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| **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: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 ]**
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| **Lecture Topics** | * 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
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| **Computer Usage** | Medium |
| **Laboratory Experience** | None |
| **Design Experience** | Medium |
| **Coordinator** | Guoping Wang |
| **Date** | September 30, 2018  |