



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH



Executive Coordinators of the Programme


Academic Coordinator Of The Programme

At Ensimag	At the UPC FME
Name: <i>Olivier Gaudoin</i>	Name: <i>Josep Burillo Puig</i>
Position: <i>Director International Relations</i>	Position: <i>Vicedean International Relations</i>
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Administrative Contact Of The Programme (If needed):

At Ensimag	At the UPC FME
Name: <i>Marianne Genton</i>	Name: <i>Sandra Carbajo Olsina</i>
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Signatures

Date: <i>21/07/2022</i>	Date:
For Ensimag	For FME
 Vivien QUEMA Directeur de l'Ensimag	
Vivien Quema	Jaume Franch Bullich
Director	Director



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Appendix 1

**Dual Degree Agreement between
[FME UPC]
and
[Grenoble INP Ensimag - UGA]**

Duration:

2022/23 academic year to 2025/26 academic year

Degree Programme at	Ensimag (applied maths and computer science)
Degree Awarded	Master Mention Mathématiques et Applications (Master in Industrial and Applied Mathematics – MSIAM) Or Grenoble INP Ensimag – UGA Engineering degree
Annual Access Places	4
Language of Instruction	English (For MSIAM)/ or French (for Engineering degree)
Specific Admission Criteria	180 credits passed for entering M1
Website	http://msiam.imag.fr https://ensimag.grenoble-inp.fr/en/education/mathematical-modeling-vision-graphics-and-simulation#page-presentation
Degree Programme at	Facultat de Matemàtiques i Estadística
Degree Awarded	Bachelor's degree in Mathematics
Language of Instruction	Catalan
Specific Admission Criteria	
Website	https://www.upc.edu/ca/graus/matematiques-barcelona-fme
All the degrees will be awarded at the end of the course of study, once the student has finished all the required courses at both institutions.	



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Mobility Paths

3 years of bachelor's degree at UPC.

2 years at Grenoble INP Ensimag - UGA: 2 possibilities, Grenoble INP Ensimag - UGA Engineering degree (applied mathematics specialization) or MSIAM master.

Curriculum Content. Description of the Programme of Study

UPC students follow 3 years of courses in the Grau en Matemàtiques - 180 ECTS

<https://www.upc.edu/ca/graus/matematiques-barcelona-fme>

They follow 2 years at Grenoble INP Ensimag - UGA

The defense of the bachelor's thesis will be done in Grenoble.

Master MSIAM (M1 and M2) - 120 ECTS

<http://msiam.imag.fr>

Engineering specialization "Mathematical Modeling, Vision Graphics and Simulation" - MMIS
120 ECTS

<https://ensimag.grenoble-inp.fr/en/education/mathematical-modeling-vision-graphics-and-simulation#page-presentation>

Both paths offer 3 semesters of academic courses (90 ECTS) and one semester of final master's thesis/graduation project (30 ECTS)

UPC students at Grenoble

Semester	Courses	University	ECTS credits at Grenoble	ECTS credits at UPC
1-2	Compulsory subjects	UPC	0	60
3-4	Compulsory subjects	UPC	0	60
5-6	Compulsory subjects	UPC	0	60
7-8-9	Compulsory and optional subjects	Ensimag Grenoble UGA	90	(45)
10	TFM/Graduation project + TFG	Ensimag Grenoble UGA	30	(15)
TOTAL				240



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Appendix II

**Dual Degree Agreement between
[FME UPC]
and
[Grenoble INP Ensimag- UGA]**

Duration:

2022/23 academic year to 2025/26 academic year

Degree Programme at	Grenoble INP Ensimag – UGA (applied maths and computer science)
Degree Awarded	Master Mention Mathématiques et Applications (Master in Industrial and Applied Mathematics – MSIAM)
Annual Access Places	4
Language of Instruction	English
Specific Admission Criteria	180 credits passed for entering M1, 240 credits passed for entering M2
Website	http://msiam.imag.fr
Degree Programme at	Facultat de Matemàtiques i Estadística - FME
Degree Awarded	Master in Advanced Mathematics and Mathematical Engineering - MAMME
Annual Access Places	4
Language of Instruction	English
Specific Admission Criteria	240 passed credits
Website	https://mamme.masters.upc.edu/en?set_language=en
All the degrees will be awarded at the end of the course of study, once the student has finished all the required courses at both institutions.	

