

CSCI 6045: Cyber-Physical Systems

Fall 2021

Instructor	Dr. Mark Hills
Scheduled Class Time	Tuesday, Thursday: 5:00pm – 6:15pm Bate 2016
Instructor Office	Science & Technology Building, Room C-110
Online Office Hours	Tuesday 2:00pm to 4:00pm Wednesday 10:00am to 11:00am Thursday 2:00pm to 4:00pm Feel free to make an appointment with me if you need to meet outside of these hours.
Instructor Phone	252-328-9692
Instructor Email	hillsma@ecu.edu , responses within 24 hours during the week, potentially longer on weekends or over holidays
Course Web Page	Canvas: https://ecu.instructure.com/

Course Description and Objectives

The ECU course catalog describes this course as: “Computational and application aspects of cyber-physical systems. Sensor networks, architectures, network protocols, and wireless technologies for designing and developing cyber-physical systems.”.

This course will focus on various aspects of cyber-physical systems. Topics covered in this course include:

- Definitions of, and examples of, cyber-physical systems
- The Internet of Things, and the relationship with cyber-physical systems
- Models of cyber-physical systems, including discrete, continuous, and hybrid models
- Platforms for development of IoT devices, such as Arduino and Raspberry Pi
- Current research in cyber-physical systems, IoT, and the merger of these two areas

As we will see, cyber-physical systems and IoT are closely related enough that many consider them to be essentially the same thing, although they have come out of two different research communities.

At the end of this course, you should understand how to model, and reason about, cyber-physical systems; should be prepared to engage with the research literature in this area; and should have some familiarity with creating applications (hardware and software) that fall under the cyber-physical systems and IoT umbrella. You should also understand the boundaries of cyber-physical systems, and how these differ from just “cyber” systems or from systems discussed in related areas, such as embedded systems.

Classroom Meetings (For On-Campus Students)

As stated in ECU's [Community Expectations](#), by working together, we can keep Pirate Nation safe for a successful Fall 2021 semester. Therefore, we will be observing the following class policies related to your health and safety:

- All students are required to comply with the [University Regulation on Face Coverings](#). No student will be allowed into the classroom without a face covering or mask worn properly over both the mouth and nose. You must wear a face covering properly the entire time you are in class.
- If you do not have access to a face covering, you may obtain a mask from Dowdy Student Store, Pirate Pantry, or another provider of masks.
- Maintain appropriate social distancing in hallways or common spaces prior to and after class, and stay spaced as much as possible in the classroom.
- Follow all posted signage related to entry, exit and pedestrian flow within classroom buildings.
- Conduct a daily health screening using the CDC's [COVID-19 symptoms](#) list. Do NOT attend class if you answer yes to any item on the list or if you are experiencing symptoms of any illness.

In the case of localized outbreaks affecting our classroom identified by health officials, we will transition to online delivery for up to two weeks for your safety. Health officials will closely monitor conditions and may need to contact you by phone to help them monitor public health conditions. Please ensure [your phone number is up to date in PiratePort](#). After this period of up to two weeks, we will resume on campus in-class activities. The temporary move to online course delivery will not affect the due dates for exams, quizzes, assignments, or any other form of assessment. If the course schedule requires adjustment, I will always notify you.

If the course moves completely online, you may be required to attend synchronous class meetings at the established class times via our existing Teams team for the course. All class meetings will be recorded.

I will post all course materials and class meeting recordings, if available, on Canvas. Students unable to attend should access those notes and materials and contact me if they have any questions. The Canvas course will be used for all communications, assignments, and assessments. It is recommended you save on your computer and/or print a copy of the syllabus, assignment schedule, and other important course material. In the event of a Canvas outage, I will use email to communicate with you.

Official Statement on Course Recordings: This class will be recorded and broadcast on the internet and/or distributed on other electronic media now or hereafter known. These recordings may contain your image and your voice. You must notify me as soon as possible if you DO NOT want your image and your voice contained on the recording. If you do not so timely notify me, then you understand and authorize that as part of this class we may record your image and record your voice and broadcast it on the internet and/or distribute it on other electronic media now or hereafter known.

Instructor's Explanation/Addendum: The language above is language we have been asked to use. Essentially, if we record the course, you may be on video. Most likely, this would only include

audio of your voice, since we would mainly be focused on recording the lecture itself, not the entire classroom, but if we have a discussion or you ask a question, the audio from this may be captured. The video will only be available to other members of the course.

Required Course Materials

Our main text for the course will be *Cyber-Physical Systems: A Model-Based Approach*, by Walid Taha, Abd-Elhamid M. Taha, and Johan Thunberg, published by Springer in 2021. Please see Canvas for links to download the textbook, which is free. This book is required.

We will also be reading a number of papers and other online materials during the course. Links to these will be provided on Canvas, with all material available electronically. This will include some lessons related to IoT developed by Microsoft.

For this course, on-campus students will need a university-approved Face Covering/Mask, Hand Sanitizer, and Disinfectant wipes. Please see <https://returnofpiratenation.ecu.edu/protecting-our-pirates/> for more details.

