Form: Study Plan- Bachelors	**Form Number**	EXC-01-03-02A
	Issue Number and Date	2/3/24/2022/2963 05/12/2022
	Number and Date of Revision or Modification	15/10/2023
	Deans Council Approval Decision Number	265/2024/24/3/2
	The Date of the Deans Council Approval Decision	23/1/2024
	Number of Pages	36

1.	School	**School of Engineering**
2.	Department	**Mechanical Engineering**
3.	Program title (Arabic)	**بكالوريوس هندسة الطيران**
4.	Program title (English)	**Bachelor of Aeronautical Engineering**

5. Components of Curriculum:

he curriculum for the bachelor's degree in **Aeronautical Engineering** consists of **(177)** credit hours distributed as follows:

Number	**Type of requirement**	**Type of Learning (Face-to-Face | Blended | Online)**	**Credit Hours**
First	**University Requirements**	**Blended | Online**	**27**
Second	**Faculty Requirements**	**Face-to-Face | Online**	**26**
Third	**Department Requirements**	**Face-to-Face | Blended | Online**	**124**
Total			**177**

6. Numbering System:

A- Department number

Department	**Number**
Civil Engineering	1
Architectural Engineering	2
Electrical Engineering	3
Mechanical Engineering	4
Chemical Engineering	5
Industrial Engineering	6
Computer Engineering	7
Mechatronics Engineering	8

B- Course number

Domain title	**Domain number**
Miscellaneous	0
Vibration and Control	1
General Mechanics	2
Engineering Drawing and Machine Design	3
Thermal Science	4
Maintenance	5
Fluids	6
Materials	7
Applied Mechanics	8
Project and Selected Topics	9

C- Course number consists of 7 digits

Serial number		Level	Department		School	
			4	0	9	0
*** The Aeronautical Engineering is denoted by (9). The Courses begin with (0994###)**						

First: University Requirements:

Compulsory Requirements					
(18 Credit Hours)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	Military Science	2220100	3		
2	National Culture	3400100	3		
3	Learning & Research Skills	3400101	3	3202099 3201099 1932099	
4	Communication Skills	3400102	3	3400101	
5	Introduction to Philosophy and Critical Thinking	3400103	3	3400101	
6	Human Civilization	3400104	3		
7	Campus Life and Ethics	3400105	(Zero credit; one-hour weekly meeting)		

Preparation Program Requirements All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program					
(0 - 15 Credit Hours)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	**Basics of Arabic**	**3201099**	**3**		**Pass/Fail**
2	**Arabic Languages Skills**	**3201100**	**3**	**3201099**	**Pass/Fail**
3	**Basics of English**	**3202099**	**3**		**Pass/Fail**
4	**English Language Skills**	**3202100**	**3**	**3202099**	**Pass/Fail**
5	**Basics of Computing**	**1932099**	**3**		**Pass/Fail**

Preparation Program Requirements All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program					
(0 - 15 Credit Hours)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	**Basics of Arabic**	**3201099**	**3**		**Pass/Fail**
2	**Arabic Languages Skills**	**3201100**	**3**	**3201099**	**Pass/Fail**
3	**Basics of English**	**3202099**	**3**		**Pass/Fail**
4	**English Language Skills**	**3202100**	**3**	**3202099**	**Pass/Fail**
5	**Basics of Computing**	**1932099**	**3**		**Pass/Fail**

Electives					
(9 Credit Hours)					
Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.					
(First Group)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	**Great Books**	**3400107**	**3**		
2	**Islam and Current Issues**	**0400101**	**3**		
3	**Arab-Islamic Civilization**	**2300101**	**3**		
4	**Jordan: History and Civilization**	**2300102**	**3**		
5	**Jerusalem**	**3400108**	**3**		
Electives					
(Second Group)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	**Legal Culture**	**1000102**	**3**		
2	**Environmental Culture**	**0300102**	**3**		
3	**Physical Fitness Culture**	**1100100**	**3**		
4	**Islamic Culture**	**0400102**	**3**		
5	**Health Culture**	**0720100**	**3**		
Electives					
(Third Group)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	**Entrepreneurship & Creativity**	**3400109**	**3**		
2	**Foreign Language**	**2200103**	**3**		
3	**Electronic Commerce**	**1600100**	**3**		
4	**Social Media**	**1900101**	**3**		
5	**Appreciation of Arts**	**2000100**	**3**		
6	**Special Subject**	**3400106**	**3**		
7	**Administrative skills**	**1601105**	**3**		

Second: School courses: distributed as follows:

A. Obligatory school courses: (26) credit hours
B. Elective school courses: (0) credit hours

A. Obligatory school courses: (26) credit hours:

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0301101	Calculus I	Face-to-Face	3	-	3	-
0301102	Calculus II	Face-to-Face	3	-	3	0301101
0301201	Calculus III	Face-to-Face	3	-	3	0301102
0302101	General Physics I	Face-to-Face	3	-	3	
0302111	General Physics Lab. I	Face-to-Face	-	3	1	0302101*
0302102	General Physics II	Face-to-Face	3	-	3	0302101
0302112	General Physics Lab. II	Face-to-Face	-	3	1	0302102*
0904131	Engineering Graphics and Descriptive Geometry	Face-to-Face	1 Hand drawing + 1Computer	2 Hand drawing + 2 Computer	3	-
0966111	Engineering Workshop	Face-to-Face	-	3	1	-
0921420	Engineering Economy	Online	2	-	2	Completing 90 C.H.
0907101	Computer Skills for Engineers	Face-to-Face	3	-	3	1932099

** Or Co-requisite*

B. Elective school courses: (0) credit hours:

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		

Third: Specialty courses: (124) credit hours distributed as follows:

B. Obligatory specialty courses: (115) credit hours
C. Elective specialty courses: (9) credit hours

A. Obligatory specialty courses: (115) credit hours:

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0303101	General Chemistry I	Face-to-Face	3	0	3	-
0303109	General Chemistry Lab. I	Face-to-Face	0	3	1	0303101
0904233	Machine Drawing	Face-to-Face	0	3	1	0904131
0914202	Computer Programming for Engineers	Blended	0	3	1	0907101 + 0994201*
##0994151	Licensing Module 3: Electrical Fundamentals	Face-to-Face	90	30	0	-
##0994152	Licensing Module 4: Electronic Fundamentals	Face-to-Face	36	0	0	-
##0994153	Licensing Module 5: Digital Techniques/ Electronic Instrument Systems (Part 1)	Face-to-Face	36	0	0	-
##0994154	Licensing Module 5: Digital Techniques/ Electronic Instrument Systems (Part 2)	Face-to-Face	30	0	0	0994153
##0994155	Licensing Module 6: Materials and Hardware	Face-to-Face	150	0	0	-
##0994156	Licensing Module 8: Basic Aerodynamics (Part 1)	Face-to-Face	12	0	0	-
##0994157	Licensing Module 8: Basic Aerodynamics (Part 2)	Face-to-Face	42	0	0	0994156

