Course Descriptions

1) Courses of Aerospace Engineering Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>01215211</td>
<td>Introduction to Aerospace Engineering</td>
<td>2(1–2–3)</td>
</tr>
<tr>
<td></td>
<td>Basic knowledge in aerospace engineering. Ethics and regulations in aerospace engineering works. Field trip required.</td>
<td></td>
</tr>
<tr>
<td>01215213</td>
<td>Computational Methods and Statistics in Aerospace Engineering</td>
<td>3(2–3–6)</td>
</tr>
<tr>
<td>01215221</td>
<td>Aircraft Structures I</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215231</td>
<td>Aerothermodynamics</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215232</td>
<td>Aerothermodynamics of Aircraft Engines</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215241</td>
<td>Fluid Mechanics in Aerospace Engineering</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215251</td>
<td>CAD/CAM for Aerospace Engineering</td>
<td>3(3–0–6)</td>
</tr>
</tbody>
</table>
01215261  Aircraft Aerodynamics and Performance  3(3–0–6)

01215311  Aerospace Engineering Laboratory I  1(0–3–2)
Laboratories in basic aircraft structures and materials, fluid mechanics and aerodynamics, aircraft propulsion, and control.

01215312  Mechanics of Machinery in Aerospace Engineering  3(3–0–6)

01215313  Aerospace Engineering Statistics  3(3–0–6)

01215322  Aircraft Structures II  3(3–0–6)

01215323  Aircraft Vibration  3(3–0–6)

01215331  Heat Transfer in Aerospace Engineering  3(3–0–6)

01215341  Fundamental of Aerodynamics I  3(3–0–6)
B.ENG. PROGRAM IN AEROSPACE ENGINEERING

01215344  Fundamental of Aerodynamics II  3(3–0–6)
Slender wing theory. Slender body theory. Effect of viscosity and drag estimation.
Compressible flow through varying area. Flow with friction. Flow with heat transfer.
Computational tools for aircraft aerodynamic design.

01215351  Aircraft Conceptual Design  3(3–0–6)
Requirements and standards in aircraft design. Weight estimation. Aircraft performance
estimation in preliminary design stage. Aircraft sizing. Weight and balance. Load
analysis. Cost analysis.

01215353  Manufacturing Processes for Aircraft Materials  3(3–0–6)
operations. Net and near net forming processes. Machining processes. Selection and
criteria of aircraft material. Special manufacturing processes for aircraft alloys and
fastening and standards. Special manufacturing processes for aircraft components.

01215362  Aircraft Stability and Control  3(3–0–6)
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.

01215371  Management for Aerospace Engineers  3(3–0–6)
Organization management. Operations management for aerospace industry. Queuing
Business development plan.

01215372  Production and Quality Engineering  3(3–0–6)
Production planning. Operation scheduling. Inventory controls. Materials requirement
Application in aerospace industry.

