



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
EXCELLENCE

COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingeniería y Sistemas
de Telecomunicación

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

593000507 - Intelligent Applications Using Iot Devices

DEGREE PROGRAMME

59AH - Master Universitario En Internet Of Things (iot)

ACADEMIC YEAR & SEMESTER

2022/23 - Semester 2



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Learning guide

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1. Description

1.1. Subject details

| | |
|---------------------------------------|--|
| Name of the subject | 593000507 - Intelligent Applications Using Iot Devices |
| No of credits | 4.5 ECTS |
| Type | Compulsory |
| Academic year of the programme | First year |
| Semester of tuition | Semester 2 |
| Tuition period | February-June |
| Tuition languages | English |
| Degree programme | 59AH - Master Universitario en Internet Of Things (Iot) |
| Centre | 59 - Escuela Técnica Superior De Ingeniería Y Sistemas De Telecomunicación |
| Academic year | 2022-23 |

2. Faculty

2.1. Faculty members with subject teaching role

| Name and surname | Office/Room | Email | Tutoring hours * |
|--|--------------------|--------------------------|-------------------------|
| Jose Fernan Martinez Ortega | | jf.martinez@upm.es | Sin horario. |
| Fernando Pescador Del Oso (Subject coordinator) | | fernando.pescador@upm.es | - - |

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Skills and learning outcomes *

3.1. Skills to be learned

CB06 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

CB08 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios

CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CE.08 - Diseñar y desarrollar soluciones tecnológicas para implementar servicios IoT capaces de interactuar con diferentes fuentes de información y dispositivos distribuidos incluyendo el diseño de estructuras de intercambio de información eficientes

CE.13 - Analizar el uso de dispositivos y servicios IoT en dominios de aplicación específicos y seleccionar los dispositivos más adecuados para el ecosistema IoT

CG04 - Los alumnos tendrán la capacidad de aplicar criterios de eficiencia, escalabilidad, fiabilidad y seguridad en distintos ámbitos de aplicaciones inteligentes y sistemas ciberfísicos, tales como Smart Living, Smart Cities o eHealth

CT.01 - Capacidad de uso de la lengua inglesa para el trabajo en contextos internacionales

CT.03 - Creatividad, iniciativa y capacidad emprendedora

CT.04 - Capacidad para la elaboración, planificación, coordinación y gestión técnica y económica de proyectos siguiendo criterios éticos, de calidad y medioambientales

3.2. Learning outcomes

RA42 - To learn and understand the bussiness models used in each intelligent application

RA40 - To identify new application domains for IoT.

RA41 - To identify the requeriments and the technological solutions that allow to develop intelligent applications supported by IoT devices. Some examples are Smart- Cities, Smart Environment, Smart Grid, Smart Water, Smart Agriculture, Smart Animal Farming, Domotic& Home Automation, e-health, etc.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

This course is focused in applications that currently are deployed in the IoT framework. The bussines models and the technologies used in each use case are explained and analyzed. Some examples are SmartCities, eHealth, Robotic, etc.

The course is splitted in two parts:

- 1) Technical seminars presented by different companies. These seminars are focused on the description of real deployed use cases, alternative technologies not included in other courses and some aspects (innovation, new devices, regulation...) not included in the other courses
- 2) Develop a complete innovative IoT project including aspects as bussiness models, enviromental impact, economic impact, innovation, etc.

4.2. Syllabus

1. Technical Seminars
2. IoT Project Development
 - 2.1. Description of the proposal
 - 2.2. Contextualization of the project
 - 2.2.1. Objectives
 - 2.2.2. State of the Art and Innovation
 - 2.2.3. Competitors
 - 2.3. Implementation
 - 2.3.1. Work Plan
 - 2.3.2. Resources and Budget