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
##0994158	Licensing Module 9: Human Factors	Face-to-Face	54	0	0	-
##0994159	Licensing Module 10: Aviation Legislation (Part 1)	Face-to-Face	24	0	0	-
0901241	Statics	Face-to-Face	3	0	3	0302101 + 0301102*
0903203	Fundamentals of Electrical Engineering (none EE students)	Face-to-Face	3	0	3	0302102
0904222	Dynamics	Face-to-Face	3	0	3	0901241
0904341	Thermodynamics	Face-to-Face	3	0	3	0994202
0904361	Fluid Mechanics	Face-to-Face	3	0	3	0302101 + 0994201
0934345	Thermodynamics Lab.	Face-to-Face	0	3	1	0904341
0934372	Strength of Materials	Face-to-Face	3	0	3	0901241
0994201	Engineering Math I for Aeronautical Engineering Students	Blended	3	0	3	0301201
0994202	Engineering Math II for Aeronautical Engineering Students	Blended	3	0	3	0994201
##0994251	Licensing Module 10: Aviation Legislation (Part 2)	Face-to-Face	336	0	0	0994159
##0994252	Licensing Module 7: Maintenance Practice I	Face-to-Face	0	48	3	-
##0994253	Licensing Module 7: Maintenance Practice II	Face-to-Face	0	48	3	0994252
##0994254	Licensing Module 15: Gas Turbine Engine (Part 1)	Face-to-Face	192	0	0	-

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
##0994255	Licensing Module 15: Gas Turbine Engine (Part 2)	Face-to-Face	120	150	0	0994254
##0994256	Licensing Module 17: Propeller	Face-to-Face	42	0	0	-
0904302	Engineering Numerical Methods	Face-to-Face	3	0	3	0907101 + 0994201
0904362	Fluid Mechanics Lab.	Face-to-Face	0	3	1	0904361
0904441	Heat Transfer	Face-to-Face	3	0	3	0904341 + 0904361
0994311	Sound and Mechanical Vibrations	Blended	3	0	3	0994202 + 0904222
0944331	Mechanics of Machines	Face-to-Face	3	0	3	0904233 + 0914202 + 0903203
0954412	Mechanical Vibrations Lab.	Face-to-Face	0	3	1	0994311
0994331	Machine Elements Design	Blended	3	0	3	0934372
0994351	Maintenance Practice III: Aircraft Practical Experience	Face-to-Face	3	0	3	0994202
##0994352	Licensing Module 11: Aeroplane Aerodynamic, Structure, and Systems (Part 1)	Face-to-Face	384	0	0	-
##0994353	Licensing Module 11: Airplane Aerodynamic, Structure, and Systems (Part 2)	Face-to-Face	0	240	0	0994352
##0994354	Work Experience 1	Face-to-Face	0	312	0	-
0994363	Aerodynamics I	Blended	3	0	3	0904361
0994443	Propulsion	Face-to-Face	3	0	3	0994363
0994461	Gas Dynamics	Face-to-Face	3	0	3	0904361

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0994481	Aircraft Structure I	Blended	3	0	3	0994202 + 0994365
0904446	Heat Transfer Lab.	Face-to-Face	0	3	1	0904441
0934374	Materials Lab.	Face-to-Face	0	3	1	0994471
0994364	Aeronautics Lab. I	Face-to-Face	0	3	1	0994363
0994365	Field Aeronautics Lab. II	Face-to-Face	0	3	1	0994364
0994411	Automatic Control	Face-to-Face	3	0	3	0994311*
0994412	Aircraft Stability and Control	Blended	3	0	3	0994363 + 0994481
##0994451	Maintenance Practice IV: Work Experience	Face-to-Face	0	48	3	0994471*
##0994452	Work Experience 2	Face-to-Face	0	336	0	-
##0994453	Work Experience 3	Face-to-Face	0	192	0	-
##0994454	Work Experience 4	Face-to-Face	0	264	0	-
0994471	Materials Science for Aeronautical Engineers	Online	3	0	3	0303101 + 0934372
0994482	Aircraft Performance	Face-to-Face	3	0	3	0994363
0994501	Instrumentation	Blended	3	0	3	0903203 + 0904361 + 0994411
0994531	Aircraft Design	Face-to-Face	3	0	3	0994412
0994581	Aircraft Maintenance Systems	Face-to-Face	3	0	3	0994202 + 0994481
0994502	Instrumentation and Dynamic Systems Lab.	Face-to-Face	0	3	1	0994501
##0994551	Maintenance Practice V: Work Experience	Face-to-Face	0	48	3	0994581*

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
##0994552	Maintenance Practice VI: Work Experience	Face-to-Face	0	48	3	0994461*
##0994553	Work Experience 5	Face-to-Face	0	416	0	-
##0994554	Work Experience 6	Face-to-Face	0	240	0	-
##0994555	Work Experience 7	Face-to-Face	0	432	0	-
0994571	Composite Materials	Blended	3	0	3	0994471
0994591	Project I for Aeronautical Engineers	Face-to-Face	-	-	1	Completing 120 C.H.
0994592	Project II for Aeronautical Engineers	Face-to-Face	-	-	2	0994591
0994593	Employability Readiness and Field Training (Aeronautical Engineering)	Face-to-Face	-	-	5	-

** Pre/ Co-requisite*

*** The duration of the project is two regular semesters with the final marks given at the end of the second semester.*

**** Employability Readiness and Field Training: The student undergoes Practical Training for 16 weeks.*

Contact Hours of these courses are per semester.

