

EC 544 - Computer Engineering in a Connected World

Spring 2022
MW 4:30 - 6:15

Staff Information

Instructor:

Babak Kia, Email: babak@kia.family, or bkia@bu.edu
Office Hours: TBA (on Blackboard Learn)

Teaching Assistants:

TBA on Blackboard Learn

Course Description

Computer Engineering is not just about designing hardware. It is also about providing the complete solution of software, firmware, connectivity, and communication while at the same time addressing the encryption, security, authentication, and provisioning of devices in a connected and distributed world.

This course aims to address the software, communication and connectivity components of a modern Connected Device in a Digital era where millions of IoT devices interact with people and machines in a distributed and decentralized fashion. The course will cover firmware and software design, encryption algorithms and authentication frameworks, messaging and communication protocols, connectivity technologies, Cloud-versus-Edge computing, and finally does a deep dive into distributed and decentralized computing. This is a fast-paced course with frequent lab assignments and students are also expected to complete a project in one of the course topics.

Prerequisites

C/C++ and Java
Embedded Systems or Microprocessors
Working knowledge of Linux

Syllabus

The course is divided into six modules that cover the following weeks:

Week	Topic	Assignment due
1	Intro / Operating Systems I	
2	Operating Systems II	HW 1
3	Cryptography I	
4	Cryptography II	Lab 1
5	Authentication I	Lab 2
6	Authentication II	Lab 3
7	APIs	Lab 4

Week	Topic	Assignment due
8	Networking & Connectivity I	Midterm Progress Report
9	Networking & Connectivity II	Lab 5
10	Distributed & Decentralized Computing I	Lab 6
11	Distributed & Decentralized Computing II	Lab 7
12	Distributed & Decentralized Computing III	
13	Distributed & Decentralized Computing IV	
14	Final presentation	

Assignments

There are 1 homework and 7 Lab assignments in this course, along with a final project. All assignments can be done on a personal computer, but students also have access to PHO115 (Software Instructional Laboratory) and PHO 305/307 (Linux machines with windows VMs).

Labs will be assigned a week ahead of time and will be on topics being discussed in class at the time. Labs in general will take less than a week to complete (about 6 hours). Labs will get progressively more free form, and will take about 7-10 hours per lab. It is important to keep pace, as lab work reinforces topics discussed in lecture during that period.

Grading Policy

Late policy for assignments:

20% late up to 1 week

50% late up to 2 weeks

Not accepted after 2 weeks

Grading

Assignment	Grade weight
Homework 1	5%
Lab 1	7%
Lab 2	7%
Lab 3	7%
Lab 4	10%
Midterm Progress Report	10%
Lab 5	10%

Assignment	Grade weight
Lab 6	10%
Lab 7	10%
Final Project Report	15%
Quiz 1	3%
Quiz 2	3%
Quiz 3	3%

Attendance

Attendance (and attention) is a critical component of the course. There is no single textbook that covers course material, and missing more than 1 or 2 lectures will seriously impact your understanding of the remaining material. Quizzes will randomly be administered through the semester, they are designed to gauge/ensure your understanding of course content. Quizzes are *closed computer but open physical (not computer) notes* on material discussed during lecture.

Missing 3 quizzes is an automatic failure of the course (grade F).

Collaboration and Academic Honesty

Collaboration is expected and encouraged, however all assignments must be the outcome of individual work. The University maintains strict academic honesty guidelines that can be found at the University website.