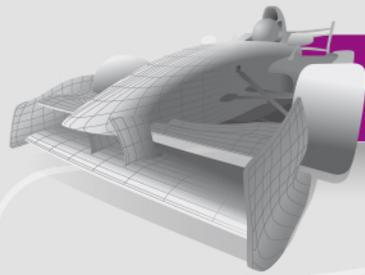


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# M2i

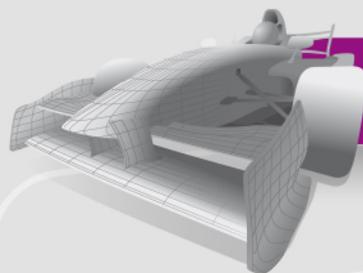
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MATHEMATICS

 [www.m2i.es](http://www.m2i.es)

## Alumni

- Regular information on jobs offers, courses, seminars is sent to both Alumni and current students.
- Since May 2012 we are very involved in a LinkedIn group for alumni and current master students called:  
    “MIM & M2i - Estudiantes y egresados”  
with 107 members





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## Alumni

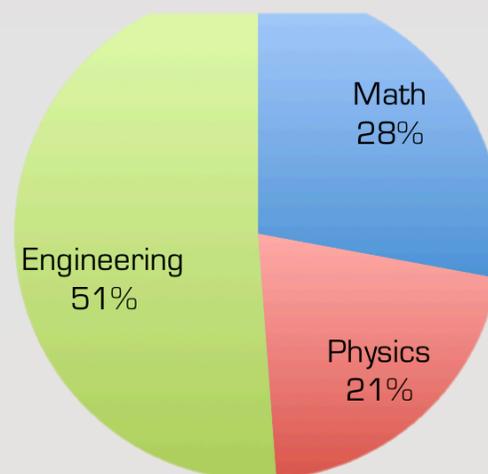
Some results of the survey to the first five Graduating classes of students of the Master in Mathematical Engineering (MIM), by the universities USC, UDC and UVigo

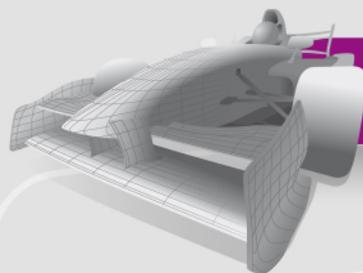
43 answers:

Male 27 (62.8%)

Female 16 (37.2%)

Degrees/Academic transcripts





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## Alumni

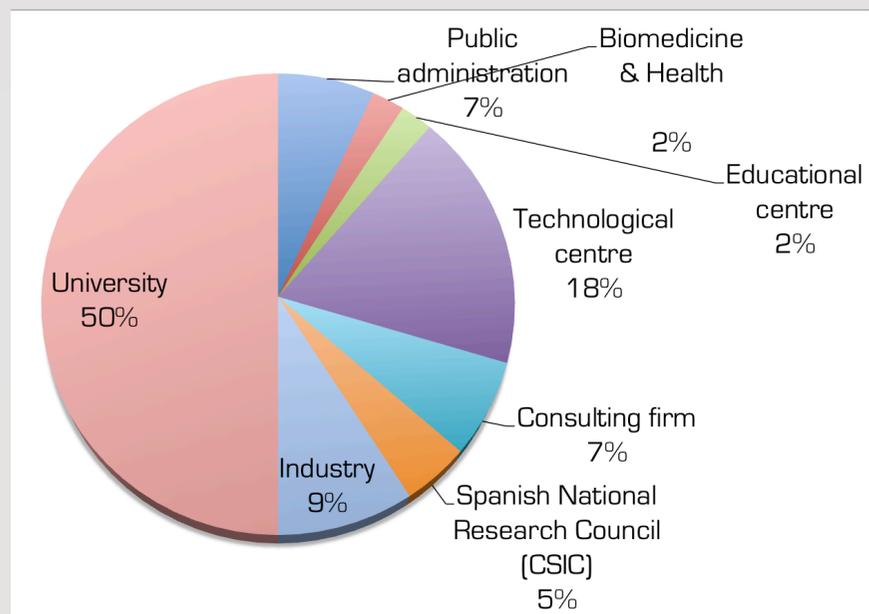
Are you currently employed?

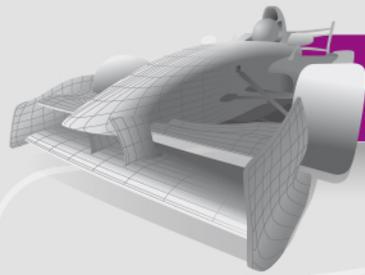
Yes: 90.7%

Did you find your current employment thanks to the Master's distribution list?

Yes: 16.3%

### Type of company





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## Alumni

### Degree of correlation between the working activity and the MIM

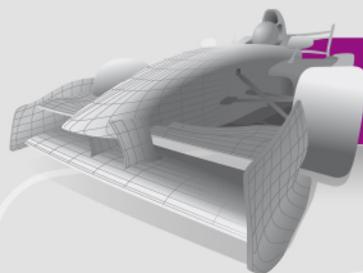
Very high	32.6%
High	32.6%
Acceptable	18.6%