5. Schedule

5.1. Subject schedule*

| Week | Face-to-face classroom activities | Face-to-face laboratory activities | Distant / On-line | Assessment activities |
|------|---|--|-------------------|--|
| 1 | Seminar 1. Company Presentation/Workshop Duration: 02:00 Presentation and Group Assignment Duration: 01:30 | | | |
| 2 | Seminar 2. Company Presentation/Workshop Duration: 02:00 | Application Selection and SoA analysis Duration: 01:30 | | |
| 3 | Seminar 3. Seminar 2. Company Presentation/Workshop Duration: 02:00 | Team work Duration: 01:30 | | |
| 4 | Seminar 4. Company Presentation/Workshop Duration: 02:00 | Team work Duration: 01:30 | | |
| 5 | Seminar 5. Company Presentation/Workshop Duration: 01:00 | | | Proposal Presentation Continuous assessment Presential Duration: 02:30 |
| 6 | Seminar 6. Company Presentation/Workshop Duration: 02:00 | Project development Duration: 01:30 | | |
| 7 | Seminar 7. Company Presentation/Workshop Duration: 02:00 | Project and documentation development Duration: 01:30 | | |
| 8 | Seminar 8. Company Presentation/Workshop Duration: 01:00 | | | State of the art and competitors (presentation) Continuous assessment Presential Duration: 02:30 |
| 9 | Seminar 9. Company Presentation/Workshop Duration: 02:00 | Project and documentation development Duration: 01:30 | | |

| | | | | |
|----|---|--|--|--|
| 10 | Seminar 10. Company Presentation/Workshop Duration: 01:00 | | | Technical challenges (presentation and document) Continuous assessment Presential Duration: 02:30 Reports of the companies seminars (uploaded each week) Continuous assessment Presential Duration: 00:00 |
| 11 | | | | Project presentation Final examination Presential Duration: 02:00 |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | | | | |
| 17 | | | | |

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Continuous assessment

| Week | Description | Modality | Type | Duration | Weight | Minimum grade | Evaluated skills |
|------|--|----------|--------------|----------|--------|---------------|--|
| 5 | Proposal Presentation | | Face-to-face | 02:30 | 10% | 5 / 10 | CT.01 CT.03 CB08 CE.13 CG04 CB07 CB10 |
| 8 | State of the art and competitors (presentation) | | Face-to-face | 02:30 | 20% | 5 / 10 | CT.01 CT.04 CB06 CB08 CE.13 CG04 CB07 CE.08 |
| 10 | Technical challenges (presentation and document) | | Face-to-face | 02:30 | 30% | 5 / 10 | CT.01 CT.04 CB06 CB08 CE.13 CG04 CB07 CE.08 |
| 10 | Reports of the companies seminars (uploaded each week) | | Face-to-face | 00:00 | 40% | 5 / 10 | CG04 CB07 CB06 CB08 |

6.1.2. Final examination

| Week | Description | Modality | Type | Duration | Weight | Minimum grade | Evaluated skills |
|------|----------------------|----------|--------------|----------|--------|---------------|---|
| 11 | Project presentation | | Face-to-face | 02:00 | 100% | 5 / 10 | CT.04 CB06 CB08 CE.13 CG04 CB10 CB07 CE.08 |

| | | | | | | | | |
|--|--|--|--|--|--|--|--|-------|
| | | | | | | | | CT.01 |
| | | | | | | | | CT.03 |

6.1.3. Referred (re-sit) examination

| Description | Modality | Type | Duration | Weight | Minimum grade | Evaluated skills |
|----------------------|----------|--------------|----------|--------|---------------|---|
| Project Presentation | | Face-to-face | 02:00 | 100% | 5 / 10 | CT.01 CT.03 CT.04 CB06 CB08 CE.13 CG04 CB10 CB07 CE.08 |

6.2. Assessment criteria

Course evaluation on regular period.

The students must follow the seminars scheduled during the sessions. They must write a summary of each presentation. The evaluation of these reports allow the student to obtain 40% of the final mark

The students must propose an innovative IoT project . During the development the students must schedule 3 milestones.

* Milestone 1: 10%. The students presents the project they want to develop. They receive a feedback from the professors

* Milestone 2: 20%. The students present the state of the art and competitors (written document and presentation)

* Milestone 3: 30%. Technical challenges and budget

Final Evaluation System and Extra exam

Each student must develop a complete project, write the proposal and present the project to professors. The weight is 100%

7. Teaching resources

7.1. Teaching resources for the subject

| Name | Type | Notes |
|------------------------|--------------|---|
| Computers | Equipment | Computers allocated into the lab |
| Slices of the seminars | Web resource | Documents related with the companies presentations |
| Moodle | Equipment | Academic platform selected by UPM. All the resources will be available at Moodle |