Elective specialty courses: (9) credit hours:

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0994505	Computational Fluid Dynamics	Blended	3	-	3	0904441
0994506	Aeroelasticity	Face-to-Face	3	-	3	0994363 + 0994481
0994507	Finite Elements Methods in Aerospace Structures	Blended	3	-	3	0994331 + 0994481
0994508	Micro Electro Mechanical Systems (MEMS)	Face-to-Face	3	-	3	0904441 + 0994471
0994509	Boundary Layer Theory	Face-to-Face	3	-	3	0904441 + 0994461
0994510	Aircraft Sensors and Actuators	Face-to-Face	3	-	3	0994501
0994511	Aircraft Navigation	Face-to-Face	3	-	3	0994412
0994561	Aerodynamics II	Face-to-Face	3	-	3	0994363
0994562	Rotary Wing Aircrafts	Face-to-Face	3	-	3	0994363
0994582	Aircraft Structures II	Face-to-Face	3	-	3	0994481
0994583	Fracture Mechanics	Face-to-Face	3	-	3	0994481
0994594	Special Topics in Aeronautical Engineering	Online	3	-	3	Department approval

Fourth: Courses offered by other faculties/schools and departments to the BSc. of **Aeronautical Engineering**

Course Number	Course Title	Type of Learning	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0301101	Calculus I	Face-to-Face	3	-	3	-
0301102	Calculus II	Face-to-Face	3	-	3	0301101
0301201	Calculus III	Face-to-Face	3	-	3	0301102
0302101	General Physics I	Face-to-Face	3	-	3	
0302111	General Physics Lab. I	Face-to-Face	-	3	1	0302101*
0302102	General Physics II	Face-to-Face	3	-	3	0302101
0302112	General Physics Lab. II	Face-to-Face	-	3	1	0302102*
0966111	Engineering Workshop	Face-to-Face	-	3	1	-
0921420	Engineering Economy	Online	2	-	2	Completing 90 C.H.
0907101	Computer Skills for Engineers	Face-to-Face	3	-	3	1932099

Fifth: Advisory Study Plan – Attached Separately.

Course Description

0301101 Calculus I Face-to-Face (3 Credit Hours)

Prerequisite: None

Functions: domain, operations on functions, graphs of functions, trigonometric functions, limits: meaning of a limit, computational techniques, limits at infinity, infinite limits, continuity, limits and continuity of trigonometric functions, the derivative: techniques of differentiation, derivatives of trigonometric functions, the chain rules, implicit differentiation, differentials, Roll's Theorem, te mean value theorem, the extended mean value theorem, L'Hopital's rule, increasing and decreasing functions, concavity, maximum and minimum values of a function, graphs of functions including rational functions (asymptotes) and functions with vertical tangents (cusps), antiderivatives, the indefinite integral, the definite integral, the fundamental theorem of calculus, the area under a curve, the area between two curves, transcendental functions: inverse functions, logarithmic and exponential functions, derivatives and integrals, limits (the indeterminate forms), hyperbolic functions and their inverses, inverse trigonometric functions.

0301102 Calculus II Face-to-Face (3 Credit Hours)

Prerequisite: 0301101

Functions: domain, operations on functions, graphs of functions, trigonometric functions, limits: meaning of a limit, computational techniques, limits at infinity, infinite limits, continuity, limits and continuity of trigonometric functions, the derivative: techniques of differentiation, derivatives of trigonometric functions, the chain rules, implicit differentiation, differentials, Roll's Theorem, the mean value theorem, the extended mean value theorem, L'Hopital's rule, increasing and decreasing functions, concavity, maximum and minimum values of a function, graphs of functions including rational functions (asymptotes) and functions with vertical tangents (cusps), antiderivatives, the indefinite integral, the definite integral, the fundamental theorem of calculus, the area under a curve, the area between two curves, transcendental functions: inverse functions, logarithmic and exponential functions, derivatives and integrals, limits (the indeterminate forms), hyperbolic functions and their inverses, inverse trigonometric functions.

0301201 Calculus III Face-to-Face (3 Credit Hours)

Prerequisite: 301102

Three-dimensional space and vectors rectangular coordinates in 3-space, spheres, cylindrical surfaces, quadric surfaces, vectors: dot product, projections, cross product, parametric equations of lines. Planes in 3-spaces, vector-valued functions: calculus of vector valued functions, change of parameters, arc length, unit tangent and normal vectors, curvature, functions of two or more variable: domain, limits, and continuity, partial derivatives, differentiability, total differentials, the chain rule, the gradient, directional derivatives, tangent planes, normal lines, maxima and minima of functions of two variables, Lagrange multipliers, multiple integrals: double integral, double integrals in polar coordinates, triple integrals, triple integrals in cylindrical and spherical coordinates, change of variables in multiple integrals, Jacobian.

0302101 General Physics I Face-to-Face (3 Credit Hours)

Prerequisite: Physics of secondary stage or equivalent or 0302099

Motion in One Dimension, Vectors, Motion in Two Dimensions, The Laws of Motion, Circular Motion and Other Applications of Newton's Laws, Work and Kinetic Energy, Potential Energy and Conservation of Energy, Linear Momentum and Collisions, Rotation of a Rigid Object About a Fixed Axis, Rolling Motion and Angular Momentum.

0302111 General Physics Lab. I Face-to-Face (1 Credit Hour)

Prerequisite: 0302101 or Concurrent

11 experiments each of 3 hrs/week duration: collection and analysis of data, measurements and uncertainties, vectors: force table, kinematics of rectilinear motion, force and motion, collision in two dimensions, rotational motion, simple harmonic motion: simple pendulum, gas's Laws, ballistic pendulum, specific heat capacity of metals.

0302102 General Physics II Face-to-Face (3 Credit Hours)

Prerequisite: 302101

Electric field, Gauss's law, electric potential, capacitance and dielectrics, current and resistance, direct current circuits, magnetic field, sources of the magnetic field, Faraday's law, inductance, alternating current circuits, the nature of light and the principles of ray optics, image formation.

0302112 General Physics Lab. II Face-to-Face (1 Credit Hour)

Prerequisite: 0302101 or Concurrent

12 experiments each of 3 hrs/week duration: electric field mapping, specific charge of copper ions, power transfer, potentiometer, capacitors: RC time constant, Kirchoff's laws, magnetic field of a current, lenses, Young's double slit experiments, electromagnetic induction, Ohm's law, Wheatstone bridge.

0904131 Engineering Graphics and Descriptive Geometry Face-to-Face (3 Credit Hours)

Prerequisite: None

Drawing equipment and use of instruments. Lettering, Geometric construction, Sketching and shape description. Basic descriptive geometry, Developments and intersections. Axonometric, oblique and perspective drawings, Multiview projection, Principal views, Conventional practice, and sectional views. Auxiliary views. Dimensioning techniques. Parallel: Introduction to computer drawing. Drawing aids, Geometrical construction, and the appropriate commands of text, editing, plotting, sections, layers, pictorial views, and dimensioning. Auxiliary views.

0966111 Engineering Workshop Face-to-Face (1 Credit Hour)

Prerequisite: None

General safety, materials and their classifications, measuring devices and their accuracy, fits and tolerances, theoretical background for the practical exercises including fitting, forging, carpentry, casting, welding, mechanical saws, shearers, drills, lathes, milling machines, shapers and grinders.

0921420 Engineering Economy Online (2 Credit Hours)

Prerequisite: Completing 90 Cr. Hrs.