### Do you think that the knowledge acquired in your company should be included in the MIM?

It is not necessary for the MIM: 74,4%  
Yes: 25,6%

### Would you recommend the MIM to a person who finishes this year his studies of degree/degree or engineering?

Yes: 90.7%

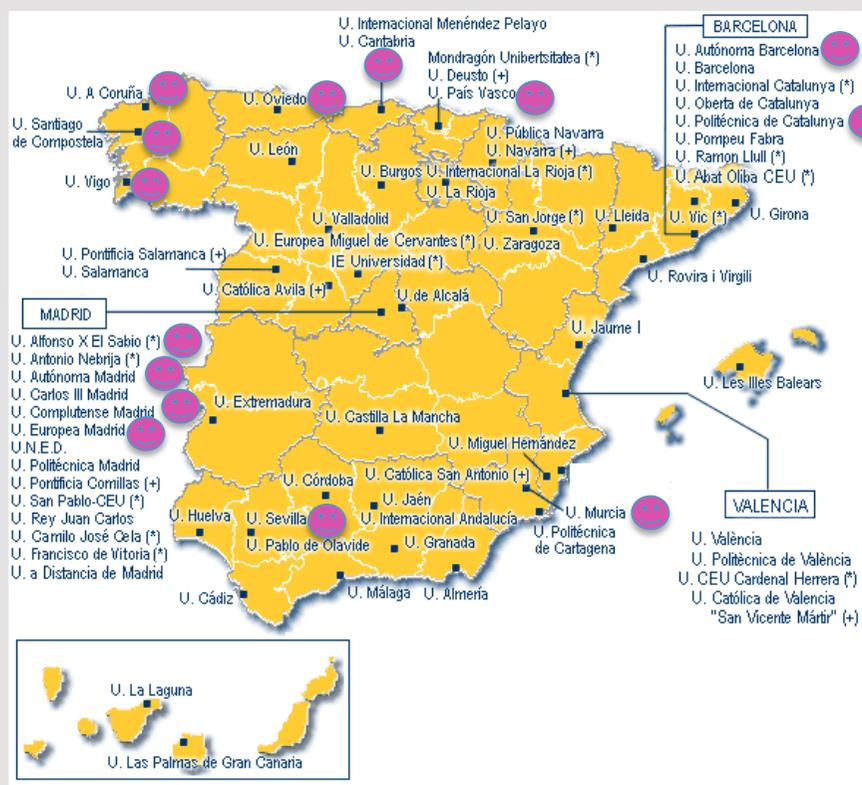


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## MASTER IN INDUSTRIAL MATHEMATICS

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### MIM students come from the Spanish universities

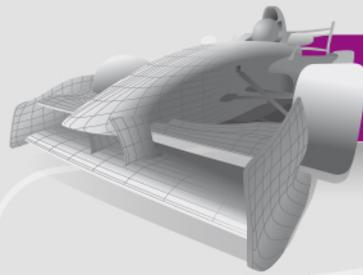


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**M2i**

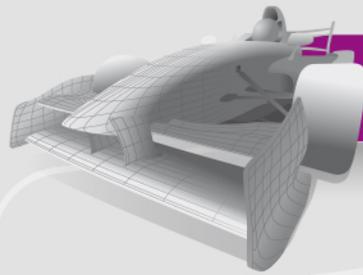
MASTER IN  
INDUSTRIAL  
MATHEMATICS

 [www.m2i.es](http://www.m2i.es)

-  Istanbul Teknik Üniversitesi (Turquía)
-  RWTH Aachen University (Alemania)
-  Universidad de la República (Uruguay)
-  Universidad de San Martín (Argentina)
-  Universidad Nacional de Córdoba (Argentina)
-  Urgench State University (Uzbekistan)
-  Universidad de Roma (Italia)
-  Università Politecnica delle Marche (Italia)

MIM students come from the non-Spanish universities 

-  Erasmus
-  Erasmus Mundus



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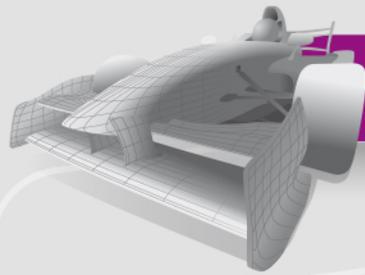
## As an international student...



I am **Umid Karimov from Uzbekistan**. I received my Masters in Mathematical Engineering (Máster en Ingeniería Matemática-MIM) in 2010 as an Erasmus Mundus student. I didn't realize how fortunate I am to be a part of the MIM until after I finished it.

The resources made available to the students for research and conferences are outstanding, but the most exceptional aspect is the high degree of access to a **dedicated and engaging faculty**. MIM has amazing professors who are greatly concerned about their students. My experience was distinguished by a number of professors in the program that served as **genuine mentors** to me and encouraged me throughout in both my teaching and research. **As an international student**, this support was invaluable, and I am deeply thankful for the energy and time those professors invested in me.

Great professors, fellow students, very diverse backgrounds, all the aspects of the program made my **learning experience the best possible**. Currently, I am teaching at the Department of Applied Mathematics and Mathematical Physics at the Urgench State University, Uzbekistan.



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the right choice for me...



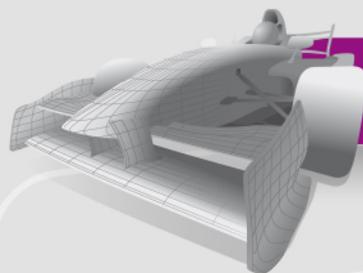
**Mathematics Engineering** gave me technical knowledge in practical and interesting areas.

The master was definitely **the right choice for me**, and provided me with many opportunities.

This master program gives you a solid understanding of the **Numerical Methods** and Finite Elements principles that are at the foundation of many of the **models** used in engineering. It gave me the skills to work with some **software** tools.

Mathematics Engineering not only does an **excellent job at teaching** a highly valued and well respected technical skill set, but more importantly, the program develops your **critical thinking** and problem solving skills that are applicable to a wide variety of fields.