01215381  Space Flight  3(3–0–6)
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.
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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>01215425</td>
<td>Mechanics of Composite Materials</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Composite material technology. Mechanical behavior of</td>
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<td></td>
<td>composite materials. Theory of elastic anisotropic</td>
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<tr>
<td></td>
<td>materials. Micromechanics and macromechanics of a</td>
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<td>lamina. Lamination theory. Stiffness and strength of</td>
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<td></td>
<td>composite materials. Structural behavior of laminated</td>
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<td></td>
<td>plate. Design considerations.</td>
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<tr>
<td>01215433</td>
<td>Design of Aircraft Propulsive Systems</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Combustion systems. Principle to combustion. Combustion</td>
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<tr>
<td></td>
<td>chamber design. Ignition systems. Combustion efficiency</td>
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<td></td>
<td>. Chemical reaction. Supercharging systems. Compressor</td>
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<td></td>
<td>and turbine systems. Compressor and turbine blade</td>
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<td></td>
<td>analysis and design.</td>
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<tr>
<td>01215435</td>
<td>Aircraft Engine Technology</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Basic operation of gas turbine and piston engines.</td>
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<td>Fuel and mixtures. Carburetors and fuel injection</td>
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<td></td>
<td>system. Anti–icing system. Ignition systems. Lubrication</td>
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<td></td>
<td>system. Power augmentation system. Diesel engines.</td>
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<td></td>
<td>Gas turbine air intake.</td>
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<td>Compressors. Turbine assembly. Gas turbine exhaust</td>
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<td>air system. Gear boxes and accessory drives. Gas</td>
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<td></td>
<td>turbine engine starting and fuel systems.</td>
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<tr>
<td>01215436</td>
<td>Advance Aircraft Engine Combustion</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Combustion performance.</td>
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<tr>
<td>01215441</td>
<td>Computational Fluid Dynamics</td>
<td>3(2–3–6)</td>
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<tr>
<td></td>
<td>Basic concept of computational fluid dynamics. Grid</td>
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<td>and grid generation. Numerical discretization.</td>
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<td></td>
<td>Solution methods for steady and unsteady flows.</td>
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<td></td>
<td>Introduction to turbulence modeling. Flows over complex</td>
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<td>geometries. Advanced topics in computational fluid</td>
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<tr>
<td></td>
<td>dynamics.</td>
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<tr>
<td>01215445</td>
<td>Introduction to Boundary Layer Aerodynamics</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Equations of motion. Navier–Stokes equations. Some</td>
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<td>exact solutions. Creeping flow. Boundary layer</td>
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<td></td>
<td>approximation. Laminar and turbulent boundary layers.</td>
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<td>Transition. Free shear layers.</td>
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<tr>
<td>01215446</td>
<td>Industrial and Vehicle Aerodynamics</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Basic aerodynamics. Impact of aerodynamics on the</td>
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<tr>
<td></td>
<td>performance and design of motor vehicles. Wind loads</td>
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<td>on buildings and structures. Ventilation of buildings.</td>
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<td></td>
<td>Wind tunnel testing and computational fluid dynamics</td>
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<td></td>
<td>in industrial and vehicle aerodynamics.</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>01215448</td>
<td>Introduction to Mini and Micro Air Vehicles</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215449</td>
<td>Experimental Aerodynamics</td>
<td>3(2–3–6)</td>
</tr>
<tr>
<td>01215452</td>
<td>Aircraft Mechanical Design</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215461</td>
<td>Automatic Flight Control I</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215462</td>
<td>Automatic Flight Control II</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215463</td>
<td>Aircraft Systems</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215464</td>
<td>Aircraft Air Conditioning and Pressurization Systems</td>
<td>3(3–0–6)</td>
</tr>
</tbody>
</table>


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.


Analysis and design of feedback control systems using both frequency and time domain techniques. Application to analog and digital automatic flight control 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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>01215465</td>
<td>Aircraft Instruments</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215471</td>
<td>Aerospace Organization Management</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215472</td>
<td>Aerospace Organization Behavior</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215473</td>
<td>Aircraft Maintenance Management</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215474</td>
<td>Aviation System Life Cycle Cost Analysis</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215475</td>
<td>Project Management for Aircraft Design and Development</td>
<td>3(3–0–6)</td>
</tr>
<tr>
<td>01215481</td>
<td>Space Technology and Applications</td>
<td>3(3–0–6)</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>01215482</td>
<td>Space Mission Analysis and Design</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td>01215490</td>
<td>Co–operative Education</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>On the job training as a temporary employee in order to get experiences from the assignment for aerospace engineering</td>
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</tr>
<tr>
<td>01215495</td>
<td>Aerospace Engineering Project Preparation</td>
<td>1(0–3–2)</td>
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<tr>
<td></td>
<td>Preparation for project proposal. Project plan. Literature review and preparing project and progress report.</td>
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</tr>
<tr>
<td>01215496</td>
<td>Selected Topics in Aerospace Engineering</td>
<td>1–3</td>
</tr>
<tr>
<td></td>
<td>Selected topics in aerospace engineering at the bachelor’s degree level. Topics are subjected to change each semester.</td>
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</tr>
<tr>
<td>01215497</td>
<td>Seminar</td>
<td>1</td>
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<tr>
<td></td>
<td>Presentation and discussion on current interesting topics in aerospace engineering at the bachelor’s degree level.</td>
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</tr>
<tr>
<td>01215498</td>
<td>Special Problems</td>
<td>1–3</td>
</tr>
<tr>
<td></td>
<td>Study and research in aerospace engineering at the bachelor’s degree level and complied into a written report.</td>
<td></td>
</tr>
<tr>
<td>01215499</td>
<td>Aerospace Engineering Project</td>
<td>2(0–6–3)</td>
</tr>
<tr>
<td></td>
<td>Project of practical interest in various field of aerospace engineering.</td>
<td></td>
</tr>
</tbody>
</table>
2) Courses of Other Codes