Major elements of feasibility studies. Principles of engineering economy. Equivalence and compound interest formulas. Single payment model. Uniform payment model. Gradient payment model. Exponential payment model. Decision criteria for single and multiple alternatives: present worth, annual worth, future worth, internal rate of return, benefit cost ratio and payback methods. Income-tax effect on decision making.

0907101 Computer Skills for Engineers (3 Credit Hours)

Prerequisite: 1932099

This course presents the fundamental concepts of programming using one high level programming language like C++, Java, or Python. It covers the basic structures of the programming language such as variables, data types, control structures, arrays, functions, and introduction to records (struct) and object-oriented programming (classes and objects). The course will focus on providing the students with practical programming skills through home works and exams which require writing whole programs.

0303101 General Chemistry I Face-to-Face (3 Credit Hours)

Pre-requisite None

Measurements and significant figures, chemical reactions, stoichiometry, the gaseous state, thermochemistry, electronic structure and periodicity, chemical bonding, molecular shapes, states of matter and intermolecular forces.

0303109 General Chemistry Lab. I Face-to-Face (1 Credit Hour)

Pre-requisite 0303101

Safety and laboratory rules, chemical observations, Avogadro's number, stoichiometry, volumetric analysis, oxidation and reduction, colligative properties, thermochemistry and equilibrium.

0904233 Machine Drawing Face-to-Face (1 Credit Hour)

Pre-requisite 0904131

Mechanical engineering drawing conventions and abbreviations, various systems of size description, including precision dimensioning, fastening elements, standard organization and preparation of engineering drawings, assembly and detailed drawings, design applications.

0914202 Computer Programming for Engineers Blended (1 Credit Hour)

Pre-requisite 0907101 + 0994201*

This course introduces students to technical computing environment (MATLAB) software that is used extensively in solving real life problems in different fields of engineering. The class focuses on the specific features of MATLAB that are useful for engineering applications. Solve nonlinear implicit equations including systematic development of programming via flowcharts and pseudo. Solution of nonlinear and linear systems of equations. Interpolation, approximation and curve fitting and statistics tool boxes. Numerical differentiation and integration. Solution of ordinary differential equations. Applied examples, Simulink and Symbolic modules, and simmechanics.

0994151 Licensing Module 3: Electrical Fundamentals Face-to-Face (0 Credit Hours)

Pre-requisite None

Electron theory, Static electricity and conduction, Electrical terminology, Generation of electricity, DC sources of electricity, DC circuits, Resistance/ resistor, power, Capacitance/capacitor, magnetism, Inductance/ inductor, DC motor/ generator theory, AC theory, Resistive, (R), Capacitive (C) and Inductive (L) circuits, transformers, filters, AC generators, AC motors.

0994152 Licensing Module 4: Electronic Fundamentals Face-to-Face (0 Credit Hours)

Pre-requisite None

Semiconductors, Printed circuit boards, Servomechanisms.

0994153 Licensing Module 5: Digital Techniques Electronic Instrument Systems (Part 1) Face-to-Face (0 Credit Hours)

Pre-requisite None

Electronic instrument systems, Numbering systems, Data conversion, Data buses, Logic circuits, Basic computer structure.

0994154	**Licensing Module 5: Digital Techniques Electronic Instrument Systems (Part 2)**	**Face-to-Face**	**(0 Credit Hours)**

Pre-requisite 0994153

Fibre optics, Electronic displays, Electrostatic sensitive devices, Software management control, Electromagnetic environment, Typical electronic/ digital aircraft systems.

0994155	**Licensing Module 6: Materials & Hardware**	**Face-to-Face**	**(3 Credit Hours)**

Pre-requisite None

Fasteners, Pipes and unions, Springs, Bearings, Transmissions, Control cables, Electrical cables and connectors, Aircraft materials-ferrous, Aircraft materials-nonferrous, Aircraft materials-composite and non-metallic, Corrosion.

0994156	**Licensing Module 8: Basic Aerodynamics (Part 1)**	**Face-to-Face**	**(0 Credit Hours)**

Prerequisite: None

Physics of the atmosphere, Aerodynamics, High speed airflow.

0994157	**Licensing Module 8: Basic Aerodynamics (Part 2)**	**Face-to-Face**	**(0 Credit Hours)**

Prerequisite: 0994156

Theory of flight, Flight stability and dynamics.

0994158	**Licensing Module 9: Human Factors**	**Face-to-Face**	**(0 Credit Hours)**

Pre-requisite None

General, Human performance and limitations, Social psychology, Factors affecting performance, Physical environment, Tasks, Communication, Human error, Hazard in the workplace.

0994159	**Licensing Module 10: Aviation Legislation (Part 1)**	**Face-to-Face**	**(0 Credit Hours)**

Pre-requisite None

Regulatory framework, certifying staff-maintenance, approved maintenance organizations, Air operations, certification of aircraft, parts and appliances.

0901241 Statics Face-to-Face (3 Credit Hours)

Pre-requisite 0302101 + 0301102*

Force systems (2D and 3D), equilibrium of particles and rigid bodies (2D and 3D), structures (trusses, frames and machines), distributed forces (centroids and centers of mass), beams (shearing force and bending moment diagrams), friction, moments of inertia and virtual work.

0903203 Fundamentals of Electrical Engineering (none EE students) Face-to-Face (3 Credit Hours)

Pre-requisite 0302102

Electrical quantities. Circuit principles. Basics of DC and AC analysis. Polyphase circuits. Transformers. Semiconductor diodes. Bipolar transistors. Field effect transistors. Thyristors. Operational amplifiers. Introduction to electric drives. DC drives. AC drives: induction motors, synchronous motors, reluctance and stepping motors. Servomotor drives.

0904222 Dynamics Face-to-Face (3 Credit Hours)

Pre-requisite 0901241

Kinematics of particles, Rectilinear and curvilinear motion in various coordinate systems. Kinetics of particles, Newton's second law, Central force motion, Work-energy equation, Principle of impulse and momentum, Impact, Conservation of energy and momentum, Application to a system of particles. Kinematics of rigid bodies, Relative velocity and acceleration, Instantaneous center, Analysis in terms of a parameter. Plane kinetics of rigid bodies with application of Newton's second law, Energy and angular impulse impulse-angular momentum.

0904341 Thermodynamics Face-to-Face (3 Credit Hours)

Pre-requisite 0994202

Thermodynamic concepts and definitions, states, properties, systems, control volume, processes, cycles, and units, pure substances, equation of states, table of properties, work and heat, the first law, internal energy and enthalpy, conservation of mass, SSSF and USUF processes, the second law, heat engines and refrigerators, reversible processes, Carnot cycle, entropy, Clausius inequality, principle of the increase of entropy, Efficiencies.

