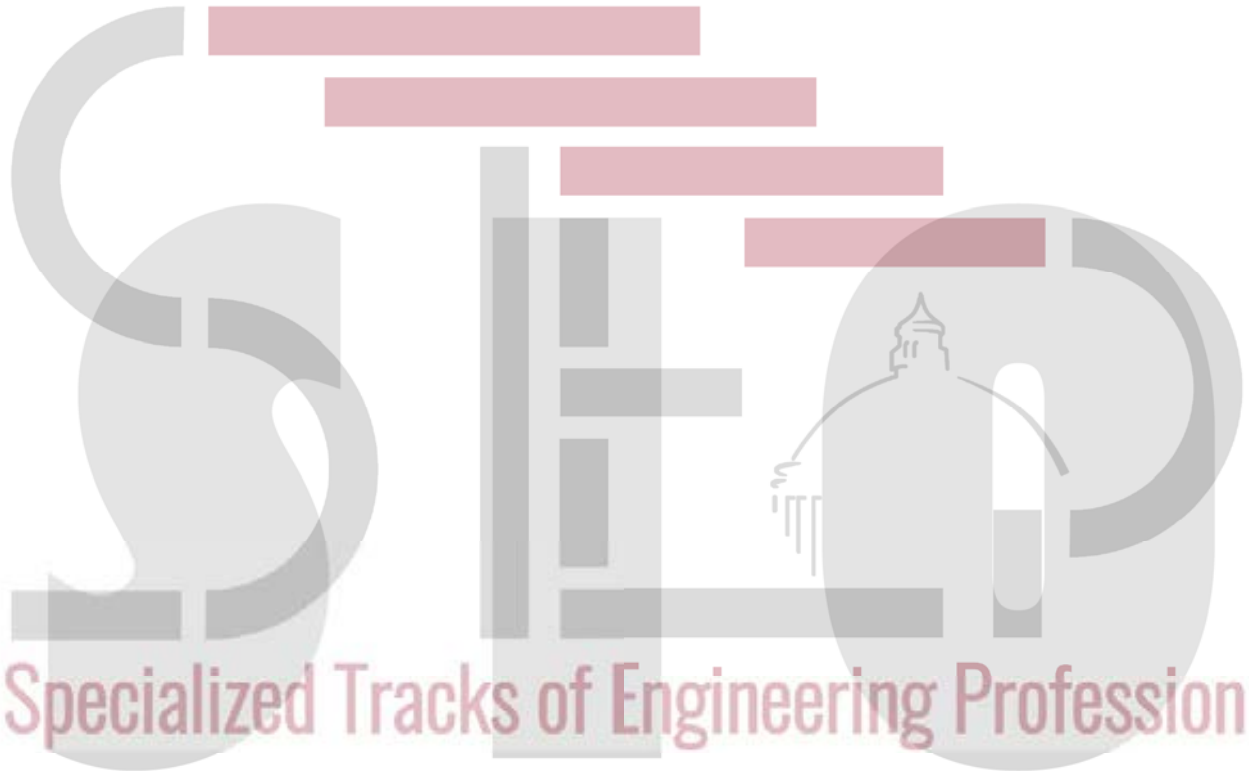

PART [C]: SPECIALIZED PROGRAMS

(10) AERONAUTICAL ENGINEERING AND AVIATION MANAGEMENT Program (AEM)

برنامج هندسة وإدارة الطيران

(10) Aeronautical Engineering and Aviation Management (AEM)

برنامج هندسة وإدارة الطيران

VISION رؤية البرنامج

To create a world class community of aeronautical engineers capable of shaping the next generation of Aviation Management systems.

MISSION رسالة البرنامج

The program's mission is to provide highly qualified Aeronautical and Aviation engineers. Equipped with proper engineering analysis and design tools, the program graduates should be capable of creative thinking and possess diversity of knowledge and skills required to understand the complex engineering systems and the state of the art of the Airtransport profession Educational Objectives

Within few years of graduation, Graduates of the AEM program should be able to utilize the acquired knowledge of science, engineering fundamentals, technical background and general managerial skills, to demonstrate leadership and work in teams to;

- Solve engineering problems related to aircraft maintenance and repair, air fleet management, and flight planning related issues.
- Demonstrate capabilities to detect problems, measure, assess, plan, design solution procedures, manage and supervise related solution activities.
- Operate and manage airports and supervise airport related services

Demonstrate leadership, desire and ability for continuous life learning and career advancement and keep up with the ethics of the profession.

GRADUATE ATTRIBUTES مواصفات الخريج

يتبنى البرنامج مواصفات الخريج التي حددتها الكلية في لوائحها المعتمدة والمعلنة في دليل الطالب بالأضافة لبعض المواصفات الخاصة بخريج هندسة وإدارة الطيران وذلك لتلبية الاحتياجات الفعلية للمجتمع في مجال هندسة وإدارة الطيران لتواكب رؤية مصر وهى كالآتي:

1. تطبيق المبادئ الأساسية ومفاهيم هندسة الطيران لإيجاد حلول للمشاكل الهندسية.
2. استخدام الطرق والأدوات الحديثة والمناسبة لهندسة وإدارة الطيران.
3. القدرة على تصميم النظم الطيرانية ومكوناتها لتحقيق الهدف الهندسي المرجو.
4. إدراك تأثير ومشاكل تطبيقات هندسة وإدارة الطيران على المجتمع والبيئة.
5. تصميم وتأدية التجارب المعملية المناسبة وتحليل وتفسير بياناتها.
6. فهم قضايا هندسة وإدارة الطيران المعاصرة.

7. العمل بكفاءة في فريق متعدد التخصصات.
8. الالتزام بأخلاقيات المهنة والمسئولية الاجتماعية والثقافية.
9. الاتصال الفعال شفويا وخطيا.
10. القدرة على التعلم الذاتي المستمر.
11. إدارة المشروعات الهندسية الطيرانية بنجاح في إطار القيود الاقتصادية والبيئية والاجتماعية المختلفة.
12. المرونة والقدرة على تحقيق متطلبات أصحاب العمل المحتملين.

PROGRAM BENCHMARK مرجعية البرنامج

NARS 2018	LEVEL A	LEVEL B	LEVEL C
	Totally Adopted P. A11	NA	ABET 2019-2020 Aerospace

In addition to the Basic Engineer competencies, the AEM program graduate (C LEVEL) must be able to:

C.1. have a knowledge of aerodynamics, aerospace materials, structures, propulsion, flight mechanics, and stability and control.

C.2. have a knowledge of orbital mechanics, space environment, attitude determination and control, telecommunications, space structures, and rocket propulsion.

C.3. combine aeronautical engineering and astronautical engineering, must prepare graduates to have knowledge covering one of the areas — aeronautical engineering or astronautical engineering as described above.

