COURSE CODE-COURSE NAME

Course Code	Course Name		Semester	
SENG 374	Introduction to Image Forensics		Fall ☒ Spring ☐ Summer ☐	
Hours			**Credit**	**ECTS**
Theory	**Practice**	**Lab**	3	4
3	0	0		

Course Details	
Department	Software Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☐ Elective ☒
Lecturer(s)	Prof. Dr. İsmail Avcıbaş
Course Objectives	The aim of this course is to introduce the students with theoretical and practical aspects of image forensics. The student is introduced to digital images, their representation and their use for steganography, steganalysis and image manipulation detection.
Course Content	This course is an introduction digital image forensics. Topics include concepts from signals and systems, information theory, lossless and lossy compression, steganography, steganalysis and manipulation detection of digital images.
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☒ Discussion ☐
Prerequisites/ Corequisites	None

Work Placement(s)	

Textbook/References/Materials

- A. V. Oppenheim, Signals and Systems, 2nd Edition, Prentice-Hall, 1996
- K. Sayood, Introduction to Data Compression, 3rd Ed. Morgan Kaufmann, 2005.
- J. Fridrich, Steganography in Digital Media: Principles, Algorithms and Applications, Cambridge University Press, 2009
- H. T. Sencar, Multimedia Forensics, Springer, 2022

Course Category				
Mathematics and Basic Sciences	☐		Education	☐
Engineering	☒		Science	☐
Engineering Design	☐		Health	☐
Social Sciences	☐		Profession	☐

Weekly Schedule

No	Topics	Materials/Notes
1	Introduction to Signals	
2	Introduction to Systems	
3	Fourier Series	
4	Continuous Time Fourier Transform	
5	Discrete Time Fourier Transform	
6	Sampling and Quantization	
7	Image Representation and Human Visual System	
8	Midterm	
9	Basic Image Processing and Filtering	
10	Transform Coding and JPEG	
11	Steganography and Watermarking	
12	Steganalysis	
13	Topics from Computer Vision	
14	Adversarial Image Manipulations	
15	Image Manipulation Detection	
16	Final Exam	

Assessment Methods and Criteria		
In-term studies	**Quantity**	**Percentage**
Attendance	14	5
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework		
Presentation / Seminar		
Project	1	20
Report		
Seminar		
Midterm Exam	1	25
Final Exam	1	50
	Total	**100%**
Contribution of Midterm Studies to Success Grade		60%
Contribution of End of Semester Studies to Success Grade		40%
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	16	3	48
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time	15	1	15
Quiz/Studio/Criticize			
Homework			
Presentation / Seminar			
Project	1	15	15
Report			
Midterm Exam and Preparation for Midterm	1	10	10
Final Exam and Preparation for Final Exam	1	10	10
Total Workload			**98**
Total Workload / 25			**3.92**
ECTS Credit			**4**

Course Learning Outcomes	
No	**Outcome**
L1	Understanding of signals and systems concepts
L2	Understanding of image representation, processing and compression
L3	Understanding the concepts of steganography, watermarking and steganalysis
L4	Understanding the concepts of image manipulation detection

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**					**Total**
L1	4	4	4	4												
L2	4	4	4	4												
L3	3	3	3	3												
L4	3	3	3	3												
															Total	

i. Sufficient knowledge in the fields of mathematics, natural sciences, and related engineering disciplines; the ability to apply theoretical and practical knowledge in solving complex engineering problems.

ii. The ability to identify, formulate, and solve complex engineering problems; the ability to select and apply appropriate analysis and modeling methods for this purpose.

iii. The ability to design a complex system, process, device, or product to meet specific requirements under realistic constraints and conditions; the ability to apply modern design methods for this purpose.

iv. The ability to select and use modern techniques and tools required for the analysis and solution of complex problems encountered in engineering applications; the ability to effectively use information technologies.

v. The ability to design experiments, conduct experiments, collect data, analyze results, and interpret findings for the investigation of complex engineering problems or discipline-specific research topics.

vi. The ability to work effectively in intra-disciplinary and multidisciplinary teams; the ability to work independently.

vii. The ability to communicate effectively both orally and in writing; proficiency in at least one foreign language; the ability to write effective reports, understand written reports, prepare design

and production reports, make effective presentations, and give and receive clear and understandable instructions.

viii. Awareness of the necessity of lifelong learning; the ability to access information, track developments in science and technology, and continuously renew oneself.

ix. Acting in accordance with ethical principles, knowledge of professional and ethical responsibilities, and the standards used in engineering applications.

x. Knowledge of business practices such as project management, risk management, and change management; awareness of entrepreneurship and innovation; knowledge of sustainable development.

xi. Knowledge of the impact of engineering practices on health, environment, and safety at global and societal levels, and awareness of contemporary engineering issues; awareness of the legal consequences of engineering solutions.