Faculty	Engineering	Department	Computer Engineering

Course Code & Number	CMPE 362	Course Title	Digital Image Processing
Type of Course	☐ Compulsory ☑ Elective	Semester	☐ Fall ☑ Spring ☐ Summer
Level of Course	BSc	Year of Study	Junior/Senior
Course Credit Hours	(3+0+0) 3	Number of ECTS Credits	5
Pre-requisite	MATH 203	Co-requisite	N/A
Mode of Delivery	☐ Face-to-face ☐ Distance learning	Language of Instruction	☑ English ☐ Turkish
Teaching Assistant	Ali Egemen Taşören	Course Lecturers	Assist. Prof. Aslı Gençtav (Room A433)
Required Reading	(GW) Digital Image Processing, R. C. Gonzalez, R. E. Woods, 4th Global Edition, Pearson Education Limited, 2018	Recommended Reading	(S) Computer Vision: Algorithms and Applications by R. Szeliski, 2nd Edition, Springer, 2021 (electronic draft available)

Course Catalog Description	Image model sampling and quantization. Basic relationships between pixels and image geometry. Two-dimensional Fourier transforms. Image enhancement. Spatial and frequency domain methods. Image restoration. Image segmentation.
Course Objectives	The objective of this course is to provide effective skills for understanding and applying image processing concepts and methods to obtain significant information from images.
Course Learning Outcomes	Upon successful completion of this course, a student will be able to 1. Describe the basic theory of image processing 2. Examine binary and color images using image processing tools 3. Analyze and apply image enhancement methods in spatial and frequency domain 4. Analyze and apply image segmentation methods 5. Analyze and apply algorithms to extract significant information from images 6. Develop solution methods for image processing problems using the state of the art
Teaching Methods & Learning Activities	☑ Telling/Explaining ☑ Discussions/Debates ☑ Questioning ☑ Reading ☑ Peer teaching ☐ Scaffolding/Coaching ☑ Demonstrating ☑ Problem solving ☐ Inquiry ☐ Collaborating ☐ Think-Pair-Share ☐ Predict-Observe-Explain ☐ Simulations & Games ☐ Video Presentations ☐ Oral presentations/Reports ☐ Concept Mapping ☐ Brainstorming ☐ Drama/Role Playing ☐ Seminars ☐ Field Trips ☐ Guest Speakers ☑ Hands-on Activities ☐ Service Learning ☐ Web Searching

	☐ Microteaching ☑ Case Study/Scenario Analysis	☐ Experiments ☐ Other(s): ....
Assessment Methods (Formal & Informal)	☑ Test/Exam ☑ Quiz/Homework ☐ Oral Questioning ☐ Laboratory work ☐ Performance Project	☐ Observation ☐ Self-evaluation ☐ Peer-evaluation ☐ Portfolio ☐ Presentation (Oral) ☑ Other(s): Programming Assignments

Student Workload (Total 152 Hrs)	☑ Lectures .... 42 hrs ☑ Course Readings .... 20 hrs ☐ Workshop .... hrs ☐ Online Discussion .... hrs ☐ Debate .... hrs ☐ Work Placement .... hrs ☐ Field Trips/Visits .... hrs ☐ Observation .... hrs ☐ Laboratory Applications .... hrs ☐ Quizzes .... hrs ☐ Hands-on Work .... hrs ☑ Homework .... 50 hrs	☑ Midterm .... 20 hrs ☑ Final .... 20 hrs ☐ Resource Review .... hrs ☐ Research Review .... hrs ☐ Report on a Topic .... hrs ☐ Case Study Analysis .... hrs ☐ Oral Presentation .... hrs ☐ Poster Presentation .... hrs ☐ Demonstration .... hrs ☐ Web Designs .... hrs ☐ Mock Designs .... hrs ☐ Team Meetings .... hrs ☐ Other .... hrs

COURSE ASSIGNMENTS
A. Midterm Exam [25%]
B. Final Exam [30%]
C. Programming Assignments [40%]
There will be 4 programming assignments (10% each).
D. Class Participation & Weekly Activities [5%]
To earn class participation & weekly activities grade, you are expected to attend classes and submit your work for weekly activities involving small programming questions about the topic of the week.

