

Course Descriptions

1) Courses of Aerospace Engineering Code

01215211	Introduction to Aerospace Engineering Basic knowledge in aerospace engineering. Ethics and regulations in aerospace engineering works. Field trip required.	2(1-2-3)
01215213	Computational Methods and Statistics in Aerospace Engineering Round-off and truncation errors. Roots of nonlinear equations. Solution methods for system of equations. Curve fitting. Fourier series and analysis. Numerical integration and differentiation. Ordinary differential equations. Statistical sampling and estimation. Hypothesis testing. Regression analysis. Computer programming for numerical and statistical analysis.	3(2-3-6)
01215221	Aircraft Structures I Aircraft structure engineering concepts in stress and strain. Axial load. Modulus of elasticity. Generalized Hooke's law. Stiffness and flexibility. Poisson's ratio. Stress-strain behavior of ductile and brittle materials. Statically indeterminate beam. Stress concentration. Torsion. Moment area method. Transverse load. Transformation of stress and strain. Beam design. Beam deflection. Column.	3(3-0-6)
01215231	Aerothermodynamics Concepts and definitions. Energy, heat and work. Properties of pure substances. Ideal gases. First and second laws of thermodynamics. Entropy. Vapor power systems.	3(3-0-6)
01215232	Aerothermodynamics of Aircraft Engines Gas power systems. Otto, Diesel and Brayton cycles. Gas turbine engines. Aircraft jet engines. Jet propulsion. Combustion systems. Rocket engines. Jet engine efficiencies. On and off design performances.	3(3-0-6)
01215241	Fluid Mechanics in Aerospace Engineering Fluid properties. Fluid statics. Fluid in motion. Bernoulli equation. Conservation laws. Dimensional analysis. Incompressible irrotational flow. Viscous internal flow. Boundary layer. Lift and drag. Applications in aerospace engineering.	3(3-0-6)
01215251	CAD/CAM for Aerospace Engineering Concepts of CAD/CAM. Surface design. Solid design. 3-D parametric variational modeler. Feature-based design. Drafting. Assemble modeling. Dimensioning and tolerancing. Kinematic simulation. CAD/CAM systems in aerospace industry.	3(3-0-6)

01215261	Aircraft Aerodynamics and Performance Properties of air and atmosphere. Basic aerodynamics. Aerodynamics of aircraft. International standard in aircraft design. Thrust and power. Cruise performance. Climb and gliding performance. Turning performance. V-n diagram. Take-off and landing performance. Application of aircraft performance charts and tables.	3(3-0-6)
01215311	Aerospace Engineering Laboratory I Laboratories in basic aircraft structures and materials, fluid mechanics and aerodynamics, aircraft propulsion, and control.	1(0-3-2)
01215312	Mechanics of Machinery in Aerospace Engineering Velocity and acceleration analysis. Kinematic and dynamic analysis of mechanisms and machines. Applications in aircraft mechanisms. Machinery balancing.	3(3-0-6)
01215313	Aerospace Engineering Statistics Concepts of probability. Principles of statistics. Experimental design. Statistical analysis in aerospace engineering.	3(3-0-6)
01215322	Aircraft Structures II Principles of stressed skin construction. Bending, shear and torsion of opened and closed thin walled tubes. Multi-cell tubes. Axial constraint. Performance of material. Introduction to composite materials.	3(3-0-6)
01215323	Aircraft Vibration Free and forced vibration for systems with one degree and multidegrees of freedom. Vibration from rotation. Lumped mass analysis. Frequency response function. Time and frequency domain. Step and impulse analysis. Flutter analysis. Introduction to random vibration.	3(3-0-6)
01215331	Heat Transfer in Aerospace Engineering Modes of heat transfer. Heat conduction equations. Steady and transient heat conduction. Heat convection. Free and forced convection. Radiation heat transfer. Heat transfer in aerospace engineering application. Heat exchangers. Aerodynamic heating. Heat transfer in space. Computational method in heat transfer.	3(3-0-6)
01215341	Fundamental of Aerodynamics I Incompressible aerodynamics. Incompressible irrotational flow. Thin airfoil theory. Finite wing theory. Compressible aerodynamics. Isentropic flow. Normal shock waves. Oblique shock waves. Expansion waves. Linearized compressible flow.	3(3-0-6)

