CENG486 ADVANCED TOPICS IN NETWORKING
Tentative Syllabus v2 (February 20, 2024), 2023-2024 Spring

Instructor: Ertan Onur, eronur@metu.edu.tr, 5534, B211
Office Hour: Mondays 10:40-11:30, and by appointment
Assistant: No TA
Schedule: Mondays 09:40-10:30 BMB5; Thursdays 13:40-15:30 BMB5
Communication: http://odtuclass.metu.edu.tr (CENG486)
Catalog Description: Internet protocols. Wireless mobile and sensor networks. Software-defined networks. Network virtualization. Multimedia networking. Performance analysis of networks. Network management. Emerging topics in computer networks.
Course Objectives: At the end of this course, you will be able to:
1. Compare and contrast various state-of-the-art or emerging network design and management approaches in software-defined networks (SDN), network function virtualization (NFV), Internet of things (IoT), 5G and beyond (5GB), and programmable data planes (PDP)
2. Analyze, design, implement and evaluate virtualized, software-defined network functions, services, or protocols using SDN and NFV
3. Define the emerging architectures of wireless mobile networks, and compare/contrast them with their wired counterparts
4. Analyze the performance of computer networks, design analytical models for performance evaluation and apply queueing theory for solving performance problems in emerging networks

Textbook: No textbooks, please refer to references
References: Recent papers on networks (ACM Sigcomm, IEEE Infocom, ICC, Globecom, WCNC)
- Kurose and Ross, Computer Networking: A Top Down Approach, 6th and 8th Ed., Pearson.
- Tanenbaum, Computer Networks, 5th Ed., Prentice Hall, 2011.
- Stallings, Data and Computer Communications, 9th Ed., Prentice Hall, 2010.
- Bertsekas, Data Networks, 2nd Ed., Prentice Hall, 1992
- Barreiros, Lundqvist, QoS-Enabled Networks, Wiley, 2nd Ed., 2016
- Stallings, Foundations of Modern Networking, Pearson, 2016
- Beard, Stallings, Wireless Communication Networks and Systems, Pearson, 1st Ed., 2016
- Hillier, F. S. and G J. Lieberman, Introduction to Operations Research. McGraw-Hill, 2020.

Prerequisites: CENG435 (CENG222 will be of use).
Grading: Flexible catalog grading will be employed.

Midterm Exam	30%
Final Exam	35%
Paper Critique (PC) Workshop	$3 \times 5\%$
Queueing Theory Assignment (QTA)	20%

Final Exam Entrance Condition: None.
Makeup policy: A makeup activity is possible only if a legally documented excuse (e.g., medical report approved by METU Medical enter) is provided.
Exams: 1 double-sided A4 cheat sheet is allowed. Closed book.
Paper Critique (PC) Workshop: Any work you submit must be your own. No cheating, collaboration. We will employ peer assessment tool of Odtuclass.
Queueing Theory Assignment (QTA): Any work you submit must be your own. No cheating, collaboration.
Late delivery: Late submission is not allowed.
Academic honesty: There will be no tolerance to cheating in the exam, to plagiarism (copying someone else's work as if it is yours) and to taking advantage in (group) assignments and projects.

The student who cheats will fail the course and be punished according to METU regulations.

Tentative Course Outline:

Week	Topic	Reading	Activities
Selected Topics in Networking			
1	Courseware, 435 Recap		
2	Physical Layer	Ch1-6 Stallings	
3	Wireless Networks	Ch. 5 Beard-Stallings	
4	Wireless Mobile Networks	Ch. 7 Kurose-Ross	PC1
5	Network Management	Ch. 9 Kurose-Ross, 6 Ed.	
6	SDN/NFV	Ch. 7, 8 Stallings 5G	PC2
7	Multimedia Networking	Ch. 7 Kurose-Ross, 6 Ed.	
Performance Evaluation of Networks			
8	Quality of Service	Lundqvist	Midterm
9	Quality of Service	Lundqvist	PC3
10	Markov Chains	Hillier	
11	Birth-death Process (BDP)	Hillier	QTA out
12	Simple Queues on BDP	Bertsekas, Hillier	
13	Non-exponential Queues	Hillier	QTA in
14	Queueing Networks *or leftovers*	Bertsekas, Hillier	