ERASMUS MUNDUS JOINT MASTER DEGREE JOINT DIPLOMA SUPPLEMENT

Master RADMEP

STUDENT ID

FAMILY NAME *[as it appears on student passport]*	XXXX
GIVEN NAME/S *[as it appears on student passport]*	XXX
PASSPORT #	XXXX
FULL PERMANENT ADDRESS *[address of the student in home country]*	XXXX
EMAIL *[personal email]*	XXXXX
COUNTRY OF CITIZENSHIP *[citizenship chosen during application in case the student hold dual citizenship]*	XXXX
STATUS	Partner country
DATE OF BIRTH	XXXX

STUDENT AGREEMENT # XXXXXXXXXXXXXX

With the support of the Erasmus+ Programme of the European Union

UNIVERSITÉ JEAN MONNET SAINT-ÉTIENNE

JYVÄSKYLÄN YLIOPISTO UNIVERSITY OF JYVÄSKYLÄ

KU LEUVEN

UNIVERSITÉ DE MONTPELLIER

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A. QUALIFICATION

A.1. Name of qualification and title conferred (in original language)

The triple *Erasmus Mundus Joint Master RADMEP / Radiation and its Effects on MicroElectronics and Photonics Technologies* will be awarded after two years on the completion of 120 ECTS in three *Full Partner* universities (from semesters 1 to 3) and in one corporate partner (during semester 4) in accordance to grading and semester validation.

Successful completion of the *Erasmus Mundus Joint Master Degree Radiation and its Effects on MicroElectronics and Photonics Technologies* will result in the award of multiple Master degrees (i.e. three (3) national diplomas issued by three (3) Higher Education Institutions from three (3) European countries and fully recognized in these respective countries).

According to the concentration which has been chosen by the graduate, the consortium will deliver multiple diplomas from Jyväskylän yliopisto (JYU), Katholieke Universiteit Leuven (KU Leuven) and University Jean Monnet (UJM) (*specialization in Photonics*) OR Jyväskylän yliopisto (JYU), Katholieke Universiteit Leuven (KU Leuven) and University of Montpellier (UM) (*specialization in Microelectronics*).

Awarding Institution	National degrees awarded, official name in local language	National degrees awarded, legalized English translation
University Jean Monnet (UJM)	Master Optics, Image, Vision, Multimedia With the specialization “Radiation and its Effects on MicroElectronics and Photonics Technologies”	Master Optics, Image, Vision, Multimedia With the specialization “Radiation and its Effects on MicroElectronics and Photonics Technologies”
Jyväskylän yliopisto (JYU)	Filosofian maisteri	Master of Science
Katholieke Universiteit Leuven (KU Leuven)	Master of Science in Electronics and ICT Engineering Technology” with the specialisation “Radiation and its Effects on MicroElectronics and Photonics Technologies”	Master of Science in Electronics and ICT Engineering Technology” with the specialisation “Radiation and its Effects on MicroElectronics and Photonics Technologies”
University of Montpellier (UM)	Master Electronique, Electrotechnique et Automatique with the specialization « Radiation and Its Effects on Microelectronics and Photonics Technologies”	Master diploma “Electronic, Electrical Engineering and Automatic”, with the specialisation "Radiation Effects on Electronic Devices and Circuits".

A.2. Names and status of awarding institutions *(in original language)*

Université Jean Monnet – Saint-Etienne – France
Katholieke Universiteit Leuven – Leuven - Belgium
Jyväskylän yliopisto – Jyväskylä – Finland
Université de Montpellier – Montpellier – France

A.3. Awarding faculties

Faculté des Sciences et Techniques - Université Jean Monnet – Saint-Etienne – France
Faculteit industriele ingenieurswetenschappen – Katholieke Universiteit Leuven – Leuven – Belgium
Matemaattis-luonnontieteellinen tiedekunta – Jyväskylän yliopisto – Jyväskylä – Finland
Faculté des Sciences – Université de Montpellier – Montpellier – France

A.4. Main field(s) of study for the qualification
Physics / Electronic / Photonics / Engineering and Technology

A.5. Language(s) of instruction/examination

English

A.6. Information on the level of the qualification

Higher academic education, Master, Second cycle – master degree

A.7. Official length of the programme

The *Programme* is a 24 months (2 years), full-time Master of Science study programme and is awarded by 120 ECTS.

A.8. Entry requirements

The minimum entry requirements to be eligible for the EMJMD RADMEP *Programme* are set as following:

a. academic prerequisites
applicants must hold a bachelor of science (or any nationally recognized first cycle degree equivalent to 180 ECTS), preferably in the fields of electronics, photonics, physics. (While this condition must necessarily be fulfilled at the time

of enrolment, The *Academic and Management Board* accepts applications from *Students* in the last year of their higher education degree);
applicants must possess a solid academic background in the general fields of electronics, photonics, physics.

b. language requirements
The tuition language is English. *Students* are notably expected to produce a Master Thesis in English. A strong command of written and oral English is therefore requested. Applicants will have to demonstrate during application an English language proficiency equivalent to level B2 in the Common European Framework of Reference (CEFR).