C.4. have design competence that includes integration of aeronautical or astronautical topics.

SPECIALIZED COURSES CONTENTS توصيف المقررات

Code	Name	Credit Hours	Category	Pre-requisite
AEMS280	Engineering Seminar	1	DR	30 CR.HRS. + AA APROVAL
AEMS281	Industrial Training-1	1	FR	60 CR.HRS. + AA APROVAL
AEMS381	Industrial Training-2	2	DR	AEMS281 + AA APROVAL
AEMS481	Graduation Project-1	1	FR	110 CR.HRS.+ AA APROVAL
AEMS482	Graduation Project-2	3	DR	AEMS481 + AA APROVAL
Total		2+6		

COURSES CONTENTS توصيف المقررات

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
Faculty Requirements										
AEMS280	Engineering Seminar	1	1	0	0					1
	Pre-requisites: 30 CR.HRS. + AA APROVAL									
	Talks and presentations are invited from industrial establishments relevant to the program. The guest speaker should discuss the organization, management, and recent technologies implemented in his/her industrial establ shment. Students exercise writing brief technical reports on the guest presentation and deliver their own presentation about the topic. This course is graded as Pass/Fail grade-system.									
AEMS281	Industrial Training-1	1	0	0	0					0
	Pre-requisites: 60 CR.HRS. + AA APROVAL									
	Training on industrial establishments relevant to the program. Training lasts for total of 90 hours, during a minimum period about of weeks. The program training advisor schedules at least one follow up visit to the training venue and formally report on performance of trainee(s). A Mentor in the industrial establishment provides a formal report on the student's performance during training. The student submits a formal report and presentation to be evaluated by a panel of three members with one member being an external examiner									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
	appointed from industry or other colleges of engineering. The course is graded as Pass/Fail grade-system.									
AEMS381	Industrial Training-2	2	0	0	0	0	0	0		0
	Pre-requisites: AEMS281 + AA Approval									
	Training on industrial establishments relevant to the program. Training lasts for total of 180 hours, during a minimum period of six weeks. The program training advisor schedules at least two follow-up visits to the training venue and formally report on performance of trainee(s). A Mentor in the industrial establishment provides a formal report on the student's performance during training. The student submits a formal report and presentation to be evaluated by a panel of three members with one member being an external examiner appointed from industry or other colleges of engineering. The course is graded as Pass/Fail grade-system.									
AEMS481	Graduation Project-1	1	1	0	0	0	0	0		1
	Pre-requisites: 110 Credits + AA APROVAL									
	Students – in groups (or individually in some programs) - undertake a final project as part of the program. In GP1, students provide a clear identification of a real-life problem that represents an actual need for the industry or the community and reflects the mission and strategic objective of CUFE. Students are expected to survey the related literature, collect and interpret market data, and proposed an approach for the solution, using the engineering knowledge and skills acquired. The course is graded as Pass/Fail based upon a report/oral presentation stating the expected cost and required material, tools, and facilities as well as a timed list of deliverables.									
AEMS482	Graduation Project-2	3	1	0	3	0	0	0		4
	Pre-requisites: AEMS481 + AA Approval									
	Graduation Project-2 is the second phase of the graduation project. The aim is to develop innovative solutions to problems encountered during the implementation process thus fulfilling the deliverables stated in Graduation Project-1. A dissertation on the project is submitted taking into consideration technical, economical, social, and environmental requirements while analyzing the major results and presenting direct conclusions.									

PROGRAM REQUIREMENTS متطلبات البرنامج

Category		No. of courses	Course Credit Hour	Total Credit Hours
Discipline Requirements (DR)	core/ compulsory	8	2	16
		15	3	45
	Elective	0	2	0
		0	3	0
Total DR courses		23		61
Program Requirement (PR)	core/ compulsory	1	2	2
		6	3	18
	Elective	4	2	8
		6	3	18
Total PR courses		17		46
Total Elective courses (DR & PR)		10		26

- **Discipline Requirements (DR) core/compulsory courses list**

Code	Name	Credit Hours	Pre-requiste
AERS121	Fundamentals of Flight	2	18 Credits
MDPS001	Fundamentals of Manufacturing Engineering	2	None
AERS212	Materials Science for Engineering	2	PHYS001
MTHS102	Linear Algebra and Multivariable Integrals	3	MTHS003
AERS213	Fundamentals of Thermodynamics	3	PHYS001
AERS211	Fluid Mechanics	3	PHYS001 MTHS003
EPES201	Electrical Engineering Fundamentals	3	PHYS002
AERS222	Strength of Materials	3	AERS212
AERS228	Aviation Economics	2	GENS120
INTS216	Computer Aided Machine Drawing	3	INTS001
AERS214	System Dynamics and Modeling	3	MTHS104
MTHS203	Complex Functions	2	MTHS102 MTHS104
AERS311	Aerodynamics	3	AERS221

Code	Name	Credit Hours	Pre-requiste
AERS313	Aircraft Jet Engine Components	3	AERS213 AERS221
AERS321	Aircraft Performance and Stability	3	AERS311
AERS412	Aircraft Structures	3	AERS312
AERS323	Aircraft Engine Performance	3	AERS313
AERS414	Introduction to Microcontroller	3	EPES201 AERS314
AERS416	Airtransport System Analysis	3	MDPS362
AERS315	Aircraft Systems	2	85 Credits
AERS325	Aircraft Engine Construction	2	85 Credits AERS313
AERS424	Flight Mechanics, Stability, and Control	3	AERS314 AERS321(Co-Reg)
AERS428	Aviation Organization	2	110 Credits
Total		**61**	

- **Program Requirements (PR) core/compulsory courses list**

Code	Name	Credit Hours	Pre-requiste
MTHS104	Differential Equations	3	MTHS003
AERS221	Gas Dynamics	3	AERS211
AERS312	Mechanics of Structures 1	3	AERS222
AERS322	Mechanics of Structures 2	3	AERS222
AERS314	Automatic Control	3	AERS214
MDPS362	Operation Research I	3	MTHS102
AERS420	Aviation Laws, Legislations, and Airworthiness	2	110 Credits
Total		**20**	

