

# Course Description

- 01208111 Engineering Drawing 3(2-3-6)  
Lettering techniques; applied geometry drawing; orthographic drawing; pictorial drawing; dimensioning and tolerancing; sectional view drawing; auxiliary views; development; sketching techniques; introduction to computer-aided drawing.
- 01208211 Engineering Design and Modeling 3(2-3-6)  
Mechanical design process, computer aided design, product data management, reverse engineering, tolerancing design, design and production drawing.
- 01208221 Engineering Mechanics I 3(3-0-6)  
Force analysis, equilibrium; application of equilibrium equation to frames and machines; centroid, theorem of Pappus; beams, shear and bending moment diagrams, cable; dry friction, wedges, screws and belts; virtual work, stability of equilibrium; area moment of inertia.
- 01208222 Engineering Mechanics II 3(3-0-6)  
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(3-0-6)  
Properties of pure substances, work and heat, ideal gas, first and second laws of thermodynamics, simple steam power plant and refrigeration cycle, entropy, basic heat transfer and energy conversion.
- 01208242 Fluid Mechanics 3(3-0-6)  
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(3-0-6)

Stress and strain analysis, axial load, normal and shear stresses, bending and shearing stresses in beams, deflection of beams, torsion load, bucking load, combined stresses and Mohr's circle, strain energy.

01208271 Computer Methods for Mechanical Engineering 3(2-3-6)

Numerical methods in engineering problems solving, root of polynomial equation determination using Newton's method, solution of linear equation system, data interpolation, numerical integration and differentiation, numerical solution of ordinary differential equation, error and stability of each method, computer-aids analysis of mechanical systems.

01208281 Workshop Practice 1(0-3-2)

Practice in work-piece measuring, machine tools, bench works, sheet metal works, gas and electric welding, and CNC machines; safety in workshop.

01208321 Mechanics of Machinery 3(3-0-6)

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.

01208322 Mechanical Vibrations 3(3-0-6)

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.

01208331 Internal Combustion Engines 3(3-0-6)

Engine types and operation, engine design and operating parameters, fuels and combustion, ideal air standard cycles, ideal engine operating cycles, gas exchange processes, combustion in spark-ignition and compression-ignition engines, pollutant formation and control.

01208332 Automotive Technology 3(3-0-6)

Automotive body and frame, engine operation, lubrication systems, cooling systems, fuel delivery systems, ignition systems,

starting and charging systems, power train systems, suspension systems, braking, and steering systems.

01208341 Thermodynamics II 3(3-0-6)

Irreversibility and availability, vapor power cycles, gas power cycles, refrigeration cycles, thermodynamics relations, gas mixtures, chemical reaction.

01208342 Power Plant Engineering 3(3-0-6)

Energy conversion principles and availability concept, fuels and combustion analysis and component study of steam, gas turbine and internal combustion engine power plants, combined cycle and cogeneration, hydro power plant, nuclear power plant, control and instrumentation, power plant economics and environmental impacts.

01208351 Heat Transfer 3(3-0-6)

Principles of heat transfer by conduction, convection and radiation, steady and unsteady state condition in one, two or three dimensional heat transfer, heat exchanger, boiling and condensation.

01208352 Refrigeration I 3(3-0-6)

Thermodynamics review, ideal and real refrigeration cycles, refrigerant and lubricating oil, refrigeration system components and selection, cooling towers and selection, refrigerant piping, control and monitoring system, cooling load calculation.

01208361 Machine Design I 3(3-0-6)

Fundamental of mechanical design, properties of materials, theories of failure, design of simple machine elements, rivets, welding, screw fasteners, keys and pins, shafts, springs, gears, power screws, couplings, bearings, brakes, clutches, belts, chains.

01208371 Automatic Control 3(3-0-6)

Modeling of physical system, transfer function and block diagram, on-off control and PID control, solution of ordinary differential equation using Laplace transformation, time variable response, analysis of system stability by root-locus method, frequency response and data

display, design and improvement of control system efficiency, state-space method.

