iPSRS

Intelligent Photonics for Security Reliability Sustainability & Safety

Erasmus Mundus Joint Master Degree 2019-2025

In the process of applying to become an **Erasmus Mundus Joint Master (EMJM)** from 2024 to 2030

European Master

INTELLIGENT PHOTONICS FOR SECURITY RELIABILITY SUSTAINABILITY AND SAFETY

Combining Photonics and Artificial Intelligence

Université Jean Monnet Saint-Étienne

UNIVERSITY OF EASTERN FINLAND

Vilnius University

UPEC Connaissance - Action | UNIVERSITÉ PARIS-EST CRÉTEIL VAL DE MARNE

https://www.master-photonics4security.eu/

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

in the process of applying for the renewal of the EU funding to pursue as an Erasmus Mundus Joint Master (EMJM)

PSRS

Erasmus Mundus Joint Master degree
Photonics for Security Reliability and Safety

iPSRS

Intelligent Photonics for Security Reliability Sustainability & Safety

EMJMD 2019-2025 **A new enhanced Master programme** 2024-2030 → EMJM

Core courses and lab sessions in
photonics, geometrical & physical optics, laser physics, material science
and
programming, image processing and analysis

New courses on professional skills including resources, energy and environmental impact + project management

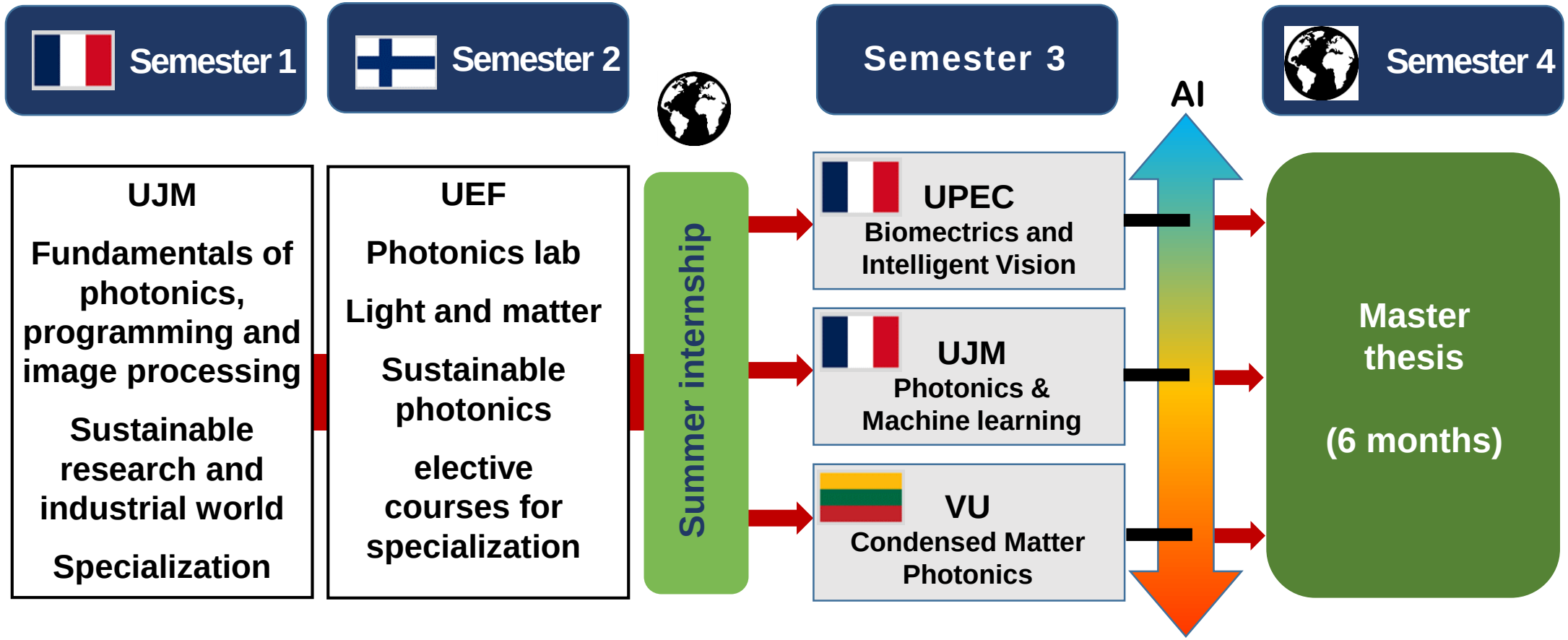
Specialization fields with some new courses in

