

Course Specifications

From the academic year 2016-2017 up to and including the

Design of Multimedia Applications (E017920)

Course size (nominal values; actual values may depend on programme)

Credits 6.0 Study time 180 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2017-2018

A (semester 2)	English	lecture	30.0 h
		practicum	30.0 h
B (semester 2)	Dutch	guided self-study	30.0 h
		practicum	30.0 h

Lecturers in academic year 2017-2018

Lambert, Peter	TW06	lecturer-in-charge
Van Wallendael, Glenn	TW06	co-lecturer

Offered in the following programmes in 2017-2018

	crdts	offering
Bridging Programme Master of Science in Electrical Engineering (main subject Communication and Information Technology)	6	A
Bridging Programme Master of Science in Computer Science Engineering	6	B
Bridging Programme Master of Science in Computer Science Engineering	6	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	6	A
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	A
Master of Science in Computer Science Engineering	6	B
Master of Science in Computer Science Engineering	6	A

Teaching languages

Dutch, English

Keywords

Multimedia, design, coding, interactivity, adaptivity, standards, implementation aspects, applications

Position of the course

The main purpose of this course is to let the students familiarize with the most important concepts behind the design of multimedia applications. Moreover, the students will gain some experience with setting up multimedia applications, including integration of different subsystems.

Contents

- mathematical transformations as a basis for the compression of multimedia data (transform coding)
- from discrete Fourier transforms to discrete cosine transform
- Karhunen-Loève transforms

- wavelet transforms and filter banks
- lossless compression techniques for visual data
- block-based hybrid coding of visual data
- measuring image and video quality
 - objective vs. subjective distortion metrics / quality metrics
- standards for compression of multimedia data
 - still images, e.g., JPEG- & JPEG2000 suite
 - video, e.g., MPEG & ITU suite
- transmission aspects
 - error resilience and concealment
- design decisions & implementation aspects of complex & integrated multimedia applications
 - requirements of different components of multimedia applications
 - lossless vs. lossy compression & coding
 - compression quality vs. compression complexity
 - pros & cons of software vs. hardware implementations
 - pros & cons of using standardized solutions vs. proprietary solutions
 - ...
- design of concrete components of multimedia applications: computer exercises (specifically tailored to actual state-of-the-art technologies)

Initial competences

Programming in a high level programming language; basic knowledge communication networks

Final competences

- 1 to understand, know, and be able to apply mathematical transformations that form the basis for the encoding and compression of multimedia data
- 2 to understand and know current techniques for encoding multimedia data, and be able to implement (parts of) them
- 3 to understand and know the structure and functionality of standards for coding of multimedia data
- 4 to understand and know current techniques for error detection, resilience, and concealment, and be able to implement (parts of) them
- 5 to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Guided self-study, lecture, practicum

Learning materials and price

PowerPoint presentations

Book: David R. Bull, "Communicating Pictures: a course in image and video coding", Elsevier Academic Press

Price: 65 EUR

References

Course content-related study coaching

Evaluation methods

end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period

Oral examination

Examination methods in case of periodic evaluation during the second examination period

Oral examination

Examination methods in case of permanent evaluation

Skills test, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible in modified form

Extra information on the examination methods

- During examination period: oral closed-book exam
- During semester: graded lab sessions; graded project reports. Second chance: Possible in adapted form

Calculation of the examination mark

First examination period: global score = 50% non-periodical evaluation + 50% periodical evaluation (exam). Additional requirement for passing: to obtain at least 7/20 for each of both parts. If this requirement is not met, the global score is the least of the two obtained scores.

Second examination period: global score = 50% exam + 50% non-periodical evaluation (as obtained during the first examination period). If the score of the non-periodical evaluation during the first examination period is less than 7/20, an additional (individual) task will be defined in the second examination period. In this case, the global score = 50% exam + 50% additional task. Requirement for passing: to obtain at least 7/20 for the exam and, if applicable, also for the additional task. If this requirement is not met, the global score is the least of the two obtained scores.