COURSE SYLLABUS

Digital Image Processing

Course code: 220057

1. General information

Course type		*Number of credits*	*Number of learning periods*
General	☐	Theory: 02 Exercise: 00 Practice: 01	Theory: 30 Exercise: 00 Practice: 30
Basic	☐		
Specialized	☑		
Required	☑		
Elective	☐		

***Learners*:**

Level	Bachelor
Discipline	Information Technology

Course requirements:

Prerequisites	Data structures and Algorithms
Parallels	
Other requirements	

2. Learning resources

Textbooks	Digital image processing, third edition, Pearson Prentice Hall, Rafael C. Gonzalez and Richard E. Woods
Other References	Digital image processing in Matlab, Pearson Prentice Hall, Rafael C. Gonzalez, Richard E. Woods, and Steven L.Eddins. Fundamentals of Digital Image Processing – A Practical Approach with Examples in Matlab, Wiley-Blackwell, Chris Solomon and Breckon. Matlab Tutorials on Image Processing: http://www.mathworks.com/access/helpdesk/help/toolbox/images/

3. Course description

The module provides students with basic knowledge: concepts of images; Image processing methods and techniques: performance, filtering and image enhancement; image partitioning method; determine the image boundary; a number of techniques and technologies for digital image compression.

4. Course learning outcomes (CLOs)

After finishing the course, students will be able to:

		Đáp ứng CĐR của CTĐT	*Satisfy LOs of the ABET*
❖ ***Topic 1: Disciplinary Knowledge and Reasoning***			B.1.1 B.1.2 B.1.3 B.1.4 B.1.5 B.1.6
L1.	Analyze problem requirements, design algorithms and build suitable data types	*1.2.1*	
L2.	Applying effective programming techniques to solve problems	*1.2.2*	
L3.	Effective use of specialized English	*1.2.7*	
L4.	Applying the methods of knowledge representation and representation to develop intelligent systems	*1.3.7*	
L5.	Applying soft skills and scientific research methods for career development	*1.4.5*	
❖ ***Topic 2: Personal and Professional Skills and Attributes***			
L6.	Problem identification and formulation	*2.1.1*	
L7.	Modelling	*2.1.2*	
L8.	Reasoning and solutions	*2.1.3*	
L9.	Evaluation and recommendations	*2.1.4*	
L10.	Active learning	*2.4.3*	
L11.	Self-development of professional knowledge	*2.4.4*	
L12.	Ethics, honesty and social responsibility	*2.5.1*	

L13.	Professional behavior	*2.5.2*	
L14.	Proactive vision and goals in life	*2.5.3*	
L15.	Equity and diversity (regardless of social class and skin color)	*2.5.4*	
L16.	Trust and loyalty	*2.5.5*	
❖ ***Chủ đề 3: Interpersonal Skills: Teamwork and Communication:***			
L17.	Forming effective teams	*3.1.1*	
L18.	Organizing team activities	*3.1.2*	
L19.	Teamwork techniques	*3.1.5*	
L20.	Written communication	*3.2.2*	
L21.	Presentation and negotiation skills	*3.2.4*	
L22.	Skills of listening, speaking, reading and writing	*3.3.1*	
L23.	Using technical terms	*3.3.2*	
❖ ***Topic 4: Conceiving, Designing, Implementing and Operating Systems in The Enterprise, Societal and Environmental Context – The Innovation Process***			
L24.	Roles and responsibilities of an information technology engineer	*4.1.1*	
L25.	Setting goals and requirements	*4.2.1*	
L26.	Analyzing the feasibility of the projects	*4.2.3*	
L27.	Project management	*4.2.4*	

5. Course content

Course content	CLOs	Number of learning periods		
		Theory	**Practice**	**Others**
Chapter 1: Introductions and Fundamentals	L3, L5	**3**	**0**	
1.1 What is Digital Image Processing? 1.2 Sources for Images 1.3 Fundamental Steps in DIP 1.4 Image Acquisition 1.5 Representing Digital Images 1.6 Image Interpolation 1.7 Basic Relationships Between Pixels				
☑ ***Personal and Professional Skills and Attributes***	L6 (T), L10, L12, L13(I)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L22 (I), L23(T)			
☑ C.D.I.O	L24 (I)			
Chapter 2: Intensity Transformations and Spatial Filtering	**L1, L2, L3**	**7**	**10**	
2.1 Spatial Domain vs. Transform Domain 2.2 Some Basic Intensity Transformation Functions 2.2.1. Image Negatives 2.2.2. Log Transformations 2.2.3. Power-Law (Gamma) Transformations 2.2.4. Piecewise-Linear Transformations 2.2.5. Bit-plane Slicing 2.2.6. Histogram Equalization 2.3 Spatial Filtering 2.4 Spatial Correlation				