- Biometry and intelligent vision, machine learning, computer vision, AI, VR, AR
- Micro-nano-photonics, quantum optics, deep learning, laser processing, advanced image processing and analysis
- Semiconductor optics, advanced microscopy, new materials and technologies, data analysis

iPSRS - Mobility Scheme

Discover intelligent photonics applications
Build your technical and soft skills set

Diversification, specialization, and personalisation
Find your niche, launch your career



iPSRS

Intelligent Photonics for Security Reliability Sustainability & Safety

The **iPSRS Erasmus Mundus Joint Master programme** aims to train highly skilled experts in Photonics and Artificial Intelligence. These adept professionals will play a pivotal role in advancing the next generation of intelligent systems based on photonics.

Rooted in the legacy of the successful PSRS master program, iPSRS seamlessly integrates the latest technological advancements with a keen understanding of rapidly evolving societal expectations. This innovative program reflects a commitment to staying at the forefront of progress, addressing contemporary challenges, and shaping the future of Photonics and Artificial Intelligence.

The iPSRS program is crafted and operated by a European academic consortium comprising four prominent universities. Like the PSRS consortium, the iPSRS consortium benefits from a diverse network of academic and industrial partners worldwide, consolidating its global impact.

During this two-year (120 ECTS) Erasmus Mundus Joint Master, our students will develop skills in **physical and quantum optics**, **cutting-edge image processing**, **computational imaging**, **deep learning**, **biometrics**, **pattern recognition**, **behavioral analysis**, **spectroscopy techniques**, **advanced optical characterizations**, **micro-nano-technologies**, **laser processing, semiconductor optics, material science, light-matter interaction,** to address the current and future societal challenges related to security and safety of people, reliability of goods and sustainable technologies.

Fostering European excellence in higher education

in the realm of

Photonics, Micro-nano-technologies and Artificial Intelligence

to meet the

global markets of

Virtual worlds and near-to-eye displays
Advanced imaging technologies
Precision micromachining
Surface functionalization
Additive fabrication
Laser processing
Intelligent vision
Laser sources
Night vision
Automotive
…

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Secured communications
Forestry management
Knowledge from data
Security documents
Photonic sensors
Health industry
Space industry
Food industry
Biometrics
Metrology
…

