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

Course catalogue

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Programme of Course "Control systems"

- Code: I0062
- Type of course unit: Compulsory (Master Degree in Mathematical Engineering curriculum Comune)
- Level of course unit: Postgraduate Degrees
- Semester: 1

Number of ects credits: (Master Degree in Mathematical Engineering) 6 (workload 150 hours)

Teachers: Alessandro D'innocenzo (alessandro.dinnocenzo@univaq.it)

1	**Course objectives**	The course provides the basic methodologies for modeling, analysis and controller design for continuous-time linear time-invariant systems.
2	**Course content and learning outcomes (dublin descriptors)**	Topics of the module include: • Frequency domain models of Linear Systems: Laplace Transform, Transfer Function, Block diagrams. • Time domain models of Linear Systems:State space representation. BIBO stability. • Control specifications for transient and steady-state responses. Polynomial and sinusoidal disturbances rejection. • The Routh-Hurwitz Criterion. PID controllers. • Analysis and controller design using the root locus. • Analysis and controller design using the eigenvalues assignment: controllability, observability, the separation principle. • Reference inputs in state space representations. • Controller design using MATLAB. • Advanced topics in control theory. On successful completion of this module, the student should : • On successful completion of this module, the student should: • have knowledge and understanding of characteristics and properties regarding feedback control systems • have knowledge and understanding of frequency- and time-domain modeling frameworks for feedback control systems • have knowledge and understanding of stability, transient and steady-state properties of feedback control systems, as well as metrics for characterising such properties • have knowledge and understating of methods for designing controllers of feedback control systems, both in frequency and time-domains, both in the analog and digital cases • demonstrate capacity to design a control system architecture and a controller given a dynamical model of a plant and a set of specifications to be satisfied • demonstrate capacity, when designing a control system architecture and a controller, to relate the design choices to practical constraints and performance metrics induced by a specific application domain • be able to browse quickly or read carefully both technical and scientific papers or to attend conferences and seminars to increase his knowledge by choosing topics he may be interested in.
3	**Course prerequisites**	Mathematical analysis

4	**Teaching methodsand language**	Theory classes and exercise classes **Language**: English **Reference textbooks** • R. C. Dorf, R. H. Bishop, ***Modern Control Systems***. Prentice Hall. 2008.
5	**Assessment methods**	Written and oral tests. The written test consists of two applicative exercises and one theoretical question, and will last 2 hours. The oral test will be held the same day of the written test. No computers, books, or notes are allowed.