Course Information

Course Code	5710489
Course Section	1
Course Title	SPECIAL TOPICS IN COMP. ENG. : INTRO.TO COMP.SECURITY
Course Credit	3
Course ECTS	6.0
Course Catalog Description	Computer security concepts. Evolution of cryptography. Symmetric encryption algorithms. Public key cryptography. Authentication and access control. Database security. Malicious software. Intrusion detection. Software security. Secure programming. Operating systems security. Network security. Legal and organizational aspects of computer security. Advanced topics in computer security.
Prerequisites	Students must complete one of the following sets to take this course.

Set	Prerequisites
1	5710334

Schedule	Tuesday , 12:40 - 13:30, BMB5 Wednesday, 15:40 - 17:30, BMB5

Instructor Information

Name/Title	Assoc.Prof.Dr. PELİN ANGIN ÜLKÜER
Office Address	B204
Email	pangin@metu.edu.tr
Personal Website	http://user.ceng.metu.edu.tr/~pangin/
Office Phone	
Office Hours	By email appointment

Course Assistants

Name/Title	Araş.Gör. YİĞİT SEVER
Office Address	
Email	
Office Hours	

Course Objectives

At the end of this course the students will:

- Develop an understanding of security requirements of modern computer and communication systems.
- Gain familiarity with well-known attacks against networks, computer software, operating systems and distributed systems, as well as the appropriate defense mechanisms.
- Develop a basic understanding of cryptography and state-of-the-art encryption algorithms, and apply them for real-world data security problems.
- Identify security problems peculiar to contemporary system architectures and apply appropriate security tools and techniques as solutions.

Course Learning Outcomes

Understand basic concepts related to computer security.

Identify causes of vulnerabilities in computer systems and software.

Apply state-of-the-art cryptographic algorithms to provide data security.

Understand the concepts of authentication and access control.

Understand attacks against software and secure software development practices.

Compare different intrusion detection/prevention systems and **analyze** their applicability for different contexts.

Understand the functioning of malicious software and the basics of protection mechanisms.

Understand security vulnerabilities of computer networks and operating systems.

Design security tests for computer systems and identify their vulnerabilities.

Analyze a given computer security problem and **design** a comprehensive security solution.

Identify security problems and solutions in modern distributed systems (cloud, IoT etc.)

Reflect on recent computer security breach incidents and **elaborate** on techniques that could be utilized to prevent them.

Program Outcomes Matrix

Undergraduate

		Level of Contribution			
	Program Outcomes	**0**	**1**	**2**	**3**
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics			X	
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			X	
3	An ability to communicate effectively with a range of audiences	X			
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts		X		
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	X			
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions		X		
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies			X	

0: No Contribution **1:** Little Contribution **2:** Partial Contribution **3:** Full Contribution

Instructional Methods

Lectures, Lab sessions.

Tentative Weekly Outline

Week	Topic	Relevant Reading	Assignments
1	Introduction to Computer Security. Movie Screening: Zero Days.	Chapter 1	
2	Computer security concepts; threats and attacks; security breach incidents. Denial of service attacks.	Chapters 6, 7	

Week	Topic	Relevant Reading	Assignments
3	Internet Vulnerabilities - Malicious software: viruses, worms, advanced persistent threats; Phishing, spyware.		
4	Intrusion Detection and Prevention - Host-based intrusion detection; Network-based intrusion detection; Honeypots; Firewalls. Lab 1.	Chapters 8, 9	
5	Network Security - Common network attacks; Internet security protocols and standards (SSL, TLS, HTTPS).	Chapter 23, 24	
6	SQL injection attacks.	Chapter 5	
7	Cryptography - Evolution of cryptography: Shift/Affine/Vigenere/Substitution ciphers.	Chapters 2, 20	
8	No class due to Ramadan holiday.		
9	Lab 2		
10	Project Presentations.		
11	Project Presentations.		
12	Project Presentations.		
13	Block ciphers. Lab 3.		
14	Cryptography - Symmetric encryption algorithms.	Chapter 20	
15	Cryptography - Public key cryptography (RSA); Secure hash functions.	Chapter 21	

Course Textbook(s)

W. Stallings and L. Brown, Computer Security: Principles and Practice, 3rd Ed. 2015, ISBN: 9781292066172.

Course Material(s) and Reading(s)

Material(s)

Course material will be posted on ODTUClass.

Reading(s)

N/A

Supplementary Readings / Resources / E-Resources

Readings

C. Pfleeger, S.L. Pfleeger and J. Margulies, Security in Computing, 5th Ed. 2015, ISBN: 9780134085043.

Assessment of Student Learning

Assessment	Dates or deadlines
Programming assignments: You will have two programming assignments. The programming assignments have to be your individual work.	
Final exam: There will be a single comprehensive final exam.	
Term project. You will have a term project, which you can do alone or in groups of two. You will need to submit a project report and deliver a project presentation.	

Course Grading

Deliverable	Grade Points
Final exam	40
Programming assignments	20
Term project	40
Total	100

Course Policies

Late Submission of Assignments

You will have 3 late days for the submission of each programming assignment.

Make up for Exams and Assignments

There will be a makeup exam at the end of the semester after the finals are over. Please note you can only take a makeup exam if you have a valid excuse backed by an official report (or a conflict with another exam).

Class and Laboratory Rules (Eating-Drinking, Use of Mobile Phones and Electronic Devices, Civility, etc.)

The audiovisual recordings, presentations, readings and any other works offered as the course materials aim to support remote and online learning. They are only for the personal use of the students. Further use of course materials other than the personal and educational purposes as defined in this disclaimer, such as making copies, reproductions, replications, submission and sharing on different platforms including the digital ones or commercial usages are strictly prohibited and illegal.

The persons violating the above-mentioned prohibitions can be subject to the administrative, civil, and criminal sanctions under the Law on Higher Education Nr. 2547, the By-Law on Disciplinary Matters of Higher Education Students, the Law on Intellectual Property Nr. 5846, the Criminal Law Nr. 5237, the Law on Obligations Nr. 6098, and any other relevant legislation.

The academic expressions, views, and discussions in the course materials including the audio-visual recordings fall within the scope of the freedom of science and art.

Other

Important announcements and course material will be posted on the ODTUClass throughout the semester.

Information for Students with Disabilities

Students who experience difficulties due to their disabilities and wish to obtain academic adjustments and/or auxiliary aids must contact ODTU Disability Support Office and/or course instructor and the advisor of students with disabilities at academic departments (for the list: http://engelsiz.metu.edu.tr/en/advisor-students-disabilities) as soon as possible. For detailed information, please visit the website of Disability Support Office: https://engelsiz.metu.edu.tr/en/

Academic Honesty

The METU Honour Code is as follows: *"Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."*