

## COURSE PROGRAM

**Academic Year: 2024/2025**

Identification and characteristics of the course			
Code	401072	ECTS Credits	6
Course name (English)	ICT Services Engineering		
Course name (Spanish)	Ingeniería de Servicios TIC		
Degree programs	Master Degree in Informatics Engineering (MII) Master Degree in Telecommunication Engineering (MIT)		
Faculty/School	School of Technology (EPCC)		
Semester	1	Type of course	Compulsory
Module	Management and leadership (MII) Technological Management of Telecommunication Projects (MIT)		
Matter	Projects in ICT Service Engineering (MII) Projects in ICT Service Engineering (MIT)		
Lecturer/s			
Name	Office	E-mail	Web page
José Ángel Barriga Corchero (MII) (*) 117 (Inf.) Lab. Quercus (Ed. Investigación EPCC)	Quercus Lab (Research building, EPCC)	<a href="mailto:jose@unex.es">jose@unex.es</a>	<a href="#">p. web</a>
Manuel Luis Romero Ramírez Grupo 2 (MIT-) (**) 5 (Tel.) 5 (Tel.)	5 (Tel.)	<a href="mailto:mromerojd@unex.es">mromerojd@unex.es</a>	<a href="#">p. web</a>
Subject Area	(*) Languages and Computer Systems (**) Signal Theory and Communications		
Department	(*) Computer Systems and Telematics Engineering (**) Computer and Communications Technology		
Coordinating Lecturer (If more than one)	José Ángel Barriga Corchero		
Competencies*			
According to the Verifica documents for the ICT Master's programs (MII			

\* The sections concerning competencies, course outline, educational activities, teaching methodologies, learning outcomes and assessment systems must conform to that included in the ANECA verified document of the degree program.

<p><b>and MIT), this course will develop the following technical competencies:</b></p>
<p><b>Basic Competences:</b></p> <p>CB6. Possess and understand knowledge that provides a foundation or opportunity to be original in the development and/or application of ideas, often in a research context.</p> <p>CB7. Students should know how to apply the knowledge acquired and their problem-solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.</p>
<p><b>General competences:</b></p> <p>CG2: Ability to direct works and installations of computer systems, complying with current regulations and ensuring the quality of the service.</p> <p>CG3: Ability to direct, plan, and supervise multidisciplinary teams.</p> <p>CG6: Ability to manage, technically lead, and direct research, development, and innovation projects in companies and technological centers in the field of Computer Engineering.</p> <p>CG7: Ability to initiate, manage, and oversee the manufacturing processes of computer equipment, ensuring safety for people and property, final product quality, and product certification.</p>
<p><b>Transversal Competences.</b></p> <p>MIT-MII-CT5. Teamwork skills.</p> <p>MIT-MII-CT8. Responsibility and ethical commitment in professional and research activities.</p> <p>MIT-MII-CT12. Ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts.</p>
<p><b>Specific Competences.</b></p> <p>(MII) 1. CEDG1: Ability to integrate technologies, applications, services, and systems inherent to Computer and Telecommunications Engineering, with a generalist approach, in broader and multidisciplinary contexts.</p> <p>(MIT) 2. CEDG1: Ability to integrate technologies and systems inherent to Telecommunications Engineering, with a generalist approach, in broader and multidisciplinary contexts such as bioengineering, nanotechnology, telemedicine.</p>
<p style="text-align: center;"><b>Contents</b></p>
<p style="text-align: center;"><b>Course outline</b></p>
<p>(MII) Technologies and methodologies that constitute the ICT sector. Synergies between them. Evolution perspectives of all of them. Comprehensive ICT projects.</p> <p>(MIT) Technologies and methodologies that constitute the ICT sector. Synergies between them. Evolution perspectives of all of them. Comprehensive ICT projects.</p>
<p style="text-align: center;"><b>Course syllabus</b></p>
<p><b>Topic 1: Introduction to ICT Service Engineering</b></p> <p>Contents:</p> <ol style="list-style-type: none"> <li>1. Service Science in organizations.</li> <li>2. ICT services.</li> <li>3. ICT service management methodologies: ITSM, DevOps.</li> </ol> <p>Practical Activities:</p> <p>In this topic, a company and a series of business services and processes will be analyzed, defined, and documented.</p>
<p><b>Topic 2: Service Engineering</b></p>

**Contents:**

1. Analysis of business services.
2. Alignment of business services and ICT services.
3. Definition and modeling of ICT services.
4. Discovery and coordination of services.

**Practical Activities:**

1. The services described in Topic 1 will be analyzed to design the necessary ICT systems to support them.
2. The designed systems will be developed following the DevOps methodology.
3. The designed systems will be coordinated to provide full support to the company's business services and processes.

**Topic 3: Quality Management**

**Contents:**

1. Introduction to quality in ICT services.
2. Service level agreements.
3. Management of service level agreements.

**Practical Activities:**

1. Identify what should be monitored to ensure the required quality for services is met.
2. Implement monitoring and alarm techniques for when quality requirements are not met.

**Topic 4: Multidisciplinary Applications of ICT Systems Engineering**

**Contents:**

1. Numerical methods in engineering.
2. Robotics and Human-Machine Interaction.
3. Fundamentals of electrical infrastructures.
4. Fundamentals of nanotechnology.

**Practical Activities:**

1. Solve practical exercises related to the theoretical content of the course.
2. Develop a multidisciplinary project related to the theoretical content of the course. Submission of a pre-project for subsequent defense.

