Section10

Aeronautical Engineering and Aviation Management (AEM)

Based on Credit Hours System (CHS)

September 2019

1. INTRODUCTION

Airtransport environment in Africa and MENA region is witnessing a tremendous revolution. Market studies indicate that the volume of Airtransport activities will at least double in the next decade. This involves adding new and advanced aircrafts, rising in fleet sizes, rising in the number and size of airports, and explosion in air traffic volume.
There is an increasing demand for air transport for both passengers and goods. More people wish to travel more often and further for both leisure and business pursuits. The globalization of supply chains challenges land-based transport infrastructure, resulting in the enormous growth of air freight.
The Aerospace Department- first established in the late thirties as the Department of Aeronautics- is planning in this proposal to expand its coverage of the field. The department current B.Sc. degree in Aerospace engineering includes both Air and Space systems. The current program concentrates more on design aspects of Aeronautical and Space vehicles and concentrates less on aviation and aviation management. The new proposed B.Sc. degree is offered in "Aeronautical Engineering and Aviation Management" to students who seek engineering careers in the airtransport and aviation sectors. The degree is also appropriate to students who seek to pursue advanced degrees in either engineering or engineering management fields.
The increased demand for air transport also results in an increased demand in highly qualified Aeronautical and Aviation engineers. Such engineers should be equipped with proper analytical tools, capable of creative thinking and possess diversity of skills as well as knowledge of the state of the art of the profession. Moreover,such increase in demand requires highly trained engineers to plan airline operations, manage the complex air traffic control issues, and to manage operational readiness of airports. They need to combine the technical and managerial skills to maintain fleet Availability and Readiness, track the inventory of parts and manage the workforce. They should possessthe capability of providing fast, independent and inexpensive remedy of emerging system problems.
Consequently, there is an increase in demand for such specialized graduates which is particularly important for Egypt, Africa, and MENA. Egypt is hoping to become a hub for tourism and trade. The government is pursuing an open market, which is based on efficient logistics especially in the sector of air transport. This led, Faculty of Engineering Cairo University to propose to establish the Aeronautical Engineering and Aviation Management (AEM) Program.
The program will prepare future engineers for the fields of airline planning and operation, airline maintenance systems, inventory management, logistics and supply chain management, airport operations and air traffic management. It will equip graduates with the knowledge and skills required for exciting and challenging careers in airlines, air freight, freight forwarders, express couriers and general logistics and supply chain management. Hence, the program will help provide the required technical capabilities for better management of the civil aviation field not only in Egypt but also in the Arab region, Africa, and MENA which will enhance trade in the future.
The existing department of Aerospace Engineering will be the main source of instructors who will mentor students during their study. Other departments such as Mechanical design and production, Electrical Power and Machines, and Engineering Mathematics and Physics, will have a share in the teaching load of the new "AEM" program (about 33% of the courses excluding the preparatory year).

2. PROGRAM MISSION

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.

3. EDUCATIONAL OBJECTIVES

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4. PROGRAM LEARNING OUTCOMES

The following academic reference standards (NARS 2009) represents the general expectation about the qualifications attributes and capabilities that the graduates of the Aeronautical Engineering and Aviation Management program should be able to demonstrate.

4.1 Knowledge and Understanding

On successful completion of the program, the graduates must have the following abilities:

- An ability to demonstrate knowledge of facts, concepts, and theories of basic sciences and mathematics.
- An ability to demonstrate knowledge of fundamentals of aeronautical engineering and aviation management principles and practices.

4.2 Intellectual Skills

On successful completion of the program, the graduates must have the following abilities:

- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

4.3 Practical and Professional Skills

On successful completion of the program, the graduates must have:

- An ability to recognize ethical and professional responsibilities in engineering situations and
- An ability to make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

4.4 General and Transferable Skills

On successful completion of the program, the graduates must have the following abilities:

- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to communicate effectively with a range of audiences
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

5. MARKET NEEDS ASSESSMENT

This market analysis is based on the following studies:

- Global market forecast-flying by numbers 2015-2034-airbus
- Boeing-Current Market Outlook 2014

Current Status

The Civil aviation field is a major employer. This includes:

- The airliner and airport industry direct jobs.
- Manufacturers of aircraft systems, frames and engines, etc.
- Direct and indirect jobs through air transport’s catalytic impact on tourism.