- **Program Requirements (PR) elective courses list**

Code	Name	Credit Hours	Pre-requiste
ELECTIVE (E-2) 10 courses (26 Credits)			
AERS339	Machine Elements	2	INTS216
AERS327	Human Resource Management	2	GENS110
AERS336	Logistics and Transportation	2	MDPS362
AERS434	Digital Control Systems	2	AERS314
AERS422	Introduction to Composite materials	2	AERS312
AERS446	Airtransport Market Analysis and Forecasting	2	GENS110 MTHS003
AERS346	Information Technology for Airtransport Industry	2	GENS110 MTHS003
AERS433	Aircraft Piston Engines	2	AERS213
AERS435	Aircraft Maintenance Systems Engineering	2	85 Credits AERS315
AERS338	Engineering Standards and Specifications	2	50 Credits
AERS334	Hydraulic and Pneumatic Systems	3	AERS314
AERS432	Fracture Mechanics and Structural Repair	3	AERS222
AERS455	Aircraft Engine maintenance systems	3	85 Credits AERS435
AERS436	Airline Operation and Management	3	MDPS362
AERS317	Maintenance systems Management and Reliability	3	MTHS003
AERS427	Strategic Planning and Management	3	GENS110 MTHS003
AERS442	Fundamentals of Nondestructive Testing	3	GENS110 MTHS003
AERS445	Aircraft Engine Systems	3	85 Credits AERS325
AERS417	Project Planing, Queueing Systems and Simulation	3	GENS110 50 Credits
AERS349	Manufacturing processes for Aercspace	3	MDPS001
Total		**26**	

Proposed Study Plan - 8 semesters - Including Freshman Level

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	OffHr	Total
SEMESTER 1	PHYS001	Mechanical Properties of Matter and Thermodynamics	3	2		2	1				5
	MTHS002	Calculus I	3	2	2						4
	EMCS001	Engineering Mechanics - Dynamics	3	1	2		1				4
	CHES001	Chemistry for Engineers	2	1	2						3
	INTS001	Engineering Graphics	3	2				3			5
	INTS004	Information Technology	2	1			3				4
	GENS004	Proficiency and Capacity Building	2	2							1
		Sub-Total	**19**	**13**	**6**	**2**	**4**	**3**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 2	MTHS003	Calculus II	3	2	2						4
	EMCS002	Engineering Mechanics - Statics	2	1	2						3
	PHYS002	Electricity and Magnetism	3	2		2	1				5
	GENS002	Societal Issues	2	2							2
	E-A (GENS005)	Elective E-A (Writing and Presentation Skills)	2	2							2
	AERS121	Fundamentals of Flight	2	1		1	2				4
	MDPS001	Fundamentals of Manufacturing Engineering	2	1		1	2				4
	MTHS005	Introduction to Probability and Statistics	3	2	2						4
		Sub-Total	**19**	**13**	**6**	**4**	**5**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	Off Hr	Total
SEMESTER 3	E-A (GENS120)	Elective E-A (Fund. of Ecconomics and Accounting)	2	2							2
	MTHS104	Differential Equations	3	2	2						4
	AERS213	Fundamentals of Thermodynamics	3	2		2	1				5
	AERS211	Fluid Mechanics	3	2	2						4
	MTHS102	Linear Algebra and Multivariable Integrals	3	2	2						4
	EPES201	Electrical Engineering Fundamentals	3	2		1	2				5
	AERS212	Materials Science for Engineering	2	1		2	1				4
		Sub-Total	**19**	**13**	**6**	**5**	**4**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 4	INTS216	Computer Aided Machine Drawing	3	2			3				5
	AERS221	Gas Dynamics	3	2		1	2				5
	AERS214	System Dynamics and modeling	3	2	2						4
	E-A (GENS110)	Elective E-A (Fundamental of Management, Risk and Environment)	2	2							2
	AERS228	Aviation Economics	2	1	2						3
	MDPS362	Operations Research I	3	2		3					5
	AERS222	Strength of Materials	3	2	2						4
		Sub-Total	**19**	**13**	**6**	**4**	**5**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	Off Hr	Total
SEMESTER 5	GENS2XX	UR - ELECTIVE - E-1	2	2							2
	MTHS203	Complex Functions	2	1		3					4
	AERS311	Aerodynamics	3	2		1	2				5
	AERS313	Aircraft Jet Engine Components	3	2	2						4
	AERS314	Automatic Control	3	2	2						4
	AERSXXX	ELECTIVE (1) - E-2	3	2	2						4
	AERS312	Mechanics of Structures 1	3	2		1	2				5
		Sub-Total	**19**	**13**	**6**	**5**	**4**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 6	AERSXXX	ELECTIVE (2) - E-2	3	2	2						4
	AEMS280	Engineering Seminar	1	1							1
	AERS321	Aircraft Performance and Stability	3	2	2						4
	AERS325	Aircraft Engine Construction	2	1		3					4
	AERS322	Mechanics of Structures 2	3	2	2						4
	AERS323	Aircraft Engine Performance	3	2	2						4
	AERS315	Aircraft Systems	2	1		3					4
	AERSXXX	ELECTIVE (3) - E-2	2	1	2						3
		Sub-Total	**19**	**12**	**10**	**6**	**0**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	OffHr	Total
SEMESTER 7	AEMS481	Graduation Project-1	1	1							1
	AERSXXX	ELECTIVE (4) - E-2	2	1	2						3
	AERSXXX	ELECTIVE (5) - E-2	2	1	2						3
	AERS414	Introduction to Microcontroller	3	2			3				5
	AERS416	Airtransport System Analysis	3	2		1	2				5
	AERS412	Aircraft Structures	3	2	2						4
	AERSXXX	ELECTIVE (6) - E-2	3	2	2						4
	AERSXXX	ELECTIVE (7) - E-2	2	1	2						3
		Sub-Total	**19**	**12**	**10**	**1**	**5**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 8	AEMS482	Graduation Project-2	3	1		3					4
	AERS420	Aviation Laws, Legislations and Airworthiness	2	1		3					4
	AERSXXX	ELECTIVE (8) - E-2	3	2	2						4
	AERSXXX	ELECTIVE (9) - E-2	3	2	2						4
	AERSXXX	ELECTIVE (10) - E-2	3	2	2						4
	AERS424	Flight Mechanics, Stability and Control	3	2		1	2				5
	AERS428	Aviation Organization	2	1	2						3
		Sub-Total	**19**	**11**	**8**	**7**	**2**	**0**	**0**	**0**	**28**