0904361 Fluid Mechanics Face-to-Face (3 Credit Hours)

Pre-requisite 0302101 + 0994201

Introduction, Fluid properties, Basic units. Fluid statics, Pressure and its measurements, Forces on plane and curved submerged surfaces, buoyancy & stability, Fluids in motion, Flow kinematics and visualization, Basic control volume approach, Differential and integral continuity equation. Pressure variation in flowing fluids, Euler's and Bernoulli's equations, Applications of Bernoulli equation. Momentum equation and its applications, Energy equation, Hydraulic and energy grade lines. Dimensional analysis and similitude. Flow in conduits, laminar and turbulent flows, Frictional and minor losses, Piping systems, Pumps, Concept of Hydraulic jump.

0934345 Thermodynamics Lab. Face-to-Face (1 Credit Hour)

Pre-requisite 0904341

Experimental methods in the following: Mechanical equivalent of heat, the adiabatic exponent, Marcet boiler, Bomb calorimeter, Flow through nozzle, Refrigeration system, Air conditioning system, Heat pump and air cooler, single stage air compressor, cooling tower, Thermic unit (steam turbine power plant).

0934372 Strength of Materials Face-to-Face (3 Credit Hours)

Pre-requisite 0901241

Axial loading, Material properties obtained from tensile tests, Stresses and strains due to axial loading, Thermal Stresses, Elementary theory of torsion, Solid and hollow shafts, Thin-walled tubes, Rectangular cross-section, Stresses in beams due to bending, shear and combined forces. Composite beams, Analysis of plane stress, Mohr's Circle, Combined stresses, Thin-walled pressure vessels, Deflection of beams, Buckling of columns, Energy Methods.

0994201 Engineering Math I for Aeronautical Engineering Students Blended (3 Credit Hours)

Pre-requisite 0301201

Ordinary differential equations, linear differential equations of second and higher order, systems of differential equations, phase plane, stability, series solutions of differential equations, orthogonal functions, Laplace transforms, linear systems of equations, matrices and determinants.

0994202 Engineering Math II for Aeronautical Engineering Students Blended (3 Credit Hours)

Pre-requisite 0994201

Vector differential calculus, line and surface integrals, integral theorems, Fourier series, Fourier integrals, Fourier transforms, partial differential equations.

0994251 Licensing Module 10: Aviation Legislation (Part 2) Face-to-Face (0 Credit Hours)

Pre-requisite 0994159

Continuing airworthiness, Oversight principle in Continuing airworthiness, Maintenance and certification beyond the current EU regulations, Cybersecurity in aviation maintenance.

0994252 **Licensing Module 7: Maintenance Practice I** **Face-to-Face** **(3 Credit Hours)**

Pre-requisite **None**

Safety precautions-aircraft and workshop, Workshop practices, Tools, Avionic general test equipment, Engineering drawings, diagrams and standards, Fits and clearances, Electrical Wiring Interconnection System (EWIS), Riveting.

0994253 **Licensing Module 7: Maintenance Practice II** **Face-to-Face** **(3 Credit Hours)**

Pre-requisite **0994252**

Pipes and Hoses, Bearings, Springs, Transmissions, Control cables, Material handling, Welding, Brazing, Soldering and bonding, Aircraft weight and balance, Aircraft handling and storage, Disassembly, Inspection, Repair and assembly techniques, Abnormal events, Maintenance procedures, Documentation and communication.

0994254 **Licensing Module 15: Gas Turbine Engine (Part 1)** **Face-to-Face** **(0 Credit Hours)**

Pre-requisite **None**

Fundamentals, Engine performance, Inlet, Compressors, Combustion section, Turbine section, Exhaust, Bearings and seals, Lubricants and fuels, Lubrication systems, Fuel systems, Air systems.

0994255 **Licensing Module 15: Gas Turbine Engine (Part 2)** **Face-to-Face** **(0 Credit Hours)**

Pre-requisite **0994254**

Starting and ignition systems, Engine indication systems, Power augmentation systems, Turbo-prop engines, Turbo-shaft engines, Auxiliary power units (APUs), Power plant installation, Fire protection systems, Engine monitoring and ground operation, Engine storage and preservation.

0994256 **Licensing Module 17: Propeller** **Face-to-Face** **(0 Credit Hours)**

Pre-requisite **None**

Fundamentals, Propeller construction, Propeller pitch control, Propeller synchronizing, Propeller ice protection, Propeller maintenance, Propeller storage and Preservation

0904302 Engineering Numerical Methods Online (3 Credit Hours)

Pre-requisite 0907101 + 0994201

The purpose of this laboratory is to expose the students to the measurement tools and equipment and to provide them training in using these instruments in order to strengthen and deepen their understanding of the principles of these subjects. The students will be exposed to the experimental methods in the following systems: centre of pressure, impulse-momentum principle, pumps, friction losses in pipes, streamlines and flow fields, buoyancy, Radial flow fan, Water turbine, and Flow visualization.

0904362 Fluid Mechanics Lab. Face-to-Face (1 Credit Hour)

Pre-requisite 0904361

The purpose of this laboratory is to expose the students to the measurement tools and equipment and to provide them training in using these instruments in order to strengthen and deepen their understanding of the principles of these subjects The students will be exposed to the experimental methods in the following systems: centre of pressure, impulse-momentum principle, pumps, friction losses in pipes, stream lines and flow fields, buoyancy, Radial flow fan, Water turbine, and Flow visualization.

0904441 Heat Transfer Face-to-Face (3 Credit Hours)

Pre-requisite 0904341 + 0904361

Introduction to modes of heat transfer, one-dimensional steady state conduction, unsteady state conduction, lumped heat capacity system, introduction to convection, flow and thermal boundary layers. Laminar and turbulent boundary layers, convection in internal and external flows, empirical relations for forced convection heat transfer, natural convection systems, condensation and boiling, introduction to thermal radiation.

0994311 Sound and Mechanical Vibrations Blended (3 Credit Hours)

Pre-requisite 0994202 + 0904222

Simple harmonic motion. Elements of vibratory systems. Systems with single degree of freedom and applications, damped free vibration, rotating and reciprocating unbalance, vibration isolation and transmissibility, and period excitation, systems with multiple degrees of freedom and applications, methods of finding natural frequencies. Introduction to sound and waves: Characteristics of Sound Waves, Measurement of Sound Levels, Description of Sound Fields, Identification of Noise Sources and Their Control.

0944331 Mechanics of Machines Face-to-Face (3 Credit Hours)

Pre-requisite 0904233 + 0914202 + 0903203

Mechanisms and applications, mobility and linkages. Cams, gears and gear trains. Velocity and acceleration analysis in mechanisms. Inertia forces. Principles of balance in rotating & reciprocating masses.

