TCN 5060 - U01 Telecommunications Software and Methodologies

Spring Term 2023

Instructor Name: Mo Sha
Knight Foundation School of Computing and Information Sciences
Florida International University

Email: msha@fiu.edu
Phone: 305-348-1717
Office: CASE 382
Office Hours: Th 8:30AM-11:30AM (through Zoom, Zoom link:
https://fiu.zoom.us/j/92221339476) or by appointment

Tentative class schedule

Course Description and Purpose

This course provides students with a high-level look into network architectures and distributed applications, client-server models, network software platforms and advanced techniques for programs specifications through implementation. A substantial part of the material will cover telecommunications systems, wireless networks, embedded operating systems, and network protocols. A variety of different telecommunications applications will be introduced, including clinical monitoring, structural health monitoring, and industrial process automation. In this course, students will also have an opportunity to obtain hands-on experience on programming embedded devices to sense and communicate. Please visit the course website for more details.

Course Objectives and Learning Outcomes

Upon completing this course, students will be able to:

- Identify telecommunications devices
- Identify major telecommunications applications
- Understand basic concepts and features of embedded operating systems
- Understand characteristics and constraints of wireless communication, such as frequency bands, modulation, signal distortion, and interference
- Compare different Medium Access Control protocols
- Understand basic concepts of telecommunications techniques
- Create telecommunications applications using embedded programming language

Important Information

Before starting this course, please review the following pages:

- [Accessibility and Accommodation](#)
- [Academic Misconduct Statement](#)

*The professor retains the right to modify the course syllabus for any reason throughout the semester

Prerequisites and Corequisites

None

Textbook

Not required

Reference Books

- Philip Levis and David Gay, TinyOS Programming, Cambridge University Press, 2009. ISBN: 978-0-521-89606-1. Free download [here](#).

Main Topics

The following topics will be covered (some may be covered only partially):

Main topics

No.	Topic
1	Introduction to telecommunications
2	Embedded operating systems: TinyOS and Android
3	Programming language for networked embedded systems
4	Wireless protocol stack: Physical layer
5	Wireless protocol stack: MAC layer
6	Wireless protocol stack: Routing layer
7	Introduction to machine learning
8	Telecommunications applications: Clinical monitoring
9	Telecommunications applications: Structural Health Monitoring
10	Telecommunications applications: Industrial Process Automation
11	Other advanced topics if time permits

Lecture Slides and Supplemental Materials

- Lecture slides will be posted a Module in CANVAS after each lecture. Take notes in class, and then compare them with the lecture slides once posted to ensure you understand the concepts

presented. *Lecture slides do not substitute for class attendance*, because (i) they will not be complete and (ii) significant parts of lectures, including discussions and in-class exercises, may not come from the lecture slides.
*   Additional materials will be added as appropriate.

Assignments

*   One programming assignment. This assignment will lead to the implementation of a basic telecommunications application, which requires the understanding and application of concepts and designs introduced in class. Each student is required to complete the assignment independently.
*   Three paper presentations.
*   One semester-long system project. This project will lead to the implementation of a complete telecommunications system, which solves a real-world problem identified by the student. Each project is an individual project.
    o   You will spend a lot of time on your project in class and after class.
    o   Start working on the project early.
    o   If you don't know how to solve a problem, don't give up. Talk to your instructor or classmate.
    o   Readability of the programs and solutions is as necessary as correctness. Expect to lose points if you provide a badly written and unclear "correct" solution. Your code should be well commented.
    o   Late submissions will not be accepted under any circumstances. Plan to turn in your required project documents early.

Grading Scheme

The following percentage weights will be used to assess student work:

*   Programming assignment   30%
*   Paper presentations   30%
*   Project   40%

As a reference, the approximate breakdown of grades from a previous class is:

Approximate breakdown of grades from a previous class					
Letter	Range%	Letter	Range%	Letter	Range%
A	90 or above	B	80 - 85	C	70 - 75
A-	88 - 90	B-	78 - 80	D	60 - 69
B+	86 - 87	C+	76 - 77	F	59 or less

Academic Integrity Expectations

- Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and to honestly demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Student Conduct and Honor Code procedures and sanctions as outlined in the FIU Regulation 2501 and the Student Handbook.
- Please review the Student Conduct and Academic Integrity website, Academic Misconduct Statement, and make sure that you understand them!

- Your programming assignment submission must have the following statement: "I have done this assignment completely on my own. I have not copied it, nor have I given my solution to anyone else. I understand that if I am involved in plagiarism or cheating I will receive the penalty specified in the FIU regulations."
- Collaboration on Assignment**: Students are encouraged to help one another and to form study groups. In Computer Science, you can learn more from your peers than from your instructors and teaching assistants. As long as the help is appropriate, please be generous with your time and expertise when helping fellow students. Doing so is good for you and good for them. You are free to discuss the assignment *in general terms* with one another. However, please do not show your work directly to other students. Each student must complete your assignments *individually* (unless indicated otherwise by the instructor). Each of you must write your own code, and you must write up all solutions individually. Students submitting solutions (including code) that are determined to be "too similar" are likely to be punished equally and harshly. We can tell whether you have done the work on your own, so please do the work on your own.

Disability Resource Center

The Disability Resource Center (DRC) collaborates with university faculty to provide inclusive learning environments. If you have a disability and plan to utilize academic accommodations, additional information may be found in the DRC's website.

Panthers Cares and CAPS services

If you are looking for help for yourself or a fellow classmate, Panthers Care encourages you to express any concerns you may come across as it relates 36 to any personal behavior concerns or worries you, for the classmate's well-being or yours; you are encouraged to share your concerns with FIU's Panthers Care website. Counseling and Psychological Services (CAPS) offers free and confidential help for anxiety, depression, stress, and other concerns that life brings. Learn more about CAPS at caps.fiu.edu Professional counselors are available for same-day appointments. Don't wait to call 305-348-2277 to set up a time to talk or visit the online self-help portal.

Intellectual Property Rights

Student work submitted to the College/School/Department in satisfaction of course or degree requirements becomes the physical property of the College/School/Department. This work may include papers, drawings, models, and other materials. However, students retain all rights to the intellectual property of such work created as part of an academic course, and may request that, upon completion of the academic course, the College/School/Department return any such work to the student holding the intellectual property rights therein. If a student declines to accept physical possession of its student work, the College/School/Department may, at its discretion, retain, return, or discard such materials. The College/School/Department will not normally discard the materials of currently enrolled students If the College/School/Department wishes to use the student's work, it will request that the student voluntarily consent in writing to the use. If consent is given, the College/School/Department will include the student's name when using the student's work.

Please be advised that classes may be audio and visually recorded and/or subject to course capture for future access by students in this course. Your attendance/ participation in this course constitutes consent to such recordings, which will only be used for educational purposes by students in the course and securely stored in University systems. If there is a concern regarding the recording and use of such recording, please contact FERPA@fiu.edu.

Class Attendance Requirement

Attendance is required and attendance will be checked regularly. If you are not present when attendance was checked it will be counted as missing the class. You may miss a total of three classes without a verifiable valid excuse. After that your final grade will be reduced by 5% for each missing class. If you miss six or more additional (beyond three) classes you automatically fail the class. Please inform the instructor ahead of time by email for any expected or excused absence. You may *not* "make up" a class by attending the other section.

Computers and Other Electronic Devices

You are not allowed to use your phone/laptop/notebook/tablet during class unless explicitly permitted. Cell phones must be turned off or in vibrate alert mode during class.