01215344	Fundamental of Aerodynamics II Slender wing theory. Slender body theory. Effect of viscosity and drag estimation. Compressible flow through varying area. Flow with friction. Flow with heat transfer. Linearized compressible flow. Method of characteristics. Hypersonic flow. Computational tools for aircraft aerodynamic design.	3(3-0-6)
01215351	Aircraft Conceptual Design Requirements and standards in aircraft design. Weight estimation. Aircraft performance estimation in preliminary design stage. Aircraft sizing. Weight and balance. Load analysis. Cost analysis.	3(3-0-6)
01215353	Manufacturing Processes for Aircraft Materials Fundamentals of manufacturing processes. Bulk deformation processes. Sheet metal operations. Net and near net forming processes. Machining processes. Selection and criteria of aircraft material. Special manufacturing processes for aircraft alloys and superalloys. Heat treatment. Materials for composite structures. Joining, mechanical fastening and standards. Special manufacturing processes for aircraft components.	3(3-0-6)
01215362	Aircraft Stability and Control Static stability and control. Aircraft equation of motion. Stability derivatives. Longitudinal motion. Lateral motion. Aircraft response to movement controls. Response to atmospheric conditions. Related topics in aircraft stability analysis.	3(3-0-6)
01215371	Management for Aerospace Engineers Organization management. Operations management for aerospace industry. Queuing theory. Project planning and scheduling. Project controlling. Financial management. Business development plan.	3(3-0-6)
01215372	Production and Quality Engineering Production planning. Operation scheduling. Inventory controls. Materials requirement planning. Quality concepts. Quality tools. Quality Management. Process control. Application in aerospace industry.	3(3-0-6)
01215381	Space Flight Basic concepts of space flight. Discipline of astronautics. Calculation and analysis of orbits and trajectories of space vehicles operating under the influence of gravitational forces. Entry of space vehicles into the earth's atmosphere. Entry trajectory and aerodynamic heating of the vehicles.	3(3-0-6)

01215399	Internship	1
	Internship for aerospace engineering in private enterprises, government agencies, government enterprises or academic places at least 240 hours and at least 30 workdays.	
01215411	Introduction to Optimization in Aerospace Engineering	3(3-0-6)
	Introduction to optimization, functions of a single variable, unconstrained function of multiple variables, development of formalized optimization problem statements, modeling engineering design problems for optimization, minimization techniques, mathematical foundations of multidisciplinary and multi-objective design optimization.	
01215412	Data Science for Aerospace Engineering	3(3-0-6)
	Concepts in data science. Data acquisition, preparation, exploration, and visualization. Basic data science methods and machine learning. Data science in aerospace applications.	
01215413	Machine Learning for Aerospace Engineering	3(3-0-6)
	Fundamental concepts and algorithms which enable computers to learn from experience. Supervised learning including data classification, decision trees, regression analysis, support vector machines, Bayesian methods, neural networks, and deep learning. Unsupervised learning including clustering, dimensionality reduction, and recommender system. Reinforcement learning.	
01215421	Computational Structural Mechanics	3(3-0-6)
	Computer programming. Numerical and finite element analysis. Application to aerospace engineering problems.	
01215422	Structural Dynamics	3(3-0-6)
	Energy methods in dynamics problems. Vibration of discrete and continuous systems. Structural analysis by finite element method. Aerodynamics forces. Divergence and flutter.	
01215424	Nondestructive Testing in Aerospace Engineering	3(3-0-6)
	Types and methods of nondestructive testing. Liquid penetrant testing. Magnetic particle testing. Ultrasonic testing. Radiography testing. Eddy current testing. Other special nondestructive testing. Application in aerospace engineering.	

