

UNIVERSITY OF SOUTHERN CALIFORNIA  
School of Engineering  
Department of Electrical and Computer Engineering

E.S. Kim

EE 608 (Cross-listed as BME 608), Fall 2024

**Wearable Technology**

4 Units -- M 5:00 - 5:50pm KAP 147  
F 9:00 – 11:50am KAP 145  
(total of four lecture hours per week)

**Instructor:** Prof. Eun Sok Kim  
PHE 602, 740-4697, eskim@usc.edu

**Office Hours:** MF 3:00 - 3:50

**Textbook:** Lecture notes from <http://blackboard.usc.edu/>

**References:** "Wearable Sensors," 2nd Ed. © 2020 Elsevier, Editor: E. Sazonov, ISBN: 9780128192467  
"Wearable and Implantable Medical Devices," © 2019 Elsevier, Editors: N. Dey, A. Ashour, S.J. Fong, and C. Bhatt, ISBN: 9780128153697  
"Wearable Technology in Medicine and Health Care," © 2018 Elsevier, Editor: R. Tong, ISBN: 9780128118108  
"Wearable Electronic Sensors for Safe and Healthy Living," © 2015 Springer, Editor: S.C. Mukhopadhyay, ISBN: 9783319181905  
"Fundamentals of Microelectromechanical Systems," © 2021 McGraw Hill, by E.S. Kim, ISBN: 9781264257584

**Helpful (Not Mandatory) Prerequisite:** EE348 and EE370L

**Course Description and Objectives:**

This course teaches fundamentals of wearable technology with focus on the following topics:

- (1) sensing, signal processing (analog and digital), RF communication,
- (2) power sources, power management, energy harvesting,
- (3) flexible substrate technology, and
- (4) wearable algorithms.

**Course Contents:**

Weeks	Topics	Reading Assignment
1	Introduction to Wearable Technology	Lecture Notes on Introduction
2 – 4	Wearable Sensors for Acceleration, Angular Velocity, Ambient Pressure, Audio, Magnetic Field, Infrared Imaging, Vapors, Lab on Skin, etc.	Lecture Notes on Wearable Sensors
5 - 7	Sensing Technologies, Flexible/Stretchable Substrate Technology, RF Communication, Batteries, Energy Harvesting	Lecture Notes on Sensing Technologies
8 - 9	Wearable Algorithms, Feature Extraction, Training and Classification, etc.	Lecture Notes on Wearable Algorithms
10 - 12	Wearable Technology for Healthcare: Heart Rate Sensing, Photoplethysmography, Electrocardiogram, etc.	Lecture Notes on Health Care with Wearable Technology
13 - 14	Analog and Digital Signal Processing, Difference Equation, Convolution, Digital Fourier Transform, etc.	Lecture Notes on Signal Processing for Wearable Technology

**Grading:** Homework: 20%, Term Paper and Oral Presentation: 40%, and Final Exam: 40%.