COURSES CONTENTS توصيف المقررات

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
Program Courses Compulsory										
MDPS001	Fundamentals of Manufacturing Engineering	2	1	0	1	2				4
	Pre-requisites: NONE									
	Engineering Materials - Elements of Manufacturing Processes - Casting and molding processes- metal forming processes - Shaping of plastic material - Joining processes - Metal cutting and finishing processes - Modern Manufacturing, additive manufacturing and 3D printing									
References	Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, 7th Edition, Wiley, 2019.									
MTHS104	Differential Equations	3	2	2	0					4
	Pre-requisites: MTHS003									
	First-order differential equations, separable, exact, linear, homogeneous and Bernoulli equations; modeling with first order differential equations; higher-order differential equations; method of undetermined coefficients; variation of parameters; modeling with higher order differential equations; series solutions; Laplace transform; properties and applications, shifting theorems, convolution theorem; solutions of differential equations using Laplace transform; Fourier series; Fourier transform.									
References	1-"A First Course in Differential Equations with Modeling Applications" 11th Edition 2017, by Dennis G. Zill 2-"Fundamentals of Differential Equations", 9th Edition, 2017, by R. Nagle , Edward Saff , Arthur Snider									
AERS221	Gas Dynamics	3	2	0	1	2				5
	Pre-requisites: AERS211									
	Review of Thermodynamics of Gases. Characteristics and Governing Equations of One-Dimensional Compressible Flow. Steady One-Dimensional Isentropic Flow with Area Change. Steady One-Dimensional Flow with Friction. Steady One-Dimensional Flow with Heat Transfer. Normal and Oblique Shock Waves. Expansion Waves. Quasi-One-Dimensional Flow. Laboratory Experiments.									
References	1 .R.D. Zucker & O. Biblarz ," Fundamentals of Gas Dynamics " edited by John Wiley & Sons, 2002. 2 .M.J. Zucrow & J.D. Hoffman, " Gas Dynamics " edited by John Wiley & Sons, 1976 3. A. H. Shapiro, "The Dynamics and Thermodynamics of Compressible Fluid Flow", in two volumes, The Ronald press Company, New York, 1953									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS312	Mechanics of Structures 1	3	2		1	2				5
	Pre-requisites: AERS222									
	General bending of beams of general cross-section, curved and non-homogeneous beams, torsion of solid and thin walled sections, shear flow in open, closed and multi-cell sections. column stability. Laboratory Experiments, Matlab programming for the analysis of structures, standard packages (Femap, Ansys).									
References	T.H.G. Megson "Aircraft Structures for Engineering Students"									
AERS322	Mechanics of Structures 2	3	2	2						4
	Pre-requisites: AERS222									
	Direct energy principles, complementary energy methods, structural displacements. Application to the solution of statically indeterminate systems. Matrix method for skeletal structures, temperature effects. Introduction to Numerical Methods and Standard Packages, Laboratory Experiments, Matlab programming for the analysis os structures, standard packages (Femap, Ansys).									
References	THG. Megson, "Aircraft Structures for Engineering Students".									
AERS314	Automatic Control	3	2	2						4
	Pre-requisites: AERS214									
	Root locus method, frequency domain analysis, Nyquist stability criterion, measures of relative stability, Bode diagrams, frequency domain design, phase lag and phase lead controllers.									
References	1. Modern Control Engineering – 5th ed tion – Katsuhiko Ogata 2. Control Systems Engineering – 6th edition – Norman S. Nise									
MDPS362	Operation Research I	3	2	0	3					5
	Pre-requisites: MTHS102									
	Optimization and mathematical models in Engineering, Linear Programming (LP) models; model formulations and applications, solutions using computer software, post optimality analysis, transportation and transshipment models, assignment problems. Maximal flow, shortest route, minimum spanning tree, and integer programming applications. Case studies. Course project.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS420	Aviation Laws, Legislations and Airworthiness	2	1	0	3					4
	Pre-requisites: 110 Credits									
	Introduction to Aviation Laws, Legislations and Regulations. International and National Regulating Organizations, IATA, FAA and EASA. Airworthiness. Aircraft Configuration and type certification requirements data sheet standards. Airworthiness Directives accomplishment and configurations control procedures. Reliability control program establishment and components failure analysis and investigations. Preparations of programs for Aircraft/ Engine performance monitoring techniques. Preparations of Flight-tests programs. Weight and balance history files. Establishment of Aircraft and components Maintenance program and sampling inspection program. Preparation of Special operation programs (ETOPS, PRNAV, CATII & CAT III,.). Standard documentation and amendment control.									
References	1. Chicago convention 1944 2. ICAO ANNEXs From annex 1 to annex 19									
Discipline Courses (Compulsory)										
AERS121	Fundamentals of Flight	2	1		1	2				4
	Pre-requisites: 18 Credits									
	Aviation history. History of flight. Nature of aerodynamic forces. Airplane components and configurations. Standard atmosphere. Elements of propulsion: propellers, piston engines, reaction principle, jet engines. Elements of airplane stability and control. Aircraft systems									
References	1. Shevel,R.S.,"Fundamentals of Flight" ,2ndEdition, Prentice Hall,1989 2. Anderson, J.D., "Introduction to Flight", 6thEdition, McGraw Hill, 2008									
AERS212	Materials Science for Engineering	2	1		2	1				4
	Pre-requisites: PHYS001									
	Introduction to materials engineering, Atomic structure and interatomic bonding, Crystal structures, crystal imperfections, Diffusion, Mechanical properties, Strengthening mechanisms and plastic deformation, phase diagrams, Iron carbon phase diagram, Classification of Metals, Composite materials.									
References	1. W. D. Callister, Jr. and D. G. Rethwisch, Materials Science and Engineering, 9th ed. Wiley, 2013 2. A. P. Mouritz, Introduction to Aerospace Materials. Woodhead Publishing, 2012									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS213	Fundamentals of Thermodynamics	3	2		2	1				5
	Pre-requisites: PHYS001									
	Introduction, concepts and definitions, work, heat, properties of pure substances, first law of thermodynamics, applications on first law. Second law of thermodynamics, applications on second law, entropy, applications on entropy, irreversibility and availability. Exergy. Steady state conduction, transient conduction. Thermal boundary layer. Natural and forced convection. Radiation. boiling and condensation. Laboratory Experiments.									
References	1. M. J. Morgan and H. N. Shapiro. Fundamentals of Engineering Thermodynamics. 5th Edition, John Willey, and Sons 2004. 2. Hollman and Cengel for heat transfer. Heat and Mass Transfer: Fundamentals and Applications									
AERS211	Fluid Mechanics	3	2	2						4
	Pre-requisites: PHYS001, MTHS003									
	Fluid kinematics. flow types. Integral analysis of flow: Continuity, Linear momentum, Angular momentum and Energy equations, Applications. Similitude and dimensional analysis and modeling, Viscous flow in pipes anc ducts. Flow measurement. General applications. Laboratory Experiments. Course project computer oriented.									
References	1. Bruce R. Munson, Donald F. young, and Theodore H. Okiishi, "Fundamentals of fluid mechanics" , John Wiley & Sons. 2. Yunus A. Cengel and John M. Cimbala, "Fluid Mechanics -Fundamentals and Applications" McGraw Hill.									
AERS222	Strength of Materials	3	2	2						4
	Pre-requisites: AERS212									
	Analysis of stress and strain. Strength theories, fatigue, creep, working stresses. Introduction to structural analysis. Analysis of statically determinate plane skeletal structures. Torsion of circular shafts. Axial force, shear force, bending moment and twisting moment diagrams. Stress and strain diagrams and transformations. Deflection of beams of symmetrical cross-sections under pure bending. Experimental measurement of deflection and strains.									
References	1. F. P. Beer, E. R. Johnston, J. T. Dewolf and D. F. Mazurek, Mechanics of Materials, McGraw Hill, 6th ed., 2012 2. D. J. Peery, Aircraft Structures, Dove Publications, Inc., 2nd ed., 2011									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
MTHS102	Linear Algebra and Multivariable Integrals	3	2	2	0					4
	Pre-requisites: MTHS003									
	Solving Linear Systems, Vector Spaces and Subspaces, Inner Product Spaces and Orthonormal Bases, The Eigenvalue Problem; Diagonalization of Matrices, Computing Functions of Matrices. Functions of Several Variables, The Gradient of a Scalar Function and its Applications, Vector Fields, Curl and Divergence, Double and Triple Integrals with Applications, Line and Surface Integrals with Applications.									
References	1. "Calculus Early Transcendentals", by James Stewart, 8th edition, 2015, Cengage Learning. 2. "Elementary Linear Algebra with Applications" by B. Kolman and D. Hill, 2013, Pearson international edition.									
EPES201	Electrical Engineering Fundamentals	3	2	1	2					5
