

Mechanical Engineering (International Program)

Mechanical Engineering

- 01208111 Engineering Drawing 3 (2-3)
Lettering techniques; applied geometry drawing; sketching techniques; orthographic drawing; pictorial drawing; dimensioning; sectional view drawing; auxiliary views; introduction to descriptive geometry; development; computer-aided drawing.
- 01208201 Basic Principles of Engineering Mechanics 3 (3-0)
Prerequisite : 01417167
Analysis of forces, equilibrium, dry friction, adaptation of equilibrium equations to frame and machines, introduction to fluid mechanics, kinematics of particles and rigid bodies in plana, Newton's laws, principles of work and energy.
- 01208211 Engineering Design and Modeling 3 (2-3)
Prerequisite : 01208111
Mechanical design process, computer aided design, product data management, reverse engineering, tolerancing design, design and production drawing.
- 01208221 Engineering Mechanics I 3 (3-0)
Prerequisite : 01417167
Force analysis, equilibrium, application of equilibrium equation to frames and machines, centroid, theorem of Pappus, beams, fluid mechanics, friction, virtual work, stability of equilibrium, area moment of inertia.
- 01208222 Engineering Mechanics II 3 (3-0)
Prerequisite : 01208221
Mass moment of inertia, mechanics of particle and rigid body in plane motion, equation of motion, principle of impulse and momentum, principle of work and energy, impact, fundamental of space motion.
- 01208241 Thermodynamics I 3 (3-0)
Prerequisite : 01417167
Properties of pure substances, work and heat, ideal gas, first and second laws of thermodynamics, entropy, basic heat transfer and energy conversion.

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- 01208242 Fluid Mechanics 3 (3-0)
Prerequisite : 01417168
Fluid properties; fluid statics; continuity equation; momentum equation; energy equation; dynamics of incompressible and inviscid fluid flow; dimensional analysis and similitude; incompressible and viscous flow; flow in pipes; drag force and lift force.
- 01208261 Mechanics of Solids 3 (3-0)
Prerequisite : 01208221
Stress and strain analysis; stress-strain relation; Mohr's circle; material properties; theorem of Castigliano; analysis of members resisting axial, torsion, bending and buckling loads; pressure vessel; combined stresses; stresses concentration; strain energy.
- 01208271 Computer Methods for Mechanical Engineering 3 (2-3)
Prerequisite : 01417267
Numerical methods in engineering problems, root of polynomials using Newton's method, data interpolation, numerical integration and differentiation, numerical solution to ordinary differential equations, error and stability of each method, computer-aids analysis of mechanical systems.
- 01208281 Workshop Practice 1 (0-3)
Practice in work-piece measuring, machine tools, bench works, sheet metal works, gas and electric welding, and CNC machines; safety in workshop.
- 01208302 Introduction to Fluid Mechanics and Fluid Machinery 3 (3-0)
Prerequisite : 01417168
Fluid properties; fluid statics; continuity equation; momentum equation; energy equation; dynamics of incompressible and inviscid flow; dynamics of incompressible and viscous flow; flow in pipes; characteristics, performance and application of compressors and pumps; hydraulics and pneumatic systems.
- 01208321 Mechanics of Machinery 3 (3-0)
Prerequisite : 01208222
Mechanisms and the analysis of displacements, velocity and acceleration of their members, analysis of forces and motions in machines, balancing of rotation and reciprocation masses.

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- 01208322 **Mechanical Vibrations** 3 (3-0)
Prerequisite : 01417267
Theory of free and forced vibration of systems with one and more than one degree of freedom, unbalanced rotation, whirling of shaft, vibration measuring instruments, vibration isolation and absorption, and industry applications.
- 01208323 **Engineering Measurements** 3 (3-0)
Prerequisite : 01417267
Measuring of engineering quantity in electrical signal for control, study and display; measurement of motion, pressure, temperature, strain, fluid flow, forces and torques; dynamic response of measuring devices.
- 01208331 **Internal Combustion Engines** 3 (3-0)
Prerequisite : 01208341
Engine types and operation, engine design an operating parameter, combustion theory, properties of working substances, engine cycles, gas exchange processes, spark-ignition engine fuel system, gas motion within the cylinder, combustion in spark-ignition and compression-ignition engines, pollutant formation and control.
- 01208332 **Automotive Engineering I** 3 (3-0)
Prerequisite : 01208222
Power required for propulsion, resistant of motions, acceleration, gear ratio, engine performances, vehicle stability on horizontal and vertical plane, equation of motions of vehicle, dynamics stability, steering response.
- 01208341 **Thermodynamics II** 3 (3-0)
Prerequisite : 01208241
Irreversibility and availability, vapor power cycles, gas power cycles, refrigeration cycles, thermodynamics relations, gas mixtures, chemical reaction.
- 01208351 **Heat Transfer** 3 (3-0)
Prerequisite : 01417267
Principles of heat transfer by conduction, convection and radiation; steady and unsteady state condition in one, two or three dimensional heat transfer; fundamental to heat flow and mass transfer; heat exchanger.

