Course Information

Course Code	5675410
Course Section	1
Course Title	HIGH-SPEED AND EMBEDDED COMPUTER NETWORKING
Course Credit	3
Course ECTS	8.0
Course Catalog Description	Review of core and edge network architectures.Introduction to in-vehicle and industrial communication networks.Quality of Service and real-time operation concepts.Basic router architectures.Fabric scheduling.Quality of Service schedulers.Packet processing and lookup.Switch fabric architectures.IPv6 and Next Generation Networks.In-vehicle networking system requirements and architectures.CAN Bus,LIN.Byteflight,FlexRay.Scheduling for CAN Bus and FlexRay.Industrial Communication Networks.Real time Ethernet.
Prerequisites	No prerequisites
Schedule	Monday , 13:40 - 16:30, EA207

Instructor Information

Name/Title	Prof.Dr. ŞENAN ECE SCHMİDT
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Office Hours	None

Course Objectives

The students will learn techniques for designing computer networks and network devices that work under real-time constraints.

Course Learning Outcomes

This course is designed to provide the students with a research-oriented point of view on computer networking under time/resource/performance constraints. The first part of the course is dedicated to high-speed router and switch design with Quality of Service support. We consider both switches in the backbone networks and on-chip networks. The second part of the course focuses on networks for embedded systems with real-time performance guarantees. Both parts of the course include scheduling algorithms to achieve performance guarantees. The course follows both fundamental and recent research papers. The students are expected to perform paper readings and reviews as well as a term project.

Tentative Weekly Outline

Week	Topic	Relevant Reading	Assignments

Week	Topic	Relevant Reading	Assignments
1	**Tentative OUTLINE** • Introduction • High-speed networking in the network backbone • Basic switch/router architectures • Data Plane QoS Support, Fair Scheduling Algorithms • Interconnection architectures • Fabric Arbitration and Scheduling • On-chip switches and networking • Packet processing and table look-up • Networks for embedded systems • Basics of real-time networks • In-vehicle networking • CAN bus • FlexRay • Real-time Ethernet • AFDX • TSN • Other Topics according to available time		

Course Textbook(s)

High Performance Switches and Routers, H. Jonathan Chao, Bin Liu, 2007, John Wiley & Sons, Inc.

Supplementary Readings / Resources / E-Resources

Readings

• Selected journal and conference papers, online manuals, white papers, and specification information for commercial products

Course Grading

Deliverable	Grade Points
MIdterms	40
Paper Review	5
Final	30
Project	25
Total	100