	Pre-requisites: PHYS002									
	Electrical elements and electrical quantities. Basic electrical laws (voltage and current divider rules, star-delta transformation). Analysis of DC circuits (branch currents, node voltages and Thevenin's theorem). First order capacitive transients. Time varying signals (average and RMS values, voltage and current waveforms). Analysis of AC circuits (vector and complex representations of sine waves, concept of impedance, power analysis, power factor correction). Three phase circuits (line and phase voltages, star and delta connected balanced loads, three phase power). Transformers circuits. Course project.									
References	"Principles and Applications of Electrical Engineering" by Giorgio Rizzoni, Second edition									
INTS216	Computer Aided Machine Drawing	3	2			3				5
	Pre-requisites: INTS001									
	Drawing of Mechanical Parts and its Assembly - Assembly Design Considerations - Surface Roughness - Fittings and Tolerances - Machining and Finishing Marks - Computer Aided Three Dimensional Mechanical Drawings – Drawing of Power Train Parts and its assembly and Kinematic Simulation – Auto Assembly – Drafting – CAD Programs Integration with Engineering Solvers. Introduction to Bolted, Riveted,Bonded, Welded Connections, gears, and mechanisms.									
References	1. Narayana, Machine Drawing. 2. Leu, NX for engineering design. 3. Schmid, Hamrock, "fundamentals of Machine Elements"									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS214	System Dynamics and modeling	3	2	2						4
	Pre-requisites: MTHS104									
	System dynamics: Models of linearized systems, governing equations, open and closed loops. Effect of feedback, stability, transient response. Analog simulation. Types of controllers, PI, PD and PID controllers.Static and dynamic balancing of rotors.Laboratory Experiments.									
References	1. Nagrath, M. Gopal,"Control System Engineering " 2. Ogata, " Feedback Control Systems " 3. Nice,"Feedback Control Systems ." 4. Van De Vegte, "Feedback Control Systems."									
AERS228	Aviation Economics	2	1	2						3
	Pre-requisites: GENS120									
	The course introduces the economics of aviation, specifically markets in aviation, demand for air transportation, airline market competition, airline pricing, airline and aircraft operating cost models as well as airport and air navigation costs and economic issues. The course also examines financial issues related to aircraft acquisition and sales as well as infrastructure financing (runways, terminals, hangars, air navigation control facilities and pricing of the aviation services, introduction of new technologies in air navigation will be examined.									
References	Bijan Vasigh , Ken Fleming, et al ,"Introduction to Air Transport Economics: From Theory to Applications".									
MTHS203	Complex Functions	2	1		3					4
	Pre-requisites: MTHS102, MTHS104									
	This course introduces complex numbers and the calculus of functions of a complex variable. The following topics will be discussed: the complex plane, definition of complex functions, analytic functions and Cauchy-Riemann equations, contour integrations, Cauchy's integral theorems and formulas, sequence representations of complex functions: Taylor series and Laurent series, isolated singularities and residues, conformal mappings, and Schwarz—Christoffel mapping.									
References	Zill, D. and Shanahan, P., "A First Course in Complex Analysis with Applications", 3rd edition. Jones & Bartlett Learning, 2015.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS311	Aerodynamics	3	2		1	2				5
	Pre-requisites: AERS221									
	Basic Aerodynamics: Kinematics, Continuity and Bernoulli's Equations, Measurement of Airspeed, Boundary Layer Concept, Skin Friction, Pressure Drag, Flow Separation, Streamlining. Incompressible flow Over Airfoils: Vortex Sheet, Kutta Condition, Thin Airfoil Theory, Vortex Panel Method. Introduction and application to Theory of Finite Wings: Lifting-line Theory, Lifting-surface Theory. Propeller design. Airplane Drag: Complete Airplane Drag Polars, Clean Airplane, Flaps, Speed-Brakes and Landing Gear Effect, Airplane Drag Contributions, Interference Drag. Laboratory Experiments.									
References	1. Schilichting, H., "Boundary Layer Theory", 7th. Edition, McGraw-Hill, New York. 2. Anderson, J. D., "Fundamentals of Aerodynamics", , McGraw-Hill, New York. 3. Bertin, J.J. and Smith, M. L., "Aerodynamics for Engineers", Prentice Hall, Englewood Cliffs, 4. N. J., 1979.Batchelor, G. K., "Introduction to Fluid Dynamics", Cambridge University Press. 5. Katz, J. and Allen Plotkin, "Low Speed Aerodynamics from Wing Theory to Panel Methods", McGraw Hill, New York.									
AERS313	Aircraft Jet Engine Components	3	2	2						4
	Pre-requisites: AERS213, AERS221									
	Classification of aircraft propulsion systems. Shaft Engines: Piston Engines, Propfans engines, Turbomachines. Types of turbomachines, Centrifugal Compressor, radial turbines Definitions and general parameters of 2D cascades. Compressor 2D cascades, pitch line design of axial compressors, off design analysis, stall and compressor surge. Turbine 2D cascades, pitch line design of axial turbines, off design analysis, turbine cooling, 3D analysis of axial flow turbomachines. types of combustion chambers. Fuels, Biofuels, Fuel Cells. Conservation equations for reacting systems (Ecm solutions). combustion chamber aerodynamic performance. Injectors. Intakes: Internal/External Performance, Nozzles.Air pollution and Environmental effects.									
References	An Introduction to Combustion (Concepts and Applications)									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS321	Aircraft Performance and Stability	3	2	2						4
	Pre-requisites: AERS311									
	Review of Aerodynamic Foundations. Review of Power-Plant Characteristics. Airplane Equations of Motion. Steady Flight Performance: Level Flight Performance, Climbing Performance, Gliding Performance, Range, Endurance. Accelerated Flight Performance: Take-off and Landing Performance, Level Turn, Pull-up and Pull-down maneuvers, VN diagram. Aircraft Equilibrium State, Static Stability, Longitudinal SS, Wing/Tail Contributions, Aircraft longitudinal and Lateral Dynamics.									
References	1. John D. Anderson, Jr. : "Introduction to Flight", 6th Edition, 2008. 2. John D. Anderson, Jr. ," Aircraft Performance and Design, 5th Edition, 2010R. 3. C. Nelson. Flight Stability and Automatic Control. McGraw-Hill, 1989.									
AERS412	Aircraft Structures	3	2	2						4
	Pre-requisites: AERS312									
	Introduction to the theory of plates and shells, plate instability, finite element methods, composite plates. Philosophies of aircraft structural design. Flight Maneuvering loads, V-N Diagrams. Wing design and construction. Fuselage design and construction. Landing gear configurations. Fittings and connections.									
References	1. Bruhn , Analysis and design of flight vehicle structures. 2. Logan, A first course in the finite element method. 3. -Ugural, Plates and shells, theory and analysis									
AERS323	Aircraft Engine Performance	3	2	2						4
	Pre-requisites: AERS313									
	Classification of Airplane Engines. Overall engine Performance. Thermodynamic Analysis of engine components. Design Point Performance of Aeroengines. Off-design Performance of Gas Turbine Engines: Single Spool Gas Generator Matching, Two Spool Gas Generator Matching, Turbojet Engine, Turbofan Engines, Turboprop Engines, Transient Performance.									
References	J.D.Mattingly, W.H.Hieser, D.H.Daley, "Aircraft Engine Design", 2002.									
AERS414	Introduction to Microcontroller	3	2			3				5
	Pre-requisites: EPES201, AERS314									
	Hardware and software organization of a typical microcontroller; machine language programming, interfacing peripheral devices, and input-output programming; real-time computer applications									
References	Dogan Ibrahim, "Microcontroller Based Temperature Monitoring and Control", Elsevier Science & Technology Books.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS416	Airtransport System Analysis	3	2		1	2				5
	Pre-requisites: MDPS362, MTHS003									
	The systems approach. The analysis and modelling of the processes and operations carried out in all three parts of the air transport system; 1- airports, 2-air traffic control and 3- airlines (an introduction). The analysis and modelling of the capacity, quality and economics of the service offered. Analytical and simulation models of the systems operations supported by an appropriate analysis of real-world events and applications.									
References	1. Abdelghany, Ahmed F._ Abdelghany, Khaled, Airline network planning and scheduling, John Wiley Sons (2019). 2. Ahmed Abdelghany, Khaled Abdelghany - Modeling Applications in the Airline Industry - Ashgate (2010)									
AERS315	Aircraft Systems	2	1		3					4
	Pre-requisites: 85 Credits									
	System designs and basic requirements for certifications; redundancy, function and load sharing. Main systems (Flight control system, Landing gear system, Air conditioning and pressurization, Hydraulic power, Interiors, Fire protection and extinguishing, Fuel tanks and feeding, Electric power generation, Auto-flight and communications Flight controls and fixed surfaces, and the processes of inspecting and adjusting them to ensure correct aircraft performance. Methods of Structure anc fuel tanks sealing, moisture trapping & and drains. Means of aircraft Structure electrical bonding. Safety precautions and considerations in aircraft maintenance work. Procedures for aircraft outer skin painting, pain repair and touchups. Standards used for aircraft exterior cleaning. Aircraft preservation and de-preservation techniques.									