Forecast passenger and air cargo traffic

As a result of increasingly affordable flight rates and cheaper oil prices, passenger and cargo air traffic are estimated to grow substantially through 2035. The Middle East is the region where passenger and cargo air traffic are forecast to experience the highest growth rates. Between 2016 and 2035, the airline industry is projected to increase its carriers' revenue passenger kilometers by about 4.8 percent and boost their revenue

ton kilometers by around 4.7 percent between 2015 and 2034. Commercial airlines stand to greatly benefit from the increased passenger demand in global air traffic. In 2015, there was a 7.4 percent growth in global air traffic passenger demand. The same year, commercial airlines worldwide generated combined revenue of 718 billion U.S. dollars.

6. PROGRAM DESCRIPTION

The Aeronautical Engineering and Aviation Management program offers the necessary background in aircraft aerodynamics, propulsion systems, control mechanisms, and structural engineering. Instruction in numerous topics concerning air transport management is also covered. By the end of the program course description, two profiles will define the graduate (both will have same degree "Aeronautical Engineering and Aviation Management" but different transcripts). Taking more Maintenance Related Engineering courses in will allow the graduate to be able to analyze all the different aircraft system components, examine advanced detection mechanisms to detect different defects and damage, have an overview of different repair techniques, manage an inventory of supplies, and perform basic engineering management tasks. Taking more courses in Engineering Management will allow the graduate to be able to perform short and long term economic planning for airline and airport operations, contribute in supply chain and logistics for air transport and perform Engineering Management duties.

The Bachelor of Engineering degree consists of approximately 180 credit hours in ten semesters' curriculum.

The curriculum covers basic science college level in mathematics, physics, mechanics, chemistry. In addition, college level basics in management of aviation systems are covered including economics, operations research, management, law and humanities.

The curriculum includes courses in engineering fundamentals and applications such as:

- Fluid mechanics/Gas dynamics
- Structural Analysis
- Thermodynamics/Heat transfer
- Automatic control
- Aircraft performance and Stability/Flight mechanics
- Fundamental of airline economics
- Principles of Management
- Fundamentals of transport system analysis

In the specialized area advanced and detailed courses are offered. Courses specific to engineering maintenance and management include:

- Airframe and powerplant maintenance systems
- Airline operation and planning
- Airline economics and management
- Airport management
- Air traffic management
- Logistics and inventory management

Legal and institutional framework is also covered with diverse courses in humanities including communication skills. Moreover, up-to-date skills in the use of computers for modeling and data analysis are developed.

The curriculum gives the students the opportunity to select between two profiles; aeronautical engineering-maintenance systems and aviation management, through a variety of elective courses. Students are also encouraged to participate in team work through projects.

Moreover, the curriculum gives the students the opportunity to interact with the industrial sector and government agencies through two field summer courses. The complete description of the program is presented in the following sections.

6.1 Curriculum Overview

6.1.1 Humanities and Social Sciences Courses

- Humanities and Engineering
- Technical writing
- Communication and Presentation Skills
- Ethics and Legislation
- Environment
- Fundamentals of Economics and Accounting
- Fundamentals of Management
- Marketing
- Risk Management and Environment

6.1.2 Basic Sciences Courses

- Mathematics
- Physics
- Mechanics
- Chemistry
- Engineering drawing
- Electrical basics

6.1.3 Engineering Science Courses

- Manufacturing Technology
- Basic engineering design
- Mechanical and Electrical Systems
- Analysis of structures
- Fluid mechanics
- Gas dynamics
- Thermodynamics
- Heat Transfer
- System Dynamics
- Automatic control
- Digital Control
- Aviation Materials
- Aircraft Maintenance Engineering
- Engineering Operations research
- Project management
- Aviation Information Technology
- Electric circuits/Electronics

6.1.4 Applied Engineering Sciences Courses

- Introduction to microcontrollers
- Fundamentals of flight

- Aerodynamics
- Aircraft structures
- Aircraft Engines: theory and technology
- Piston Engines
- Aircraft Performance and Stability
- Flight Mechanics and control
- Hydraulic and pneumatic systems
- Digital control systems
- Aircraft systems
- Airframe maintenance
- Aircraft Engines maintenance
- Fracture Mechanics and Structural Repair
- Electrical circuits
- Avionics

6.1.5 Applied Aviation Management

- Aviation Economics
- Airline planning and operation
- Airline management
- Airport planning, operation and management
- Maintenance management and reliability
- Logistics and transportation
- Air traffic management
- Strategic planning and management

6.2 University Requirements

The main purpose of a university education is not only to prepare students for successful careers but also to provide them with the knowledge and skills to develop a rational, well-rounded and successful personal identity. Moreover, Cairo University helps students to gain an appreciative understanding of the natural and cultural environments in which they live and their roles in the society and community services.

