Wearable Technology Innovations Syllabus

» Course Overview

From hearing aids to pedometers to smart watches, humans have made and worn devices to overcome physical deficiencies, count their steps, and communicate. With the continue miniaturization of chips and sensors, combined with increasing sophistication of artificial intelligence, wearable technology has proliferated into countless end-markets. This course will introduce students to wearable technologies and the components and software that make these technologies possible. The course will also evaluate several applications of wearable technologies in various industries. Finally, the course will examine and discuss the implications of wearable technology, including its pros and cons, and potential implications to our health, privacy, and society.

» Course Outline by Module

Module 1	Introduction to Wearable and Implantable Technologies	Module 6	Wearable Technology in Fitness and Sports
Module 2	Components and Software of Wearables	Module 7	Wearable Technology in Public Safety and the Military
Module 3	Batteries in Wearables	Module 8	Wearable Technology in Fashion
Module 4	Product Design of Wearables	Module 9	Wearable Technology in Education
Module 5	Wearable Technology in Healthcare	Module 10	Wearable Technology in Business

» Module Overview and Learning Objectives

| Module 1. Introduction to Wearable and Implantable Technologies

Working in the design industry is more than just knowing how to use graphic design tools. There are crucial design, legal, and technical aspects that you must take into consideration when you work on any design project. Another key factor is working with colleagues and clients, and how well you are able to communicate your ideas and design visions.

Learning Objectives: In this module, students will:

- Define wearable technology and distinguish this from non-wearable technologies
- Define implantable technology
- Describe the history of wearable technologies
- Identify key security and privacy challenges presented by wearable technology
- Discuss whether wearable technology devices isolate or connect people

| Module 2. Components and Software of Wearables

This module introduces students to the physical components and software that make up nearly all wearables. Students will examine Moore's Law and how smaller chips and sensors have enabled significant growth in wearable technology in recent years. Getting an "under the hood" look at the sensors, chips, and software that make wearables work will help students understand and evaluate applications in later modules.

Learning Objectives: In this module, students will:

- Describe the key electronic components that make up nearly all wearables
- Define Moore's law and describe how the reduction in the size of components has contributed to the rise in wearables
- List and describe key sensors used in various wearable applications
- Compare analog and digital sensors
- Examine 3 points of vulnerability in wearable technologies

| Module 3. Batteries in Wearables

For most of us, it's a minor annoyance when the battery on our device runs out in the middle of the day. However, for a soldier or police officer using wearable technology, long-lasting and reliable battery power could mean life or death! In this module, we will explore the critical role that batteries play in wearable technologies. We'll also examine the historical progression of battery technology, charging, and its limitations..

Learning Objectives: In this module, students will:
- Describe efficiency and evaluate how technological improvements in other areas help extend battery life
- Examine various battery technologies and describe their characteristics and limitations
- Differentiate between liquid and solid-state batteries
- Define wireless battery charging
- Evaluate the past and current work of John Goodenough, who invented the lithium-ion battery
- Discuss destructive mining from rare metals used in batteries

| Module 4. Product Design of Wearables

This module will introduce students to the design process of wearable technology. Throughout the module, students will learn the many aspects that are unique to wearable products, such as durability, safety, and comfort. Students will evaluate their favorite wearable product on the dimensions outlined in this module.

Learning Objectives: In this module, students will:
- Describe an operating system and how it is used to integrate components
- Distinguish between hardware and software
- Evaluate key technologies that are part of wearable products, including Artificial intelligence, machine learning, and voice recognition
- Describe the product development process of wearables
- List design considerations that are unique to wearable products, such as durability, reliability safety, and consumer comfort
- Identify potential career opportunities within wearable technology development

| Module 5. **Wearable Technology in Healthcare**

This module is separated into two sub-topics. The first is wearable technologies used by patients. This includes monitors to track vital signs, ingestible pills, and robotic prosthetics. The second sub-topic is the use of wearables by medical professionals, such as doctors and nurses, to improve care and reduce healthcare costs. The module concludes with a discussion of the benefits and risks of utilizing wearables in healthcare.