01215425	Mechanics of Composite Materials Composite material technology. Mechanical behavior of composite materials. Theory of elastic anisotropic materials. Micromechanics and macromechanics of a lamina. Lamination theory. Stiffness and strength of composite materials. Structural behavior of laminated plate. Design considerations.	3(3-0-6)
01215433	Design of Aircraft Propulsive Systems Combustion systems. Principle to combustion. Combustion chamber design. Ignition systems. Combustion efficiency. Chemical reaction. Supercharging systems. Compressor and turbine systems. Compressor and turbine blade analysis and design.	3(3-0-6)
01215435	Aircraft Engine Technology Basic operation of gas turbine and piston engines. Fuel and mixtures. Carburetors and fuel injection system. Anti-icing system. Ignition systems. Lubrication system. Cooling system. Power augmentation system. Diesel engines. Gas turbine air intake. Compressors. Turbine assembly. Gas turbine exhaust system. Reverse thrust. Gas turbine performance. Bleed air system. Gear boxes and accessory drives. Gas turbine engine starting and fuel systems.	3(3-0-6)
01215436	Advance Aircraft Engine Combustion Combustion fundamentals. Diffusers. Aerodynamics. Combustion performance. Combustion noise. Fuel injection. Heat transfer. Emissions. Alternative fuels.	3(3-0-6)
01215441	Computational Fluid Dynamics Basic concept of computational fluid dynamics. Grid and grid generation. Numerical discretization. Solution methods for steady and unsteady flows. Introduction to turbulence modeling. Flows over complex geometries. Advanced topics in computational fluid dynamics.	3(2-3-6)
01215445	Introduction to Boundary Layer Aerodynamics Equations of motion. Navier-Stokes equations. Some exact solutions. Creeping flow. Boundary layer approximation. Laminar and turbulent boundary layers. Transition. Free shear layers.	3(3-0-6)
01215446	Industrial and Vehicle Aerodynamics Basic aerodynamics. Impact of aerodynamics on the performance and design of motor vehicles. Wind loads on buildings and structures. Ventilation of buildings. Wind tunnel testing and computational fluid dynamics in industrial and vehicle aerodynamics.	3(3-0-6)

01215448	Introduction to Mini and Micro Air Vehicles Micro Unmanned Air Vehicles (Micro Air Vehicles; MAVs). Components of MAVs. Low Reynolds number aerodynamics for MAVs. Rigid-fixed wing MAVs. Flexible-fixed wing MAVs. Rotor wing MAVs and flapping wing MAVs. Fundamental of propeller. Effect of propulsive induced-flow on fixed-wing's aerodynamics. Fixed-wing and rotor-wing MAV design. Autopilot and navigationsystem of MAVs.	3(3-0-6)
01215449	Experimental Aerodynamics Wind tunnel. Scale and Reynolds number's effect. Selection of equipment, tools and instrument for experimental aerodynamics. Experimental design and procedure in static aerodynamic testing. Data acquisition, data processing, data analysis. Wall effect and wall correction in low speed wind tunnel testing. Calculation and analysis of uncertainty.	3(2-3-6)
01215452	Aircraft Mechanical Design Fundamental of mechanical design. Aircraft loads. Materials properties and selection. Fasteners and structural joints. Theories of failure and fail safe design. Design of simple machine elements. High lift devices. Undercarriages. Engine mounts. Design project.	3(3-0-6)
01215461	Automatic Flight Control I Analysis and design of feedback control systems using both frequency and time domain techniques. Application to analog and digital automatic flight control systems.	3(3-0-6)
01215462	Automatic Flight Control II PID control systems and the limitations of the systems. Multi-variable control. Robust control. Adaptive control. Computer-based control.	3(3-0-6)
01215463	Aircraft Systems Operation. Locating and maintenance of hydraulic systems. Fuel systems. Avionic systems. Electrical systems. Environmental systems. Effects of one system on the overall design of the aircraft and on other systems.	3(3-0-6)
01215464	Aircraft Air Conditioning and Pressurization Systems New technology in air conditioning and pressurization systems of commercial aircraft. Psychrometry. Thermodynamics of heating and cooling. Systems of air conditioning and pressurization of aircraft. Maintenance and operations of air conditioning and pressurization systems in airline industry. Air quality control in passenger cabin. Safety in air conditioning and pressurization of commercial aircraft based on international regulations.	3(3-0-6)