- 01208381 Mechanical Engineering Laboratory I 1(0-3-2)  
Experimental works in the areas of mechanics of machinery, automatic control, engineering materials, thermodynamics and internal combustion engines.
- 01208399 Internship 1  
Internship for mechanical engineering in private enterprises, government agencies, government enterprise or academic places at least 240 hours and at least 30 workdays.
- 01208411 CAD/CAM for Mechanical Engineering I 3(3-0-6)  
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.
- 01208412 CAD/CAM for Mechanical Engineering II 3(3-0-6)  
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(3-0-6)  
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(3-0-6)  
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(3-0-6)

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(3-0-6)

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(3-0-6)

Properties of rubber; rubber forming processes; design and manufacturing of rubber moulds using computer-aided engineering; quality control and improvement for rubber products.

01208418 Introduction to Finite Element Methods

3(3-0-6)

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(3-0-6)

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(3-0-6)

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.

- 01208422 Engineering Measurements 3(3-0-6)  
 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.
- 01208423 Introduction to Engineering Composite Materials 3(3-0-6)  
 Fiber-reinforced polymeric composites; micromechanics of fiber-reinforced composites; mechanical behavior of laminae; classical lamination theory; thermal and hygroscopic stress analysis; strength of laminates; structural analysis of laminated plates; fabric-reinforced composites; preliminary design of composite structures.
- 01208431 Computer-aided Automotive Design 3(2-3-6)  
 Computer sketching, 3-dimensional geometrical object construction, solid part design, surface object design, volume object construction, part assembly, 2-dimensional working drawing.
- 01208432 Automotive Vehicle Dynamics 3(3-0-6)  
 Standard units, vehicle resistances, traction force, acceleration of vehicles, braking, engine and vehicle performance, gear ratio selection, vehicle handling characteristics.
- 01208433 Alternative Energy for Vehicles 3(3-0-6)  
 Automotive engines, automotive natural gas system, liquefied petroleum gas system, safety standard, hybrid systems, electric vehicles, automotive batteries, electric motors, fuel cells, fuel cell supporting systems, flexible fuel engines.
- 01208434 Control of Air Pollution from Automobile 3(3-0-6)  
 Air pollution from spark-ignition and diesel engines, emission regulations for air pollution, impacts of each air pollution species on ecology system, greenhouse gases, control devices of air pollution from automobile.
- 01208435 Construction Machinery 3(3-0-6)  
 Basic machine components, tractors and related equipment, excavating equipment, scrapers, trucks, grading and compacting equip-

ment, compressors and drills, selection of construction equipment, planning and management.

- 01208436 Combustion 3(3-0-6)  
Combustion and thermochemistry, fuel types and properties, introduction to chemical kinetics, ignition, premixed and non-premixed flames, laminar and turbulent flames, control of pollution and environmental effects
- 01208337 Lubrication 3(3-0-6)  
Viscosity, Reynolds equation, hydrodynamic lubrication, pad bearing, journal bearing, hydrostatic lubrication, elastohydro dynamics lubrication.
- 01208438 Equipment Management 3(3-0-6)  
Principles of equipment management, planning, control and evaluation of equipment utilization, maintenance and repair, spare parts control.
- 01208439 Automotive Manufacturing Technology 3(1-4-4)  
Automotive body production, metal, plastic and rubber parts manufacturing process, field trip required.
- 01208441 Fluid Machinery 3(3-0-6)  
Theory and design of turbomachinery; characteristics, performance and application of fans, blowers, compressors, and pumps; hydraulic and pneumatic systems.
- 01208442 Energy Management and Economics 3(2-3-6)  
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(3-0-6)  
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(3-0-6)  
The sun's position calculation, solar radiation calculation, solar collector and energy storage, feasible study in engineering and economics, energy conversion, system design and applications of solar energy.
- 01208445 Gas Turbine 3(3-0-6)  
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(3-0-6)  
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; modeling thermal equipment; system simulation and optimized design.
- 01208447 Gas Dynamics 3(3-0-6)  
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(3-0-6)  
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(2-3-6)  
Analysis and measurement of performance for heating, ventilating, and air conditioning systems, refrigeration systems, lighting and hot water systems in commercial and industrial buildings; measurement techniques for energy audits; energy conservation.
- 01208451 Air Conditioning 3(3-0-6)



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.