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- 01208352 Refrigeration I** 3 (3-0)
Prerequisite : 01208341
Refrigeration cycles, vapor compression refrigeration, refrigerants properties, refrigeration system components and selection, refrigerant tubes and selection, cooling towers and selection, tubes design and selection, control system and measurement, cooling load calculation.
- 01208361 Machine Design I** 3 (3-0)
Prerequisite : 01208261
Analysis and design of machine components using the principles involved in engineering mechanics; mechanics of materials and properties of materials.
- 01208371 Automatic Control** 3 (3-0)
Prerequisite : 01417267
Modeling of physical system, transfer function and block diagram, on-off control and PID control, normal state operation, tolerance and coefficient of tolerance, solution of ordinary differential equation using Laplace transformation and analog computer, time variable response, analysis of system stability by root-path method, frequency response and data display, improvement of control system efficiency, state-space method, control system with multi input-output.
- 01208381 Mechanical Engineering Laboratory I** 1 (0-3)
Prerequisite : 01208222
Experimental work in the areas of mechanics of machinery, automatic control, engineering materials, thermodynamics and internal combustion engines.
- 01208382 Mechanical Engineering Laboratory II** 1 (0-3)
Prerequisite : 01208341
Experimental works in the areas of heat transfer, refrigeration, air conditioning, power plant engineering, energy conversion, fluid mechanics, and internal combustion engines.
- 01208411 CAD/CAM for Mechanical Engineering I** 3 (3-0)
Hardware and software for CAD/CAM, commands for creating three dimensional models, detail drawing and dimensioning, assembly and bill of materials, CAM for basic milling functions.

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- 01208412 CAD/CAM for Mechanical Engineering II 3 (3-0)
Prerequisite : 01208411
Complex solid and surface modeling, sheet metal design, finite element modeling and analysis for structure and plastic flow, CAM for CNC wire-cutting and CNC turning machines, advanced CAM for CNC milling machine, sheet metal manufacturing.
- 01208413 CAD/CAM for Mechanical Engineering III 3 (3-0)
Prerequisite : 01208411
Applications of CAD/CAM/CAE for mechanical components design, jig and fixture design, mold design for polymers and sheet metal, CAE for stress-strain and vibration analysis, prediction of in-process material behavior for polymer and sheet metal.
- 01208414 Design and Manufacturing Processes for Metal Products 3 (3-0)
Prerequisite : 01208361
Types and properties of metal; metal forming process by machining, metal casting and forging; sheet metal design; machines for sheet metal production; design criteria for metal products; mold and die designs for metal forming processes; rapid tooling.
- 01208415 Product Development 3 (3-0)
Prerequisite : 01208361
Product development process from design to commercialization; design criteria for manufacturing and assembly; proper design, prototyping and manufacturing technologies; machines, tool and material for manufacturing; quality control; testing standards; product development cost.
- 01208416 Design and Manufacturing Processes for Polymer Products 3 (3-0)
Prerequisite : 01208361
Types and properties of polymer; polymer forming process by injection, blow, and compression; design criteria for polymer products; molds and machines for production; mold design and material; industrial standard testing; rapid tooling.
- 01208417 Mould Design for Rubber Products 3 (3-0)
Properties of rubber; rubber forming processes; design and manufacturing of rubber moulds using computer-aided engineering; quality control and improvement for rubber products.

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- 01208418 **Introduction to Finite Element Methods** 3 (3-0)
 Concept of finite element method; integral formulations and variational methods; formulation of finite element methods for analysis of linear static solids and structures, heat transfer in solids, and fluid flow.
- 01208419 **Introduction to Computational Fluid Dynamics** 3 (3-0)
 Concept of computational fluid dynamics, transport equations of flow, finite volume method; application of computational fluid dynamics software for laminar and turbulent flows in a pipe, flow over obstacles, flow and heat transfer in an air-conditioned room, heat transfer in an electronic equipment, modeling of fire in a room.
- 01208421 **Biomechanics Engineering** 3 (3-0)
 Mechanics and dynamics of body motion, muscle, joints and heart; analysis of force, stress and strain of bone, muscle and tissue; applications of biomechanics engineering to medical equipment and instrument.
- 01208431 **Power Plant Engineering** 3 (3-0)
Prerequisite : 01208341
 Energy transformation, load calculation in power plant, economics of power plant, fuel and combustion, steam power plant, gas turbine power plant, hydro-electric power plant, internal combustion engine power plant, nuclear power plant.
- 01208432 **Automotive Engineering II** 3 (3-0)
 Ignition system, fuel system, lubricating system and cooling system of engine.
- 01208433 **Automotive Engineering III** 3 (3-0)
 Power drive system, suspension system, steering system, braking system, frame, wheels and tires.
- 01208434 **Automotive Engineering IV** 3 (3-0)
 Automotive system technology, design and manufacturing technology, engine and automobile diagnostic and maintenance technology.
- 01208435 **Construction Machinery** 3 (3-0)
Prerequisite : 01208321
 Basic machine components, tractors and related equipment, excavating equipment, scrapers, trucks, grading and compacting equipment, compressors and drills, selection of construction equipment, planning and management.

