

# **Course Information and Standards**

## **Special Topics Course: “Internet of Things”**

### **CS.3500**

University of Massachusetts Lowell  
Department of Computer Science  
Spring Semester 2020

**Time and location:** Wednesday, 2:00 – 4:50 – DAN403  
**Instructor:** Bill Moloney, Jeffrey Brown, Daniel Pivonka  
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**Office hours:** by appt.  
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**Email:** [jeffbrown@redhat.com](mailto:jeffbrown@redhat.com)  
[dpivonka@redhat.com](mailto:dpivonka@redhat.com)  
**Web site:** <https://github.com/Daniel-Pivonka/iot>

#### **1. Course Description:**

This course will combine lectures of various topics related to the Internet of Things (IOT) and a hands-on lab with creating your own IOT devices.

Some lectures will cover large-scale networks of devices with embedded electronics, software, sensors and connectivity. Other lectures will cover market issues including technology drivers, market segments, industry trends, security implications, and current residential commercial offerings.

In the lab students will have a 6 step crash course on creating an IOT device followed by a final project to create their own IOT device with a Raspberry Pi, arduino and their choice of sensor.

#### **2. Prerequisites:**

Comp 1-4, OS, or permission of instructor

#### **3. Required Text:**

*Online material and handouts.*

#### 4. Grading:

Final grades will be based as follows:

Type	Number	Weight
Class Participation		25%
Labs	approx. 6	30 %
Project Proposal	1	5 %
Final Individual Project	1	30 %
Final Project Presentation	1	10%

One of the **major** aspects of this class is the discussions that will be held on different topics during each held class. It is important that you pay attention to the presentations, just showing up to the presentation and not paying attention will be reflected in your grade.

Up to 2 class absences will be permitted without grade penalty. Any absences beyond this will incur a reduction in the class participation component of your grade by 5% per class.

All code from your labs and final project **must** be uploaded to github and linked with your submission. I suggest you make an 'IOT' repo with directories for each assignment/project. Not providing your code will result in zero credit for the lab/project.

Labs will be assigned at the end of lecture and will be due before the start of the following class.  
**Labs and Final Projects will need to be submitted through email as follows**

To: [dpivonka@redhat.com](mailto:dpivonka@redhat.com)

Subject: Assignment 'X' submission / Final project submission

Body: github link to your code

link to video of lab working (youtube or some video platform)

Each student will be given an IOT kit. Failure to return this kit will result in a failing grade.

#### 5. Lateness:

For each **class day** a lab is late, **10 % of the total points** will be deducted from the points received. This will continue for **five class days**, after which the lab may be submitted at any time **up to and including 11:59:59 PM of the last class of the semester (April 29, 2020)** and will receive a maximum of half the total credit.

The project will be due on the last day of class (**April 29, 2020**) and **must** be submitted by that day.

## 6. Academic Dishonesty:

In this course, **all** work is to be **each student's own**. With the exception of Open Source software obtained to help the student complete their projects. Students should therefore be familiar with the University's rules on academic dishonesty, which can be found in the *Bulletin of Undergraduate Studies* and in the *Schedule of Classes*. In particular, **plagiarism** will not be tolerated! Any student caught plagiarizing another's work will automatically receive a grade of **F** for the course. If you are unsure as to what constitutes plagiarism, it is your responsibility to check with the instructor. Other forms of dishonesty will result in similar actions. You may collaborate with your classmates on the design and results of the programs you will write in this course, but each student **must implement these programs alone for the individual project and programming assignments**. Submission of **shared student code for the individual project or programming assignments is not permissible**, and will result in a grade of 0 for each component. Help files may be provided for some programming assignment, and students are encouraged to cut and paste useful code from these help files into their assignment submissions, but all other code **must be the specific work of each student for the individual project or programming assignments**.

## 7. Topical Outline:

The potential topics to be covered in lectures include the following:

- What is the “Internet of Things”
- Introduction to IOT, Market, Technology, Issues, Impacts
- Real World IOT business
- Hardware Technology impacts on IOT market
- Open Source and IOT
- Leading IOT Devices in Market
- Deep Machine Learning
- IOT Data Explosion - Opportunity, Challenges, Risks
- AWS IOT Service
- Security in IOT space
- Edge containerization

Guest Speakers will cover some of these topics

Short description of labs and project, more details will be given as they are assigned. Most labs build off the previous lab so falling behind / skipping a lab will make the next lab more difficult.

Lab 1. Setup raspberry Pi and arduino

Lab 2. Work with buttons and leds on Pi and arduino

Lab 3. Communicate between Pi and arduino

Lab 4. Logging sensor data in database

Lab 5. Restful API

Lab 6. Phone app / website

Final Project Proposal: Write a short description of your project

Final Project: Build your IOT device

Final Project Demo: A test run of your final project presentation

Final Project Presentation: A **ten** minute or less video showing and demoing your project. It will be shown at the final class and the projects will be judged based on the video. The judging will be done by some of the guest lectures has no impact on your grade, but is a fun competition at the end of class.