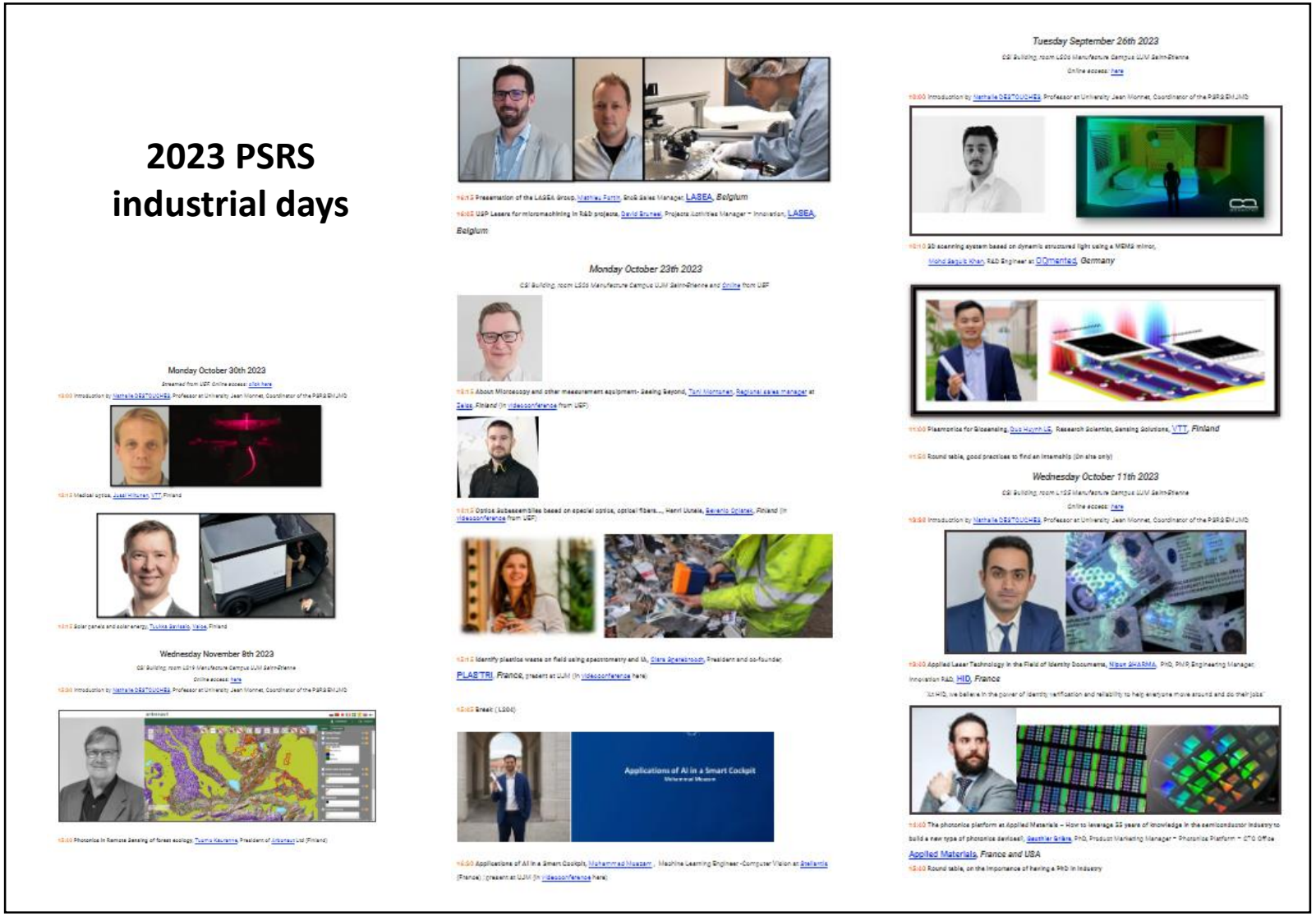
Industrial partner – student interactions

We communicate on the iPSRS website and the social networks

Seminars by industrial partners

Connecting our students with our industrial partners and learning about the latest R&D projects in applied photonics

2023 PSRS industrial days



Monday October 30th 2023

Wednesday November 8th 2023

Monday October 23th 2023

Tuesday September 26th 2023

Wednesday October 11th 2023

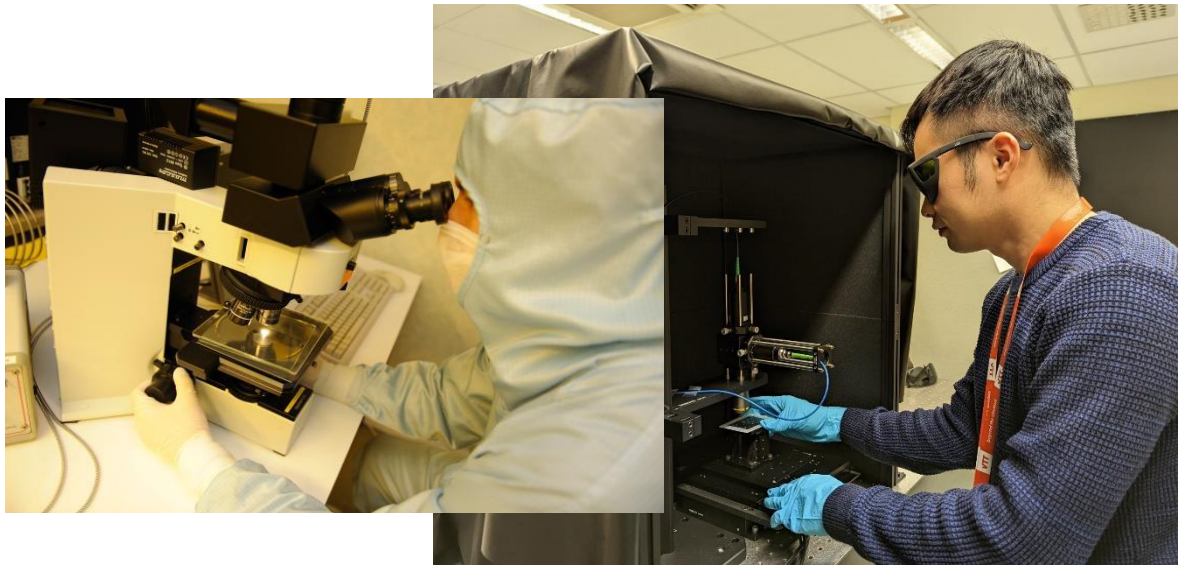
Industrial partner – student interactions

