**Università degli Studi di L'Aquila - Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica**

# Course catalogue

*Page compiled on 23/10/2019*

## Programme of Course "Fondamenti Di Comunicazioni"

- Code: I0044
- Type of course unit: Elective (Laurea in Ingegneria dell'Informazione curriculum Telecomunicazioni)
- Level of course unit: Undergraduate Degrees
- Semester: 1

Number of ects credits: (Laurea in Ingegneria dell'Informazione) 9 (workload 225 hours)

Teachers: Fabio Graziosi

| | | |
|---|---|---|
| **1** | **Course objectives** | This course provides the basics for understanding the techniques of transmitting information in a generic communications system and for its protection against noise and disturbances superimposed. At the end of the course students will acquire the basic knowledge for understanding, characterization and transmission of the main signals: audio and data. |
| **2** | **Course content and learning outcomes (dublin descriptors)** | Topics of the module include:<br>• Introduction on Communication Systems - Brief Review on Signals, Spectra, and Linear Systems<br>• Brief Review on Noise and Random Variables<br>• Analog Communication Systems - AM (DSB, SSB, VSB), FM, and PM - Effect of Random Noise on the Performance of Communication Systems<br>• Digital Data Communication Systems - Pulse Modulation Systems (PAM, PWM, PPM, PCM), Digital Signaling Techniques - Data Rates and Bandwidth Calculation in Digital Data Communication Systems – Inter-symbol interference - Carrier Systems: ASK, FSK, PSK and DPSK Probability of Error and BER Calculation and Performance Comparison - Multiplexing Technologies (TDMA, FDMA)<br>• Transmission Media – Optical fibers - Radio waves<br>• Focus on radio wave propagation: reflection, diffraction, refraction, absorption, multi-path, statistical models<br>• Introduction to information theory – Information measure – Source coding – Channel Capacity<br><br>On successful completion of this module, the student should :<br>• This course aims to provide the basics for understanding the techniques of transmitting information in a generic communications system and for its protection against noise and disturbances superimposed.<br>• At the end of the course, students will have acquired the basic knowledge for understanding, characterization and transmission of the main signals: audio and data.<br>• The assessment of the degree of preparation by the student will be made, first, by establishing the ability to translate theoretical knowledge acquired in simple design examples. Particular attention will be given to the student's ability to make connections between the various topics examined and to assess their impact in a real telecommunications system.<br>• There are no intermediate checks other than those arising from the interaction daily during lessons and individual meetings between teacher and students. Based on the perceived level of preparation the teacher could calibrate, as much as possible, the contents of the course. An optional check will be made, for students who will request it, through the development of a research paper on a topic of the course. The evolution of this integrative study activity will give the teacher more individual elements of assessment, usable also for the final exam. |
| **3** | **Course prerequisites** | Analisi ed Elaborazione dei Segnali |
| **4** | **Teaching methodsand language** | Learning happens through theoretical lectures alternating with exercises. As part of the course monographic issues are also offered that the student can develop at home and that can be possibly used also for the examination.<br>**Language**: Italian |

| | | |
|---|---|---|
| | | **Reference textbooks**<br>• Simon Haykin, ***Communication Systems***. Wiley & Sons.<br>• John G. Proakis, Masoud Salehi, ***Communication Systems Engineering***. Prentice Hall. |
| **5** | **Assessment methods** | The assessment of the students degree of preparation will be made, first, by establishing the ability to translate theoretical knowledge in simple design examples. The examination will consist of a written test, whose score above a minimum threshold represents a pre-requisite to proceed with the next stage of evaluation. This will consist of an oral interview which will aim to check the understanding of the concepts provided in the course. Particular attention will be reserved to the student's ability to make connections between the various treated topics and to assess their impact in a real telecommunications system. There are no intermediate checks other than those arising from the daily interactions during lessons and individual meetings between teacher and students. Based on the perceived level of preparation the teacher could calibrate the contents of the course. An optional check will be made, for students who will request it, through the development of a research paper on a topic of the course. The evolution of this integrative study activity will provide to the teacher more individual elements of assessment, usable also for the final exam. Exam booking must be done exclusively via the internet at segreteriavirtuale.univaq.it / Start.do. |