



### 38. Digital Image Processing Laboratory (PH039IU)

Module designation	<i>This course gives students computer-based laboratory exercises designed to introduce methods of real-world data manipulation. The lab exercises will introduce various imaging processing topics, which could be completed with many widely used programming languages such as Matlab, C, or Python.</i>
Semester(s) in which the module is taught	1, 2
Person responsible for the module	Dr. Hồ Đình Duẩn
Language	English
Relation to curriculum	Compulsory
Teaching methods	Laboratory report.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 55 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): laboratory: 25 Private study including examination preparation, specified in hours: 30
Credit points/ECTS	1 credit/2 ECTS
Required and recommended prerequisites for joining the module	Parallel Course: Introduction to Digital Image Processing (PH038IU)



Module objectives/intended learning outcomes	Upon the successful completion of this course students will be able to:	
	<b>Competency level</b>	<b>Course learning outcome (CLO)</b>
	Knowledge	CLO1. Apply the basic knowledge of digital imaging processing and manipulating on computers in designing, manipulating, and creating 2D digital images.
	Skill	CLO2. Use many widely used programming languages such as Matlab, C/C++, or Python at advanced levels.
	Attitude	CLO3. Show the legal issues and responsibilities in engineering practice.



Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: laboratory session (4 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>		
	<b>Topic</b>	<b>Weight</b>	<b>Level</b>
	Viewing digital images, bits and bytes, raster scan format, quantization	1	T, U
	Scaling, translation and rotation, sums and differences	1	T, U
	Histograms and stretches, convolutional filters	1	T, U
	Fourier transforms and the frequency domain, filters	1	T, U
	FFTs, Image filtering: smoothing and sharpening	1	T, U
	2D convolution and correlation	1	T, U
	Color and color tables	1	T, U
	Creating multiple image sequences for the project	1	T, U
Examination forms	Exam		
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		



Reading list	<p><b>Textbooks:</b></p> <p>[1] Handouts</p> <p><b>References:</b></p> <p>[2] Scott Umbaugh (1998). <i>Computer Vision and Image Processing</i>, Prentice-Hall, Inc., Upper Saddle River, New Jersey.</p> <p>[3] Pratt, W.K. (1978). <i>Digital Image Processing</i>, John Wiley and Sons, New York</p>
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