2.5 Spatial Convolution 2.6 Smoothing Spatial Filters				
☑ ***Personal and Professional Skills and Attributes***	L6 (T), L10, L12, L13(I)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L22 (I), L23(T)			
☑ C.D.I.O	L25, L26 (T)			
Chapter 3: Filtering in the Frequency Domain	**L1-L5**	**5**	**5**	
3.1.Fourier Transform 3.2.Filtering in Fourier Transform Domain				
☑ ***Personal and Professional Skills and Attributes***	L6-L16 (U)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L23 (U)			
☑ C.D.I.O	L24-L26 (U)			
Chapter 4: Morphological Image Processing	**L1-L5**	**5**	**5**	
4.1 Introduction 4.2 Erosion and Dilation 4.3 Opening and Closing 4.4 Some Basic Morphological Algorithms				
☑ ***Personal and Professional Skills and Attributes***	L6-L16 (U)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L23 (U)			
☑ C.D.I.O	L24-L26 (U)			
Chapter 5: Image Segmentation	**L1-L5**	**5**	**5**	
5.1 Fundamentals 5.2 Edge Detection 5.3 Thresholding				

5.4 Region-Based Segmentation				
☑ ***Personal and Professional Skills and Attributes***	L6-L16 (U)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L23 (U)			
☑ C.D.I.O	L24-L26 (U)			
Chapter 6: Color Image Processing	**L1-L5**	**5**	**5**	
6.1 Color Fundamentals 6.2 RGB Color Model 6.3 The CMY and CMYK Color Models 6.4 Color Transformations				
☑ ***Personal and Professional Skills and Attributes***	L6-L16 (U)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L23 (U)			
☑ C.D.I.O	L24-L26 (U)			
Chapter 7: Image Compression	**L1-L5**			
7.1 Relative Data Redundancy 7.2 Spatial and Temporal Redundancy 7.3 Image Compression Standards 7.4 Some Basic Compression Methods				
☑ ***Personal and Professional Skills and Attributes***	L6-L16 (U)			
☑ ***Interpersonal Skills: Teamwork and Communication***	L17-L23 (U)			
☑ C.D.I.O	L24-L26 (U)			
Summary of skills in course level				

☑ ***Personal and Professional Skills and Attributes***	Identify and state the problem; Modeling the problem; Inference and resolution; Reviews and recommendations; Self-develop career knowledge; Demonstrating morality, honesty and social responsibility; Have a professional attitude
☑ ***Interpersonal Skills: Teamwork and Communication***	Organize group activities; Teamwork technique; Written communication skills; Multimedia communication skills; Listening, speaking, reading and writing skills; Use technical terms.
☑ C.D.I.O	The role and responsibilities of an information technology engineer; Determine requirements and set goals; Analyze the feasibility of the topic; Managing topics.

6. Teaching and learning methods

ID	Teaching method/technique		Description
M1.	Lecturing	☑	
M2.	Questions – Answers	☑	
M3.	Group-based Learning	☑	
M4.	Problem-based Learning	☐	
M5.	Project-based Learning	☑	
M6.	Case studies	☑	
M7.	Role play	☐	
M8.	Demo	☑	
M9.	Simulations	☐	
M10.	Debate	☐	
M11.	Game	☐	
M12.	Brainstorming	☑	
M13.	Think-Pair-Share	☐	

7. Course assessment

ID	Assessment activity		Quantity	Weight	LOs assessed
T1.	Text-based midterm exam	☑	01	10%	L1, L2, L3
T2.	Text-based final exam	☑	01	50%	L1-L5
T3.	Practice midterm exam	☑	01	15%	L1-L5
T4.	Practice final exam	☐			
T5.	Report	☐			
T6.	In-class exercises	☐			
T7.	Homework assignments	☑	06	25%	L1-L5
T8.	Question – Answer	☐			
T9.	Term Project	☐			
T10.	Final Exam	☐			
Formula for Overall score	T1*0.1+T3*0.15+T7*0.25+T2*0.5				

8. Course requirements and expectations:

8.1. Requirements on attendance

- Students are responsible for attending all classes. In case of absence due to force majeure circumstances, there must be sufficient and reasonable evidence.
- Students who do not attend more than 20% of the class sections, whether for reason or not, are deemed not to have completed the course and must re-enroll in the following semester.

8.2. Requirements and expectations on student behaviors

- Students must show their respects for teachers and other learners.
- Students must be on time. Students who are late more than five minutes will not be allowed to attend the class.
- Students should not make noise and interfere with others in the learning process.
- Students should not eat, chew gum, and use devices such as cell phones, music players during class hours.
- Laptops and tablets can only be used in class for the purpose of learning.

- Students who violate the above principles will be asked to leave the class and considered absent from the class.

8.3. Requirements on learning issues

Issues related to applying for score reservation, scoring complaints, scoring, exam disciplines are done according to the Learning Regulation of Tra Vinh University.

9. Tentative course instructor

Vo Phuoc Hung

DEAN	**DEPARTMENT HEAD**	**LECTURER**
		Vo Phuoc Hung