Learning Objectives: In this module, students will:

- Define key terms related to wearable healthcare technology
- Describe several applications of wearable technology in healthcare
- Evaluate the use of wearable technologies by medical professionals
- Discuss the benefits and potential risks of utilizing and relying on wearable technologies for healthcare monitoring and delivery of care
- Identify potential career opportunities within wearable healthcare technologies

| Module 6. **Wearable Technology in Fitness and Sports**

While many people are familiar with fitness trackers worn on the wrist, this application is just the tip of the iceberg when it comes to wearable technology in fitness and sports! While the module will certainly cover the rise of fitness trackers to count steps, monitor heart rate and sleep, it will also explore some of the new and emerging products, such as smart socks, smart helmets, and even smart ski goggles. Given their convenience, and in some cases, sheer awesomeness, the use of these products will continue to grow for both amateur and professional athletes.

The module will also discuss the pros and cons of fitness wearables, and finish up with a section on potential career opportunities for those who are passionate about both technology and fitness!

Learning Objectives: In this module, students will:

- Define key terms related to wearable technology in fitness and sports
- Describe applications of wearable technology in fitness and sports
- Evaluate the smartwatch industry and describe various companies and products
- Discuss the benefits and potential risks of utilizing wearable technologies for fitness and sports
- Identify potential career opportunities within wearable fitness/sport technologies

| Module 7. Wearable Technology in Public Safety and the Military

What happens when wearable technology evolves beyond a simple watch? Military leaders have always sought ways to keep soldiers safe and find advantages over adversaries. In this regard, wearable technologies hold many promising applications from communication devices through strength-enhancing exoskeletons. This module will also explore the use of wearable technology with public safety officers, such as the use of police body cameras. Students will examine the implications of these uses on society.

Learning Objectives: In this module, students will:

- Define key terms related to wearable technology in public safety and defense
- Examine several applications of wearable technology by firefighters
- Examine several applications of wearable technology by the military
- Describe the developments and potential uses of exoskeleton technology by the military
- Discuss the benefits and potential risks of having the military utilize wearable technologies
- Evaluate the use of police body cameras in the U.S.

| Module 8. **Wearable Technology in Fashion**

Given today's technology, would you ever imagine buying a phone that isn't "smart"? If it can't text, use apps, or access the internet, what's the point? In the future, we may have the same view on smart clothing; why purchase a shirt or jacket, if it isn't smart?

Companies on the cutting edge of wearable technologies are introducing smart clothing items, with sensors woven right into the fabric. These sensors can do many things that other devices, such as smartphones and watches, can do but more accurately and with the user's hands-free. This module will explore the latest applications of wearable technology in clothing and in fashion and examine potential career paths in this growing sector.

Learning Objectives: In this module, students will:

- Define key terms related to wearable technology in fashion
- Describe the function of electronic textiles and smart clothing
- Evaluate several applications of wearable technology in fashion and clothing
- Discuss the factors that contribute to a wearable product's success or failure
- Identify potential career opportunities within wearable fashion technologies

| Module 9. **Wearable Technology in Education**

This module presents the various ways in which wearable technology is making its way into the classroom. It will discuss how smartwatches are being used by both teachers and students to enhance learning outcomes. Students will also learn about some of the applications of augmented and virtual reality in education, and how this is enabling more immersive learning. Finally, the module will discuss some of the risks and drawbacks of this technology, including digital distraction and potential for cheating.

Learning Objectives: In this module, students will:

- Define key terms related to wearable technology in education
- Describe current and potential applications of wearable technology in education for both students and teachers
- Evaluate the use of augmented and virtual reality systems to enhance learning experiences
- Discuss the potential risks and downsides of utilizing wearable technologies for education, such as technical problems, high cost, and cheating
- Examine how wearable technology and AR/VR can contribute to digital distraction and what students can do to increase focus and attention

| Module 10. Wearable Technology in Business

Increasingly, companies are providing their workers with a variety of wearable technology, such as wristbands, badges, and smart glasses. These tools can improve productivity, allowing workers to do more in less time. Wearables like headsets can provide workers with real-time information to help them work safer and more efficiently. Students will evaluate a variety of applications in many different business settings. Students will also discuss privacy issues and potential drawbacks of constant monitoring of employees.

Learning Objectives: In this module, students will:

- Define key terms related to wearable technology in business
- Describe applications of wearable technology in the workforce to improve safety and productivity
- Discuss the benefits and potential risks of utilizing wearable technologies for business
- Discuss standards companies should follow to improve the security and privacy of users
- Identify potential career opportunities within wearable technologies for business