Mobility Paths

MAMME (Master in Advanced Mathematics and Mathematical Engineering)/ MSIAM (Master of Science in Industrial and Applied Maths)



M1 at host institution / M2 at partner insertion, adding one semester

Curriculum Content. Description of the Programme of Study

The following paths represent models and can be modified individually under approval of both FME and Ensimag

Path 1: Computer vision and graphics

Semester	Courses	ECTS credits at Grenoble	Equivalent subject at the UPC	ECTS credits at UPC
1	Graph Theory (FME)			7.5
	Discrete and Algorithmic Geometry (FME)			7.5
	Numerical Methods for PDEs (FME)			7.5
	Mathematical Models with PDEs (FME) OR Mathematical Models in Biology (FME)			7.5
2	Master's Thesis (FME/ENSIMAG)	30		(15)
3	Signal and Image Processing (Ensimag)	6		
	Geometric Modelling (Ensimag)	6		
	3D Graphics (Ensimag)	6		
	Advanced Imaging (Ensimag)	3		
	Level set methods and optimization algorithms with applications in imaging (Ensimag)	3		
	Model exploration for approximation of complex, high-dimensional problems (Ensimag)	3		
...	Geophysical imaging (Ensimag)	3		



Path 2: Mathematical modelling

Semester	Courses	ECTS credits	Equivalent subject at the UPC	ECTS credits at UPC
1	Mathematical Models in Biology (FME)			7.5
	Numerical Methods for Dynamical Systems (FME)			7.5
	Numerical Methods for PDEs (FME)			7.5
	Mathematical Models with PDEs (FME)			7.5
2	Master's Thesis (FME/Ensimag)	30		(15)
3	Signal and Image Processing (Ensimag)	6		
	Computing science for big data an HPC (Ensimag)	6		
	Variational methods applied to modelling (Ensimag)	6		
	Wavelets and applications (Ensimag)	3		
	Non-smooth Convex Optimization Methods (Ensimag)	3		
	Numerical optimal transport and geometry (Ensimag)	3		
...	Temporal and spatial point processes (Ensimag)	3		



Path 3: Machine learning

Semester	Courses	ECTS credits	Equivalent subject at the UPC	ECTS credits at UPC
1	Graph Theory (FME)			7.5
	Discrete and Algorithmic Geometry (FME)			7.5
	Numerical Methods for PDEs (FME)			7.5
	Mathematical Models with PDEs (FME) OR Mathematical Models in Biology (FME)			7.5
2	Master's Thesis (FME/ Ensimag)	30		(15)
3	Object oriented & software design (Ensimag)	6		
	Applied Probability and Statistics (Ensimag)	6		
	Statistical Analysis and document mining (Ensimag)	6		
	Machine learning fundamentals (Ensimag)	3		
	Inverse problem and data assimilation: variational and Bayesian approaches (Ensimag)	3		
	Kernel methods for machine learning (Ensimag)	3		
...	Reinforcement learning (Ensimag)	3		



Path 4: Mathematical Optimization

Semester	Courses	ECTS credits	Equivalent subject at the UPC	ECTS credits at UPC
1	Graph Theory (FME)			7.5
	Discrete and Algorithmic Geometry (FME)			7.5
	Numerical Methods for PDEs (FME)			7.5
	Mathematical Models with PDEs (FME) OR Mathematical Models in Biology (FME)			7.5
2	Master's Thesis (FME/ Ensimag)	30		(15)
3	Object oriented & software design (E Ensimag)	6		
	Applied Probability and Statistics (Ensimag)	6		
	Statistical Analysis and document mining (Ensimag)	6		
	Nonsmooth Convex Optimization Methods (Ensimag)	3		
	Model exploration for approximation of complex, high dimensional problems (Ensimag)	3		
	Efficient methods in optimization (Ensimag)	3		
...	Numerical optimal transport and geometry (Ensimag)	3		



Grade Conversion Table and Credit Recognition (ECTS)

Taula d'equivalència de Qualificacions i Reconeixement de Crèdits ECTS

1 ECTS = 25 h

Grade Conversion Table: Ensimag->FME

Ensimag	FME
17, 18, 19, 20	10 - Excel·lent *
16	9.5 - Excel·lent
15	9 - Excel·lent
14	8.5 - Notable
13	8 - Notable
12	7 - Notable
11	6 - Aprovat
10	5 - Aprovat
9	4 - Suspès

- Matricula d'honor is given in exceptional occasions

FME->Ensimag

FME		Ensimag
10	A	18
9	A	17
8	B	15
7	B	14
6	C	12
5	D	10
<5	non validé	0



Model de “Learning Agreement”

GENERAL INFORMATION

Student	Last name(s)			
	First name(s)		Sex	Male Female
	Date of birth		Nationality	
	Study Cycle ⁱ		Field of education ⁱⁱ	

Sending Institution	Universitat Politècnica de Catalunya (UPC)		Erasmus code	EBARCELO03
	Faculty/ Department	School of Mathematics and Statistics (FME)		
	Address	C. Pau Gargallo, 14; 08028 BARCELONA	Country	Spain
	Contact person name	Sandra Carbajo Olsina		
	Position	Responsible of International Relations at FME		
	Phone	+34934015699	e-mail:	relacions.internacionals.fme@upc.edu