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- 01208436 Combustion 3 (3-0)
 Prerequisite : 01208341
 Chemical reaction, reacting gas flow, premixed gas flames, detonation, diffusion flames, ignition, combustion in rockets, combustion of coal, environmental effects.
- 01208437 Lubrication 3 (3-0)
 Prerequisite : 01208242
 Viscosity, Reynolds equation, hydrodynamic lubrication, pad bearing, journal bearing, hydrostatic lubrication, elastohydro dynamics lubrication.
- 01208438 Equipment Management 3 (3-0)
 Principles of equipment management, planning, control and evaluation of equipment utilization, maintenance and repair, spare parts control.
- 01208441 Fluid Machinery 3 (3-0)
 Prerequisite : 01208242
 Theory and design of turbomachinery; characteristics, performance and application of fans blowers compressors and pumps; introduction to gas turbine, hydraulics and pneumatic systems.
- 01208442 Energy Management and Economics 3 (2-3)
 Prerequisite : 01208241 or 01202221 and 01205201 or 01205211
 Energy situation and concepts of energy conservation, energy audits, calculation of the overall thermal transfer value and the roof thermal transfer value, energy conservation in thermal and electrical system, energy management in buildings and industry, energy economics analysis and energy usage environment.
- 01208443 Gas Engineering 3 (3-0)
 Properties of gases and distillation system, gas separation and process, gas compression, gas measurement, calculation of gas flow in pipe.
- 01208444 Introduction to Solar Engineering 3 (3-0)
 Prerequisite : 01208351
 Renewable energy, solar radiation data, collector absorption, theory of plane collector and performance, energy storage, conversion to mechanical energy.

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- 01208445 Gas Turbine 3 (3-0)
 Prerequisite : 01208341
 Types of engine and working, gas turbine cycle, improve of gas turbine performance, gas turbine for airplane, gas turbine accessory.
- 01208446 Thermal system Design 3 (3-0)
 Prerequisite : 01208351
 Basic concepts of thermodynamics; application of first and second law of thermodynamics with thermal systems; heat transfer; workable design of heat engines, heat pumps, steam turbine, gas turbine, condensers and reciprocating engines : economic analysis; equation fittings; modelling thermal equipment; system simulation and optimized design.
- 01208447 Gas Dynamics 3 (3-0)
 Prerequisite : 01208341
 Compressible flow; isentropic flow; normal shock wave; flow with friction; flow with heat transfer; generalized one, two and three dimensional flow; oblique shock waves.
- 01208448 Introduction to Renewable Energy 3 (3-0)
 Sources and types of renewable energy, energy conversion processes and storage methods, equipments and implementations in energy conversion processes, evaluation of renewable energy sources.
- 01208449 Energy Audits 3 (2-3)
 Prerequisite : 01208241
 Analysis and measurement of performance for heating, ventilating, and air conditioning (HVAC) systems, refrigeration systems, lighting and hot water systems in commercial and industrial buildings; measurement techniques for energy audits; energy conservation.
- 01208451 Air Conditioning 3 (3-0)
 Prerequisite : 01208352
 Basic concepts in air conditioning, psychrometry, calculation of cooling load, design of air duct and air distribution, air ventilation, noise and vibration control, control of air conditioning system, air conditioning in building.