**Topic 5: Oral Presentations of Multidisciplinary Projects**

**Contents:**

1. Defense of multidisciplinary projects.

**Educational activities**

Student workload in hours by lesson		Lectures	Practical activities				Monitoring activity	Homework
Lesson	Total	L	HI	LAB	COM	SEM	SGT	PS
1	12	4		2				7
2	35	12		4				20
3	19	6		2				11
4	58	18		7				32
5	5	3						2
<b>Assessment</b>	21	2						18
<b>TOTAL</b>	150	45		15				90

L: Lectures (85 students)

HI: Hospital internships (7 students)

LAB: Laboratory or field practices (15 students)

COM: Computer room or language laboratory practices (20 students)

SEM: Problem classes or seminars or case studies (40 students)

SGT: Scheduled group tutorials (educational monitoring, ECTS type tutorials)

PS: Personal study, individual or group work and reading of bibliography							
<b>Teaching Methodologies</b>							
Problem-Based Learning, Project-Based Learning, Cooperative and Collaborative Learning, Interactive Lectures.							
<b>Learning outcomes</b>							
<p><b>Learning outcomes:</b></p> <ol style="list-style-type: none"> <li>1. Analyzes all the technologies and methodologies that constitute the ICT sector, focusing more on how they integrate, their synergies, and their evolution perspectives rather than on the basic technique of each.</li> <li>2. Designs and plans comprehensive ICT projects that involve the various technologies in the sector.</li> <li>3. Evaluates different alternatives, making strategic decisions in the field of ICT.</li> <li>4. Analyzes, synthesizes, and relates the different functions carried out in an ICT company or a technological center, integrating the various areas and making decisions that consider the company or technological center as a whole.</li> <li>5. Applies quality criteria to ICT Service Management.</li> <li>6. Understands tools for systematizing the provision of ICT services.</li> </ol>							
<b>Assessment systems</b>							
The course offers two different assessment pathways:							
<p><b>Continuous Assessment:</b></p> <p>Students must demonstrate that they have completed work (E2) equivalent to the course credits (6 ECTS credits = 150 hours of work) by submitting the results of the activities assigned and developed continuously over that work period. These results are referred to as deliverables. The grading of the deliverables and the project will be carried out according to the evaluation rubrics.</p> <p>Finally, continuous assessment may involve a final exam (E1) to evaluate the theoretical concepts learned.</p>							
<table border="1"> <thead> <tr> <th>Element</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>E1. Final Exams (individual and team)</td> <td>40%</td> </tr> <tr> <td>E2. Project</td> <td>60%</td> </tr> </tbody> </table>		Element	Weight	E1. Final Exams (individual and team)	40%	E2. Project	60%
Element	Weight						
E1. Final Exams (individual and team)	40%						
E2. Project	60%						
<p>All grading elements in section E1 will have the same weighting. It will be necessary to obtain a minimum score of 5 in each of the deliverables or exams (E1) and parts of the project. If the course is not passed in one attempt, the passed parts will not be saved for future attempts.</p> <p>To pass the course, it will be necessary to obtain a minimum score of 5 out of 10 in each of the grading elements (E1 and E2).</p>							
<p><b>Global Assessment:</b></p> <p>Students must submit on the official date of the examination period a project (E2) similar to the one carried out in continuous assessment. This project must be presented and</p>							

defended on the official exam date. Additionally, students must take a final exam (E1) to evaluate the theoretical concepts learned.

Element	Weight
E1. Final Exams (individual and team)	40%
E2. Project	60%

During the first quarter of the course period, the student can choose to follow either continuous assessment or global assessment.

### Bibliography (basic and complementary)

- Subject notes.
- ITIL @ Home. <http://www.itil-officialsite.com/>
- SCRUM.org. <http://www.scrum.org/>
- Axelos Global Best Practices (<http://www.axelos.com/>)
- ISO: International Organization for Standardization. <http://www.iso.org/iso/home.html>
- DevOps <https://es.atlassian.com/devops>
- Foundations of ITIL. Van Haren Publishing; 1st edition (September 24, 2007). ISBN-13: 978-9087530570
- The Practical Guide To World-Class IT Service Management. The Anima Group (March 29, 2017)
- Building Microservices - Designing Fine-Grained Systems. O'Reilly Media; 1 edition (February 20, 2015). ISBN-13: 978-1491950357
- Microservices - Building Scalable Software. Packt Publishing; 1 edition (January 31, 2017)
- The DevOps Handbook. IT Revolution Press (October 6, 2016). ISBN-13: 978-1942788003
- Charles P. Jr. Poole, Frank J. Owens. "Introducción a la nanotecnología". Editorial Reverte
- Fermín Barrero y otros. "Fundamentos de Instalaciones eléctricas". Editorial Garceta

### Bibliografía complementaria

Electronic access to scientific journals and, in particular, to the following journals:

- ACM Communications
- Pervasive and Mobile Computing
- IEEE Transactions on Mobile Computing
- IEEE Transactions on Services Computing
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Electromagnetic compatibility
- IEEE Transactions on Robotics
- IEEE Transactions on Terahertz Science and Technology
- A.J. Conejo y otros. "Instalaciones Eléctricas". Editorial MC Graw Hill
- [IEEE Nanotechnology Council - Website](#)
- <http://www.itu.int/en/ITU-T/>

### Other resources and complementary educational materials

The materials used are available in electronic format in the virtual classroom of the course:

- Slides for each topic in the program
- Scripts for lab sessions
- Student agenda

The following are resources specific to the virtual classroom:

- Virtual tasks for submitting activities and problems
- Participation systems
  - Communication forums
  - Announcements and news board
- Additional information
  - Glossaries of terms and keywords
  - Collection of program source codes
  - Set of web references related to the course
  - Explanatory videos
- Self-assessment
  - Self-assessment content tests
  - Self-assessment problems
  - Batteries of test questions