0954412 Mechanical Vibrations Lab. Face-to-Face (1 Credit Hour)

Pre-requisite 0994311

Static and dynamic balancing. Centrifugal force. Simple and compound pendulums. Bifilar suspension. Centre of percussion. Kater's reversible pendulum. Torsional oscillations of single and two rotors system. Vibration of a rigid body spring system. Undamped vibration absorber. Dunkerley's equation.

0994331 Machine Elements Design Blended (3 Credit Hours)

Pre-requisite 0934372

The analysis of design of machine elements including fatigue-failure analysis of shafts, springs, screws, brakes, clutches, chains, belts, welds & rivets, lubrication of journals, ball & roller bearings, and spur, helical, bevel and worm gears.

0994351 Maintenance Practice III: Aircraft Practical Experience Face-to-Face (3 Credit Hours)

Pre-requisite 0994202

Practical experience in aircraft maintenance typically involves hands-on tasks and activities to ensure the safety, reliability, and performance of aircraft. This course focusing in the following practical topics:

Inspection and Diagnosis: Conducting routine and detailed inspections to identify any wear, damage, or malfunction. This includes visual inspections and using diagnostic tools. Routine Maintenance: Performing regular maintenance tasks such as oil changes, filter replacements, and checking fluid levels. Repair and Replacement: Fixing or replacing faulty components, including engines, avionics, hydraulic systems, and landing gear. Testing and Calibration: Ensuring all systems and instruments are functioning correctly through various tests and calibrations. Documentation: Maintaining accurate records of all maintenance work performed, including any discrepancies and corrective actions taken. Compliance: Ensuring all work is done in accordance with aviation regulations and manufacturer specifications. Safety Procedures: Adhering to strict safety protocols to protect both the personnel and the aircraft.

0994352 **Licensing Module 11: Aeroplane Aerodynamics, Structures and Systems (Part 1)** **Face-to-Face** **(0 Credit Hours)**

Pre-requisite **None**

Theory of flight, Airframe structures-general concepts, Airframe structures-aeroplanes, Air conditioning and cabin pressurisation (ATA21), Equipment and furnishings (ATA 25), Flight controls (ATA 27), Fuel systems (ATA 28), Hydraulic power (ATA 29), Ice and Rain protection (ATA 30), Landing gear (ATA 32), Oxygen (ATA 35), Pneumatics/vacuum (ATA 36), Water/ waste (ATA 38).

0994353 **Licensing Module 11: Aeroplane Aerodynamics, Structures and Systems (Part 2)** **Face-to-Face** **(0 Credit Hours)**

Pre-requisite **0994352**

Instruments/ avionics systems, Electrical power (ATA 24), Fire protection (ATA26), Lights (ATA 33), On board maintenance systems (ATA 45), Integrated Modular Avionics (ATA42), Cabin Systems (ATA 44), Information Systems (ATA46).

0994354 **Work Experience 1** **Face-to-Face** **(0 Credit Hours)**

Pre-requisite **None**

Performing many types of tasks related to aircraft systems.

0994363 **Aerodynamics I** **Blended** **(3 Credit Hours)**

Pre-requisite **0904361**

Basics of aerodynamics: the concept of lift and drag, stream function and potential velocity function. Incompressible-inviscid flow theory: flow about bodies, superposition of flows, source panel method, kutts-Joukwski theorem. Aerodynamic characteristics of airfoils: airfoil geometry parameters, vortex panel method, kutta condition, thin-airfoil theory, high-lift airfoil section. Wings of finite span: liftingline theory, trailing vortices and downwash, vortex-induced drag, vortex-lattice method. Effects of boundary layer interaction.

0994443 **Propulsion** **Face-to-Face** **(3 Credit Hours)**

Pre-requisite **0994363**

An integrated approach to the application of engineering principles to propulsion systems. Topics include: piston props, turboprops, turbojets, turbofans, turbo shaft, ramjets, scramjets and rocket engines, beside intakes, compressors, fans, combustors, turbines and propelling nozzles.

0994461 Gas Dynamics Face-to-Face (3 Credit Hours)

Pre-requisite 0904361

One-dimensional gas dynamics; normal and oblique shock waves; Prandtl-Meyer flows; Rayleigh and Fanno-line flow; method of characteristics.

0994481 Aircraft Structure I Blended (3 Credit Hours)

Pre-requisite 0994202 + 0994365

Basics of elasticity. Bending, buckling, and Vibration of Euler-Bernoulli beam. Aerodynamic loads. Functions of structural components. Fabrication of structural components. Principles of stressed skin construction; bending, shear, and torsion of open and closed thin-walled, single and multi-cell, crosssection beams, including shear center and structural idealization.

0904446 Heat Transfer Lab. Face-to-Face (1 Credit Hour)

Pre-requisite 0904441

Conduction heat transfer, One-dimensional conduction, Transient conduction, Convection heat transfer, External flow, Internal flow, Natural convection, Boiling and condensation, Heat exchangers and Thermal radiation.

0934374 Materials Lab. Face-to-Face (1 Credit Hour)

Pre-requisite 0994471

This laboratory serves mainly the measuring and/or determination of some material properties (strain and stress, yield stress, ultimate stress, fracture stress). Nondestructive testing of materials (NDT), micro and macro examination of materials and phase diagrams for steel. It is equipped with machines for conducting tests, such as: Tension, impact fatigue, bending, creep, hardness, and photo elasticity tests.

0994364 Aeronautics Lab. I Face-to-Face (1 Credit Hour)

Pre-requisite 0994363

Basic measurements of aerodynamic forces and pressure distribution using low speed wind tunnel. Supersonic flow, flight demonstration, tunnel experiments. Aerospace propulsion (gasturbines), ramjets, etc.). Basic aircraft sensors.

0994365 Field Aeronautics Lab. II Face-to-Face (1 Credit Hour)

Pre-requisite 0994364

Short period oscillation; The phugoid oscillation; Trim curves and neutral point determination; Bending of Aircraft Wing (Symmetric Wing; The Role of the Shear Center); Torsion of Airfoils (Two-cell Section; Effect of the Spar); Thin-walled Shear Beams (Three Stringer Beams; The Role of the Shear Center); Structural Dynamics (Vibration of Beam; Various Vibration Modes of a Cantilevered Plate); Whole-field Stress Analysis (Photoelasticity of Grooved Specimen; Effect of Notch Geometry).