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- 01208452 Refrigeration II 3 (3-0)
Prerequisite : 01208352
Cold storages; food preservation by cooling; low temperature refrigeration and cryogenic; absorption, thermal-electric, steam jet refrigeration system; air cycle and vortex tube; design of refrigeration system and installation.
- 01208453 Practice in Refrigeration and Air Conditioning 3 (2-3)
Prerequisite : 01208241
Study in use of instruments, installation practice, operation and maintenance, compilation into written reports.
- 01208454 Control Elements in Air Conditioning System 3 (3-0)
Prerequisite : 01208451
Function of control variable; control purpose; control methods; control of liquid flow, air flow, temperature, humidity; control elements in air conditioning system.
- 01208455 Plumbing System Design 3 (3-0)
Prerequisite : 01208211
Plumbing codes and standards, plumbing system for building, increasing water head in plumbing system, guiding rule for finding the circulator, drainage system and vent pipe design, design of hot-water pipe line, fire protection system.
- 01208456 Optimization in Air Conditioning System 3 (3-0)
Prerequisite : 01208352
Engineering design, principle of system simulation, expressing performance data in equation form, component simulation, optimization.
- 01208457 Industrial Ventilation 3 (3-0)
Prerequisite : 01208451
Principle of ventilation, dilution ventilation, ventilation for heat control, hood design, specific operations, design procedure, make-up and recirculated air, construction specifications, testing of ventilation systems, air cleaning devices.

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- 01208458 Clean Room 3 (3-0)
 Prerequisite : 01208451
 Controlling room environment, principle of air filtration, selection and application of air filter, introduction to clean room, environmental pollution, clean room type, clean room design, energy savings, control of air flow, biological clean room, countermeasures for biological hazards.
- 01208461 Machine Design II 3 (2-3)
 Prerequisite : 01208361
 Analysis and design of complex element of machinery.
- 01208462 Principles of Fire Protection 3 (3-0)
 Principles of fire protection, fire classifications and selection of extinguishers, human behavior in fires, safety to life from fire, principles of passive and active fire protection, fundamental of fire suppression systems, building fire safety design, fire safety planning, fire safety inspection, fire hazard analysis.
- 01208463 Building Codes and Fire Codes 3 (3-0)
 Prerequisite : 01208462
 Building codes and fire codes, analysis of the purpose and enforcement of building codes, analysis of international and local fire codes, regulations and local laws relating to building codes, development of building codes and fire codes in Thailand.
- 01208464 Theory and Design of Automatic Fire Suppression Systems 3 (3-0)
 Prerequisite : 01208462
 Theory and approval standards of automatic fire suppression systems ; analysis and selection of automatic sprinkler systems and their components; design of automatic sprinkler systems, gaseous fire suppression systems, foam and dry chemical fire suppression systems.
- 01208465 Fire Alarm and Smoke Control system 3 (3-0)
 Principles of fire alarm system and smoke/fire detectors, analysis of fire alarm circuits and their components, standards and design of fire alarm system, principles and design of smoke control and air pressurized systems, fire alarm and smoke control system related to other fire safety system.

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- 01208466 Risk Analysis in Fire Protection Engineering 3 (3-0)
 Prerequisite : 01208462
 Theory and concept of risk analysis in fire protection engineering, risk identification and measurement, risk management by insurance method, risk tools, risk engineering methods, preparation for loss adjustments, risk management analysis and planning.
- 01208471 Design of Mechanical System Control 3 (3-0)
 Prerequisite : 01208371
 Dynamic model of mechanical systems; electronic control system design; electric motor control system; control and design of PLC; introduction to control using microprocessor.
- 01208472 CNC Machine and Programming 3 (3-0)
 Type of CNC machines, manufacturing process and planning, metal cutting technology, CNC programming for turning and milling machines.
- 01208473 Electronic Application in Mechanical Engineering 3 (3-0)
 Prerequisite : 01205201
 Electrical instruments in mechanical systems; characteristics diodes, LED, and transistors; fundamental concepts of filters, time comparators and digital circuits; application and design us operational amplifiers, integrated circuits, relays, transdue interfacing and servomechanicsm; principles of robotic system.
- 01208474 Fluid Power 3 (3-0)
 Prerequisite : 01208242
 Fluid power systems, basic theory and symbols in fluid power systems, hydraulic systems and circuit design, pneumatic systems and circuit design, trouble shooting and maintenance in fluid power systems.
- 01208481 Special Mechanical Engineering Laboratory 1 (0-3)
 Prerequisite : 01208341
 Special experimental works in the fields of automotive engineering, air conditioning engineering, energy engineering, design and manufacturing, fire protection engineering, and dynamics system engineering.
- 01208495 Mechanical Engineering Project Preparation 1 (0-3)
 Preparation of project proposal, literature review and progress report.

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01208496	Selected Topics in Mechanical Engineering	1-3
	Selected topics in mechanical engineering at the bachelor degree level. Topics are subject to change each semester.	
01208497	Seminar	1
	Presentation and discussion on current interesting topics in mechanical engineering at the bachelor degree level.	
01208498	Special Problems	1-3
	Study and research in the mechanical engineering at the bachelor degree level and compiled into written reports.	
01208499	Mechanical Engineering Projects	2 (0-6)
	Prerequisite : 01208495	
	Projects of practical interest in various fields of mechanical engineering.	