References	1. ICAO Training Manual Part D-1 2. ECARS 147									
AERS325	Aircraft Engine Construction	2	1		3					4
	Pre-requisites: AERS313, 85 Credits									
	Nacelle-air-inlet: function, construction, materials. Compressor: centrifugal flow compressors, axial flow compressors, compressor surge-variable stator vanes, air bleed-variable bleed valve, materials, balancing. Combustion chamber: Fuel supply, Types of combustion chambers, construction, materials. Turbines: construction, tip clearance control, materials. Accessory drives: gearbox drives, construction, materials.									
References	1. ICAO Training Manual Part D-1 2. ECARS 147									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS424	Flight Mechanics, Stability and Control	3	2		1	2				5
	Pre-requisites: AERS314, AERS321(Co-Reg)									
	Aircraft Static Stability and Control, Longitudinal, Lateral Static Stability, Longitudinal Control. Roll Stability, Roll Control. Equations of motion of aircraft. Longitudinal Autopilots, Lateral Autopilots.									
References	R. C. Nelson. Flight Stability and Automatic Control. McGraw-Hill,									
AERS428	Aviation Organization	2	1	2	0					3
	Pre-requisites: 110 Credits									
	Technical Organizations & Quality Assurance, Technical Organization & AIRCRAFT Type Certification, AIRCRAFT Modifications, Quality Assurance, ISO 9000, Aviation Quality Systems. Systems of Safety and Compliance. Safety System Objectives, Safety Organization Structure, Safety Management process, Compliance requirements.									
References	1- ICAO Annex 6 "Operation of Aircraft", Annex 8 "Airworthiness of Aircraft" and Annex 19 "Safety Management" 2- Federal Aviation Regulation (FAR 145) for approved repair stations. 3- EASA Part M for Continuing Airworthiness Management and Part 21 for Design and Production organizations. 4- Flight Operations and Safety Standard. 5- ISO 9001- 2015.									
Program Courses (Electives)										
Elective E-3										
AERS339	Machine Elements	2	1	2						3
	Pre-requisites: INTS216									
	Bolted, Riveted,Bonded, and Welded Connections. Shaft/hub connections, couplings and clutches, springs, aircraft wheel brakes, hydraulic cylinders and actuators. Rolling elements bearing, ball screw actuators, gears, mechanisms.									
References	1. Shigley's, Mechanical Engineering Design 2. Hall, Theory and Problems of Mechanical Design, Schaum's Outline Series. 3. Schmid, Hamrock, "fundamentals of Machine Elements"									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS349	Manufacturing processes for Aerospace	3	2			2				4
	Pre-requisites: MDPS001									
	Classification of manufacturing processes. Casting: Types of foundries, steps in making a casting; cast metals; molding processes and materials; gating and risering; casting defects. Forming: Metal forming process classification, basic metal working concepts and plasticity; yield criterion; estimation of force and energy requirements; technology of sheet metal forming processes; features of different types of metal forming dies. Metal cutting: metal cutting processes including turning, milling, shaping, drilling, and grinding. Tool materials and tool life, surface finish, and cutting fluids. Welding: Welding processes; welding energy sources and their characteristics; fluxes and coatings; weldability and welding of various metals and alloys; metallurgical characteristics of welded joints; weld testing and inspection. Metrology: Introduction and definitions, Gauges, Errors in measurement, Linear measuring instruments, and Angle measuring instruments.								
References										
AERS327	Human Resource Management	2	1	2						3
	Pre-requisites: GENS110									
	HR planning: Job analysis, demand for HR, Supply of HR – Staffing: Recruitment, Selection – Training and development – Teamwork and Leadership -Performance Appraisal – Compensation: Type of equity, Designing the pay structure, employee benefits. Labor/management relations. Motivation. Leadership-Communication.									
References	1. Aswathappa. K. (2008), Human Resource and Personnel Management (5th edition), Tata McGraw-Hill Publishing Company Ltd., New Delhi. 2. Biswajeet Pattanayak (2001), Human Resource Management, Prentice Hall of India Pvt. Ltd., New Delhi. 3. Lloyed L. Byers and Leslie W. Rue (1997), Human Resource Management (5th edition), The McGraw-Hill Companies, USA. 4. Michael Armstrong (1999), A Handbook of Human Resource Management Practice (7th edition), Kogan Page Limited, 120 Pentonvelle Road, London.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS336	Logistics and Transportation	2	1	2						3
	Pre-requisites: MDPS362									
	Warehouses classifications. Warehouse lay outs. Introduction to supply chains: the production, distribution, and transportation of goods. Supply chain as a physical process and network design. Inventory costs and control. Spares quantity replenishment policy (order and critical limits). Components/ parts movement tracking procedures. Quarantine parts control and movement. Shelf time items identification and control. Spares storage and delivery policies (FIFO- FILO- LIFO- LILO). Handling and transportation.									
References										
AERS434	Digital Control Systems	2	1	2						3
	Pre-requisites: AERS314									
	Introduction, Discrete Time Systems, Z-transform, Open and Closed Loop in Discrete Systems. Stability, Transient Response- Design of Digital Systems, Analysis Multivariable Discrete Systems, Root Locus, Methods of Bode and Nyquist Optimum Control.									
References	1. Dogan Ibrahim, "Microcontroller Based Applied Digital Control", John Wiley & Sons, 2006. 2. Dogan Ibrahim, "Microcontroller Based Temperature Monitoring and Control", Elsevier Science & Technology Books, 2002.									
AERS422	Introduction to Composite materials	2	1	2						3
	Pre-requisites: AERS312									
	Introduction, definition, classification, behaviors of unidirectional composites. Analysis of lamina, and laminate, constitutive classical laminate theory, thermal stresses. Design consideration, analysis of laminates after initial failure, inter-laminar stresses, fracture mechanics, joints, and experimental characterization. • Micromechanics factors influencing strength and stiffness. Failure modes. Performance under adverse environment. Prediction of strength, stiffness. Fabrication, Applications.									
References	1. Ashton – Halpin – Petit, "A Primer on Composite Materials Analysis". 2. Jones, "Mechanics of Composite Materials". 3. Barbero, "Introduction to Composite Materials Design". 4. Calcote, "The analysis of Laminated Composite Structures". 5. Hoskin, "Composite Materials for Aircraft Structures". 6. Reddy, "Mechanics of Laminated Composite Plates and Shells".									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS446	Airtransport Market Analysis and Forecasting	2	1			2				3
	Pre-requisites: GENS110, MTHS003									
	Airline Industry: Scope, Aircraft types, Aircraft Manufacturers, Types of services, Scheduled and unscheduled flight services, Passenger Travel, Cargo Transport, Air Freight Forwarders, Economic Impacts. Key Performance Indicators: Revenue Passenger kilometers, Yield, Available Seat Kilometers, Unit costs, Passenger Impact factors. Seasonality. Airline Profitability and Revenue management Marketing Analysis: Growing Demand, Growth of Airline Passenger and Cargo Traffic, Fuel Pricing, Fares, Capacity Management. Market Forecasting: Forecasting Methodologies: Quantitative and Qualitative Methods, Decision analysis, Time Horizons, Forecasting Accuracy, Growth of Passenger and Cargo Service Worldwide, Regional Breakdown. Low Cost carriers. Future Growth. Forecasting for Aviation Planning: air navigation systems, Airport and airline planning. Case Studies									
References	Søren Bisgaard, and Murat Kulahci, Time Series Analysis and Forecastingby Example, John Wiley & Sons, Inc., 2011.									
AERS346	Information Technology for Airtransport Industry	2	1	2						3
	Pre-requisites: GENS110, MTHS003									
	Role of Information Technologies in improving the affordability, safety, capability and efficiency of the air transportation. Air Transportation System Elements, Air Transportation System Level, Air Traffic Management System Level, Airline System Level. Airline Flight Operations. Information Sharing Between Operational Databases. Roles of wireless and satellite-based Information Technologies, G4 and Big Data. Vehicle System Level, Information Flow, data flows, Sensors, Navigation, radio Communication, Flight Safety's, Auto-flight Control loops, Airborne weather radars. Ground Proximity Warning Systems (GPWS), Terrain Awareness Warning Systems (TAWS), Controlled Flight Into Terrain (CFIT). Traffic Collision and Avoidance Systems (TCAS). Airline Business and Profitability Cycle. Facing challenges of system capacity, financial stability and environmental impacts. Opportunities in developing new markets and environmentally friendly operating strategies.									
References										

