



## Course Outline

<b>Course Code</b>	<b>Course Title</b>	<b>ECTS Credits</b>
COMP-475	Internet of Things and Wearable Technologies	6
<b>Prerequisites</b>	<b>Department</b>	<b>Semester</b>
COMP-212, COMP 358	Computer Science	Fall, Spring
<b>Type of Course</b>	<b>Field</b>	<b>Language of Instruction</b>
Elective	Computer Science	English
<b>Level of Course</b>	<b>Lecturer(s)</b>	<b>Year of Study</b>
1 <sup>st</sup> Cycle	Dr. Constandinos Mavromoustakis	4 <sup>th</sup>
<b>Mode of Delivery</b>	<b>Work Placement</b>	<b>Corequisites</b>
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

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.

**Assessment:**

Assessment Type
Mid-term Exam
Project(s)/ HW&Qs/Laboratory Exercises
Laboratory and Lecture Attendances
Final Examination

**Course Requirements:**

- The final Examination will be comprehensive. Covers ALL topics.
- Make-up tests will never be given. Only in case of serious reason-for which a documented evidence is required to support such cases.
- Make-up tests will never be given to improve a low scored grade at the regular exams.
- No delays in submitting the individual sets of exercises will be allowed/ accepted. For a possible/justified (with documented evidence) delay that will occur, a 50% of the total exercise's grade will be removed.
- Anyone failing to take the exam (s) will be assigned a grade zero for that particular exam. Possible classroom quizzes and exercises may not be announced. If an exercise or a quiz is missed, a grade zero (0) will be assigned, unless a valid excuse is evident or documented evidence is presented.
- The laboratory sessions are covering all the required material with hands-on source coding. The attendances during the laboratory sessions will impact half the attendance of every lecture/session.
- Academic Integrity and Plagiarism: Plagiarism is a major academic offence which undermines academic integrity. Plagiarism is prohibited at the University of Nicosia and leads to severe punishment.
- Essays homework and projects should include a bibliography and a list of reference material consulted. This reference material should be clearly cited in the work presented by the student.
- Communication with the lecturer can be performed by face-to-face contact or by e-mail for an urgent matter regarding the course. All students are requested to obtain an e-mail account. If you have any questions about the course or need assistance, please contact the lecturer in-person or by telephone during office hours; or by e-mail at any time.

**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
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**Recommended Textbooks / Readings:**

<b>Title</b>	<b>Author(s)</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
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.