**Aygul Babadjanova** (An Erasmus Mundus student in 2008).  
Uzbekistan.

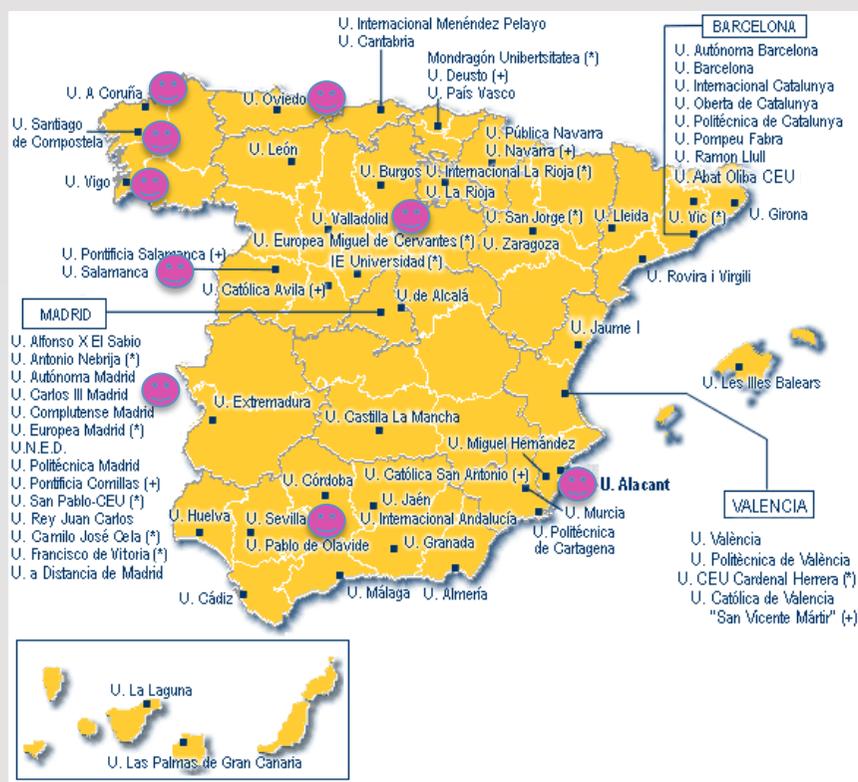


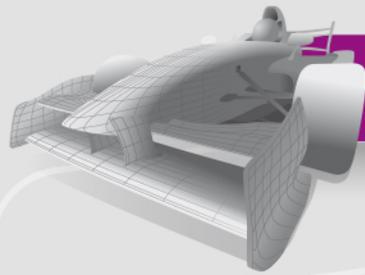
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😊 M2i students come from the Spanish universities



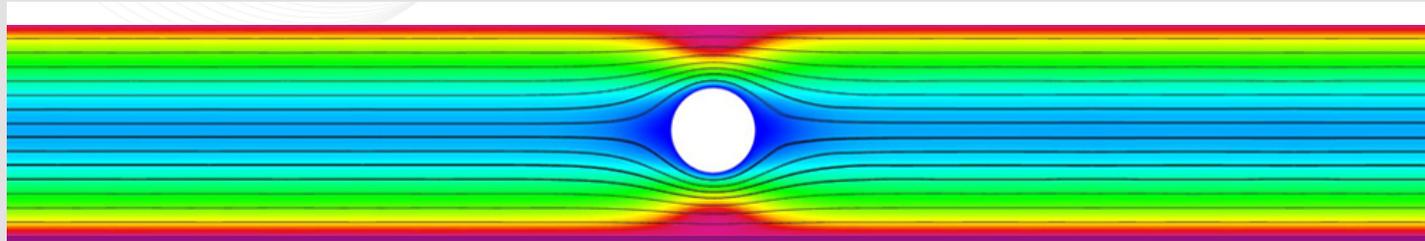


# M2i

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www.m2i.es

## Faculty



### FACULTY

Our faculty members are renowned professionals with extensive experience in the field of modelling and numerical simulation.

Guests will include specialists in their scientific and/or technical field.

UNIVERSITY OF SANTIAGO DE COMPOSTELA

Department of Applied Mathematics and others

UNIVERSITY OF A CORUNA

Department of Mathematics and

others

UNIVERSIDAD DE VIGO

Department of Applied Mathematics and others

CARLOS III UNIVERSITY OF MADRID

Gregorio Millán Insitute and others

TECHNICAL UNIVERISTY OF MADRID

Department of Applied Mathematics and others

OTHER UNIVERSITIES AND RESEARCH CENTRES

Collaborators

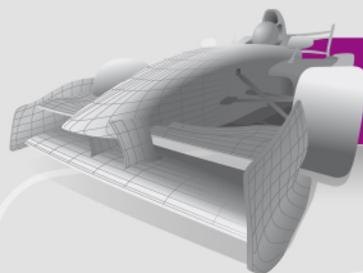


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### UNIVERSITY OF SANTIAGO DE COMPOSTELA

#### Department of Applied Mathematics and others

José Antonio Álvarez Dios  
Associate Professor  
Web

Carlos José Álvarez López  
Associate Professor  
Web

Carlos Amiana Ares  
Asistant Professor  
Web

Patricia Barral Rodiño  
Associate Professor  
Web

Alfredo Bermúdez De Castro López-Varela  
Professor  
Web

José Carlos Cabaleiro Domínguez  
Associate Professor  
Web

José Luis Ferrín González  
Associate Professor  
Web

María Dolores Gómez Pedreira  
Associate Professor  
Web

Jesús Liñares Beiras  
Professor  
Web

Oscar López Pouso  
Associate Professor  
Web

María del Carmen Muñiz Castiñeira  
Associate Professor

Rafael Muñoz Sola  
Associate Professor

Francisco José Pena Brage  
Assistant Professor  
Web

Juan Carlos Pichel Campos  
Research Fellow "Isidro Parga Pondal"  
Web

Peregrina Quintela Estévez  
Professor  
Web

Jerónimo Rodríguez García  
Research Fellow "Ramón y Cajal"  
Web

Carmen Rodríguez Iglesias  
Associate Professor  
Web

Jesús María Rodríguez Presedo  
Associate Professor

María del Pilar Salgado Rodríguez  
Associate Professor

Duarte Santamarina Ríos  
Assistant Professor

María Luisa Seoane Martínez  
Associate Professor

María Elena Vázquez Cendón  
Associate Professor  
Web

Miguel Ernesto Vázquez Méndez  
Associate Professor  
Web

Juan Manuel Viaño Rey  
Professor  
Web

Miguel Angel Vilar Rivas  
Lecturer  
Web

### UNIVERSITY OF A CORUÑA

#### Department of Mathematics and others

### UNIVERSIDAD DE VIGO

#### Department of Applied Mathematics and others

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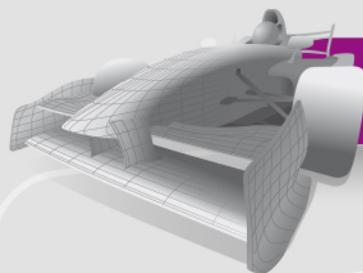
#### Gregorio Millán Insitute and others