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS433	Aircraft Piston Engines	2	1	2						3
	Pre-requisites: AERS213									
	Review of Thermodynamic Cycles. Aircraft piston engine operation, maintenance and repair. Techniques of assembly and disassembly of engines using appropriate manuals and completing required documentation. Propeller System Integration. Learners will identify engine components and their functions. Ignition, induction, supercharging and turbocharging, exhaust, and fuel systems including carburetors and injection. They will learn the operating principles and how to test, adjust, and install the systems.									
References										
AERS435	Aircraft Maintenance Systems Engineering	2	1	2						3
	Pre-requisites: AERS315, 85 Credits									
	Types of maintenance, maintenance system procedures. Inspection techniques, frequency etc...., Standard practices and standard documentation used in aircraft maintenance work.; torque standards, Fasteners standards, Processes standards, fluid specifications standards, electric bonding standards, and repair standards. Methods of Non-destructive testing, Chemical Processes, liquid penetrant and magnetic particle methods. Maintenance Planning, Quality control and assurance of maintenance. Maintenance and Repair operation practices and techniques; safety precautions and considerations, dismantling and assembly practices, pressurized vessels practices, fuel tanks maintenance practices, handling hazard materials, signs and signals, work on disabled aircraft, aircraft recovery practices. Power plants, Rotating assemblies, Brakes, and Painting.									
References	1. ICAO Training Manual Part D-1 2. ECARS 147									
AERS334	Hydraulic and Pneumatic Systems	3	2			2				4
	Pre-requisites: AERS314									
	Digital Circuits: Basic Gates, Combinational Logic Circuits, flip-flop, Sequential Logic Circuits, encoder and decoder, Applications. PLC controllers. Design of Hydraulic Systems, Modeling of Systems, Transfer Functions of Hydraulic System, Flight Control System, Fuel Control System, Hydraulic Control System, Electric Power Systems, Safety Instruments: Proximity Warning Wind Shear Alarm. Application on Airplane Hydraulic Systems: Control Surfaces System, Landing Gear System, Pneumatic System Design, Pneumatic System Contents, System Modeling, Pneumatic System Transfer Function and Application on Airplane Pneumatic System.									
References										

