

COURSE CONTENT

Academic Year	2022-2023	Semester	1																											
School/Programme	EEE/SP																													
Course Code	EE6427																													
Course Title	Video Signal Processing																													
Pre-requisites	NIL																													
No of AUs	3																													
Contact Hours	39																													
Proposal Date <i>i.e. date proposal was drafted</i>	29 Jan 2022																													
Expected Implementation date of new/revised course	AY2022-23, Semester 1																													
Any cross-listing? <i>Is course opened to all Postgraduate students (including IGP) or specific program (please indicate)?</i>	<table><tr><th colspan="6">Within EEE</th><th rowspan="3">Outside EEE (please specify)</th></tr><tr><th colspan="5">MSc Programmes*</th><th rowspan="2">MEng</th><th rowspan="2">PhD</th></tr><tr><th>CME</th><th>CCA</th><th>ET</th><th>PE</th><th>SP</th></tr><tr><td>GE</td><td>GE</td><td></td><td></td><td>SE</td><td>√ (subject to vacancy)</td><td>√ (subject to vacancy)</td><td>√ All MEng/PhD (subject to vacancy)</td></tr></table> <p>* List of MSc programmes</p> <ul style="list-style-type: none">– MSc Communication Engineering (CME) Programme– MSc Computer Control & Automation (CCA) Programme– MSc Electronics (ET) Programme– MSc Power Engineering (PE) Programme– MSc Signal Processing (SP) Programme			Within EEE						Outside EEE (please specify)	MSc Programmes*					MEng	PhD	CME	CCA	ET	PE	SP	GE	GE			SE	√ (subject to vacancy)	√ (subject to vacancy)	√ All MEng/PhD (subject to vacancy)
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Course Aims
The objective of this course is to provide you with knowledge in image and video signal processing. This course focuses on advanced topics in image and video processing, especially on the image filter, image and video compression, and some international standards for image and video processing. All of these topics are important to the understanding of image and video technologies and applications. This course will also arouse your interest in image and video processing topics and further motivate you towards developing your career in the area of image and video processing.
Intended Learning Outcomes (ILO)
By the end of this course, you should be able to <ul style="list-style-type: none"> (1) gain in-depth knowledge of image and video processing and compression. (2) understand of image and video applications.
Course Content
Image and Video Basics -- Image and Video fundamental. Sampling. (4 hours)
Image and Video Transform Coding -- Discrete Cosine Transform. Discrete Wavelet Transform. Lifting Scheme. Quantization. (9 hours)

Image and Video Coding Principles and Standards -- Image and Video compression standards. Motion estimation. Motion compensation. Rate control algorithm. (15 hours)

Filtering and Error Resilience for Image and Video -- Image filter. Histogram techniques. Halftoning. Interpolation algorithms. Error concealment. Resynchronization marker. Data partitioning. (7 hours)

Recent and Emerging Topics in Image and Video Processing. (4 hours)

Assessment (includes both continuous and summative assessment)

Component	ILO Tested	Weighting	Team/Individual	Assessment Rubrics
1. Final Examination	1, 2	60%	Individual	
2. Continuous Assessment 1 (CA1): Quiz	1, 2	20%	Individual	
3. Continuous Assessment 2 (CA2): Homework	1, 2	20%	Individual	
Total		100%		

Continuous Assessment (CA) consists of one quiz and one homework.

Formative feedback

You will receive feedback through your Quiz performances. Feedback on overall class performances will be provided through in-class discussions.

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	You will participate in lectures that explains the topics in course content.

Reading and References

Textbook:

(1) Yun Q. Shi and Huifang Sun, Image and Video Compression for Multimedia Engineering: Fundamentals, Algorithms, and Standards, CRC Press, 3rd Edition, 2019.

(2) Y. Wang, J. Ostermann, and Y.-Q. Zhang, Video Processing and Communications, Prentice Hall, 2002.

References:

(1) Iain E.G. Richardson, H.264 and MPEG-4 Video Compression. Video Coding for Next-generation Multimedia, John Wiley & Sons, 2004.

(2) John W. Woods, Multidimensional Signal, Image, and Video Processing and Coding, Academic Press, 2011.

Course Policies and Student Responsibilities

Please do not copy or let others copy your assignment solutions. Penalties apply for late submission (without any valid reason).

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Planned Weekly Schedule

Weeks	Topics	Course ILOs	Readings/Activities
1	Image and Video Basics	1,2	Lecture
2	Image and Video Basics, and Image and Video Transform Coding	1,2	Lecture
3	Image and Video Coding Principles and Standards	1,2	Lecture
4	Image and Video Coding Principles and Standards	1,2	Lecture
5	Image and Video Coding Principles and Standards	1,2	Lecture
6	Image and Video Coding Principles and Standards	1,2	Lecture
7	Image and Video Coding Principles and Standards	1,2	Lecture
8	Image and Video Transform Coding	1,2	Lecture and Quiz
9	Image and Video Transform Coding	1,2	Lecture
10	Image and Video Transform Coding and Filtering and Error Resilience for Image and Video	1,2	Lecture
11	Filtering and Error Resilience for Image and Video	1,2	Lecture

12	Filtering and Error Resilience for Image and Video, and Recent and Emerging Topics in Image and Video Processing.	1,2	Lecture and Assignment
13	Recent and Emerging Topics in Image and Video Processing.	1,2	Lecture