COURSE POLICIES

Programming Prerequisites

Prior programming knowledge is required for the programming assignments and the weekly activities where we will be using Python programming language and OpenCV software library.

Missed Work

Make ups for midterm and final exams will be provided if you can provide a legal document confirming a significant health issue at the time of the examination or with the approval of the instructor. There will be no make up for programming assignments.

Late Assignment Submission Policy

Each late day imposes 20% penalty of the total homework grade. Late submissions more than 2 late days will not be accepted.

Extra Credit

Extra credits will not be offered. Optional bonus grades will be provided as part of homework assignments.

Assignment Rules

Assignment works must be done individually or in pairs; the specific rule for a homework assignment will be explicitly stated in the homework handout. You can submit only one work. In case of multiple submissions, only the latest submission will be considered. You cannot submit work on other students' behalf.

Plagiarism

All of the following are considered plagiarism:
- turning in someone else's work as your own
- copying words or ideas from someone else without giving credit
- failing to put a quotation in quotation marks
- giving incorrect information about the source of a quotation
- changing words but copying the sentence structure of a source without giving credit
- copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not" (www.plagiarism.org)

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.

Cheating

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following:
- Copying answers on examinations, homework and laboratory works,
- Using prohibited material on examinations,
- Lying to gain any type of advantage in class
- Providing false, modified or forged data in a report
- Plagiarizing
- Modifying graded material to be regraded.
- Causing harm to colleagues by distributing false information about an examination, homework or laboratory

Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee.

Class Readings

Class readings are necessary but not mandatory. The material covered in class by your instructor will only provide a fundamental understanding of the general context. If you are willing to effectively learn something, you must actively work on it yourself. Reading is one of the most successful ways of learning about a topic.

TENTATIVE COURSE OUTLINE				
Week	Day	Topic	Reading	Assignments
W1	06.03-12.03	Introduction	GW1, S1	
W2	13.03-19.03	Image Formation Color	GW2, S2 GW6, S2.3.2	
W3	20.03-26.03	Point Operations Spatial Filtering	GW3, S3.1 GW3, S3.2-3.3	PA1 Out
W4	27.03-02.04	Frequency Domain Techniques	GW4, S3.4	
W5	03.04-09.04	Frequency Domain Techniques	GW4, S3.4	
W6	10.04-16.04	Image Pyramids Morphological Image Processing	S3.5 GW9	PA2 Out
W7	17.04-23.04	Image Segmentation	GW10 S7	
W8	24.04-30.04	Image Segmentation	GW10 S7	
W9	01.05-07.05	**Midterm Exam**		PA3 Out
W10	08.05-14.05	Image Pattern Classification	GW12 S5	
W11	15.05-21.05	Image Pattern Classification	GW12 S5	
W12	22.05-28.05	Image Pattern Classification	GW12 S5	PA4 Out
W13	29.05-04.06	Feature Extraction	GW11 S7	
W14	05.06-11.06	Feature Extraction	GW11 S7	

This outline is tentative and might be updated later in the semester.

STUDENT SERVICES INFO:

- **Student Development and Psychological Counseling Center:**

The Center is a service mandated with providing crisis intervention and supportive listening services to the campus community. A major part of fulfilling that mandate is raising awareness of our service so students know they are never alone in dealing with problems. You may contact the SDPCC at: ogrencidanismamerkezi@tedu.edu.tr, 0312 585 0316, Office A122, Or visit their website at http://csc.tedu.edu.tr/

- **TEDU COPeS - Psycho-Social Support**

TED University Psychosocial Support Team was initially established in order to facilitate coping with the psychological, social, familial, academic, and professional difficulties that may arise due to adverse conditions associated with COVID-19 pandemic for TEDU students and employees.

In time we have expanded our services to provide psychosocial support in diverse disasters. In this line, TEDU COPeS offers psychosocial support for TED University students and employees in the aftermath of Kahramanmaraş earthquakes.

For further information and/or questions, visit their website at https://copes.tedu.edu.tr/

- **Specialized Support and Students with Disabilities**

Students who may require specialized support due to a disability affecting mobility, vision, hearing, learning, mental or physical health should consult with Specialized Support and Disability Coordinator, Asst. Prof. Emrah Keser E-mail: emrah.keser@tedu.edu.tr, or visit the website at https://www.tedu.edu.tr/tr/main/engelsiz-tedu