A.9. Absence of discrimination and equal opportunities

No discrimination on the basis of nationality, gender, age, religion, health conditions.

B. PROGRAMME CONTENTS AND RESULTS GAINED

B.1. Programme objectives

The field of radiation effects on electronic and photonic components and systems is historically linked to space and nuclear power plants, for which radiation environments are particularly constraining. With technological integration, components and systems have become sensitive to the natural atmospheric environment. In the 1990s, the effect of atmospheric neutrons started to be considered in the development of aircraft electronics. The integration of electronic and photonic technologies continues to evolve, today it is the electronic systems at ground level that are sensitive to natural radiation (neutrons). Digital data storage has been an issue for some years now, and it is necessary to bury computers and data centers to protect them. In the context of the energy transition, where we are developing more electric aircraft, electric and autonomous mode of transportation, it is necessary to take this new constraint into account to ensure the reliability of the systems. The dismantling of nuclear power plants will require radiation-resistant optoelectronic and electronic systems, first to observe what needs to be dismantled and then to have the tools to dismantle the sites. Space is undergoing a revolution with the New Space, which consists in using commercial components to make satellites more intelligent and give them unequalled observation and analysis capacities, but which requires the reliability of these technologies, which were not originally intended for space. It will no longer be possible to develop an electronic or photonic system for which the safety of people is essential without recourse to the radiation analysis. of which the students trained by the RADMEP Master's degree will be capable.

A key feature of the RADMEP programme is its focus on advanced and emerging fields in photonics, microelectronics and radiation effects. Through this, students will obtain fundamental knowledge and experience in state-of-the art technologies, their radiation testing and optimization methods. Students will be trained to ◊ Applied Semiconductor Physics to improve their knowledge on the basics of microelectronics and optoelectronics, on ◊ Measuring Techniques; Electron, Photon and Ion Beams methods in Materials Sciences as well as ◊ Efficient Numerical Programming in order to understand how to measure and analyze the radiation responses of advanced technologies. The students will specifically learn about ◊ Radiation Environments and Challenges. Students will then deepen their knowledge and know-how in important aspects of electronics and photonics from theory to practical work in laboratories with world-class facilities and tools on the following topics: ◊ Analog CMOS, ◊ Digital and mixed chip signal, ◊ Optoelectronics or ◊ Basics of Photonics Technologies and Radiation Effects, advanced programming skills such as ◊ Big Data, or ◊ Machine learning will also be accessible to the students.

For the third semester, two different specializations will be offered to the RADMEP students. First one will focus its programme on Radiation Effects on Photonics technologies with units such as ◊ Laser Physics, ◊ Optical Engineering or ◊ Radiation effects on Advanced Photonic and Optoelectronic Technologies. Second one will be more oriented to radiation effects on microelectronics and advanced electronic technologies with courses like ◊ Radiation and Reliability of Electronics for Transport, Aerospace and Nuclear, ◊ Test and Reliability of Integrated Circuits and Systems. All students will then have the opportunity to develop their skills in ◊ Simulation tools for radiation matter interaction and radiation effects on materials, components and systems. RADMEP students will undertake a 6-months master thesis either in either an industrial, an agency or in a research center from the large RADMEP network of associate partners.

B.2. Learning Outcomes at Programme level

At the end of RADMEP Programme, students should be able to:

a) Apply knowledge of radiation effects, microelectronics and photonics fundamentals
b) Design and conduct experiments involving radiations, micro-nanotechnologies, photonic or optoelectronic technologies
c) Analyse and interpret data by data processing or other advanced intelligence methods
d) Identify, formulate and solve electronic or photonics problems
e) Design a system, component, or process to meet industrial needs
f) Have an ability to operate in multidisciplinary, multicultural and geographically spread teams
g) Understand the professional and ethical responsibility
h) Communicate effectively in oral, written and other media forms
i) Have a broad education necessary to understand the impact of science solutions in a global and societal context and to advance sustainability
j) Recognize the need to engage in lifelong learning and the ability to do so.

B.3. Programme structure

RADMEP is a two-year programme, composed of four semesters, consisting of a minimum of 120 ECTS credits, including the Master Thesis semester at the end of the course.

