

Erasmus Mundus Master's Degree Programme Computational Colour and Spectral Imaging (COSI)

COSI Learning Outcomes

At the end of the COSI Programme (120 ECTS), the student should be able to:

- Describe and apply fundamental aspects of computational colour science and data science, optics and photonics, measurement systems and spectral technologies, digital imaging and computer vision, maths and computation;
- Implement and apply current colour and spectral technologies and other High-Tech devices used in digital imaging, demonstrating the ability to design and implement colour data processing algorithms;
- Calculate a range of colour quantities and image quality quantities, apply transforms, derive and implement colour and image metrics;
- Analyse colour technology and machine vision problems into components, construct solutions and design processing workflows;
- Model colour and digital image processes and predict a range of quantities including visual and psychometric response, colour appearance, perception of quality, spectral and colorimetric reproduction, 2D and 3D spatial models, display functions;
- Evaluate own and previous work from both theoretical, practical and application perspective

Curriculum

Each semester equals to 30 ECTS of degree studies. For the semester 2 and semester 3 there are two universities to choose.

Semester 1

Norwegian University of Science and Technology (NTNU)

Compulsory courses (30 ECTS):

- Computer graphics fundamentals and applications, 7.5 ECTS
- Cross-media colour reproduction, 7.5 ECTS
- Image Processing and Analysis, 7.5 ECTS
- Introduction to research on colour and visual computing, 7.5 ECTS

Technical compulsory unit

Mandatory to be at the level

Seminar series: programming course, MATLAB and Python / Research communication, incl. LaTeX. / Research ethics / Optics, No ECTS

Semester 2

University Jean Monnet (UJM), Specialization in Color image modelling and understanding

Compulsory courses (20 ECTS):

- Advanced image processing, 5 ECTS

- 3D models in computer vision, 5 ECTS
- Light matter interaction and materials appearance: from physics to virtual reality, 5 ECTS
- From Statistics to data mining, 5 ECTS

Elective units:

- Research methodology and projects management, 5 ECTS
- Digital Innovation and Entrepreneurship, 5 ECTS
- Pattern recognition, 5 ECTS
- Real Time 3D Visualization, 5 ECTS
- French Language and Culture, 2 ECTS

Semester 2

University of Granada (UGR), Specialization in Photonics, Image and Vision

Core teaching modules (30 ECTS)

Compulsory courses (15 ECTS):

- Advanced optoelectronics, 5 ECTS
- Computer vision, 5 ECTS
- Advanced Colour and Spectral Imaging, 5 ECTS

Elective units:

- Optical sensors, 5 ECTS
- Remote imaging and sensing, 5 ECTS
- Data Science, 5 ECTS
- Human Perception and Cognition, 5 ECTS

Semester 3

University of Eastern Finland (UEF), Specialization in Computational Spectral Imaging

Core teaching modules (30 ECTS)

Compulsory courses (25 ECTS):

- Applications on photonics, 4 ECTS
- Advanced spectral imaging, 5 ECTS
- Color science laboratory, 5 ECTS
- Industrial group project, 6 ECTS
- Advanced deep learning, 5 ECTS

Elective units

Elective advanced level courses upon eligibility, 5 ECTS

(Between semesters 2 and 3: Mandatory internship, no ECTS granted)

Semester 3

Norwegian University of Science and Technology (NTNU), Specialization in Colour and Visual Computing

Core teaching modules (30 ECTS)

Compulsory courses (22.5 ECTS):

- Specialisation in colour imaging, 7.5 ECTS
- Specialisation in video processing, 7.5 ECTS
- Appearance, perception and measurement, 7.5 ECTS

Elective units (Extra ECTS, 7.5 ECTS at least, students must take 2 courses at least)

- Advanced colour management, 7.5 ECTS
- Advanced project work, 7.5 ECTS
- Other elective course upon eligibility, 7.5 ECTS

Semester 4

Master Thesis 30 ECTS