

Course	ECE 56000 - Body Sensors and Body Communications Networks
Type of Course	Graduate Course
Catalog Description	Principles of the acquisition, communication, and processing of in-body and on-body signals. Design and implementation of Body sensors. Path-Loss modeling for on-body and in-body communications. Body sensor networks and topologies. Related communication protocols and Standards. Low Power sensors and signal processing. Multi-Sensor Fusion.
Credits	3
Contact Hours	1
Prerequisite Courses	ECE 302 Probabilistic Methods and ECE 362 Microprocessor Systems and Interfacing, OR equivalent courses, OR instructor approval
Textbook	No textbook. The course material is composed of a series of online slides and articles drawn from the scientific literature
Course Objectives	To learn a basic knowledge of body sensors, body path-loss models for wireless communications, body sensor networks, and the processing of signals generated by the human body.
Course Outcomes	Students who successfully complete this course will have demonstrated: <ol style="list-style-type: none">1. Understanding of power, time, and frequency characteristics of signals present in the human body [1]2. Understanding the design and interfacing of body sensors [1]3. Understanding the electromagnetic propagation characteristics present in- and on-body communication paths [1]4. Ability to compute path-losses for different scenarios [1]5. Ability to carry out simple designs of antennas for in- and on- body transmission of signals [2]6. Understanding of network topologies [1]7. Understanding of IEEE standards applicable to body sensor networks [1]8. Understanding the power consumption of body sensors [1]9. Understanding the algorithms and software used to process signals collected by body sensors [1]10. Ability to design and implement signal processing algorithms [1]

Lecture Topics	<ul style="list-style-type: none"> ▪ Characteristics of the human body as a signal generator and transmission medium ▪ Design and implementation of on-body and in-body sensors ▪ Body path-Loss characteristics and modeling for wireless communications ▪ Body Area Networks ▪ Communication Protocols ▪ IEEE 802.15.1, IEE 802.15.3, IEEE 802.15.4, IEEE 802.15.6 ▪ Energy Scavenging ▪ Low-Power sensors and Signal Processing ▪ Multi-Sensor Fusion ▪ Dimensionality Reduction and Feature Selection
Computer Usage	Medium
Laboratory Experience	None
Design Experience	Medium
Coordinator	Guoping Wang
Date	September 30, 2018