MIDDLE EAST TECHNICAL UNIVERSITY
Department of Electrical and Electronics Engineering
EE5410
High-Speed and Embedded Computer Networking
Fall 2017

Given by:
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Background Requirement(s):
General background on computer networking and hardware design or consent of instructor.

Course Objectives:
This course is designed to familiarize the graduate students with modular, scalable and low complexity design of the devices and protocols for networks that have to operate with timing constraints and provide Quality of Service (QoS). To this end, the first part of the course focuses on the architectures for switch fabric, packet processor and packet scheduler components of high-speed backbone routers with an emphasis of the *complexity and the scalability* of the design. The second part of the course focuses on the distributed embedded systems which require communication with certain timing guarantees. First time-triggered and event-triggered embedded system designs along with their communication requirements are introduced to demonstrate the design issues of the networks for such systems. Providing real-time guarantees while using the limited hardware and network resources efficiently is emphasized.

Textbooks and Reference Material :
- High Performance Switches and Routers, H. Jonathan Chao, Bin Liu, 2007, John Wiley & Sons, Inc.
- Selected journal and conference papers, online manuals, white papers and specification information for commercial products

Tentative Grading:
Midterms: 45%
Final: 35%
Class Project: 20%

Tentative OUTLINE
- **Introduction**
- **High-speed networking in the network backbone**
  - **Basic switch/router architectures**
  - **QoS Support**
  - **Interconnection Architectures**
  - **Router fabrics**
  - **Look up and Classification**
  - **Hardware support for SDN, NFV**
- **High-speed networking in real-time embedded systems**
- **In-Vehicle networking**
  - **CAN**
  - **CAN-FD**
  - **FlexRay**
- **Networking for the Connected Vehicle**