EE4211: COMPUTER VISION

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Computer Vision

Subject Code
EE - Electrical Engineering
Course Number
4211

Academic Unit
Electrical Engineering (EE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MA2001 Multi-variable Calculus and Linear Algebra
and
EE3210 Signals and Systems

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

The elective course introduces a thorough grounding of the principles of image processing and computer vision and seeks to develop students' knowledge from basic image processing techniques to advanced computer vision. It concentrates on the fundamental theory of image processing and computer vision with emphasis on the areas of feature extraction, image segmentation, object recognition.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the main characteristics of different image processing techniques and computer vision applications			x	
2	Implement image processing and computer vision algorithms on computers		x	x	
3	Apply and combine suitable computer vision and image processing principles to create new and improved solutions for real-world applications		x	x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Key mathematical, algorithmic and system concepts are described and illustrated. Key mathematical, algorithmic and system concepts are worked out based on examples and exercises. Key concepts are applied to solve real-world image processing problems.	1, 2	3 hrs / week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Tests (min.: 2)	1, 2, 3	50	
2	#Assignments (min.: 3)	1, 2, 3	15	

Continuous Assessment (%)

65

Examination (%)

35

Examination Duration (Hours)

2

Additional Information for ATs

Remark:
To pass the course, students are required to achieve at least 30% in course work and 30% in the examination.

may include homework, tutorial exercise, project/mini-project, presentation

Assessment Rubrics (AR)

Assessment Task

Assignment

Criterion

The ability to understand different algorithms and techniques.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal level

Assessment Task

Examination

Criterion

The extent to which the students can understand the algorithms and techniques, apply them appropriately for different applications, and evaluate their performances.

Excellent (A+, A, A-)

High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal level

Assessment Task
Project

Criterion
The ability and creativity in applying appropriate algorithms and techniques for real-world applications.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal level

Part III Other Information

Keyword Syllabus
This elective course is designed for electronic engineering students to learn the principles of digital image processing and the use of digital image processing techniques to solve practical problems in computer vision field. The course will first introduce basic concepts, theory and methods of digital image processing, including image acquisition, image representation, sampling, interpolation, geometric distortions, image restoration. Then this course will introduce image segmentation, object recognition, image classification.

Reading List

Compulsory Readings

	Title
1	Gonzalez R. C. and Woods R.E.: Digital Image Processing, Third Edition (Prentice Hall, 2008).
2	Szeliski R.: Computer Vision, Algorithms and Applications, Springer-Verlag, 2011.

Additional Readings

	Title
1	Nil