Lectures by industrial partners

2h to 8h courses to explain a topic in detail

Industrial partner – student interactions

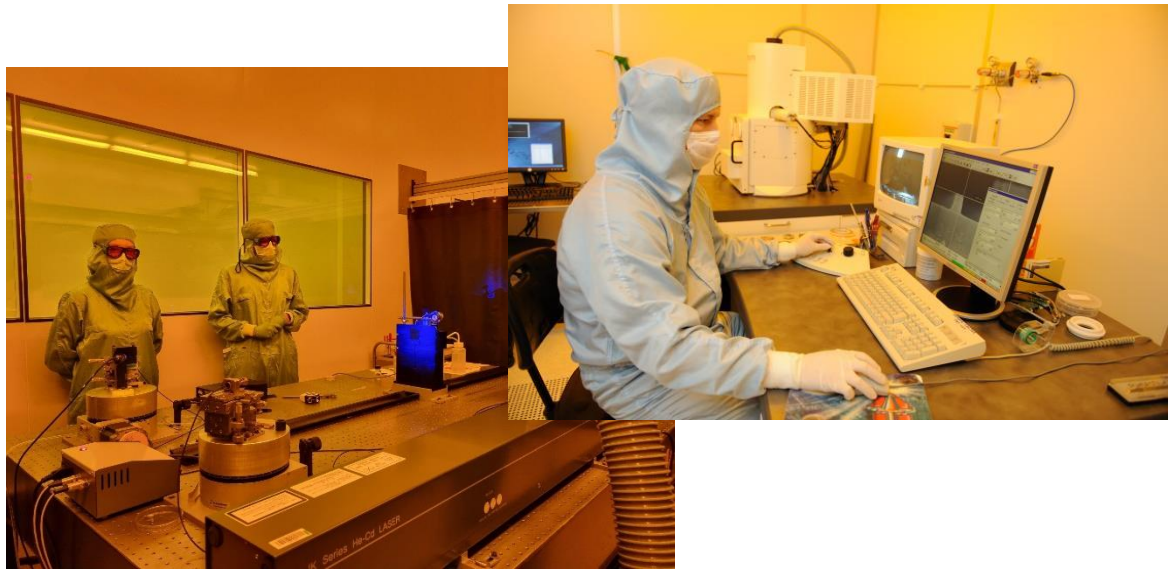
Collaborative International Online Learning project



UJM, UPEC and VU identify, with an industrial partner, a project requiring skills covering a large part of the curriculum in each institution, to be developed during the entire semester 3, in multiple phases.

Groups are formed among the students, including students from the three concentration tracks.

