



University of Cyprus

Department of Mechanical and  
Manufacturing Engineering

## FALL SEMESTER 2019-2020

### **MME 317 Computational Engineering II (6 ECTS)**

**Prerequisites: MME 117, MAS 027 and MAS 029**

This course is an introduction to numerical methods for the solution of real engineering problems in the areas of vibrations, statics and dynamics, heat transfer, wave propagation, etc. Topics covered include: numerical integration and optimization, and solution of ordinary and partial differential equations with Taylor series, Euler, Runge-Kutta, finite differences, and Crank-Nicolson methods. The course also covers solutions to initial and boundary value problems. It includes a programming component for writing algorithms for the numerical solutions in FORTRAN and use of established packages like MatLab.

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### **MME 325 Modeling and Analysis of Dynamic Systems (6 ECTS)**

**Prerequisites: MAS 027 and MME 225**

The course introduces a unified approach for modeling real dynamic systems. Modeling is accomplished using appropriate graphical or state-space equation models, in order to meet the requirements during the use of the models in design and automatic control. Methods of system analysis are used to calculate behavioral characteristics and to evaluate the accuracy of modeling assumptions. Topics taught include: lumped parameter models; rigid body models; models with electric, fluid and thermal elements; interfaces; state-space equations; block diagrams; analysis of linear systems; Laplace transforms – transfer functions; time and frequency domain response stability. Students will be taught how to use Matlab/ Simulink, as computational analysis tools.

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### **MME 347 Design and Manufacturing (6 ECTS)**

**Prerequisite: MME 145**

The course is an introduction to modern computeraided design and manufacturing technology, with emphasis on geometrical aspects (material aspects are covered in MME 348). Topics taught include: Design by CAD, representation of 2D/3D lines, surfaces and objects, geometric processing by homogeneous transformations. Rapid prototyping with material deposition - technologies, systems and applications. Machining processes, material removal, non-traditional technologies, manufacturing by CAM. Shaping by deformation/flow of foil and bulk material, CAE analysis. Surface patterning by lithography, coating and etching, micro- and nanotechnology. Metrology, microscopy, scanning and machine vision,

instruments and image processing. Tolerances, fits, surface quality and defects. Assembly and transportation with Department of Mechanical and Manufacturing Engineering automation, robotics and navigation systems. Applications of Design and Manufacturing Systems.

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### **SPRING SEMESTER**

#### **MME 456- Properties of Polymers and Polymer Processing - 7 ECTS**

##### **Prerequisite: MME155**

The course is divided into two parts. In the first part, the mechanical properties of polymers (e.g., elasticity, viscoelasticity, strength, etc.) and the effect of their structural and chemical characteristics on their mechanical behavior are discussed. The structure-properties correlation, the thermal transitions of polymers and how these are capable of affecting their properties, as well as the rheological characteristics of polymeric solutions and melts are analyzed. In the second part, different methods used in polymer processing such as mixing, reinforcement, molding, etc. are discussed.

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