In this course, you will have online activities including quizzes, online discussions, and assignment submissions outside of class in Canvas (<https://canvas.ecu.edu>). This class requires reliable access to a computer and a microphone for recording presentations and providing peer review feedback. Webcams are an option for office hour interactions if attending remotely, but are not required. [Please review the ECU Computer Recommendation.](#)

Equipment—including computers, webcams, headsets, and hotspots—is available for checkout at both ECU libraries:

- [Equipment Available for Checkout from the main campus library \(link\)](#)
- [Equipment Available for Checkout from Laupus Library \(link\)](#)

Grading

Students will be evaluated based on the combination of class activities. The final grade will be assessed with the following criteria:

Assessment		Grading
Exam 1 (15%) and Exam 2 (15%)	30%	A: ≥ 90
Hands-On Activities (including in-class activities), Discussions, and Quizzes	20%	B: ≥ 80
CPS/IoT Projects	30%	C: ≥ 70
Research Project	20%	F: < 70
Total	100%	

Exams

The first exam for the course will be available on Canvas on Tuesday, October 5, 2021. The final exam for the course will be available on Canvas on Thursday, December 2, 2021. We will not have class on either day, but our classroom will be available if you want to come to class to take the exam. For online students, please contact me if you cannot take the exam on the exam date. More

details about the exams will be available closer to the exam dates. Both are timed exams. Note: you will not need a proctor for the exams in this course. All exams will be administered through Canvas.

Attendance Policy

On-campus students should make every effort to attend in person. Attendance is not required for this course, but you will do much better in the class if you attend regularly. Online students are invited to attend during our class time, but all classes will also be recorded for later viewing.

As is to be expected, **if you are sick, do not come to class!** Just contact me as soon as you are able. Since we are recording as much of the class as possible, you can continue to follow along online, or catch up when you are better.

In case of an outbreak, the class may be moved to a fully online format for up to two weeks. During this period, the above attendance policy will remain in effect. If you have poor Internet access, contact me within 48 hours of the announcement of the online move to work out a plan for attendance.

You are responsible for announcements and assignments given in class. If you miss a class, it is up to you to obtain notes and any other information that was provided in the class. Excuses that you did not know about something because you did not come to class and did not obtain the information will not be accepted. If you are having trouble keeping up with the work in this course, come to office hours or ask for help right away. If you wait until the end of class to seek help, there is most likely very little that you can do to improve your score.

Starfish

This course uses the Starfish system to provide you with information on your performance within the course. For more information, please see <http://www.ecu.edu/cs-acad/advising/upload/Starfish-Student-Getting-Started.pdf>.

Student Conduct

Smoking is not permitted in classrooms. Please turn off mobile phones in class. Laptops and tablets can be used for taking notes, but should not be used for other work (or recreational browsing, playing games, etc).

Students are expected to abide by the university's Student Honor Code. The homework that you do is a critical part of your education. Each student is expected to do his or her own individual work, and each group is expected to do their own group work. That does not mean you are not allowed to discuss your ideas with other students or groups. Working in groups can be beneficial, and I encourage you to talk through ideas with other students. But outright copying is considered plagiarism and is unacceptable. Students who copy other students' work, or who allow their work to be copied, or who copy their work from other sources, such as the Internet, will receive either no credit or negative credit for the assignment, and may be reported to the university for an academic integrity violation.

Other potential academic integrity violations are cheating, falsification, multiple submissions of the same work in different classes, and attempts at any of these violations. Please see http://www.ecu.edu/cs-studentlife/policyhub/academic_integrity.cfm for more details.

Academic integrity violations can result in a grade penalty up to and including an F for the course.

Incompletes

No incompletes will be issued in this course except for extraordinary circumstances, which generally will be situations where almost all work is complete, this work has been done at an acceptable level of quality, and it is realistic that you can pass the course once the remaining work is completed.

Continuity of Instruction

Making up missed instructional time in this course will follow [ECU's Policy for Making Up Missed Instructional Time Due to Suspension of Instruction](#).

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in the course will be communicated as soon as possible by email, and on Canvas. Students are encouraged to continue the readings and other assignments as outlined in this syllabus or subsequent syllabi.

Copyright on Course Materials

Course materials, including programming assignments and lecture notes, can only be publicly shared or used for commercial purposes if given permission. This is covered by ECU copyright regulations, available at <http://www.ecu.edu/prr/10/40/02>, which state the following:

7.1.3. Notes of classroom and laboratory lectures, syllabi, exercises and other course materials taken by Students shall not be deemed Student Works, may only be used for personal educational purposes, and shall not be used for commercialization by the Student generating such notes or by any third party without the express written permission of the author of such Works. Violation of University Policy may be grounds for disciplinary action pursuant with the ECU Student Conduct Process.

Weather Emergencies

In the event of a weather emergency, information about ECU can be obtained through the following sources:

ECU emergency notices	http://www.ecu.edu/alert
ECU emergency information hotline	252-328-0062

Caveats

Occasionally, it may be necessary to revise this syllabus due to extenuating circumstances. I reserve the right to revise this syllabus if the need arises. If I do so, I will announce this on Blackboard.