

Electrical-Mechanical Manufacturing Engineering (International Program)

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01211231 Conventional and Computer-Controlled Machines 3 (3-0)

Prerequisite : 01208281

Conventional machine for tools: turning, drilling, tapping, milling, grinding, cutting, punching, boring and bending; cutting speed, feed and depth of cut, safety precaution, machine installation and site preparation, lubrication and maintenance, cutting tool application and technology; computer numerical control machines and programming, introduction to computer-controlled machine.

01211311 Introduction to CAD/CAM 3 (2-3)

Prerequisite : 01208111 and 01211231

CAD/CAM systems for production engineering, hardwares and softwares for CAD/CAM systems, wireframe, surface and solid design, three dimension CAD functions: protrusion, sweep, blend, revolve, cut, copy, pattern, shell and relation, assembly design and detail drawing, dimensioning, section view and bill of material.

01211322 Instruments and Precision Measurement 3 (2-3)

Prerequisite : 01208371

Industrial instrument characteristics and applications, instruments for length, depth, height, surface, roughness, flatness, parallelism, straightness and roundness. force and torque measurement in machine tools, temperature and pressure measurements in injection molding process, calibration process, laser instrument, non-contact measurement, CNC coordinate measuring machine, measuring standard, control environment for precision measurement.

01211323 Instrument and Control Systems Laboratory 1 (0-3)

Laboratory experiments on topics covered in instrument and control systems.

01211331 CNC Machine Technology I 3 (2-3)

Prerequisite : 01211231

CNC turning and milling machines, machine components and operation, cutting tool and tool holder standards, safety precaution, turning and milling operations, feed, speed and depth of cut determination for selected cutting tool and materials, G and M codes programming.

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01211361 Mold and Die 3 (2-3)

Prerequisite : 01206311

Machine for mold and die, limitation and structure of machines, basic operation of injection machine and punching machine, components for mold and die, standard mold bases, injection mold and die design, finishing processes, selection of materials and their properties.

01211411 Computer Aided Design 3 (2-3)

Prerequisite : 01211311

Advanced CAD functions: advanced sweep and non-parallel blends, surface design, advanced assembly and sheet metal design, CAD file conversion.

01211412 Computer-Aided Manufacturing Application 3 (3-0)

prerequisite : 01211311

Applications of CAM for turning, drilling, milling, mill-turn, four and five axis milling, two and four axis wirecutting and sheet metal working, machining sequences, CAM pre and post processing for application, CAM and CNC machine interfacing.

01211413 Computer-Aided Engineering Application 3(3-0)

Prerequisite : 01211311

Type and application of CAE for product development; basic principle and calculation of finite element analysis; type and property of elements, material property; finite element modeling; load conditions; analysis for strength, heat, vibration, flow of fluid, mechanism motion and dynamics; manufacturing process analysis.

01211431 Machine Part Design 3 (3-0)

Prerequisite : 01208361 and 01211311

Basic theory of machine design, static and dynamic characteristics of machinery, vibration and fatigue of machines and components, machine tool structure and design, basic concepts and techniques of using CAD in parts design, use of CAD, finite element modeling and finite element analysis and optimization component design, analysis and optimization.

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01211432 CNC Machine Technology II 3 (2-3)

Prerequisite : 01211331

Advanced CNC machine technology, CNC surface and cylindrical grinding, high speed machining, CNC horizontal machining center, CNC mill-turn machine, CNC wire EDM, CNC turret punching, CNC laser cutting, and CNC sheet metal machines, safety precaution, precision machining, jig and fixture design, hydraulic and pneumatic clamping devices.

01211433 Robotics 3 (3-0)

Prerequisite : 01208371 and 01211331

History of industrial robots and application, various robotics systems, kinematics and dynamics of robots, tolerances and load capacities, robot control, sensor and vision, control language and commands, development of robot for the future.

01211434 CNC Machine Retrofitting and Controller Design 3 (3-0)

Prerequisite : 01208371

CNC controllers fundamentals, functions and operations of CNC machines, electrical components, feedback control stability and performance analysis, frequency domain methods, state-space representations, PID controllers, modern control design, system identification, robustness analysis, control design using software tools, digital control and digital signal processing, multi-axis motion control.

01211435 Heat Transfer and Refrigeration 3(3-0)

Prerequisite : 01206311

Basic principles of heat transfer, mass transfer and heat exchanger for production machinery and manufacturing process; components and selections of refrigeration and air conditioning systems for machines, manufacturing process and factory building.

01211441 Introduction to Flexible Manufacturing Systems 3 (3-0)

Prerequisite : 01211341 and 01211432

Components in Flexible Manufacturing Systems, automated systems, cell, Flexible Manufacturing Systems and Computer Integrated Manufacturing, work piece management and scheduling, communication systems and interface between computer and machines.

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01211442 Principles of Operation and Production 3 (3-0)

Procedure of operation and production, general management, statistics procedure and quantity measurement, production planning and operation, materials management, production management, stock management, quality control and productivity improvement.

01211443 Fabrication Technology for Thermoplastic Product 3(3-0)

Prerequisite : 01211311

Type and property of thermoplastic; thermoplastic fabrication process by injection, blowing, extrusion and vacuum; design criterion for thermoplastic products; mold and machine for fabrication; mold design and material selection; industrial standard testing; rapid tooling.

01211444 Fabrication Technology for Thermoset Product 3(3-0)

Prerequisite : 01211311

Type and property of thermoset, rubber, polyurethane and silicone rubber; thermoset fabrication process by injection and compression; resin casting; design criterion for thermoset products; mold and machine for fabrication; design and material selection; for reaction injection mold.

01211445 Fabrication Technology for Metal Product 3(3-0)

Prerequisite : 01211311

Type and property of metal; metal fabrication process by machining, casting, extrusion, forging and welding; sheet metal fabrication by cutting, punching, rolling, pressing and bending; machines for sheet metal production; design criterion for metal products; mold and die design for metal fabrication processes.

01211457 Industrial Materials 3 (3-0)

Prerequisite : 01206311 and 01213211

Metallic and plastic materials and their processing, composite material, engineering ceramics and plastics, steel, alloy steel and cast irons, steel and its heat treatment, material for different kinds of manufacturing processes, material properties and measurements, material failures, non-destructive testing, property changes for post processing.

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01211471 Products Design 3 (3-0)

Prerequisite : 01211311 and 01211431

Procedure of product and process design, artistic design, design communication, mechanical and industrial considerations, quality control, industrial processes to meet user needs, human factors, design for manufacturability and packaging design, use of CAD and rapid prototyping machine for visualization and function testing, choice of material and design characteristics of each material, investment cost estimation.

01211495 Electrical-Mechanical Manufacturing Engineering Projects Preparation 1 (0-3)

Prerequisite : 01211311

Preparation of project proposal, literature review and progress report.

01211496 Selected Topics in Electrical-Mechanical Manufacturing Engineering 1-3

Selected topics in electrical-mechanical manufacturing engineering at the bachelor's degree level.

Topics are subject to change each semester.

01211497 Seminar 1

Presentation and discussion on current interesting topics in electrical-mechanical manufacturing engineering at the bachelor's degree level.

01211498 Special Problems 1-3

Study and research in electrical-mechanical manufacturing engineering at the bachelor's degree level and compiled into a written report.

01211499 Electrical-Mechanical Manufacturing Engineering Project 2(0-6)

Prerequisite : 01211495

Project of practical interest in various fields of electrical-mechanical manufacturing engineering.