



Course Syllabus

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|------------------------------|--|--------------------------------|
| Course Code | Course Title | ECTS Credits |
| COMP-475 | Internet of Things and Wearable Technologies | 6 |
| Prerequisites | Department | Semester |
| COMP-212, COMP 358, COMP-470 | Computer Science | Fall, Spring |
| Type of Course | Field | Language of Instruction |
| Elective | Computer Science | English |
| Level of Course | Lecturer(s) | Year of Study |
| 1 st Cycle | Dr. Constandinos Mavromoustakis | 4 th |
| Mode of Delivery | Work Placement | Corequisites |
| Face-to-face | N/A | None |

Course Objectives:

The main objectives of the course are to:

- introduce the background and concepts of Internet of Things and Wearable Technologies
- compare and contrast the Internet of Things applications with other computing paradigms and the required infrastructures
- introduce and provide students with deep knowledge for the up-to-date technologies for Internet of Things and Wearable Technologies in today's Cyber-Physical Systems
- introduce the concepts for resource sharing and efficient resource manipulation for Cyber-Physical Wearable Systems and Internet of Things Systems
- provide students with deep knowledge for the up-to-date techniques for Streaming Data and critically assess the technical challenges and limitations in the Internet of Things era
- make students aware of Internet of Things Standardisation initiatives i.e. Status, Requirements, Initiatives and Organisations and how a Connected World can be built
- provide students with deep knowledge for the Architectures supporting the Internet of Things and Wearable Technologies and assess resource manipulations as well as introduce state-of-the art research in the area
- expose the students to development tools/environments/frameworks to develop applications using cloud computing infrastructure

Learning Outcomes:

After completion of the course students are expected to be able to:

1. explain in a concise manner how the general Internet as well as Internet of Things work.
2. describe the concepts, benefits, principals, architecture, and implementation technology of Internet of Things and Wearable Technologies and computing.
3. understand constraints and opportunities of wireless and mobile networks for Internet of Things.
4. demonstrate and analyze the various infrastructure metrics for the Internet of Things with other Cyber-Physical paradigms in a connected world.
5. explain fundamental architecture, models, services, and platforms that are used in the Internet of Things domain.
6. introduce the Internet of Things Standardization initiatives and how a Connected World can be built.
7. analyze trade-offs in interconnected wireless embedded sensor networks.
8. provide students with deep knowledge of the existing technologies for cognitive Internet of Things (IoT) systems, Agent-oriented IoT systems and Cross layering issues and Traffic based schemes and how these concepts affect the efficiency of the network resources.
9. introduce cutting edge industrial implementations in the area with respect to medial and ambient assisted living in smart spaces.

Course Content:

1. Introduction to Internet of Things: layers, protocols, packets, services, performance parameters of a packet network as well as applications such as web, Peer-to-peer, sensor networks, and multimedia.
2. Networked Systems and Internet of Things structure.
3. Internet Communication aspects: System Architecture of the Mobile Web based applications and services with the utilized protocols, Sockets and Client/Server structures and P2P existing architectures.
4. Mobile Networking: roaming and handover/handoff, mobile IP, and ad hoc and infrastructure less networks.
5. Hybrid and purely Mobile Peer-to-Peer Communication and principles, supported IoT protocols in next generation systems (i.e. 5G).
6. Connectivity and networks (Wireless technologies for the IoT, Edge connectivity and protocols) - Collaborative outsourcing in IoT systems.
7. Cyber-Physical Systems: efficiency, and resource manipulation

- a. Methodologies and State-of-the-Art architectures;
 - b. High performance IoT computing systems;
 - c. Survey on smart energy protocols.
8. Wireless Sensor Network (WSN), life cycle, energy efficiency, lifetime of WSNs, energy conservation.
 9. Internet of Things (IoT)
 - a. Internet of Things Standardisation i.e. Status, Requirements, Initiatives and Organisations and how a Connected World can be built;
 - b. Smart spaces, intelligent interfaces communication within social, environmental, user contexts and industrial examples, e.g. Smart Grid and automatic meter readings.
 10. Enabling Multimedia and Ambient Intelligence applications through the IoT
 - a. Techniques for Streaming Media (synchronously and asynchronously);
 - b. Case studies (AAL paradigm and context-awareness).
 11. IoT and platform oriented integrations: Cloud platform paradigm for the IoT and the state-of-the-art notations currently used.
 12. IoT and wearable devices: Case studies*, e.g. sensor body-area-network and control of a smart home.

*Including Emulation/Simulation experiments for certain network scenarios using Core packages by Oracle, NS-3 and other integrated packages

Learning Activities and Teaching Methods:

Lectures, Lab Presentations, Lab Tutorials, Practical Exercises and Assignments.

Assessment Methods:

Tests/Quizzes, Design project, Homework, Project, Mid-Term, Final Exam.

Required Textbooks / Readings:

| Title | Author(s) | Publisher | Year | ISBN |
|--|--|--------------------------------------|-------------|--|
| Internet of Things (IoT) in 5G Mobile Technologies | Constandinos X. Mavromoustakis, George Mastorakis, Jordi Mongay Batalla | Springer International Publishing AG | 2016 | ISBN-10: 3319309110 ISBN-13: 978-3319309118 |
| Beyond the Internet of Things: Everything Interconnected | Jordi Mongay Batalla, George Mastorakis and Constandinos X. Mavromoustakis | Springer International Publishing AG | 2017 | ISBN-10: 3319507567 ISBN-13: 978-3319507569 |

Recommended Textbooks / Readings:

| Title | Author(s) | Publisher | Year | ISBN |
|--|------------------------|-----------------------|-------------|--|
| Ambient assisted living and enhanced living environments: principles, technologies and control | Ciprian Dobre et al. | Butterworth-Heinemann | 2016 | 9780128051955 |
| Designing Connected Products: UX for the Consumer Internet of Things | Claire Rowland, et al. | O'Reilly Media | 2016 | ISBN-10: 1449372562 ISBN-13: 978-1449372569 |

* Some additional material for the state-of-the-art in IoT and Wearable Technologies (published flagship papers/chapters and demonstrations etc.) will be provided to students.