### TECHNICAL UNIVERISTY OF MADRID

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#### Collaborators



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**Department of Mathematics and others**

Javier Andrade Garda  
Associate Professor  
Web

Íñigo Arregui Álvarez  
Associate Professor  
Web

José Jesús Cendán Verdes  
Associate Professor

Web

Ana Ferreiro Ferreiro  
Assistant Professor  
Web

José Antonio García Rodríguez  
Associate Professor

María González Taboada  
Associate Professor

Luis María Hervella Nieto  
Associate Professor  
Web

Andrés Prieto Aneiros  
Assistant Professor  
Web

José Manuel Rodríguez Seijo  
Associate Professor  
Web

Carlos Vázquez Cendón  
Professor

Web

### UNIVERSIDAD DE VIGO

**Department of Applied Mathematics and others**

### CARLOS III UNIVERSITY OF MADRID

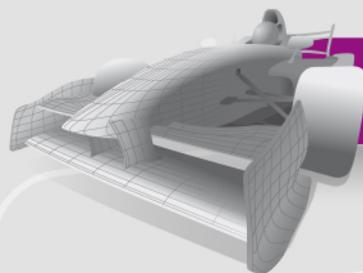
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**Department of Mathematics and others**

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**Department of Applied Mathematics and others**

Lino José Álvarez Vázquez  
Professor  
Web

María Begoña Cid Iglesias  
Assistant Professor

Web

María Edita De Lorenzo Rodríguez  
Associate Professor

José Durany Castrillo  
Professor

José Ramón Fernández García  
Associate Professor  
Web

Generosa Fernández Manín  
Associate Professor  
Web

Guillermo García Lomba  
Associate Professor

Pablo Izquierdo Belmonte  
Doctor

Elena Beatriz Martín Ortega  
Assistant Professor

Áurea María Martínez Varela  
Associate Professor  
Web

Abraham Segade Robleda  
Assistant Professor

Manuel Ángel Sobreira Seoane  
Associate Professor  
Web

Fernando Varas Mérida  
Associate Professor

### CARLOS III UNIVERSITY OF MADRID

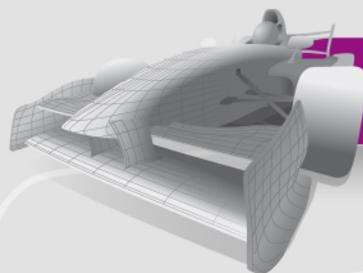
**Gregorio Millán Insitute and others**

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**Department of Applied Mathematics and others**

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Juan Diego Álvarez Román  
Associate Professor  
Web

Mariano Álvaro Ballesteros  
Assistant Professor  
Web

Luis Francisco López Bonilla  
Professor  
Web

Manuel Carretero Cerrajero  
Associate Professor  
Web

Óscar Flores Arias  
Assistant Professor  
Web

Manuel García Villalba  
Assistant Professor  
Web

Pedro González Rodríguez  
Assistant Professor

Manuel Kindelan  
Professor

Vadim Kourdioumov  
Assistant Professor

Mario Merino Martínez

Assistant Professor  
Web

Miguel Ángel Moscoso Castro  
Professor  
Web

Antonio Sánchez Pérez  
Professor

Manuel Sanjurjo  
Assistant Professor

Filippo Terragni  
Assistant Professor

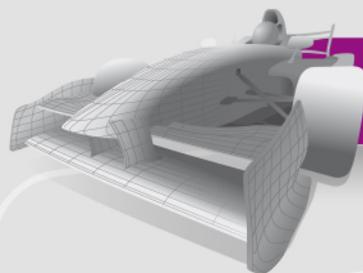
Marcos Vera Coello  
Associate Professor

### TECHNICAL UNIVERSITY OF MADRID

**Department of Applied Mathematics and others**

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### UNIVERSIDAD DE VIGO

Department of Applied Mathematics and others

### CARLOS III UNIVERSITY OF MADRID

Gregorio Millán Insitute and others

### TECHNICAL UNIVERISTY OF MADRID

Department of Applied Mathematics and others

Juan Ramón Arias Pérez  
Associate Professor

Antonio Barrero Gil  
Associate Professor

Rodolfo Bermejo Bermejo  
Professor

Soledad Le Clainche  
Lecturer

María Higuera Torrón  
Associate Professor

Carlos Martel Escobar  
Professor

Juan Ángel Martín  
Lecturer

Jeff Porter  
Assistant Professor

Laura Saavedra Lago  
Assistant Professor

José Joaquín Sánchez Álvarez  
Assistant Professor  
Web

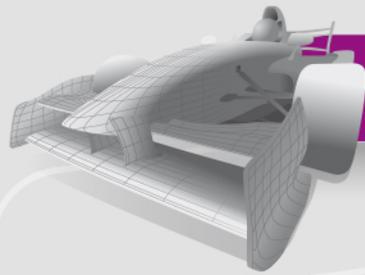
Vassilios Theofilis  
Assistant Professor  
Web

José Manuel Vega De Prada  
Professor  
Web

Ángel Velázquez  
Professor  
Web

### OTHER UNIVERSITIES AND RESEARCH CENTRES

Collaborators



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### UNIVERSITY OF A CORUNA

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### UNIVERSIDAD DE VIGO

Department of Applied Mathematics and others

### CARLOS III UNIVERSITY OF MADRID

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Department of Applied Mathematics and others