B.4. Common grading scale guidelines and correspondence

RADMEP grading system: (All marks: X/10) to assess performance for each unit module			RADMEP grading scale
1	Excellent - outstanding performance	X ≥9	A
2	Very Good - above the average standard but with some errors	8≤ X < 9	B
3	Good - generally sound work with a number of notable errors	7 ≤ X <8	C
4	Satisfactory - fair but with significant shortcomings	6 ≤ X < 7	D
5	Sufficient - performance meets the minimum criteria	5 ≤ X < 6	E
6	Fail - some more work required before the credit can be awarded	4 ≤ X < 5	FX
7	Fail - considerable further work is required	0 ≤ X < 4	F

Grade equivalence between University Jean Monnet institutional grading system and RADMEP grading system

University Jean Monnet grading system: (All marks: X/20) to assess performance for each unit module			RADMEP grading scale
1	Excellent – *Très bien*	X ≥16	A
2	Very Good - *Très bien*	14≤ X < 16	B
3	Good - *Bien*	12 ≤ X <14	C
4	Satisfactory – *Assez Bien*	11 ≤ X < 12	D
5	Sufficient - *Passable*	10 ≤ X < 11	E
6	Fail - *Echec*	X < 10	F

Grade equivalence between University of Montpellier (UM) institutional grading system and RADMEP grading system

University of Montpellier grading system: (All marks: X/20) to assess performance for each unit module			RADMEP grading scale
1	Excellent – *Très bien*	X ≥16	A
2	Very Good - *Très bien*	14≤ X < 16	B
3	Good - *Bien*	12 ≤ X <14	C
4	Satisfactory – *Assez Bien*	11 ≤ X < 12	D
5	Sufficient - *Passable*	10 ≤ X < 11	E
6	Fail - *Echec*	X < 10	F

Grade equivalence between University of Jyväskylä (JYU) institutional grading system and RADMEP grading system

University of University of Jyväskylä (JYU) grading system: (All marks: X/5) to assess performance for each unit module			RADMEP grading scale
1	Excellent - *Erinomainen*	5	A
2	Very Good - *Kiitettava*	4	B
3	Good - *Hyva*	3	C
4	Satisfactory - *Tyydyttava*	2	D
5	Sufficient - *Valttava*	1	E
6	Fail - *Hylatty*	0	FX
7	Fail - *Hylatty*	0	F

Grade equivalence between Katholieke Universiteit Leuven (KUL) institutional grading system and RADMEP grading system

Katholieke Universiteit Leuven (KU Leuven) grading system: (All marks: X/20) to assess performance for each unit module			RADMEP grading scale
1	Excellent – *Très bien*	X ≥16	A
2	Very Good - *Très bien*	14≤ X < 16	B
3	Good - *Bien*	12 ≤ X <14	C
4	Satisfactory – *Assez Bien*	11 ≤ X < 12	D
5	Sufficient - *Passable*	10 ≤ X < 11	E
6	Fail - *Echec*	X < 10	F

C. INDIVIDUAL PROGRAMME DETAILS

C.1. Mobility track of the student

Semester 1	University of Jyväskylä	Finland
Semester 2	Katholieke Universiteit Leuven (KU Leuven)	Belgium
Semester 3	To be adapted to each student's case	To be adapted to each student's case
Semester 4	To be adapted to each student's case	To be adapted to each student's case

C.2. Transcript

Semester 1		**Grade obtained**
Hosting Institution	University of Jyväskylä	
Learning rationale	Develop skills and competencies in semiconductor physics, radiation testing, radiation matter interactions	
Core Teaching Modules	**= 30 ECTS**	
Mandatory courses	**= 22 ECTS**	
Applied Semiconductor Physics	5 ECTS	Grade
Electron, Photon and Ion Beam Methods in Materials Science	5 ECTS	Grade
Measuring Techniques	5 ECTS	Grade
Numerical Methods in Physics	4 ECTS	Grade
Workshop #1: Basics of Radiation Environments and Challenges related to radiation effects	3 ECTS	Grade
Elective units	**= 8 ECTS**	
Electronics part A	4 ECTS	Grade if selected
Electronics part B	4 ECTS	Grade if selected
Electronics Workshop	2 ECTS	Grade if selected
Nuclear Physics	8 ECTS	Grade if selected
Fission and its applications	5 ECTS	Grade if selected
Systematic Information Seeking	1 ECTS	Grade if selected
Creating Careers	1 ECTS	
Optional courses	**Extra ECTS granted**	
Survival Finnish	2 ECTS	Grade if selected
Each-one teach-one (Finnish)	3 ECTS	Grade if selected

