



Master Optique, Image, Vision, Multimédia Parcours Computational cOLOUR and Spectral Imaging (COSI)

Diplôme Master ERASMUS+
Domaine d'étude Sciences, Technologies, Santé
Mention Optique, Image, Vision, Multimédia
Parcours Computational cOLOUR and Spectral Imaging (COSI)

Objectifs

L'Erasmus Mundus Joint Master Degree COSI offre un programme de formation interdisciplinaire et innovant dans les domaines combinant l'imagerie colorée et spectrale avec la science avancée des données.

Le programme COSI forme la prochaine génération d'experts industriels hautement qualifiés en science appliquée de la couleur, dans diverses industries de pointe (photonique, optique, imagerie spectrale, technologies multimédias, infographie et vision) dans des secteurs variés, notamment le multimédia, les soins de santé, les cosmétiques, l'automobile et l'agroalimentaire.

Les compétences de COSI sont très recherchées dans un large éventail de secteurs où l'évolution continue des domaines de la R&D nécessite des cours adaptés et extrêmement spécialisés, fortement axés sur les applications industrielles et les tendances récentes dans divers domaines de recherche. Grâce à des bourses d'études compétitives, nous espérons recruter d'excellents étudiants issus de différents milieux éducatifs dans le monde entier. L'ensemble du cursus est entièrement enseigné en anglais, mais les étudiants acquerront également des compétences multiculturelles ainsi que d'autres compétences transversales. Les étudiants de COSI recevront une éducation spécialisée très bien adaptée à leur parcours, à leurs intérêts et à leurs futurs plans de carrière.

English

The COSI Erasmus Mundus Joint Master Degree provides an interdisciplinary and innovative training program in a specialised field combining colour and spectral imaging with advanced data science.

The COSI programme trains the next generation of highly-skilled industrial experts in applied colour science, in various cutting-edge industries (photonics, optics, spectral imaging, multimedia technologies, computer graphics and vision) in a diverse range of sectors including multimedia, health care, cosmetics, automotive and agro-food.

COSI competence is highly sought after in a wide range of sectors where the continued evolution of R&D fields requires adapted and extremely specialized courses with a strong focus on industrial applications and recent trends in various research areas. With competitive scholarships available we expect to recruit excellent students from various educational backgrounds worldwide. The whole curriculum is entirely taught in English, but students will also gain multicultural skills as well as other transversal skills. COSI students will receive a specialized education very well adapted to their background, interests, and future career plans.

Pour qui ?

Conditions d'admission

Les candidats doivent être titulaires d'une Licence (ou tout autre diplôme de premier cycle reconnu au niveau national et équivalent à 180 ECTS), dans le domaine de l'informatique, de l'optique, de la physique, des mathématiques, du traitement du signal, de l'électronique, ou de la psychologie cognitive. Les candidats doivent avoir suivi au moins 5 ECTS de cours de niveau universitaire sur un langage de programmation - d'autres cours suivis en dehors de l'université peuvent être pris en considération au cas par cas - et au moins 5 ECTS en mathématiques. Les candidats doivent de préférence avoir des compétences en traitement d'images, en imagerie, en science des couleurs, en photonique, en vision, en infographie, en vision par ordinateur, en apprentissage automatique, ou justifier d'une expérience dans des domaines connexes.

Connaissance de l'anglais : Test TOEFL avec un score minimum de 90 points, test IELTS avec un score minimum de la bande 6.5, test de langue de Pearson avec un score d'au moins 62 points, Cambridge Advance Language Test, documentation attestant qu'ils atteignent le niveau B2 du CECR.

Applicants must hold a Bachelor degree from an accredited institution in the topic of computer science, optics, physics, mathematics, signal processing, electronics, cognitive psychology, or other relevant adequate education. Applicants must have completed at least 5 ECTS university level course on any programming language – other courses completed outside the University may be considered on an individual basis-, and at least 5 ECTS in mathematics. Applicants should preferably have skills on image processing, imaging, colour science, photonics, vision, computer graphics, computer vision, machine learning, or justify of an experience in related fields.

Knowledge of English: TOEFL-test (min. 90 pts) IELTS-test (6.5), Pearson's language test (min.62 pts), Cambridge Advanced Language Test (min. B2).

Et après ?



Poursuites d'études

Le parcours COSI est conçu pour répondre aux besoins et aux défis des industries. Il ouvre également sur des opportunités de carrières internationales et stimulantes, puisque le besoin de diplômés experts en sciences des données, en informatique, et en sciences des couleurs et des images est croissant sur le marché international du travail. Les étudiants ont l'opportunité de poursuivre leurs études en doctorat.