The different groups are in competition to find the best solution to the problem using skills specifically taught in the three institutions



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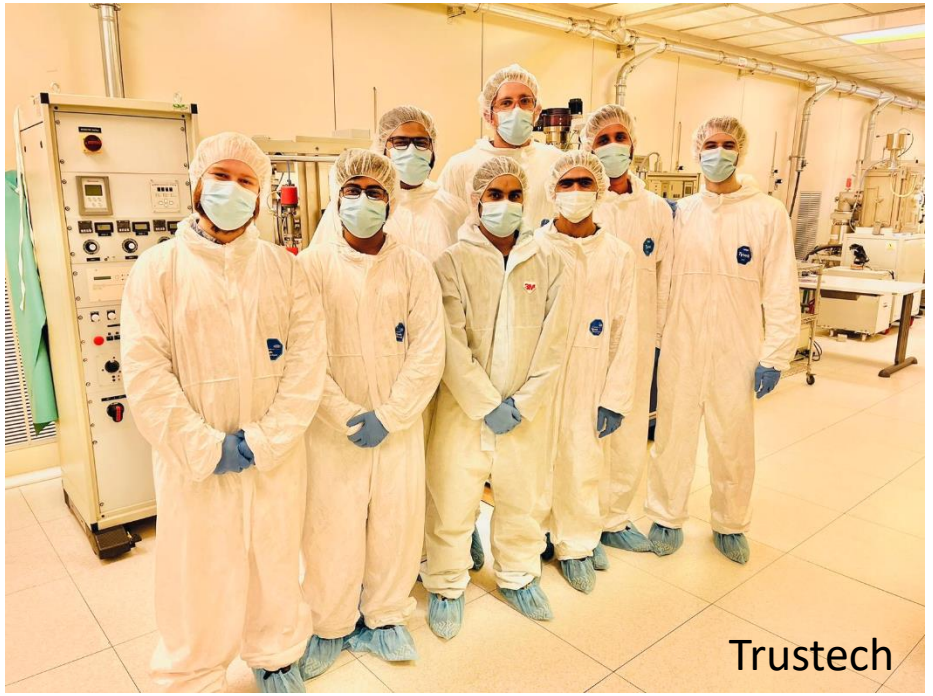
Industrial partner – student interactions

Group company visit



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Industrial partner – student interactions

Internships

3-month internship at the end of the first year
6-month master thesis at the end of the second year

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Research associated to the Master programme

MANUTECH SLEIGHT
Université de Lyon
GRADUATE SCHOOL - SURFACES LIGHT ENGINEERING HEALTH & SOCIETY

PHOTONICS CENTER

CENTER FOR PHOTONICS SCIENCES
(Formerly Institute of Photonics)

LiSSi
Laboratoire Images, Signaux et Systèmes Intelligents

Curriculum – 1st semester (all students)

Semester 1	**30**
Major Units	20
Physical and Fourier Optics	**5**
Physical and Fourier Optics	3
Digital Holography: numerical simulation and reconstruction (Python)	2
Scientist of Tomorrow	**5**
Industrial and Research Days	1
Energy and environnement	2
Scientific Methodology and project management	2
Digital Image Processing and Analysis	**5**
Algorithmic and Programming (Python)	**5**
Elective courses - select among the following	10+
Lasers	**5**
Laser physics	4
Fiber lasers	1
Digital Innovation and Entrepreneurship	**5**
Introduction to guided optics	**2**
Scientific Computing with Python	**2**
Optical Engineering	**3**
Data Analysis	**6**
Optional extra-credits: French or English language and culture	2

Curriculum – 2nd semester (all students)

Semester 2	**30**
Major Units	17
Photonics Laboratory	**8**
Electricity and Laster Safety	
Advanced Laboratory Measurements (24h)	
Working skills in Optics Laboratory (12h)	
Four Laboratory practices	
Light and Matter	**4**
Course on Energy and Environment	**5**
Elective courses - select among the following	13+
Materials Physics	**4**
Micro- and nanophotonics	**4**
Color Science	**4**
Basics of Signal and Image Processing	**5**
Commercializing high-tech (only odd years)	**4**
Advanced Biomedical Optics (only even years)	**4**
Optical Design: Geometrical Optics	**4**
Components for Optical Telecommunications	**4**
Display Technologies	**5**
Optional extra-credits:	
Finnish language	2
Participation in a scientific workshop/conference/event	1-3
Summer internship (3 months) *	5

Curriculum – 3rd semester (~1/3 of students)

