

# ECE 592-054/614; ECE 792-031/614

## Internet of Things: Architectures, Applications, and Implementation

**Instructor(s):** Muhammad Shahzad, mshahza@ncsu.edu

**Objective or Description:** This course focuses on advanced topics in the Internet of Things (IoT). These topics include (but are not limited to) challenges in the design of IoT infrastructure, limitations of existing protocols such as HTTP when used with IoT, security, applications of machine learning techniques, and leveraging cloud to achieve the full potential of IoT. The students will be encouraged to read research publications in this area. The course also includes multiple demos using real IoT hardware such as Raspberry Pi boards and/or other similar devices. The course also covers one or more of IoT platform such as IBM Bluemix/Cloud platform. To enable students to see IoT in action, they will be required to do assignments/projects using real IoT devices.

**Prerequisites:** Students are expected to have good programming skills and good understanding of conventional network design, architecture, and operations.

**Textbook:** The instructor will provide majority of the course materials. The students are not required to purchase any books. Students, however, will need to purchase IoT prototyping boards such as Raspberry Pis, Arduinos, and various sensors and actuators

**Topics:** Introduction to the Internet of Things and Internet overview; Application and Transport Layers; Socket Programming; Programming Arduino and Raspberry Pi; Interfacing sensors/actuators; MQTT; CoAP; IFTTT; IoT Analytics; Cloud Computing; Focused project meetings

### **Grading:**

The grading will be relative.

Graded Elements	Description	Weight (ECE-592)	Weight (ECE-792)
Homework Assignments	In most cases, these will be programming assignments. Four to five assignments in total.	55%	55%
Exam	One mid-term exam; no final exam.	15%	10%
Course project	Students will do a comprehensive project during the course.	30%	28%
Research Presentation	792 students will conduct a detailed study of the state of the art in one of the IoT verticals and make a comprehensive presentation on that vertical.	0%	7%

**Cross-listing in other departments:** CSC 591-022; CSC 591-065; CSC 791-022, CSC 791-065