01215465	Aircraft Instruments	3(3-0-6)
	Various aircraft instruments. Methods of grouping instruments in aircraft. Theories: instruments concept. Interpretation of instruments. Errors and corrections. Designs to fit usage.	
01215471	Aerospace Organization Management	3(3-0-6)
	Environment and dynamics in aerospace industry. Evolution of management theory. Globalization and aerospace industry. Ethics and social responsibility in organizational management. Planning and controlling. Organizing and leading the organization in aerospace industry. Decision making process. Managing change and innovation. International management in aerospace industry.	
01215472	Aerospace Organization Behavior	3(3-0-6)
	Organizational behavior in aerospace industry. Diversity and individual differences. Perception and learning in aerospace organization. Motivation. Work performance and stress. Group and team behavior. Power and politics. Conflict and negotiation. Leadership. Communication. Job design and aerospace organizational culture.	
01215473	Aircraft Maintenance Management	3(3-0-6)
	Concepts, regulations, and requirements of maintenance. Reliability analysis. Operation and planning. Organization. Computer-based aids to maintenance management. Defect and accident. Economics and cost of maintenance. Technology and future of aircraft maintenance.	
01215474	Aviation System Life Cycle Cost Analysis	3(3-0-6)
	Overview of systems life cycle costing. Introduction to engineering economy. Advanced economic analysis of alternatives. Life cycle framework and techniques. Simulation-based costing. Costing of complex systems. Parametric cost estimating. Project management's role in life cycle costing.	
01215475	Project Management for Aircraft Design and Development	3(3-0-6)
	Aircraft life cycle in engineering point of view. FAR part 23. Part manufacturing approval (PMA). Designated engineering representative (DER). Project selection. Project manager. Project activity planning. Budget and cost estimation, Resource allocation, Project report. Project termination.	
01215481	Space Technology and Applications	3(3-0-6)
	Satellite technology applications. Space technology. Meteorology. Image processing techniques. Geographic information system (GIS). Image interpretation.	

01215482	Space Mission Analysis and Design Orbit design. Effects of space environment to space missions. Defining and sizing space payloads. Design of spacecraft systems. Design of ground station. Design of spacecraft sub systems.	3(3-0-6)
01215490	Co-operative Education On the job training as a temporary employee in order to get experiences from the assignment for aerospace engineering	7
01215495	Aerospace Engineering Project Preparation Preparation for project proposal. Project plan. Literature review and preparing project and progress report.	1(0-3-2)
01215496	Selected Topics in Aerospace Engineering Selected topics in aerospace engineering at the bachelor's degree level. Topics are subjected to change each semester.	1-3
01215497	Seminar Presentation and discussion on current interesting topics in aerospace engineering at the bachelor's degree level.	1
01215498	Special Problems Study and research in aerospace engineering at the bachelor's degree level and compiled into a written report.	1-3
01215499	Aerospace Engineering Project Project of practical interest in various field of aerospace engineering.	2(0-6-3)

2) Courses of Other Codes

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| 01200431 | Principles of Rail Engineering | 3(3-0-6) |
| | Thailand rail systems, state railway of thailand system, bts system, operation and maintenance, permanent way, track works, diesel locomotives, diesel multiple units, electric multiple units for mass rapid transit, signalling and telecommunication systems, SCADA system, power supply system, field trips. | |
| 01200432 | Rolling Stock Technology | 3(3-0-6) |
| | Thailand's rolling stocks, diesel locomotives, diesel multiple units, electric multiple unit for mass rapid transit and commuter, high speed rolling stocks, monorail rolling stocks, trams and light rail rolling stocks, train performance, wheel-rail interactions, rail vehicle dynamics, rolling stock maintenance, field trips. | |
| 01200433 | Signalling and Telecommunication Systems | 3(3-0-6) |
| | Thailand's signalling, telecommunication, SCADA, and power supply systems, interlocking system, wayside equipments, on-board equipments, rail telecommunication system, central train control center, SCADA systems, rail power supply system, third rail system, catenary cables and pantographs, rail power stations, field trips. | |
| 01200434 | Rail Infrastructure | 3(3-0-6) |
| | Thailand's rail infrastructure, rail route alignment design, permanent way design, viaduct/elevated way design, tunnel design, station design and location, track works design, depot design, stabling yard design, park and ride building design, e&m systems (building service systems), field trips. | |
| 01200435 | Rail System Operation and Maintenance | 3(3-0-6) |
| | Thailand's rail operation and maintenance, System operation planning, headway time, time table construction, train control, safety regulations, fare collection system, shunting operations for passenger and freight cars, station operation, principles of maintenance, maintenance schedules, rolling stock maintenance, signalling/telecom/SCADA/power supply system maintenance, track works maintenance, e&m system (building service system) maintenance, field trips. | |