Semester 3 at University Jean Monnet	**30**
Major Units	20
Micro-nanophotonics 2	**6**
Electromagnetic modeling of micro-nano-structured surfaces	3
Nanoplasmonics	2
Applications of micro-nano-photonics	1
Advanced Photonics	**5**
Non-linear optics	2
Quantum light sources for secure communications in photonics	3
Deep Learning and applications to nano-photonics	**5**
COIL Project (collaborative, online, international learning project with students from UPEC & VU)	4
Elective courses - select among the following	10+
Environmental Remote Sensing	**5**
Laser Processing & Laser Characterization	**6**
Laser processes for material structuring	2
Temporal and spatial shaping of the laser pulse	1
Analytical instrumentation	3
Image-based Security	**5**
Color reproduction	1
Security printing project	1
Security printing	2
Visual cryptography	1
Color and spectral Imaging	**5**
Advanced image processing	**5**
Markovian models	2
Deconvolution	3
Optional extra-credits: French or English Language and Culture	2

Curriculum – 3rd semester (~1/3 of students)

Semester 3 at University Paris-Est Créteil	**30**
Major Units	30
Biometrics II	**6**
Computer Vision and Machine Learning	**6**
Artificial Intelligence and Innovation Workshop	**6**
Research and professional culture	**3**
Emerging technologies: Virtual and Augmented Reality	**3**
Project III	**6**
Local project	2
COIL project with students from UJM & VU	4
Optional extra-credits: French Language and Culture	2
Software integration	6
French Language and Cluture	2

Curriculum – 3rd semester (~1/3 of students)

Semester 3 at Vilnius University	**30+**
Major Units	20
Renewable energy solutions	**5**
Scientific Project	**10**
Research activities	6
COIL project with students from UPEC & UJM	4
Semiconductor Optics	**5**
Elective courses - select among the following:	10+
Advanced methods of microscopy	**5**
New materials and technologies	**5**
Methods of data analysis	**5**
Technologies of organic optoelectronics	**5**
Solid-state lighting technology	**5**
Physics and technology of disordered materials	**5**
Extra-credits: Lithuanian Language and Culture	2
Participation in a scientific conference/event (optional, in connection with the the compulsory couse Scientific Project course)	2

Tuition fees and scholarships

The PSRS EMJMD programme has been supported by funding from the European Union spanning from 2019 to 2025. Currently, the consortium is in the process of seeking the renewal of this European funding. Should this renewal be successful, the iPSRS programme will attain the status of an EMJM (Erasmus Mundus Joint Master) and will have the capacity to bestow EMJM scholarships upon students in the 2024-2026 cohort.

In anticipation of the results for the next EMJM programme, set to be announced in July 2024, the PSRS programme has earmarked exceptional resources for consortium scholarships in 2024 and 2025. These resources are intended to ensure that every outstanding student has access to a substantial stipend, covering both living, travel and study expenses while in Europe, eliminating the need for additional personal financial support.

The PSRS EMJMD program retains its Erasmus Mundus Joint Master Degree label for the next 3 cohorts, with the intention of being renewed as an EMJM.

The top students, selected from the main list, in the 2024-2026 cohort will receive a Consortium Scholarship until the results of the next EMJM program are announced. They will automatically transition to an EMJM scholarship in case of program success.

Among the students accepted from the reserve list in the 2024-2026 cohort, who receive a substantial fee waiver but no Consortium Scholarship, the best performers will be automatically upgraded to Consortium Scholarships, replacing those on the main list who no longer require them.

The scholarship policy is now simplified and is no longer tied to the student's place of origin.

