

Introduction to Internet of Things

XEE100

Course Syllabus

Course Description

The Internet of Things is transforming our physical world into a complex and dynamic system of connected devices on an unprecedented scale.

Advances in technology are making possible more widespread adoption of IoT, from pill-shaped micro-cameras that can pinpoint thousands of images within the body, to smart sensors that can assess crop conditions on a farm, to the smart home devices that are becoming increasingly popular. But what are the building blocks of IoT? And what are the underlying technologies that drive the IoT revolution?

In this short non-credit course, six Stanford faculty members will deliver an overview of exciting and relevant technical areas essential to professionals in the IoT industry. This introductory course provides a taste of what to expect from courses that are part of the IoT Graduate Certificate program.

Note: Learners do not earn a record of completion for completing this course.

Instructor

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Course Topics

- **Module 1 – Course Overview**

Approximate video length in module: 36 minutes

The following topics will be discussed in this module:

- Why is IoT important?
- Short course components

- **Module 2 – Cool Applications**

Approximate video length in module: 28 minutes

The following topics will be discussed in this module:

- Smart cities: waste management, street lights, street parking and connected vehicles
- Healthcare: Baby monitoring, elderly monitoring, mood enhancing, disease treatment, enhance adherence and challenges
- Agriculture: precision agriculture, connected livestock and food safety
- Smart manufacturing and smart packing

- **Module 3 – Sensors**

Approximate video length in module: 93 minutes

The following topics will be discussed in this module:

- Sensor terminology
- Sensor dynamics and specifications
- Linearization and error
- Noise
- Reading a spec sheet
- Picking a sensor

- **Module 4 – Circuits**

Approximate video length in module: 63 minutes

The following topics will be discussed in this module:

- Overview on circuits for IoT
- Battery currents
- Energy management and wireless links
- Digital computing
- Analog-to-Digital interfaces

- **Module 5 – Embedded Systems**

Approximate video length in module: 138 minutes

The following topics will be discussed in this module:

- Internet connectivity and MGC architecture
- CortexM and BLE
- Typical costs and computing an energy budget
- Energy management and sleep states
- Microcontrollers: Peripherals, buses and DMA
- Operating systems and multiprogramming

- **Module 6 – Connectivity and Networking**

Approximate video length in module: 58 minutes

The following topics will be discussed in this module:

- Historical evolution of wireless systems
- Energy harvesting and wirelessly powered transmitters
- Capacity of wireless channels
- Massive multiple access and embracing collisions
- Computation versus communication

- **Module 7 – Course Wrap-Up**

Approximate video length in module: 2 minutes

Course Materials

All course materials are provided within the course learning platform. These include videos, handouts and assignments.

This course features real-world examples to provide the learner with relevant examples of the concepts. Case studies and examples involving specific persons or companies do not imply any affiliation of those persons or companies with Stanford, nor do they imply Stanford's endorsement of those persons or companies or their actions.

The course learning platform is available for 60 days after the date of enrollment via your [mystanfordconnection](#) account.

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these policies may result in disciplinary action, including removal from the course/program.