01204111	Computers and Programming	3(2-3-6)
	Basic structure of modern computer systems; data representation in computer; Algorithmic problem solving; program design and development methodology; introductory programming using a high-level programming language; programming practice in computer laboratory.	
01205201	Introduction to Electrical Engineering	3(3-0-6)
	Direct current and alternating current circuit analysis. Generators and their uses. Motors and their uses. Transformers. Three-phase systems. Power transmission system. Electrical instruments.	
01205202	Electrical Engineering Laboratory I	1(0-3-2)
	Laboratory experiments on topics covered in introduction to Electrical Engineering	
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; detail and assembly drawings; introduction to computer-aided drawing.	
01208201	Basic Principles of Engineering Mechanics 3	(3-0-6)
	Analysis of forces, equilibrium, dry friction, adaptation of equilibrium equations to frame and machine, introduction to fluid mechanics, kinematics of particles and rigid bodies in plane, Newton's laws, principles of work and energy.	
01208281	Workshop Practice 1	(0-3-2)
	Practice in the work-piece measuring, machine tools, bench works, sheet metal works, gas and electric welding, and CNC machines, safety in workshop.	
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.	
01213211	Materials Science for Engineers	3(3-0-6)
	Relationships between structures, properties, processes and performances of engineering materials. Phase equilibrium diagrams and their interpretation. Micro and macrostructures related to properties of engineering materials. Investigation of material structures. Material properties testing and analysis. Corrosion and degradation of materials. Production processes of engineering materials. Composite and construction materials.	

01225361	Aviation Logistics and Supply Chain Management) Supply chain and logistics management concepts in aviation industry, materials handling system, aviation inventory management, capacities planning, locating distribution centers of air transportation.	3(3-0-6)
01225371	Airline Operations and Management Airline management. Airline forecasting. Airline finance. Airline scheduling. Airline flight operations and crew management. Airline ground handling. Airport and airline interface. Aircraft maintenance and airline interface.	3(3-0-6)
01225372	Airport Operations and Management Airport management. Airport cost and revenue structure. Airport capacity. Airport safety and security. Airport environment management. Airport operation and performance.	3(3-0-6)
01403114	Laboratory in Fundamentals of General Chemistry Laboratory work for 01403117 Fundamentals of General Chemistry.	1(0-3-2)
01403117	Fundamentals of General Chemistry Atomic structure, periodic table and periodic properties, chemical bonds, stoichiometry, gases, liquids, solids, solutions, chemical kinetics, chemical equilibria, acids and bases, ionic equilibria, representative elements, metals, nonmetals and metalloids, transition metals.	3(3-0-6)
01417167	Engineering Mathematics I Limits and continuity of functions, derivatives and applications, differentials, integration and applications, polar coordinates, improper integrals, sequences and series, mathematical induction.	3(3-0-6)
01417168	Engineering Mathematics II Vectors and solid analytic geometry, calculus of multivariables functions, calculus of vector valued functions.	3(3-0-6)
01417267	Engineering Mathematics III First order linear differential equations, linear differential equations with constant coefficients, Laplace transforms and inverse transforms, power series solutions, system of linear differential equations.	3(3-0-6)
01420111	General Physics I Mechanics, harmonic motion, waves, fluid mechanics, thermodynamics.	3(3-0-6)

01420112	General Physics II Electromagnetism, electromagnetic waves, optics, introduction to modern physics and nuclear physics.	3(3-0-6)
01420113	Laboratory in Physics I Laboratory for General Physics I or Basic Physics I.	1(0-3-2)
01420114	Laboratory in Physics II Laboratory for General Physics II or Basic Physics II.	1(0-3-2)