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| <b>Program</b> | <b>09TT- Engineering in Telecommunication Technologies and Services</b> |
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| <b>Course number and name</b> |   |
|-------------------------------|---|
| <b>Number</b>                 | 95000015                                  |
| <b>Name</b>                   | Signals and Systems<br>Señales y Sistemas |
| <b>Semester</b>               | Y2-S3                                     |

| <b>Credits and contact hours</b> |    |
|----------------------------------|----|
| <b>ECTS Credits</b>              | 6  |
| <b>Contact hours</b>             | 68 |

|                           |                        |
|---------------------------|------------------------|
| <b>Coordinator's name</b> | Gonzalo de Miguel Vela |
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| <b>Specific course information</b>  |                                       |  |
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| <b>Description of course content</b>  |                                       |  |
| <p>The program covers basics aspects of signal and system analysis, in continuous time and in discrete time. Taking as starting point the basics and mathematical tools known at the beginning of the second course, the main new concepts presented are: linear and time invariant systems characterization using the impulse response, convolution, continuous and discrete time Fourier Transform, and signal and system analysis in the transform domain (Laplace and Z transforms). All these concepts will be used in the remaining subjects of this career.</p>  |                                       |  |
| <b>List of topics to be covered</b>   |                                       |  |
| <ul style="list-style-type: none"> <li>- Analysis of signals and systems in time domain (basic concepts, linear systems, impulse response, convolution and systems defined by linear differential or difference equations)</li> <li>- Analysis of continuous-time signals and systems in transformed domain (Fourier series and transforms, Laplace transform and linear system analysis)</li> <li>- Analysis of discrete-time signals and systems in transformed domain (Fourier series and transforms, Z transform and linear system analysis)</li> <li>- Sampling (sampling theory, discrete time implementation of continuous systems)</li> <li>- Introduction to MATLAB as a basic tool for signal processing</li> </ul> |                                       |  |
| <b>Prerequisites or co-requisites</b>   |                                       |  |
| It is assumed students have studied Calculus and Algebra  |                                       |  |
| <b>Course category in the program</b>   |                                       |  |
| <input checked="" type="checkbox"/> R (required)  | <input type="checkbox"/> E (elective) | <input type="checkbox"/> SE (selective elective) |

**Specific goals for the course**

**Specific outcomes of instruction**

- RA 1: To know the basics concepts o signals and system analysis
- RA 2: To be proficient in the analysis of signals and systems (continuous and discrete time) using transforms (Fourier, Laplace, Z)
- RA 3: To known the theory of signal sampling and digital implementation of continuous systems
- RA 4: To have a first contact with a signal processing laboratory

**Student outcomes addressed by the course**

CEB1, CEB4  
 CG1, CG2, CG5

**Bibliography and supplemental materials**

- “Signals and Systems” , second edition, de A.V. Oppenheim, A.S. Willsky y S.H. Nawab, editorial Prentice Hall, 1997.
- “Signals and Systems”, Simon Haykin, Barry Van Veen. Editorial Johm Wiley 1999.
- “MATLAB for Engineers”, Holly Moore. Editorial Pearson Education 2009.

**Teaching methodology**

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|----------------------------|--|--|---------------------------------------|
| <b><u>_X_</u> lectures</b> | <b><u>_X_</u> problem solving sessions</b> | <b><u>__</u> collaborative actions</b> | <b><u>_X_</u> laboratory sessions</b> |
| <b>Other:</b>              |  |  |                                       |