

Rutgers University
Electrical and Computer Engineering Department

ECE 499/593	Wearable and Implantable Electronic Systems
Index Number	Undergrads: 0112618 (14:332:493:01), Graduate Students: 0114247 (16:332:599:01)
Date:	Fall 2016
Credits:	3
Time:	10:20 AM – 1:20 PM Tuesdays
Location	CORE 538
Grading	15% Paper Presentation #1, 15% Paper Presentation #2, 15% Paper Presentation #3, 15% Mandatory Guest Lecture Attendance, 10% Pop Quizzes, 30% Final Project Report and Presentation
Final Exam	None
Instructor	Mehdi Javanmard, PhD.
Course TA:	TBA
Textbook:	Class slides will be available on the class website. A series of Journal Manuscripts and Conference Proceedings will be assigned for reading and in class discussions.
Prerequisites:	14:332:361 Electronic Devices

Description of Course: This course will cover the fundamentals of next generation wearable and implantable technologies from the device level to the system level.

Course intent

- Explain fabrication techniques for wearable and implantable systems.
- Describe the fabrication and operating principles of common wearable systems for biomedical applications.
- Analyze performance; including sensitivity, noise, bandwidth, and dynamic range for common wearable and implantable systems a variety of applications.
- Design interface circuitry, and identify appropriate signal processing and data processing algorithms for a given application.
- Evaluate the methods, results, and conclusions from a technical paper and extract relevant details for a performance comparison.
- Recommend appropriate process steps for a device based on tolerances, size, cost, operating conditions, and capabilities.
- Describe design tradeoffs in selecting, developing or redesigning wearable and implantable solutions.

Week Number Topic

Week 1	Introduction
Week 2	Molecular Biology (DNA, Proteins, Cells) and Physiology (Cardiovascular, Brain)
Week 3	Basic Electronics Part I (Impedance, Electrodes, Characterization)
Week 4	Basic Electronics Part II (Circuit Interfaces to physiological monitoring systems)
Week 5	Micro- and Nanofabrication Fundamentals
Week 6	Wearable Technologies Part I
Week 7	Wearable Technologies Part II
Week 8	Wearable Technologies Part III
Week 9	Implantable Technologies Part I
Week 10	Implantable Technologies Part II
Week 11	Implantable Technologies Part III
Week 12	Energy Sources for Wearable and Implantable Systems
Week 13	Wearable Systems: Signal Processing, Data Processing, and Communications
Week 14	Wearable Environmental Monitoring Technologies
Week 15	Review and Final Project Presentation