0994411 Automatic Control Face-to-Face (3 Credit Hours)

Pre-requisite 0994311*

Study of continuous-time systems, classical and modern system design methods, transfer functions models, state space, dynamics of linear systems, and frequency domain analysis and design techniques. Introduction of controllability and observability, and full-state pole placement controller design

0994412 Aircraft Stability and Control Blended (3 Credit Hours)

Pre-requisite 0994363 + 0994481

Introduction to stability and control of flight vehicles. Flight dynamic equations of unsteady motion.

Inertial and aerodynamic coupling. Stability and control of longitudinal and lateral-directional motions. Dynamic stability and control.

0994451 Maintenance Practice IV: Work Experience Face-to-Face (3 Credit Hours)

Pre-requisite 0994471*

Performing many types of tasks related to aircraft systems.

0994452 Work Experience 2 Face-to-Face (0 Credit Hours)

Pre-requisite None

Performing many types of tasks related to aircraft systems.

0994453 Work Experience 3 Face-to-Face (0 Credit Hours)

Pre-requisite None

Performing many types of tasks related to aircraft systems.

0994454 Work Experience 4 Face-to-Face (0 Credit Hours)

Pre-requisite None

Performing many types of tasks related to aircraft systems.

0994471 Materials Science for Aeronautical Engineers Online (3 Credit Hours)

Pre-requisite 0303101 + 0934372

This course introduces the basic principles underlying the behavior of materials. Design philosophy (safe-life and damage-tolerant design). Provide the scientific foundation for understanding of the relations among material properties, microstructure, macrostructure, and behavior of metals, polymers, and ceramics. Deals with atomic structure and bonding, the structure of crystalline solids, imperfection in solids, dislocations and strengthening mechanisms, phase diagrams and alloy formation, ferrous metals, and nonferrous metals and alloys.

0994482 Aircraft Performance Face-to-Face (3 Credit Hours)

Pre-requisite 0994363

Aircraft performance in steady flight; Straight and level flight; Flight limitations; Drag; Power; Performance curves in terms of thrust and power; Gliding flight; Climbing flight; Range and endurance; Other methods of solution to performance problems; Aircraft performance in accelerated flight; Climbing flight; Take off; Landing; Turning flight; Introduction to helicopters; Helicopter performance; Thrust and torque theory; Rotor flow effects; Power required; Vertical climb.

0994501 Instrumentation Blended (3 Credit Hours)

Pre-requisite 0903203 + 0904361 + 0994411

Analysis of experimental data. Statistics; mean and variance, Basic electronic measurement and sensing devices, Displacement, area, force, torque, pressure, strain, fluid flow, temperature, and thermal and transport properties measurements.

0994531 Aircraft Design Face-to-Face (3 Credit Hours)

Pre-requisite 0994412

Preliminary design of a modern airplane to satisfy a given set of requirements. Estimation of size, selection of configuration, weight and balance, and performance of airplane. Satisfaction of stability, control, and handling quality requirements.

0994581 Aircraft Maintenance Systems Face-to-Face (3 Credit Hours)

Pre-requisite 0994202 + 0994481

Introduction; Reliability theory; Life testing; Maintained systems; Integrated logistic support (ILS); Aircraft handling; Repair station requirements; Quality systems; Inventory control; Structural repair; Engine maintenance and overhaul; Maintenance of aircraft systems and instruments.

0994502 Instrumentation and Dynamic Systems Lab. Face-to-Face (1 Credit Hour)

Pre-requisite 0994501

System response and performance, Strain, pressure, force and temperature measurements, Operational amplifiers, Data acquisition.

0994551 Maintenance Practice V: Work Experience Face-to-Face (3 Credit Hours)

Pre-requisite 0994581*

Performing many types of tasks related to aircraft systems.

0994552 Maintenance Practice VI: Work Experience Face-to-Face (3 Credit Hours)

Pre-requisite 0994461*

Performing many types of tasks related to aircraft systems.

0994553 Work Experience 5 Face-to-Face (0 Credit Hours)

Pre-requisite None

Performing many types of tasks related to aircraft systems.

0994554 Work Experience 6 Face-to-Face (0 Credit Hours)

Pre-requisite None

Performing many types of tasks related to aircraft systems.

0994555 Work Experience 7 Face-to-Face (0 Credit Hours)

Pre-requisite None

Performing many types of tasks related to aircraft systems.

Licensing Module 1: Mathematics: Arithmetic, Algebra, Geometry.

Licensing Module 2: Physics 1: Matter, Mechanics.

0994571 Composite Materials Blended (3 Credit Hours)

Pre-requisite 0994471

Introduction. Application of composite materials in aerospace industry. Fiber reinforced composites. Stress, strain, and strength of composite laminate. Failure criterion. Environmental effect. Design of composite structure.

0994591 Project I for Aeronautical Engineers Face-to-Face (1 Credit Hour)**

Pre-requisite Completion of 120 C.H.

Provides students the opportunity to individually explore an aeronautical engineering problem or issue within their field of study and apply their education to solving the problem for the benefit of the local community and society as a whole. Students produce a short report that documents the application of previous learning, experience and knowledge to the problem at hand, and evaluates the results.

0994592 Project II for Aeronautical Engineers Face-to-Face (2 Credit Hours)

Pre-requisite 0994591

Project 2 is an extension of the project within the Bachelor of Aeronautical Engineering program. In this course, students continue the work on the project that was started in the previous semester, with a focus on improving and developing the various aspects of the project. The course includes preparing a comprehensive technical report that covers all aspects of the project, including economic analysis and environmental assessment, according to the rules and instructions published on the department's website. In addition, the course pays special attention to developing students' technical writing skills, as they learn how to prepare technical reports in a professional and accurate manner. They are also trained in presentation skills, as they are required to present a comprehensive summary of the project to a panel of examiners, who evaluate the project based on a set of academic and technical criteria. This course aims to prepare students for the transition to the labor market or graduate studies, by emphasizing the importance of combining technical knowledge, practical skills, and competence in preparing engineering projects within a team.

0994593 Employability Readiness and Field Training (Aeronautical Engineering) Face-to-Face (5 Credit Hours)

Pre-requisite None

The course offers a comprehensive blend of theoretical and practical instruction, spanning university classrooms and external settings such as companies, factories, and government institutions. Intensive coursework, totaling 105-120 contact hours over four weeks, covers essential topics like: Technical Skills Development, Teamwork, Written and Oral Communications, Career Services, Networking and Professional Associations, Work Ethics, Professionalism, Industry Projects and Case Studies, Certification and Continuing Education. Emphasis is placed on practical application through

assignments, assessments, and field training, both domestically and internationally. The program aligns with University of Jordan regulations and aims to equip students with the skills necessary for successful careers.

The field training should focus on aircraft power plant and its components according to the course syllabus. The student must be able to apply for the Airframe and Power plant (A&P) license.