COSI opens up for international and challenging career opportunities. The demand for postgraduates in photonics and microelectronics in radiated environments as well as basic and applied research is high on the international job market. Postgraduates will be qualified to work in any company as data scientists and engineers, computer vision engineers, colours science engineers or researchers image science engineers or software engineers. This master programme also qualifies the postgraduate for PhD studies

Programme

YEAR 1

SEMESTER 7 - Norwegian University of Science and Technology (NTNU) - From September to December

Minimum of **30 ECTS** from the following courses

| Compulsory courses - 30 credits | Credits | Syllabus | Instructor |
|---|---------|----------|---|
| Computer graphics fundamentals and applications | 7.5 | | |
| Cross-media colour reproduction | 7.5 | Syllabus | Prof. Phil Green |
| Deep learning for visual computing | 7.5 | Syllabus | Hao Wang |
| Introduction to research on colour and visual computing | 7.5 | Syllabus | Peter Nussbaum |
| Technical compulsory unit | | | |
| Seminar series: programming course, MATLAB and Python / Research communication, incl. LaTeX. / Research ethics / Optics | No ECTS | | Coordinated by Prof. Jean-Baptiste Thomas |

| Optional Courses - extra credits | Credits | Syllabus | Instructor |
|--|---------|----------|------------|
| Norwegian language and culture | 5 | | |

SEMESTER 8 - From January to June**Track at University Jean Monnet (UJM)**Minimum of **30 ECTS** from the following courses

| Compulsory courses - 20 credits | Credits | Syllabus | Instructor |
|--|----------------|-----------------|---|
| Advanced image processing | 5 | Syllabus | Ass Prof. Hubert Konik and Ass Prof. Damien Muselet |
| 3D models in computer vision | 5 | Syllabus | Prof. Alain Trémeau |
| Light matter interaction and materials appearance: from physics to virtual reality | 5 | Syllabus | Prof. Alain Trémeau |
| From Statistics to data mining | 5 | | |

| Elective courses - min. 10 credits | Credits | Syllabus | Instructor |
|---|----------------|-----------------|--------------------------|
| Research methodology and projects management | 5 | Syllabus | Prof. Alain Trémeau |
| Digital Innovation and Entrepreneurship | 5 | | |
| Pattern recognition | 5 | | |
| Real Time 3D Visualization | 5 | Syllabus | Prof. Philippe Colantoni |
| French Language and Culture | 2 | | CILEC |

Track at Universidad de Granada (UGR)Minimum of **30 ECTS** from the following courses

| Compulsory courses - 15 ECTS | Credits | Syllabus | Instructor |
|---|----------------|-----------------|---|
| Advanced optoelectronics | 5 | | F.J. Gámiz |
| Computer vision | 5 | | N. Pérez de la Blanca |
| Advanced colour and spectral imaging | 5 | | J. Hernández / E. Valero / R. Huertas |

| Elective courses - min. 15 credits | Credits | Syllabus | Instructor |
|---|----------------|-----------------|--|
| Optical sensors | 5 | | C. Sampedro / A. Carrasco |
| Remote imaging and sensing | 5 | | F.J. Olmo |
| Data Science | 5 | | M. Lastra / F.J. Benítez |
| Advanced colour and image processing | 5 | | E. Valero / J.L. Nieves / M. Martínez |
| Human Perception and Cognition | 5 | | J.L. Nieves / R. Huertas / L. Gómez-Robledo |

| Optional courses - extra credits | Credits | Syllabus | Instructor |
|---|----------------|-----------------|--|
| Spanish Language and Culture | 5 | | Professors from the Centre for Modern Language (UGR) |

MANDATORY INTERNSHIP : Summer internship in July/August

YEAR 2

SEMESTER 9 - From August to December

Specialization in Computational Spectral Imaging - Track at University of Eastern Finland (UEF)Minimum of **30 ECTS** from the following courses

| Compulsory courses - 25 ECTS | Credits | Syllabus | Instructor |
|---|----------------|-----------------|-------------------|
| Applications on photonics | 5 | | |
| Advanced spectral imaging devices | 5 | | |
| Color science laboratory | 5 | | |
| Industrial group project | 5 | | |
| Advanced deep learning | 5 | | |

| Elective courses - min. 5 credits | Credits | Syllabus | Instructor |
|--|----------------|-----------------|-------------------|
| Optical metrology and fabrication | 5 | | |
| Location-aware mobile applications development | 5 | | |
| Other elective course upon eligibility | 5 | | |

| Optional courses - extra credits | Credits | Syllabus | Instructor |
|---|----------------|-----------------|-------------------|
|---|----------------|-----------------|-------------------|

| | | | |
|------------------|---|--|-----------------------|
| Finnish Language | 2 | | Language Centre (UEF) |
|------------------|---|--|-----------------------|

Specialization in Colour and Visual Computing - Track at Norwegian University of Science and Technology (NTNU)

Minimum of **30 ECTS** from the following courses

| Compulsory courses - 22.5 ECTS | Credits | Syllabus | Instructor |
|--|---------|--------------------------|----------------------|
| Specialisation in colour imaging | 7.5 | Syllabus | Jean-Baptiste Thomas |
| Specialisation in video processing | 7.5 | Syllabus | Faouzi Alaya Cheikh |
| Appearance, perception and measurement | 7.5 | | Phil Green |

| Elective courses - min. 7.5 credits | Credits | Syllabus | Instructor |
|---|---------|--------------------------|-------------|
| Advanced colour management | 7.5 | Syllabus | Phil Green |
| Advanced project work | 7.5 | Syllabus | Sony George |
| Other elective course upon eligibility | 7.5 | | Phil Green |

SEMESTER 10 - From January to August

MASTER'S THESIS

Coût de l'inscription

4500€

Détail coût d'inscription

4500€ / year for Programme Country Students

9000€ / year for Partner Country students

Scholarships available with the EU and the Manutech-SLEIGHT Graduate School

Self-funded students will be able to pay participation costs in three instalments.

Contact

Contact(s) scolarité

Master COSI

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