COMP 5230 THE INTERNET OF THINGS (3 credit hours)

Elmira College

SPRING 2025

Required Text:

1. Robert Barton et al. (2017), ***IoT Fundamentals: Networking Technologies***, Protocols, and Use Cases for the Internet of Things, 1st Edition, CISCO Press.
2. Brian Russell and Drew Van Duren (2016), ***Practical Internet of Things Security***, 1st Edition, Packt Publishing.
3. Dirk Slama et al. (2015), ***Enterprise IoT: Strategies and Best Practices for Connected Products and Services***, 1st Edition, O'Reilly Media.

Pre-requisites: COMP 1305 Computer Programming in Python; COMP 3360 Visual Analytics

Course Description

This course is designed to offer students an in-depth and comprehensive understanding of the Internet of Things (IoT), a revolutionary technology that interconnects a vast array of devices, facilitating seamless and intelligent communication and interaction. The primary objective of this course is to arm students with the essential skills and profound knowledge required to adeptly design, implement, and deploy IoT applications. These applications are designed to significantly enhance the functionality, efficiency, and overall performance of a wide range of systems and processes across various industries. By the end of the course, students will be well-versed in leveraging IoT to drive innovation and optimize operations, helping them make contributors to the evolving technological landscape.

Course Objectives and Goals

- Grasp the core concepts of IoT, including its architecture, protocols, and the role of various components such as sensors, actuators, and micro-controllers.
- Learn how to design IoT applications that are efficient, scalable, and user-friendly, taking into account the unique constraints of small devices and the need for energy efficiency.
- Gain hands-on experience in implementing IoT systems using a variety of hardware and software tools, including programming microcontrollers and integrating sensors.
- Develop skills in data management, including data storage, processing, and analysis, to extract meaningful insights from the vast amounts of data generated by IoT devices.
- Understand the critical issues of security and privacy in IoT, and learn how to implement measures such as encryption, authentication, and data protection to safeguard IoT systems.

Evaluation of Performance

Your grade will be based upon your performance on exams, assignments, and participation.

3 Homework	15%

2 Quizzes	15%
4 Labs	30%
Midterm Exam	20%
Final Exam	20%
Total	100%

Grades will be assigned as follows:

A	93% and above	B-	80 - 82%	D+	67 - 69%
A-	90 - 92%	C+	77 - 79%	D	63 - 66%
B+	87 - 89%	C	73 - 76%	D-	60 - 62%
B	83 - 86%	C-	70 - 72%	F	59% or below

Withdrawal Policy: Please see Elmira College Bulletin for information on this policy.

Academic Honesty: Please read the section on Academic Honesty in the **Code of Conduct**. Briefly, academic dishonesty includes: cheating, fabrication, facilitating academic dishonesty, and plagiarism. Ask if you have any questions on whether something constitutes as academic dishonesty. All work must be original and new. Past assignments from current or other courses will not be accepted. Academic dishonesty will not be tolerated. It will result in zero on the assignment, and a report will be filed with the school. Continued practice will result in failure of the class. Institutional penalties may also apply with repeated acts of academic honesty.

Student Responsibility:

- It is your responsibility to keep track of assignments and due dates.
- You should ask questions concerning assignments and lectures, if you need any clarifications.
- If you are struggling in class, have concerns, and/or unsure about expectations, please stop by during office hours or make an appointment for another time.

Tentative Schedule of Topics

Topic	Materials	Tasks & Evaluations
Introduction to IoT	Chapter 1	
IoT Architecture	Chapter 2	Homework 1
IoT Protocols and Standards	Chapter 3	
IoT Hardware and Software Basics	Chapter 4	Lab 1
Cryptography in IoT	Chapter 5	
Domain Specific IoTs: Home Automation, Cities, Environment, Energy, Agriculture, and Industry	Chapter 6	Homework 2
OWASP Top 10 IoT Security Risks	Chapter 7	
IoT Security in 4G and 5G	Chapter 8	Quiz 1
Programming for IoT	Chapter 9	
Key Programming Paradigms in IoT	Chapter 10	Midterm Exam
User Interface Design for IoT	Chapter 11	Lab 2
IoT Systems - Logical Design Using Python	Chapter 12	

IoT Physical Servers & Cloud Offerings	Chapter 13	
Tools for IoT	Chapter 14	Lab 3
Advanced IoT Security Techniques	Chapter 15	
IoT and Edge Computing	Chapter 16	Homework 3
IoT and AI Integration	Chapter 17	
IoT Data Analytics and Visualization	Chapter 18	Lab 4
Data Management in IoT	Chapter 19	
IoT and Blockchain Integration	Chapter 20	Quiz 2
IoT and Supply Chain Management	Chapter 21	
Public Safety	Chapter 22	Final Exam