0994561 Aerodynamics II Face-to-Face (3 Credit Hours)

Pre-requisite 0994363

Dynamics of a compressible flow field, Prandtl-Meyer flow, Mach lines and characteristics, linearized compressible subsonic flow: flow about a thin wing, swept wings at transonic speed Two-dimensional, supersonic flows over wings and airplane configuration: conical-flow method, singularity-distribution method. High-lift configurations: multi-element airfoils, Drag reduction methods: laminar-flow control. Aerodynamics design tools.

0994562 Rotary Wing Aircrafts Face-to-Face (3 Credit Hours)

Pre-requisite 0994363

Fundamentals of aerodynamics and fluid flow concepts for developing rotary wing aircraft performance. Two-dimensional aerodynamic characteristics of airfoils and their application in helicopter design. Means for augmenting lift and the effects of various types of high lift devices on the aerodynamic characteristics. Aerodynamics of finite aspect ratio wings leading to the fundamentals of airplane performance calculation. Theory of helicopter hovering and vertical flight including autorotation and the aerodynamic behavior of the rotor and helicopter in forward flight. Introduction to airplane and helicopter stability.

0994582 Aircraft Structures II Face-to-Face (3 Credit Hours)

Pre-requisite 0994481

Energy principles, matrix analysis of structures, introduction to finite element methods. Application to aircraft structural elements. Introduction to composite material in aircrafts and introduction to classical laminated plate theory. Elementary aerolasticity.

0994583 Fracture Mechanics Face-to-Face (3 Credit Hours)

Pre-requisite 0994481

Investigation of linear elastic and elastic-plastic fracture mechanics. Topics include microstructural effects on fracture in metals, ceramics, polymers, thin films, biological materials and composites, toughening mechanisms, crack growth resistance and creep fracture. Also covered: interface fracture mechanics, fatigue damage and dislocation substructures in single crystals, stress- and strain-life approach to fatigue, fatigue crack growth models and mechanisms, variable amplitude fatigue, corrosion fatigue and case studies of fracture and fatigue in structural, bioimplant, and microelectronic components.

0994506 Aeroelasticity Face-to-Face (3 Credit Hours)

Pre-requisite 0994363 + 0994481

Wing divergence control reversal. Lift effectiveness. Swept wing aero elasticity. Vibrations of structure unsteady aerodynamic forces and moment. Flutter of a single degree of freedom system. Methods of flutter analysis.

0994507 Finite Elements Methods in Aerospace Structures Blended (3 Credit Hours)

Pre-requisite 0994331 + 0994481

Introduction to the advanced matrix methods in treating aerospace structures. Static analysis of wing, fuselage, and rocket structures. Stability and large displacement of ribs, stringers, and skins. Vibration of wing-fuselage combinations. Structural damping. Vibration of stretched or compressed wing panels.

0994505 Computational Fluid Dynamics Blended (3 Credit Hours)

Pre-requisite 0904441

Introduction to computational fluid dynamics and heat transfer using the finite-volume method. Extensive code development. Application of a commercial CFD solver to a problem of interest.

0994508 Micro Electro Mechanical Systems (MEMS) Face-to-Face (3 Credit Hours)

Pre-requisite 0904441 + 0994471

Fabrication and design fundamentals for Micro Electro Mechanical Systems (MEMS): on-chip sensor and actuator systems having micron-scale dimensions. Basic principles covered include microstructure fabrication, mechanics of silicon and thin-film materials, electrostatic force, capacitive motion detection, fluidic damping, piezoelectricity, piezo resistivity, and thermal micromechanics. Applications covered include pressure sensors, micromirror displays, accelerometers, and gas microsensors and microfluidic systems.

0994509 Boundary Layer Theory Face-to-Face (3 Credit Hours)

Pre-requisite 0904441 + 0994461

Derivation of the boundary layer equations. Exact, approximate, and numerical solution techniques. Boundary layers in compressible flow. Separation. Unsteady boundary layers. Stability and transition. Turbulent boundary layers. Integral, differential, & numerical methods for solving problems associated with transfer of heat in a viscous fluid.

0994511 Aircraft Navigation Face-to-Face (3 Credit Hours)

Pre-requisite 0994412

Fundamentals of aircraft navigation systems. Techniques in celestial and inertial navigation. Global Positioning System (GPS) principles. Least squares estimation and Kalman filtering for optimal estimation of stochastic systems.

0994510 Aircraft Sensors and Actuators (3 Credit Hours)

Pre-requisite 0994501

Study of control systems components and mathematical models. Amplifiers, DC servomotors, reaction mass actuators. Accelerometers, potentiometers, shaft encoders and resolvers, proximity sensors, force transducers, piezoceramic materials, gyroscopes, air-data systems, heading sensors, GPS receivers.

0994594 Special Topics in Aeronautical Engineering Online (3 Credit Hours)

Pre-requisite Department approval

Inclusion rates in the program:

A. Courses that will be taught on the principle of full online:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
	University Requirements	6	-	6	-
0921420	Engineering Economy	2	-	2	Completing 90 C.H.
0904302	Engineering Numerical Methods	3	0	3	0907101 + 0994201
0994471	Materials Science for Aeronautical Engineers	3	0	3	0303101 + 0934372
0994594	Special Topics in Aeronautical Engineering	3	-	3	Department approval

Total hours that will be taught on the principle of full online in this program: (19 hours).

The percentage achieved for the subjects that will be taught on the principle of full online in this program: (11%)

B. Subjects to be taught on the blended learning principle:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
	University Requirements	21	-	21	-
0914202	Computer Programming for Engineers	0	3	1	0907101 + 0994201*
0994201	Engineering Math I for Aeronautical Engineering Students	3	0	3	0301201
0994202	Engineering Math II for Aeronautical Engineering Students	3	0	3	0994201
0994311	Sound and Mechanical Vibrations	3	0	3	0994202 + 0904222
0994331	Machine Elements Design	3	0	3	0934372

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0994363	Aerodynamics I	3	0	3	0904361
0994481	Aircraft Structure I	3	0	3	0994202 + 0994365
0994412	Aircraft Stability and Control	3	0	3	0994363 + 0994481
0994501	Instrumentation	3	0	3	0903203 + 0904361 + 0994411
0994571	Composite Materials	3	0	3	0994471
0994505	Computational Fluid Dynamics	3	-	3	0904441
0994507	Finite Elements Methods in Aerospace Structures	3	-	3	0994331 + 0994481

The total number of hours that will be taught on the principle of blended learning in this program: (55 hours)

Percentage achieved for subjects that will be taught on the principle of blended learning in this program: (31%)

C. Face-to-face learning courses:

Number of hours of face-to-face education: (103 hours).