### OTHER UNIVERSITIES AND RESEARCH CENTRES

#### Collaborators

Vicente Cutanda Henríque  
Associate Professor  
(University of Southern Denmark, Dinamarca)

Francisco Javier Fernández Fernández  
Assistant Professor  
(C.U Defensa. Escuela Naval de Marín)

Carlos Fernández Sánchez  
System Administrator  
(CESGA)

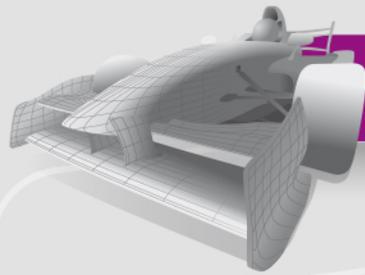
Miguel Ángel Fernández Varela  
Directeur de Recherche  
(INRIA, Rocquencourt, Francia)

M<sup>a</sup> de las Mercedes Fernández Veiga  
Risk and Control Rating  
(Banco Santander)

Carlos Moreno González  
Professor  
(UNED)

María Rodríguez Nogueiras  
Research Fellow  
(IMPA, Brasil)

Virginia Selgas Buznego  
Assistant Professor  
(Universidad de Oviedo)



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## Relations with Industry

M2i is **strongly active** in its relations with **industry**.



97 European Study Group with Industry  
(11-14/11/2013, USC)

ITMATI. Technological Institute for Industrial Mathematics  
Instituto de Investigacións Tecnolóxicas, planta -1

[Web: //www.itmati.com/](http://www.itmati.com/)



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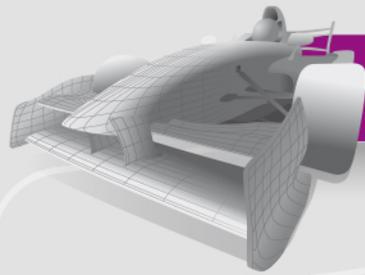


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Carlos III de Madrid



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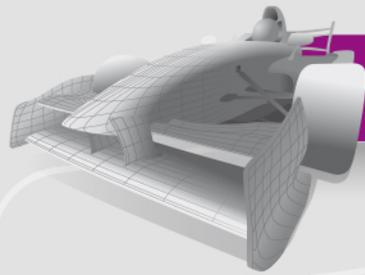
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## Relations with Industry

- Due to the **Workshop on Industrial Problems** we have signed more than **60** agreements with regional, national and international **companies** that collaborate with M2i.
- These companies present problems on which the students and teachers work in the **Workshops on Industrial Problems and on Modelling**.
- Some of these problems may become the subject of the **Master's dissertation**.
- These companies and technological centers also offer **internships** to students.





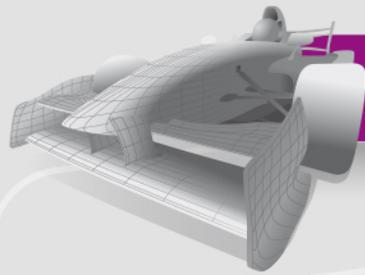
### Companies

List of companies with this agreement are listed at:

<http://www.m2i.es/en/?seccion=empresas>

- Biomedicine & Health
- Economics & Finances
- Energy & Environment
- Logistics and transport sectors

Abengoa <a href="http://www.abengoa.com">www.abengoa.com</a>	Confederación Hidrográfica del Miño-Sil <a href="http://www.chminosil.es">www.chminosil.es</a>
Acuanorte <a href="http://www.acuanorte.es">www.acuanorte.es</a>	ELINSA <a href="http://www.elinsa.org/">www.elinsa.org/</a>
Adatica <a href="http://www.adatica.com">www.adatica.com</a>	Endesa Generacion, SA <a href="http://www.endesa.es">www.endesa.es</a>
AFI <a href="http://www.afi.es">www.afi.es</a>	Fundación CIDAUT <a href="http://www.cidaut.es">www.cidaut.es</a>
AMES <a href="http://www.ames.es">www.ames.es</a>	Fundacion Instituto de Hidraulica Ambiental de Cantabria <a href="http://www.ihcantabria.com/es/fundacionih">www.ihcantabria.com/es/fundacionih</a>
AMV Soluciones <a href="http://www.amvsoluciones.com">www.amvsoluciones.com</a>	Fundacion para el Fomento de la Calidad Industrial y el Desarrollo Tecnologico de Galicia <a href="http://www.fundacioncalidade.org">www.fundacioncalidade.org</a>
Analistas Financieros Internacionales <a href="http://www.afi.es">www.afi.es</a>	Gallega de Mecanizados Electronicos <a href="http://www.gamelsa.com">www.gamelsa.com</a>
Aqua Ambiente Servicios Integrales, SA <a href="http://www.aquaambiente.es">www.aquaambiente.es</a>	GMV Aerospace & Defence SAU <a href="http://www.gmv.com/en">www.gmv.com/en</a>
AXA Group Solutions <a href="http://www.axa.es/Seguros/Particulares/seguros.aspx">www.axa.es/Seguros/Particulares/seguros.aspx</a>	Grupo Antolin Ingenieria, S.A <a href="http://www.grupoantolin.com">www.grupoantolin.com</a>
BALIÑO <a href="http://www.balino.com">www.balino.com</a>	Grupo Ferroatlantica <a href="http://www.ferroatlantica.es">www.ferroatlantica.es</a>
BANESTO <a href="http://www.banesto.es">www.banesto.es</a>	Iberdrola Energias Renovables de Galicia, SA <a href="http://www.iberdrola.es">www.iberdrola.es</a>
BBVA <a href="http://www.bbva.es">www.bbva.es</a>	Idealos <a href="http://www.idealos.es">www.idealos.es</a>
CASTROSÚA <a href="http://www.castrosua.com">www.castrosua.com</a>	Ikerlan S. Coop <a href="http://www.ikerlan.es">www.ikerlan.es</a>
Cedervall España, S.A. <a href="http://www.cedervall.com">www.cedervall.com</a>	INDAR <a href="http://www.ingeteam.com/Es.aspx">www.ingeteam.com/Es.aspx</a>
Centro de Investigacion Forestales de Lourizan <a href="http://www.escuelalourizan.es">www.escuelalourizan.es</a>	Indizen Technologies <a href="http://www.indizen.com">www.indizen.com</a>
Centro de Observacion y Teledeteccion Espacial SAU <a href="http://www.grupotecopy.es/es/nosotros/organizacion/cotesa.html">www.grupotecopy.es/es/nosotros/organizacion/cotesa.html</a>	Inergy Automotive Systems <a href="http://www.inergyautomotive.com/Pages/Home.aspx">www.inergyautomotive.com/Pages/Home.aspx</a>
Centro de Supercomputación de Galicia (CESGA) <a href="http://www.cesga.es">www.cesga.es</a>	Inspiralia <a href="http://www.inspiralia.com">www.inspiralia.com</a>
Centro Tecnológico Aimen <a href="http://www.aimen.es">www.aimen.es</a>	Instituto de Ciencias de la Construcción Eduardo Torroja <a href="http://www.ietcc.csic.es">www.ietcc.csic.es</a>
Centro Tecnológico de Automoción de Galicia (CTAG) <a href="http://www.ctag.com">www.ctag.com</a>	Instituto de Hidráulica Ambiental "IH Cantabria" <a href="http://www.ihcantabria.com">www.ihcantabria.com</a>
Château Luchey-Halde <a href="http://www.luchey-halde.com">www.luchey-halde.com</a>	Instituto de Investigaciones Marinas del Vigo <a href="http://www.iim.csic.es">www.iim.csic.es</a>
CIE Automotive <a href="http://www.cieautomotive.com">www.cieautomotive.com</a>	



