



COURSE: Foundations of Dynamical systems (Module 2 of Signals and Systems)

ACADEMIC YEAR: 2019-20

TYPE OF EDUCATIONAL ACTIVITY: Affine

TEACHER: Fabrizio Caccavale

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mobile (optional):

Language: Italian

ECTS: 6 (4,5 lessons, 1,5
tutorials/practice)

n. of hours: 54 (36 lessons,
18 tutorials/practice)

Campus: Potenza/Matera
Dept./School: Department of
Mathematics, Computer Science
and Economics
Program: Computer Science and
Technology

Semester: II

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The goal of the course is to provide an introduction to the modeling of the physical systems, as well as the basic methodologies and tools for the analysis of linear time-invariant dynamical systems in the time and frequency domains.

PRE-REQUIREMENTS

Knowledge of the methodologies and skills learned in the mathematics, physics, circuits and signal theory courses.

SYLLABUS

Properties of the systems (12 hrs lessons, 3 hrs tutorials/practice): Abstract definition of system, Systems classification, Input-output and input-state-output models (continuous time and discrete time), Systems interconnections, Causal and time-invariant systems, Stability, Linear and time-invariant (LTI) systems.

Analysis in the Laplace domain (6 hrs lessons, 6 hrs tutorials/practice): The Laplace transform and its application to the analysis of continuous time LTI systems, Transfer function and block diagrams.

Analysis in the time domain (12 hrs lessons, 6 hrs tutorials/practice): Impulse and step response, Response to periodic signals, Elementary systems.

Analysis in the frequency domain (6 hrs lessons, 3 hrs tutorials/practice): Frequency response and its graphical representations, Filtering properties of the systems.

TEACHING METHODS

The course is organized as follows:

- Theoretical lessons (36 hrs)
 - Classroom tutorials (18 hrs)
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EVALUATION METHODS

The evaluation is based on a written and oral test:

- the written test is aimed at assessing the knowledge of the topics covered during the course and ability to apply the analysis methods learned during the course,
 - the oral test is aimed at assessing the ability to link and compare the topics covered during the course.
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TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

- Lecture notes available at <http://www2.unibas.it/caccavale/fsd.html>.
 - Textbooks:
 - ✓ S. Chiaverini, F. Caccavale, L. Villani, L. Sciavicco, "Fondamenti di Sistemi Dinamici", McGraw-Hill Italia
 - ✓ Paolo Bolzern, Riccardo Scattolini, Nicola Schiavoni, "Fondamenti di controlli automatici 2/ed" McGraw-Hill Italia
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INTERACTION WITH STUDENTS



Università degli Studi della Basilicata

DIPARTIMENTO DI MATEMATICA, INFORMATICA ED ECONOMIA

Learning goals, contents, evaluation methods/procedures and educational material are illustrated in detail at the beginning of the course.

Receiving hours: Wednesday 10:30-12:30, Room 75, 5th floor, School of Engineering building. The Professor can be contacted at the end of the lessons and/or by e-mail as well.

EXAMINATION SESSIONS (FORECAST)¹

30/07/2020, 24/09/2020, 05/11/2020, 15/12/2020, 28/01/2021, 25/02/2021, 07/04/2021, 06/05/2021, 24/06/2021

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

¹ Subject to possible changes: check the web site of the Teacher or the Department/School for updates.