

## Design of Multimedia Applications (E017920)

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

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2023-2024**

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

**Lecturers in academic year 2023-2024**

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

**Offered in the following programmes in 2023-2024**

	<b>crdts</b>	<b>offering</b>
<a href="#">Bridging Programme Master of Science in Computer Science Engineering</a>	6	A
<a href="#">Master of Science in Electrical Engineering (main subject Communication and Information Technology )</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Maritime Engineering)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Mechanical Construction)</a>	6	A
<a href="#">Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)</a>	6	A
<a href="#">Master of Science in Computer Science</a>	6	A
<a href="#">Master of Science in Computer Science Engineering</a>	6	B
<a href="#">Master of Science in Computer Science Engineering</a>	6	A
<a href="#">Exchange Programme in Computer Science (master's level)</a>	6	A

**Teaching languages**

English, Dutch

**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**

- block-based hybrid coding for digital video
- measuring image and video quality: objective vs. subjective distortion metrics / quality metrics
- standards for compression of multimedia data (e.g., H.264/AVC, HEVC, AV1)
- transmission aspects: error resilience and concealment
- coding and compression of 3D meshes
- audio compression (e.g., MP3)

- capita selecta: recent advances in multimedia technology
- design decisions & implementation aspects of complex & integrated multimedia applications
- 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; basic knowledge of multimedia coding (DCT and Fourier Transforms, quantization, entropy coding, JPEG compression)

#### **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**

Lecture, Practical, Independent work

#### **Extra information on the teaching methods**

The use of an own laptop is highly recommended for the lab exercises.

#### **Learning materials and price**

PowerPoint presentations

Book [optional]: David R. Bull and Fan Zhang, "Intelligent Image and Video Compression - Communicating Pictures", 2nd Edition, Elsevier Academic Press

Price: 123 EUR

#### **References**

#### **Course content-related study coaching**

#### **Assessment moments**

end-of-term and continuous assessment

#### **Examination methods in case of periodic assessment during the first examination period**

Oral assessment

#### **Examination methods in case of periodic assessment during the second examination period**

Oral assessment

#### **Examination methods in case of permanent assessment**

Skills test, Assignment

#### **Possibilities of retake in case of permanent assessment**

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**

**General:** students who eschew one or more parts of the evaluation can no longer pass the course as a whole. Total scores will be reduced to the highest non-deliberative quotation (7/20) in case the total score is higher.

**First examination period:** total score = 50% non-periodical evaluation + 50% periodical evaluation (exam). When students obtains less than 8/20 for at least one of the components, they can no longer pass the course as a whole. If the total score does turn out to be a mark of ten or more out of twenty, this is reduced to the highest fail mark (9/20).

**Second examination period:** total 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 8/20, an additional (individual) task will be defined in the second examination period. In this case, the total score = 50% exam + 50% additional task. When students obtains less than 8/20 for at least one of the components, they can no longer pass the course as a whole; if the total score does turn out to be a mark of ten or more out of twenty, this is reduced to the highest fail mark (9/20).