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## Companies

- Biomedicine & Health
- Economics & Finances
- Energy & Environment
- Logistics and transport sectors

Instituto Español de Oceanografía  
[www.ieo.es](http://www.ieo.es)

Instituto Tecnológico de Aragón  
[www.ita.es/ita](http://www.ita.es/ita)

Labein Tecnalia  
[www.tecnalia.com](http://www.tecnalia.com)

Magallanes Renovables  
[www.magallanesrenovables.com](http://www.magallanesrenovables.com)

Mestrelab Research  
[mestrelab.com](http://mestrelab.com)

Metalurgica Orro  
<http://metalurgicaorro.es>

MGI Coutier  
[www.mgicoutier.fr](http://www.mgicoutier.fr)

N.A.S.A.L.  
[www.nasalsystems.com/](http://www.nasalsystems.com/)

Navantia, SA  
[www.navantia.es](http://www.navantia.es)

Next Limit, Technologies  
[www.nextlimit.com](http://www.nextlimit.com)

Norvento  
[www.norvento.com](http://www.norvento.com)

Puerto de Celeiro  
[www.puertodeceleiro.es](http://www.puertodeceleiro.es)

RECSA  
[www.recsa.com](http://www.recsa.com)

Russula  
[www.russula.com](http://www.russula.com)

SEAT  
[www.seat.com](http://www.seat.com)

Simpple, SL  
[www.simpple.com](http://www.simpple.com)

Sound of Numbers, S.L.  
[www.soundofnumbers.net](http://www.soundofnumbers.net)

Técnicas y Servicios de Ingeniería, SL  
[www.tsisl.es](http://www.tsisl.es)

Tecnologías Avanzadas Inspiralía, SL  
[www.inspiralia.com](http://www.inspiralia.com)

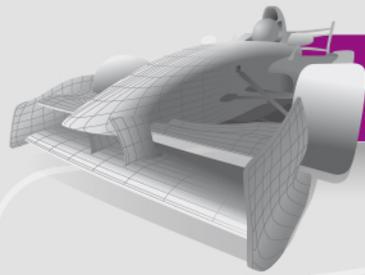
UMANA  
[www.umanaingenieria.com/biomecanica](http://www.umanaingenieria.com/biomecanica)

UNESPA  
[www.unespa.es](http://www.unespa.es)

Unidad de Vehículos Industriales  
[www.unvi.es](http://www.unvi.es)

Vasco Gallega  
[www.vascogallega.com](http://www.vascogallega.com)

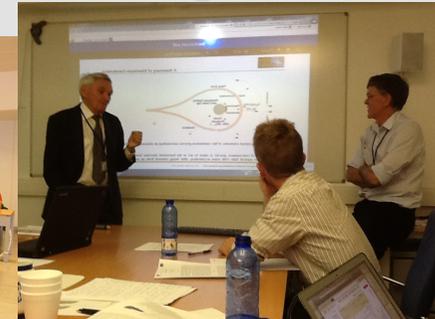
Vicus Desarrollos Tecnológicos  
[www.vicusdt.com](http://www.vicusdt.com)



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## IT technologies

- M2i takes advantage of the IT technologies by using a modern videoconferencing system which simultaneously allows students and teachers of the different M2i sites to connect in **real time**.
- Additionally, the teaching sessions of a large part of the subjects are **recorded [Video lecture]** so that the students can access the classes from home.
- Students have also access to **professional software** during the Master.

### COMPANIES

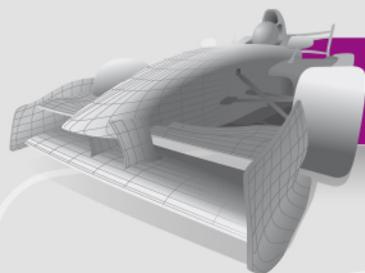
Companies who have lend their software to be freely use in the M2i:



ANSYS Fluent used in Professional software in fluid mechanics.



MIKE used in Professional software in environmental issues.