01200431 Principles of Rail Engineering 3(3–0–6)

Thailand's 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>01204111</td>
<td>Computers and Programming</td>
<td>3</td>
<td>2-3-6</td>
</tr>
<tr>
<td></td>
<td>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.</td>
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<tr>
<td>01205201</td>
<td>Introduction to Electrical Engineering</td>
<td>3</td>
<td>3-0-6</td>
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<tr>
<td>01205202</td>
<td>Electrical Engineering Laboratory I</td>
<td>1</td>
<td>0-3-2</td>
</tr>
<tr>
<td></td>
<td>Laboratory experiments on topics covered in introduction to Electrical Engineering</td>
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<tr>
<td>01208111</td>
<td>Engineering Drawing 3</td>
<td></td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td>01208201</td>
<td>Basic Principles of Engineering Mechanics 3</td>
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<td></td>
<td>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.</td>
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<tr>
<td>01208281</td>
<td>Workshop Practice 1</td>
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<td></td>
<td>Practice in the work-piece measuring, machine tools, bench works, sheet metal works, gas and electric welding, and CNC machines, safety in workshop.</td>
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<tr>
<td>01208381</td>
<td>Mechanical Engineering Laboratory I 1</td>
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<tr>
<td></td>
<td>Experimental works in the areas of mechanics of machinery, automatic control, engineering materials, thermodynamics and internal combustion engines.</td>
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<tr>
<td>01213211</td>
<td>Materials Science for Engineers</td>
<td>3</td>
<td>3-0-6</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>01225361</td>
<td>Aviation Logistics and Supply Chain Management</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Supply chain and logistics management concepts in aviation industry, materials handling system, aviation inventory management, capacities planning, locating distribution centers of air transportation.</td>
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<tr>
<td>01225371</td>
<td>Airline Operations and Management</td>
<td>3(3–0–6)</td>
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<tr>
<td>01225372</td>
<td>Airport Operations and Management</td>
<td>3(3–0–6)</td>
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<tr>
<td>01403114</td>
<td>Laboratory in Fundamentals of General Chemistry</td>
<td>1(0–3–2)</td>
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<td></td>
<td>Laboratory work for 01403117 Fundamentals of General Chemistry.</td>
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<tr>
<td>01403117</td>
<td>Fundamentals of General Chemistry</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>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.</td>
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<tr>
<td>01417167</td>
<td>Engineering Mathematics I</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Limits and continuity of functions, derivatives and applications, differentials, integration and applications, polar coordinates, improper integrals, sequences and series, mathematical induction.</td>
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<tr>
<td>01417168</td>
<td>Engineering Mathematics II</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Vectors and solid analytic geometry, calculus of multivariables functions, calculus of vector valued functions.</td>
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<tr>
<td>01417267</td>
<td>Engineering Mathematics III</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>First order linear differential equations, linear differential equations with constant coefficients, Laplace transforms and inverse transforms, power series solutions, system of linear differential equations.</td>
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<tr>
<td>01420111</td>
<td>General Physics I</td>
<td>3(3–0–6)</td>
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<tr>
<td></td>
<td>Mechanics, harmonic motion, waves, fluid mechanics, thermodynamics.</td>
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<td>Course Code</td>
<td>Course Title</td>
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</table>
| 01420112   | General Physics II                              | 3(3–0–6)
|            | Electromagnetism, electromagnetic waves, optics, introduction to modern physics and nuclear physics. |         |
| 01420113   | Laboratory in Physics I                         | 1(0–3–2)
|            | Laboratory for General Physics I or Basic Physics I. |         |
| 01420114   | Laboratory in Physics II                        | 1(0–3–2)
|            | Laboratory for General Physics II or Basic Physics II. |         |