

Dynamic Systems Modeling

1. **Course number and name:** 020MSDES1 Dynamic Systems Modeling
2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours per week
3. **Instructor's or course coordinator's name:** Ragi Ghosn
4. **Instructional materials:** Professor textbook, Slides, MATLAB/Simulink documentation

Textbook/Reference:

- Close Charles M., Frederich Dean H. and Newell Jonathan C. *Modeling and Analysis of Dynamic Systems*, 3rd ed. Wiley & Sons, 2002.

5. Specific course information

a. Catalog description:

The aim of this course is to introduce and train students to the crucial importance of modeling and analysis in the industry nowadays that leads to performance improvement, better time management and manufacturing cost reduction of a given product. These goals are taught through examples of electrical, mechanical, thermal, and complex systems. Pre-sizing, modeling, analysis of operation and performance are performed through simulations using the advanced software MATLAB/Simulink. This course initiates engineering design to students through iterative improvements, feasibility study and process optimization before the usual industrial prototyping.

b. Prerequisite: MATLAB (020MATNI4).

c. Required for EE students, **Selected Elective** for ME students.

6. Educational objectives for the course

a. Specific outcomes of instruction:

- Modeling and analysis of linear and non-linear electrical systems.
- Modeling and analysis of mechanical systems.
- Modeling and analysis of thermal systems.
- Modeling and analysis of complex systems.
- Example of iterative improvements, feasibility study and process optimization before prototype.

b. PIs addressed by the course:

PI	1.1	1.2	1.3	2.4	2.5
Covered	x	x	x	x	x
Assessed	x	x	x	x	x

7. Brief list of topics to be covered

- Course introduction. (1 Lecture).
- Modeling and analysis of linear and non-linear electrical systems. (5 Lectures).
- Modeling and analysis of mechanical systems. (5 Lectures).

- Modeling and analysis of thermal systems. (5 Lectures).
- Modeling and analysis of complex systems. (6 Lectures).
- Example of iterative improvements, feasibility study and process optimization before prototype. (6 Lectures).