Tuition fees and scholarships

CASE 1 : 2024-2026 SCHOLARSHIPS IF PSRS IS AWARDED NEW FUNDING BY THE EUROPEAN UNION IN 2024

Funding organization	Allocated scholarship for 2 years	Tuitions fees for 2 years	Origin of students
European Commission ERASMUS MUNDUS	Scholarships of 33,600 € EMJM Scholarship (1400€ / month)	0€ 100% fee waivers offered by the PSRS consortium	For students from all nationalities
iPSRS Intelligent Photonics for Security Reliability Sustainability & Safety	Scholarships of 22,000 € PSRS consortium scholarship	0€ 100% fee waivers offered by the PSRS consortium	For students from all nationalities
MANUTECH SLEIGHT Université de Lyon	5,000 € in M1 and/or 5,000 € in M2 MANUTECH SLEIGHT Graduate School scholarship	0€ 100% fee waivers offered by the PSRS consortium	For students from all nationalities who choose their concentration at UJM in semesters 3&4
iPSRS Intelligent Photonics for Security Reliability Sustainability & Safety		0€ 100% fee waivers offered by the PSRS consortium	For students from all nationalities

Tuition fees and scholarships

CASE 2 : 2024-2026 SCHOLARSHIPS IF PSRS DOES NOT OBTAIN NEW FUNDING IN 2024

Funding organization	Allocated scholarship for 2 years	Tuitions fees for 2 years	Origin of students
iPSRS Intelligent Photonics for Security Reliability Sustainability & Safety	Scholarships of 22,000 € PSRS consortium scholarship	2,000 € equivalent to 90% fee waivers offered by the PSRS consortium	For students from all nationalities
MANUTECH SLEIGHT Université de Lyon	5,000 € in M1 and/or 5,000 € in M2 MANUTECH SLEIGHT Graduate School scholarship	2,000 € equivalent to 90% fee waivers offered by the PSRS consortium	For students from all nationalities who choose their concentration at UJM in semesters 3&4
iPSRS Intelligent Photonics for Security Reliability Sustainability & Safety	0 €	2,000 € equivalent to 90% fee waivers offered by the PSRS consortium	For students from all nationalities

Awarded degrees

Université Jean Monnet Saint-Étienne

Master of science diploma in Optics, Image, Vision, Multimedia with specialization in Intelligent Photonics for Security Reliability Sustainability and Safety

UNIVERSITY OF EASTERN FINLAND

Master of Science in Photonics

Université Jean Monnet Saint-Étienne

University Diploma 'Photonics for Security, Reliability and Safety' on behalf of the iPSRS consortium

UPEC UNIVERSITÉ PARIS-EST CRÉTEIL VAL DE MARNE

Master of Science diploma “Optics, Image, Vision, Multimedia with the specialization “Biometrics and Intelligent Vision”

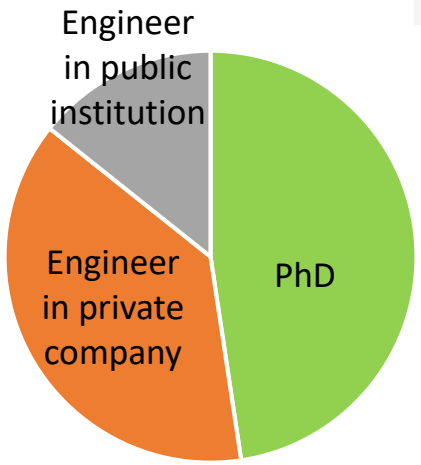
Vilnius University

Master of Technological Sciences “Materials Technology”

Career opportunities: our alumni

10 students graduated in 2022, 16 in 2023, they are now employed at ….

Public Institutions	Private companies
Montanuniversität Leoben	Wolt
Institut des Sciences Moléculaires d'Orsay	Oqmented (2)
Technical University of Eindhoven	Focally
University of Helsinki	STMicroelectronics
Ghent University	Fractile
IEMN	Carl Zeiss AG
University of Stuttgart	Stellantis
University of Oulu	The QA Company
VTT Technical Research Centre of Finland Ltd	LioniX International
University of Eastern Finland (2)	
Northeastern University, Boston	
Denmark Technical University	
University of Groningen	



Apply to iPSRS

Application deadline: February 6th 2024

Students must apply **at least 1 week before the deadline** to allow their referees to upload their recommendation letters before the application deadline. The referees will receive a personal link by email to upload their letter

Find all the information to apply on our website: https://www.master-photonics4security.eu/

Submission of the application files: https://international-sciencemasters.univ-st-etienne.fr/login

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

We are pleased to invite you to be part of our network !

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