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS432	Fracture Mechanics and Structural Repair	3	1		2	1				4
	Pre-requisites: AERS222									
	Crack initiation, crack modes, Griffith approach, Irwin approach, Stress field intensity approach. Critical crack opening, cracks emanating from notches, stable crack growth, fracture toughness, linear-elastic crack growth. Crack-tip plasticity. Energy balance approach. Elastic-plastic crack growth, J integral. Fatigue and creep crack growth. Fatigue failure and creep rapture. Rate-dependent and time-dependent failures. Failure inspection and repair, structural reliability and life prediction, case studies.									
AERS455	Aircraft Engine maintenance systems	3	2	2						4
	Pre-requisites: AERS435, 85 Credits									
	Inspection and service, starting, ignition. Engine run up, recording parameters, acceleration-deceleration checks. Engine shut down normal/abnormal. Cleaning Engine parts. Inspection procedures. Engine checking: Bore-scope inspection of gas path, defects mapping and dimension identification, oil spectrometry, radiographic inspection, ferrography, vibration check, Test cell, Overhaul, Balancing,. Engine prior removal preservation, post removal plugging and preparation for transportation. Engine de-preservation and installation preparation standards. Heavy maintenance, modularity. Overhaul concept: TBO, main overhaul procedures: reception, disassembly, cleaning, inspection, investigation, repair, reassembly, test, delivery, documentation. Theoretical basics of engine diagnostics.									
References	1. ICAO Training Manual Part D-1 2. ECARS 147									
AERS436	Airline Operation and Management	3	2			2				4
	Pre-requisites: MDPS362, MTHS003									
	Review of optimization and mathematical models in Engineering, Linear Programming (LP) models; Integer Linear Programming (ILP), Nonlinear Programming (NLP). Solutions using computer software. Network Flows, Flight Scheduling, Fleet Assignment, Aircraft Routing, Crew Scheduling, Manpower Planning, Maintenance Scheduling, Case studies. Course project.									
References	Massoud Bazargan, "Airline Operations and Scheduling", Second Edition, 2020									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS317	Maintenance systems Management and Reliability	3	2	2						4
	Pre-requisites: MTHS003									
	Types of maintenance, FADEC systems. The system engineering process, system measures, availability, maintainability, dependability, cost-effectiveness. Reliability functions, MTBF/ MTBUR/ EIFSDR/ ESVR, structure and structure functions (series/parallel/(m,n)), standby systems, reliability control program and ts effect on performance and cost, performance rates and its upper control limits, performance limits exceedance inestigations and corrective actions, systems with repair, repair of renewal process and renewal function, systems with spares, sparing criteria, predective maintenance considerations, determination of spares, determination of spare kits. Staggering programs.									
References	1. West Churchman, "The System's Approach". 2. Chadwick, "A Systems View of Plann ng". 3. Van Gigch, "General Applied Systems Theory". 4. Chander, Graham, Williamson, "Practical Systems Analysis". 5. Russell Ackoff, "The Art of Problem Solving".									
AERS427	Strategic Planning and Management	3	2	2						4
	Pre-requisites: GENS110, MTHS003									
	Strategy formation within regulated industries. Corporate governance and organization structure models of particular relevance to the aviation industry, the processes for managing large scale organizational change. Specific techniques used in managing human resources such as employee development and training, job analysis, performance appraisal, safety, security, communications, employee and labor relations, study of procedures for the determination of compensation levels, benchmark positions.									
References	David, Fred R_David, Forest R -Strateg c Management_ A Competitive Advantage Approach, Concepts-Pearson (2016_2017)									
AERS442	Fundamentals of Nondestructive Testing	3	2	2						4
	Pre-requisites: GENS110, MTHS003									
	Introduction, Cracks and crack propagation, Visual inspection, Liquid Penetrants inspection, Magnetic Particle inspection, Ultrasonic Testing, Radiographic Inspection, Eddy Current Detection, Acoustic Emissions Monitoring, Thermal Inspection, Industrial Computed Tomography, Microwave Optical Holography, Acoustic Holography, Experimental project.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
AERS445	Aircraft Engine Systems	3	2	2						4
	Pre-requisites: AERS325, 85 Credits									
	ubrication system: subsystems, components, oil types-characteristics. Fuel system, components, electronic engine control, fuel types-characteristics, Biofuels and Fuel cells. Aircraft fuel system: storage, Anti-Icing subsystems, refueling-defueling-transfer. Air system: cooling and pressurization, services bleed, performance improvements bleed. Starting and ignition system: starting methods, staring components, ignition components and operation. Control and instrumentation system: control system, components, sensors, instruments. Thrust reversal system: construction, operation, materials. Engine fire system: detection, extinguishing, instrumentation, control. Power plant installation: nacelles, mounts, normal operation and precautions, abnormal operation. Auxiliary power unit: construction, systems, operation, control. Air Pollution.									
References	1. ICAO Training Manual Part D-1 2. ECARS 147									
AERS417	Project Planing, Queueing Systems and Simulation	3	2	2						4
	Pre-requisites: GENS110, 95 Credits									
	Construction of arrow network. Critical path. Minimum project finish time. Activity time scheduling. Reduction of project time at minimum cost. Queueing systems. Single server and multi server systems. Reduction of customer waiting time. Simulation of complex systems. Operation of simulation models. Simulation of series systems (e.g. workshops) , and parallel systems (e.g. airports) . Design improvement of complex systems .									
References	Sanjay K. Bose, "An Introduction to Queueing Systems", Springer US, 2014									
AERS338	Engineering Standards and Specifications	2	1	2						3
	Pre-requisites: 95 Credits									
	Definitions; Standard, Code, Specification & Technical Regulation. Standards & Specifications as part of the engineering profession. Specifications What, Where/Why they're Used. National and International Standard Development Organizations. Role and impact of standards. affecting products and processes. Aerospace Engineering Standards and Aerospace Material Standards Specific Examples Related to Aerospace; Guards, Principles of Design, Selection & Testing. Engineering Drawings and Revision. Product Specifications; Geometrical, Materials, Parts, Machining, Processes, Safety, hazard Reduction, automation, Integration Noise, Quality, Life Cycle Assessment. Code of Good Practice and Ethical requirements									
References	Owen R. Greulich and Maan H. Jawad, "Primer on Engineering Standards", John Wiley & Sons, Ltd., 2018.									