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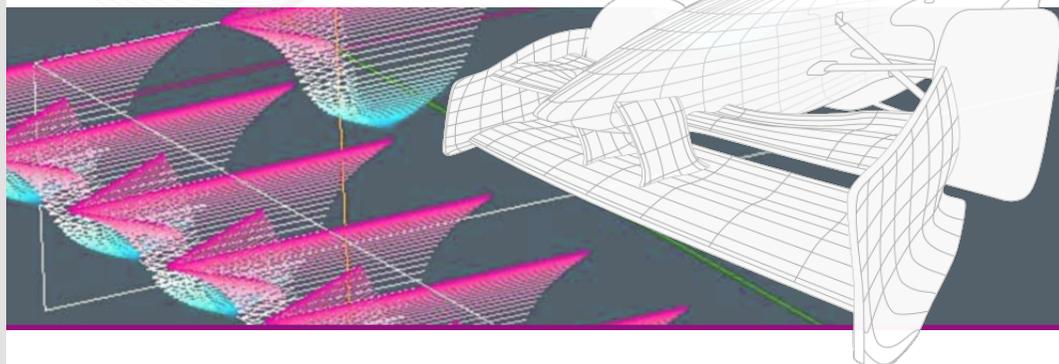
[www.m2i.es](http://www.m2i.es)

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# M2i

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### MASTER IN INDUSTRIAL MATHEMATICS (M2I): PROVIDING A SPECIFIC EDUCATION TO SOLVE REAL PROBLEMS IN INDUSTRY

The Master in Industrial Mathematics (M2I) is an official degree jointly delivered by the University of Santiago de Compostela (USC), University of A Coruña (UDC), University of Vigo (UVigo), Carlos III University of Madrid (UC3M) and Technical University of Madrid (UPM) Since the current academic year 2013/2014.

The M2i duration is 3 semesters and offers two specializations: Modelling and Numerical Simulation.

M2i degree promotes a strong dynamic relationship between the main stakeholders: students, Alumni, faculty members and professionals from industry.

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Admission  
Scholarships  
Quality control and results

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Coordination  
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Timetable  
Dissertation

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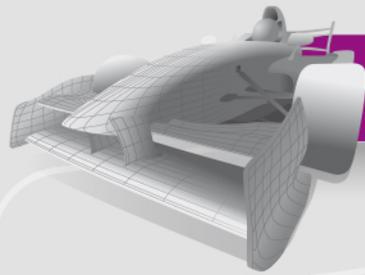


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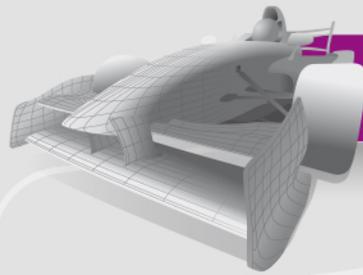
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## Program

- Basic Training (24 compulsory ECTS)
- Modelling Specialization Module [MS] ( \*\* ) (24 ECTS)
- Numerical Simulation Specialization Module [NSS] ( \*\* ) (24 ECTS)
- Optional Module ( \*\* )
- Master Dissertation (30 compulsory ECTS)

( \*\* ) The 12 optional ECTS compulsory can be obtained from any of the non compulsory modules



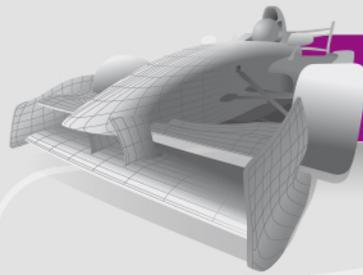
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## Basic Training (24 compulsory ECTS)

- Numerical methods and programming (6 ECTS)
- Ordinary differential equations / Dynamical systems (6 ECTS)
- Partial differential equations (6 ECTS)
- Numerical methods for partial differential equations (6 ECTS)



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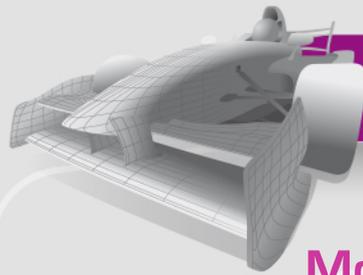
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## Basic Modelling

[Choose 6 compulsory ECTS to obtain the MS and NSS]:

- Fluid mechanics (6 ECTS)
- Solid mechanics (6 ECTS)
- Electromagnetism and Optics (6 ECTS)
- Acoustics (6 ECTS)
- Mathematical modelling in the environment (6 ECTS)
- Mathematical modelling in finance (6 ECTS)



## Modelling Specialization Module [MS] ( \*\* ) (24 ECTS)

**Basic Modelling** (Choose 6 compulsory ECTS to obtain the MS)

**Advanced Modelling** (Choose 6 compulsory ECTS to obtain the MS):

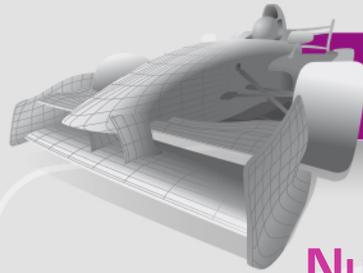
- Fluid Thermal MEMS and Power MEMS (6 ECTS)
- Combustion (6 ECTS)
- Turbulence (6 ECTS)

**Perturbation methods** (6 compulsory ECTS to obtain the MS)

**Issues of Applied Mathematics** (Choose 6 compulsory ECTS to obtain the MS):

- Optimization and Control (6 ECTS)
- Variational analysis of partial differential equations (3 ECTS)
- Stability of physical systems (6 ECTS)
- Hydrodynamical stability (6 ECTS)
- Inverse problems and image reconstruction (6 ECTS)

( \*\* ) The 12 optional ECTS compulsory can be obtained from any of the non compulsory modules

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## Numerical Simulation Specialization Module [NSS] ( \*\* ) (24 ECTS)

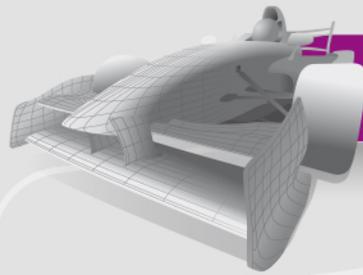
**Basic Modelling** (Choose 6 compulsory ECTS to obtain the NSS)

