

<b>IMA4508</b>	<b>Image, video and 3D graphics compression</b>
<b>Period:</b> S8 / P3	<b>ECTS:</b> 4
	<b>Language:</b> English

**Organization:**

- Teaching Load / Total Load: 45/90
- Lectures/Exercices/Labs/Final Exam: 36/0/9/0

**Assessment:**

Two-student group project (P) (45h) linked to real industrial applications or to national/European research projects with oral defence (D).

Final mark = Average (P, D)

**Objectives:**

To be aware of the new scientific challenges derived from the scalable coding and universal access paradigms.

To master the underlying fundamental principles and mathematical tools, as well as the major compression standards.

To be able to implement these methods, algorithms and techniques in the framework of realistic industrial applications (e.g. digital TV, telesurveillance, robotics, 3D gaming...).

**Reference to CDIO Syllabus:**

- 1.1.1 Mathematics (including statistics)
- 1.2 Core engineering fundamental knowledge and other disciplines
- 1.3 Advanced engineering fundamental knowledge, methods and tools
- 2.1.2 Modeling
- 2.1.6 Reflections on Problems and Paradoxes

**Keywords:**

Image compression, mono / multi resolution coding techniques, transform-based approach, predictive methods, JPEG/MPEG standards, scalability, progressive transmission, technological convergence.

**Prerequisites:**

Basic programming knowledge in C/C++

**Course outlines:**

- New challenges for multimedia compression: digital terrestrial TV, High-Definition TV, TV over ADSL, scalability and technological convergence
- Generic principles of image compression techniques
- Decorrelation techniques, predictive approaches, transform-based and hybrid methods
- Quantization techniques
- Binary coding: arithmetic coding, error resilient tools

- Multiresolution image coding: wavelet-based approaches
- Scalable compression techniques
- Fractal-based image coding
- The JPEG standards: from JPEG to MotionJPEG
- The MPEG standards: from MPEG-1 to MPEG-4
- Compression for film distribution over the Internet
- New challenges in multimedia compression
- Adaptive compression techniques
- Transcoding techniques
- Emerging standards: MPEG-4 AFX, MPEG-4 AVC (H-264), MPEG-4 SVC

### **Learning materials and literature:**

Learning materials: Documentation provided by lecturers.

Literature:

- A.K. Jain, *Fundamentals of Digital Image Processing*, Prentice Hall, 1989.
- Y.Q. Shi, H . Sun, *Image and Video Compression for Multimedia Engineering*, CRC, 2000.
- M. Bosi, R. Golberg, *Introduction to Digital Audio Coding and Standards*, Kluwer, 2002.

### **Person in charge:**

Dr. Titus ZAHARIA (titus.zaharia@telecom-sudparis.eu)

### **Lecturers:**

From Télécom SudParis:

- Dr. Marius PREDA

Guest lecturer :

- Dr. Gérard MOZELLE (Thomson)