E-Learning Module: Academic Reading / Supplementary Module	2 ECTS	Grade if selected
E-Learning Module: Academic Vocabulary	2 ECTS	Grade if selected
E-Learning Module: Grammar for Writing	2 ECTS	Grade if selected
Semester 2		
Hosting Institution	Katholieke Universiteit Leuven (KU Leuven)	
Learning rationale	Develop skills and competencies in microelectronics and optoelectronics, radiation effects	
Core Teaching Modules	**= 30 ECTS**	
Mandatory courses	**= 22 ECTS**	
Analog CMOS design	3 ECTS	Grade
Embedded Systems	5 ECTS	Grade
Ethics	1 ECTS	Grade
Digital chip design	4 ECTS	Grade
Analog and mixed signal chip design and image sensors	6 ECTS	Grade
Workshop #2: Basics of Photonics Technologies and Their use in Harsh Environments	3ECTS	Grade
Elective units	**= 8 ECTS at least**	
Machine learning	4 ECTS	Grade if selected
Big Data	4 ECTS	Grade if selected
Radiation to electronics project	4 ECTS	Grade if selected
RF and PLL design	4 ECTS	Grade if selected
Digital Signal Processing	4 ECTS	Grade if selected
Optional courses	**Extra ECTS granted**	
Survival Dutch	3 ECTS	Grade if selected
Semester 3		
Hosting Institution	University Jean Monnet (UJM)	
Learning rationale	Specialization in *Photonics*	
Core Teaching Modules	**= 30 ECTS**	
Mandatory courses	**= 22 ECTS**	
Laser Physics	4 ECTS	Grade
Optical Engineering	2 ECTS	Grade
Advanced Photonic and Optoelectronic Technologies	5 ECTS	Grade
Radiation Effects on Photonic & Optoelectronic Technologies	5 ECTS	Grade
Photonics Labs	3 ECTS	Grade
Workshop #3: Simulation tools for Radiation-Matter Interaction and radiation effects on materials, components and systems	3 ECTS	Grade
Elective units	**= 8 ECTS**	
Digital Innovation and Entrepreneurship	5 ECTS	Grade if selected
Scientific Methodology & Project management	3 ECTS	Grade if selected
Analytical Instrumentation for Detection	3 ECTS	Grade if selected
Radiation to photonics project	2 ECTS	Grade if selected
Extra credits:		
French language and culture	2 ECTS	Grade if selected
Scientific Methodology and Project management	3 ECTS	Grade if selected
Digital Innovation and Entrepreneurship	5 ECTS	Grade if selected
Analytical Instrumentation for Detection	3 ECTS	Grade if selected

Radiation to photonics project	2 ECTS	Grade if selected
Extra credits:		
French language and culture	2 ECTS	Grade if selected
Semester 4 (Master Thesis)		

The individual grades/marks/credits obtained are also available on the official transcripts from each awarding University.

C.3. Title of Master Thesis

To be adapted to each student's case

C.4. Master Thesis hosting institution

To be adapted to each student's case

C.5. Master Thesis Jury

To be adapted to each student's case

C.6. Student distinction

Overall grade	Master's	XX
Student distinction		XX
Ranking		XX

C.7. Proclamation date

Xth of September 20XX

D. CONTACTS

D.1. Web site of the Erasmus+ EMJMD RADMEP

https://master-radmep.org/

D.2. Web site of the four universities:

University Jean Monnet	http://portail.univ-st-etienne.fr/
University of Jyväskylä	https://www.jyu.fi/en
Katholieke Universiteit Leuven	https://www.kuleuven.be/lang/fr
University of Montpellier	https://www.umontpellier.fr/

D.3. Contact addresses

If you need further information on the E+EMJMD RADMEP or national degree, please contact:

E+EMJMD	https://master-radmep.org/
University Jean Monnet	Université Jean Monnet, Faculty of Science, 18 rue Lauras, F-42000 Saint-Etienne, France ; Tel: +33 4 77 91 57 30, Fax : +33 4 77 91 57 26
University of Jyväskylä	Faculty of Mathematics and Science Postal address: PO Box 35, FI-40014 University of Jyväskylä Street address: Survontie 9 C, Ylistönrinne, Building YK Tel. +358 14 260 1211
Katholieke Universiteit Leuven	Celestijnen 200H - box 2100 3001 Leuven (Heverlee) info.wet@kuleuven.be.
University of Montpellier	Campus Triolet Place Eugène Bataillon – CC437 34095 Montpellier cedex 5 Tél. : +33 (0)4 67 14 30 30 fds.communication@umontpellier.fr

E. CERTIFICATION

UNIVERSITY JEAN MONNET SAINT ETIENNE (FRANCE) | UNIVERSITY OF JYVÄSKYLÄ (FINLAND) | KATHOLIEKE UNIVERSITEIT LEUVEN (BELGIUM) | UNIVERSITY OF MONTPELLIER (FRANCE)

Represented for the purposes of signatures of this Certificate of Admission by

PROF. SYLVAIN GIRARD

RADMEP
ACADEMIC COORDINATOR
UNIVERSITY JEAN MONNET

DATE

SIGNATURE

PROF.MARILYN BEAUCHAUD

DEAN OF THE
FACULTY OF SCIENCE AND TECHNOLOGY
UNIVERSITY JEAN MONNET

DATE

SIGNATURE