**Continuum mechanics** (6 compulsory ECTS to obtain the NSS)

**Professional Software in Numerical Simulation** (Choose 12 compulsory ECTS to obtain the NSS):

- Professional software in finance (6 ECTS)
- Professional software in fluid mechanics (6 ECTS)
- Professional software in solid mechanics (6 ECTS)
- Professional software in electromagnetism and optics (6 ECTS)
- Professional software in acoustics (6 ECTS)
- Professional software in environmental issues (6 ECTS)
- Computer-aided design (CAD) (6 ECTS)

[ \*\* ] The 12 optional ECTS compulsory can be obtained from any of the non compulsory modules



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## Optional Module ( \*\* )

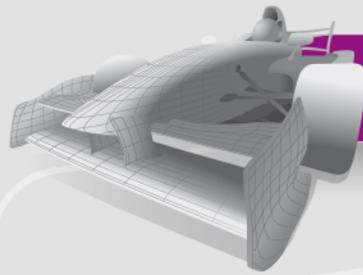
### Advanced Numerical Methods

- Stochastic numerical methods (6 ECTS)
- Advanced finite elements (3 ECTS)
- Advanced finite volumes (3 ECTS)
- Boundary element methods (3 ECTS)
- Numerical methods for large systems of equations (3 ECTS)
- Advance Scientific Calculus with Matlab (6 ECTS)

### Computation

- Programming in C++ (3 ECTS)
- Parallel Computing (3 ECTS)
- Computer nets and distributed computing (3 ECTS)
- Computer architectures and operative systems (3 ECTS)

( \*\* ) The 12 optional ECTS compulsory can be obtained from any of the non compulsory modules

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### Master Dissertation (30 compulsory ECTS):

- Workshop on Industrial Problems (compulsory)
- Workshop on Software Engineering (optional)
- Workshop on Modelling (optional)
- Workshop on Projects Methodology (optional)
- Modelling Weeks (optional)
- Internships in Companies / Technological centres (optional)
- Internships in University Departments (optional)

**Dissertation:** The topic will be chosen by students and supervised by a faculty member from the proposals introduced by the different companies/technological centres in the Workshop on Industrial Problems and the Workshop on Modelling.



Master in Industrial Mathematics (M2i):  
An experience with cross-institutional education  
in industrial mathematics



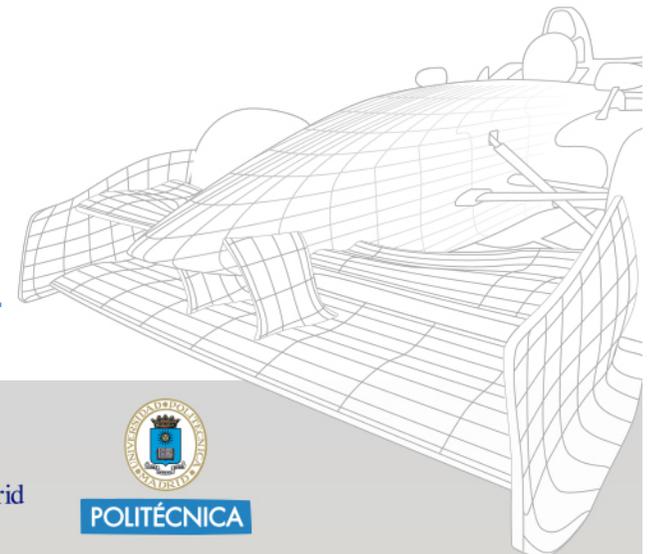
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Thank you very much for your time and attention!

[www.m2i.es/en](http://www.m2i.es/en)  
[info@m2i.es](mailto:info@m2i.es) [elena.vazquez.cendon@usc.es](mailto:elena.vazquez.cendon@usc.es)

Success stories from the ECMI Educational Programme.  
Online Industrial Mathematics.



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# Master in Industrial Mathematics (M2i): An experience with cross-institutional education in industrial mathematics



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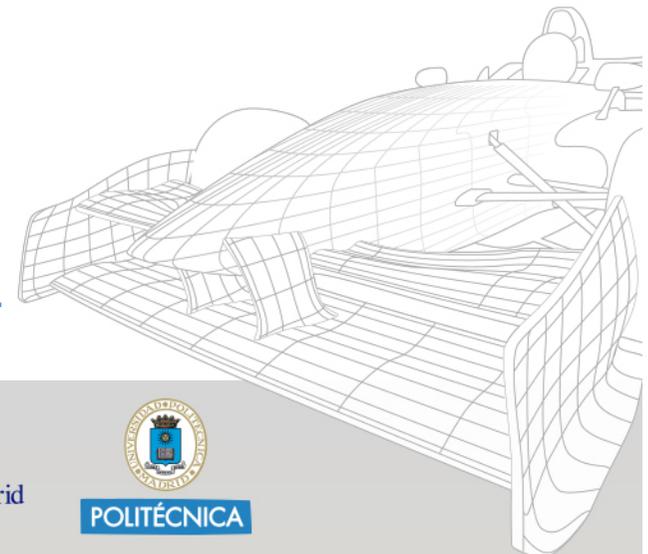


This project was co-financed with  
FEDER and Xunta de Galicia funds under the  
grant reference GRC2013-014.



[www.m2i.es/en](http://www.m2i.es/en)  
[info@m2i.es](mailto:info@m2i.es) [elena.vazquez.cendon@usc.es](mailto:elena.vazquez.cendon@usc.es)

Success stories from the ECMI Educational Programme.  
Online Industrial Mathematics.



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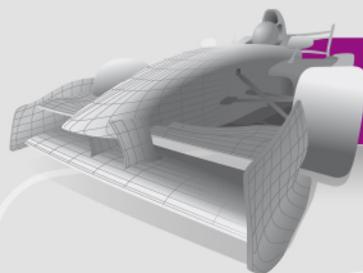
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[info@m2i.es](mailto:info@m2i.es)



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