Module Code	EEP55C37
Module Name	Introduction to Motion Picture Engineering
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Dr. David Corrigan and Prof. Anil Kokaram
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: LO1. Design tools in a commercial video processing platform LO2. Design motion picture processing algorithms to achieve a specified outcome (e.g. denoising) and critically compare them LO3. Explain and apply video quality metrics for performance assessment and optimization LO4. Describe and explain the use of AI and motion information in motion picture processing algorithms. LO5. Describe the main components of current video compression standards and assess relative performance in terms of industry standard metrics and energy sustainability LO6. Design and deploy Adaptive Bitrate strategies for video streaming LO7. Describe aspects of the video technology industrial ecosystem in terms of sustainability and standardization **Graduate Attributes: levels of attainment** To act responsibly - Not embedded To think independently - Enhanced To develop continuously - Attained To communicate effectively - Enhanced
Module Content	Motion Pictures in the form of Digital Video account for more than 70% of all internet traffic today. R&D in this area has inspired new industries in digital media creation, online video streaming and video media sharing. Industrial Light and Magic, The Foundry, YouTube, Netflix, Vimeo, Skype, Sky Digital are just a few of the well known large companies that now successfully operate in this space. Motion Picture Engineering prepares the student for a career in these industries including post-production tool development and video streaming. The first part (before the reading week) introduces the underlying ideas in motion estimation and video processing in general including now the impact of AI on new techniques. The second part after the reading week will introduce modern compression standards such as H.264/5, VP9, AV1/2. The module incorporates a seminar program with guest lectures from domain experts.

[1] TEP Glossary

Students develop practical skills in applied research and algorithmic development/testing that are common in companies developing tools for digital media. Students will be introduced to leading research papers in the field and develop video processing plugins for Nuke (www.thefoundry.co.uk), a leading video-processing platform in the Cinema Post-Production industry.

The module is mostly lab-based containing a mixture of tutorials and conventional lab sessions where students will be able to seek assistance on their development assignments. There will be approximately 44 contact hours. The module also includes 4 guest lectures from leading industry experts in post production and video compression. We are delighted to have contributions on compression and AI from Dr. Darren Ramsook of Netflix and Vibhoothi from the AOMedia Consortium.The guideline for a 5 ECTS module is for 125 hours of student effort including class hours.

Assessment for 5C1 will be 100% based on Continuous Assessment. Assessment will be a mixture of algorithm design assignments and in-class tests.

Syllabus
Video Quality Measurement (VQM, SSIM, PSNR, VMAF)
Motion Estimation – state of the art frameworks and implementations
Optimisation – strategies for image/video processing applications such as image/video segmentation and motion estimation.
Deep Learning in Video – Recent topics in Deep Learning for motion estimation

Video Compression – an introduction to state of the art compression standards (HEVC, VP9, AV1) and the influence of Royalty Free standards in shaping the future of the industry.

Teaching and Learning Methods

Assessment Details[2]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Exercise	Developing in NUKE	1	5%	4
Presentation	Quality assessment exercise	2,3,4	20%	8
Class Test	In-class test	1-4	25%	6

[2] TEP Guidelines on Workload and Assessment

	Interview	Compression design	5,6,7	20%	12
	Class Test	In-class test	4-7	30%	12

Reassessment Requirements	Interview based on all components of the module
Contact Hours and Indicative Student Workload[2]	**Contact hours:** 48 (22 Lecture hours, 4 Guest lectures, 22 Guided exercise and assignment hours) **Independent Study (preparation for course and review of materials):** 48 **Independent Study (preparation for assessment, incl. completion of assessment):** 29
Recommended Reading List	• Markov Random Fields for Vision and Image Processing. Edited by A. Blake, P. Kohli and C. Rother, MIT Press, 2011. ISBN: 978-0-262-01577-6 • The Essential Guide to Video Processing. A. Bovik, Academic Press, 2009. ISBN: 978-0-12-374456-2 There are many other text books on Image and Video Processing and Computer Vision available in the library which you may wish to consult. Google scholar, arxiv.org and IEEE Xplore are essential resources for the research papers you will access over the duration of the module. The library also has paper versions of many relevant journals.
Module Pre-requisite	Deep Learning, DSP and Image Processing recommended
Module Co-requisite	None
Module Website	See departmental pages
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No

Module Approval Date	
Approved by	Prof. Naomi Harte
Academic Start Year	September 2025
Academic Year of Date	2025/2026