Receiving Institution	Name		Erasmus code (if applicable)	
	Faculty/ Department			
	Address			
	City		Country	
	Contact person ⁱⁱⁱ			
	Position			
	Phone		e-mail:	



BEFORE THE MOBILITY

Table A - Study programme at the Receiving Institution

Planned period of the mobility		From:	to:
		(day/month/year)	(day/month/year)
Component ^{iv} code (if any)	Component title at the Receiving Institution (as indicated in the course catalogue ^v)	Semester [e.g. autumn/spring; term]	Number of ECTS ^{vi} credits (or equivalent) to be awarded by the Receiving Institution upon successful completion
Total:			
Web link to the course catalogue at the Receiving Institution describing the learning outcomes: [web link to the relevant information]			

Main language of work: _____

The level ^{vii} of language competence that the student already has or agrees to acquire by the start of the mobility period is	A	A	B	B	C	C	Native speaker
	1	2	1	2	1	2	



Table B – Recognition at the Sending Institution

Component code (if any)	Component title at the Sending Institution (as indicated in the course catalogue)	Semester [e.g. autumn/spring; term]	Number of ECTS credits (or equivalent) to be recognised by the Sending Institution
Total:			
Provisions applying if the student does not complete successfully some educational components: [web link to the relevant information]			

Commitment

By signing this document, the student, the Sending Institution and the Receiving Institution confirm that they approve the Learning Agreement and that they will comply with all the arrangements agreed by all parties. Sending and Receiving Institutions undertake to apply all the principles of the Erasmus Charter for Higher Education relating to mobility for studies (or the principles agreed in the Inter-Institutional Agreement for institutions located in Partner Countries). The Beneficiary Institution and the student should also commit to what is set out in the Erasmus+ grant agreement. The Receiving Institution confirms that the educational components listed in Table A are in line with its course catalogue and should be available to the student. The Sending Institution commits to recognise all the credits or equivalent units gained at the Receiving Institution for the successfully completed educational components and to count them towards the student's degree as described in Table B. Any exceptions to this rule are documented in an annex of this Learning Agreement and agreed by all parties. The student and the Receiving Institution will communicate to the Sending Institution any problems or changes regarding the study programme, responsible persons and/or study period.



Student	Name		signature
	e-mail		
	Position	Student	
	Date		
Responsible person ^{viii} at the Sending Institution	Name	Josep Burillo Puig	signature
	e-mail	relacions.internacionals.fme@upc.edu	
	Position	Vice Dean of International Relations	
	Date		
Responsible person ^{ix} at the Receiving Institution	Name		signature
	e-mail		
	Position		
	Date		

ⁱ **Study cycle:** Short cycle (EQF level 5) / Bachelor or equivalent first cycle (EQF level 6) / Master or equivalent second cycle (EQF level 7) / Doctorate or equivalent third cycle (EQF level 8).

ⁱⁱ **Field of education:** The ISCED-F 2013 search tool available at http://ec.europa.eu/education/tools/isced-f_en.htm should be used to find the ISCED 2013 detailed field of education and training that is closest to the subject of the degree to be awarded to the student by the Sending Institution.

ⁱⁱⁱ **Contact person:** person who provides a link for administrative information and who, depending on the structure of the higher education institution, may be the departmental coordinator or works at the international relations office or equivalent body within the institution.

^{iv} An "**educational component**" is a self-contained and formal structured learning experience that features learning outcomes, credits and forms of assessment. Examples of educational components are a course, module, seminar, laboratory work, practical work, preparation/research for a thesis, mobility window or free electives.

^v **Course catalogue:** detailed, user-friendly and up-to-date information on the institution's learning environment that should be available to students before the mobility period and throughout their studies to enable them to make the right choices and use their time most efficiently. The information concerns, for example, the qualifications offered, the learning, teaching and assessment procedures, the level of programmes, the individual educational components and the learning resources. The Course Catalogue should include the names of people to contact, with information about how, when and where to contact them.

^{vi} **ECTS credits (or equivalent):** in countries where the "ECTS" system is not in place, in particular for institutions located in Partner Countries not participating in the Bologna process, "ECTS" needs to be



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replaced in the relevant tables by the name of the equivalent system that is used, and a web link to an explanation to the system should be added.

vii **Level of language competence:** a description of the European Language Levels (CEFR) is available at: <https://europass.cedefop.europa.eu/en/resources/european-language-levels-cefr>.

viii **Responsible person at the Sending Institution:** an academic who has the authority to approve the Learning Agreement, to exceptionally amend it when it is needed, as well as to guarantee full recognition of such programme on behalf of the responsible academic body. The name and email of the Responsible person must be filled in only in case it differs from that of the Contact person mentioned at the top of the document.

ix **Responsible person at the Receiving Institution:** the name and email of the Responsible person must be filled in only in case it differs from that of the Contact person mentioned at the top of the document.