- 01208452 Refrigeration II 3(3-0-6)  
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(2-3-6)  
Study in use of instruments, installation practice, operation and maintenance, compilation into written reports.
- 01208454 Control Elements in Air Conditioning Systems 3(3-0-6)  
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(3-0-6)  
Plumbing code 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(3-0-6)  
Engineering design, principle of system simulation, expressing performance data in equation form, component simulation, optimization.
- 01208457 Industrial Ventilation 3(3-0-6)  
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.
- 01208458 Clean Room 3(3-0-6)

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(2-3-6)

Analysis and design of complex element of machinery.

01208462 Principles of Fire Protection 3(3-0-6)

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(3-0-6)

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(3-0-6)

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(3-0-6)

Principles of fire alarm system and smoke and fire detectors, analysis of fire alarm circuits and components, standards and design of fire alarm and smoke control systems, principles and design of smoke control and air pressurized system, fire model for smoke control system.

01208466 Risk Analysis in Fire Protection Engineering 3(3-0-6)

Theory and concept of risk analysis in fire protection engineering, risk identification and measurement, risk management by insur-

ance method, risk tools, risk engineering methods, preparation for loss adjustments, risk management analysis and planning.

- 01208467 Introduction to Fire Phenomena 3(3-0-6)  
Combustion in natural fires heat transfer in fire ignition flame spread and burning rate fire plume and ceiling jet combustion products in fire enclosure fire phenomena.
- 01208468 Mechanical Design Processes 3(3-0-6)  
Mechanical design, designers, design teams, design process, planning for design, concept generation, concept evaluation, product generation, product evaluation.
- 01208469 Entrepreneurship for Mechanical Engineering 3(3-0-6)  
Creative thinking, product development, market opportunity, legal aspects in entrepreneurship, entrepreneurial financial, marketing and human resource management, financial accounting for management.
- 01208471 Design of Mechanical SystemControl 3(3-0-6)  
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(3-0-6)  
Type of CNC machines, manufacturing process and planning, metal cutting technology, CNC programming for turning and milling machines.
- 01208473 ElectronicApplication in Mechanical Engineering 3(3-0-6)  
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(3-0-6)

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.

01208475 System Dynamics Simulation 3(3-0-6)

Definition and classification of dynamic systems and components, state-variable and input-output models, mathematical modeling of system components of electrical, mechanical, fluid, and thermal, modeling of multi-domain systems, nonlinear systems and linear representations of nonlinear components, simulation techniques using software package.

01208476 Modern Control Systems 3(3-0-6)

Vector spaces, modeling, state-stead system representations, solution to the state equations, stability, controllability and observability, Eigen-structure assignment, partial and full order observers.

01208477 Introduction to Industrial Robots) 3(3-0-6)

Introduction to industrial robots, robot reference frames, forwards manipulator kinematics, inverse manipulator kinematics, Jacobian of manipulators, manipulator dynamics and introduction to robot controls, trajectory generation, mechanism design, introduction to hybrid force and position control.

01208478 Vibration Monitoring and Analysis 3(3-0-6)

Predictive maintenance, mechanical vibration, Fourier series and fast Fourier transform, vibration measurement and instrumentation, symptoms of vibration signals, diagnosis, setup of alarm band.

01208481 Mechanical Engineering Laboratory II 1(0-3-2)

Experimental works in the areas of heat transfer, refrigeration,air conditioning, power plant engineering, energy conversion, fluid mechanics,and internal combustion engines.

01208490 Co-operative Education 6

On the job training as a temporary employee in order to get experience from the assignment.

- 01208495 Mechanical Engineering Project Preparation 1(0-3-2)  
Preparation of project proposal, literature review and progress report.
- 01208496 Selected Topics in Mechanical Engineering 1-3  
Selected topics in mechanical engineering at the bachelor's 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's degree level.
- 01208498 Special Problems 1-3  
Study and research in mechanical engineering at the bachelor's degree level and compiled into written reports.
- 01208499 Mechanical Engineering Projects 2(0-6-3)  
Projects of practical interest in various fields of mechanical engineering.

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- 01208201 Basic Principles of Engineering Mechanics 3(3-0-6)  
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 plane, Newton's laws, principles of work and energy.
- 01208302 Introduction to Fluid Mechanics and Fluid Machinery 3(3-0-6)  
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; hydraulic and pneumatic systems.