The university requirements of the CHS bachelor programs consist of 19 credits (10.9% of total 175 credits), which are satisfied by completing ten (10)courses:

1. Seven (7) compulsory courses equivalent to 13 credits (7.5%), as listed in Table 1a
2. Three (3) elective courses equivalent to 6 credits (3.4%), as listed in Table 1b.

Table 1a Compulsory Courses of University Requirements (13credits, 7.5% of total 175credits)

	Code	Course Title	Credits
1	GENN001	History of Science and Engineering	1
2	GENN004	Computers for Engineers	2
3	GENN005	Technical Writing	2
4	GENN102	Fundamentals of Management	2
5	GENN201	Communication and Presentation Skills	2
6	GENN210	Risk Management and Environment	2
7	GENN224	Fundamentals of Economics and Accounting	2

Table 1b Elective Courses of University Requirements (6 credits, 3.4% of total 175 credits)

	Code	Course Title	Credits	Group
1	GENN301	Ethics and Legislation	2	E-1
2	GENN303	Critical Thinking	2	
3	GENN305	Interdisciplinary Project	2	
4	GENN310	Advanced Risk Management	2	
5	GENN311	Technical Writing in Arabic	2	
6	GENN321	Foreign Language	2	
7	GENN326	Marketing	2	
8	GENN327	Selections of Life-long Skills	2	
9	GENN328	Scientific Research Methods	2	
10	GENN331	Business Communication	2	
11	GENN332	Service Management	2	
12	GENN333	Creativity, Art & Design	2	
13	GENN380	Thesis Writing for GP	2	

Remarks:

(1) Student selects three (3) courses equivalent to 6 credits

(2) AEM students must take GENN326 as compulsory.

6.3 College Requirements

College requirements provide students with the knowledge and skills that are essential to develop a successful engineer. A College Common core that is common to all credit hour programs is implemented. This unified college core contains two categories of courses. The first category of college core courses includes courses of basic knowledge essential to all engineering graduates such as Mathematics, Physics, Mechanics, Graphics and Design, Manufacturing, and Chemistry. The second category includes courses that all students are required to undertake in order to develop certain intended learning outcomes common to all engineering graduates, such as Seminar, Industrial Training, and Graduation Project courses. The College Common requirements of the CHS bachelor programs consist of 45 credits (24 % of total 175 credits), which are satisfied by completing Eighteen (18) compulsory courses, as listed in Table 2a.

College Non-Common core are college courses required for the program students only. This requirement is satisfied though 3 courses of 7 credits (5.7% of the total of 175 credits, as listed in Table 2b.

Table 2a Compulsory Courses of College Requirements (47credits, 25.1 % of total 175credits)

	Code	Course Title	Credits
1	CHEN001	Chemistry	3
2	GENN003	Basic Engineering Design	2
3	MDPN001	Engineering Graphics	3
4	MDPN002	Fundamentals of Manufacturing Engineering	3
5	MECN001	Mechanics-1 (Statics)	2
6	MECN002	Mechanics-2 (Dynamics)	2
7	MTHN001	Introduction to Linear Algebra and Analytic Geometry	3
8	MTHN002	Calculus I	3
9	MTHN003	Calculus II	3
10	MTHN102	Multivariable Calculus and Linear Algebra	3
11	MTHN103	Differential Equations	3
12	MTHN203	Probability and Statistics	3
13	PHYN001	Mechanics, Oscillations, Waves and Thermodynamics	3
14	PHYN002	Electricity and Magnetism	3
15	AEMN280	Engineering Seminar	1
16	AEMN281	Industrial Training-1	1
17	AEMN381	Industrial Training-2	2
18	AEMN480	Graduation Project-1	1
19	AEMN481	Graduation Project-2	3

Table 2b: Compulsory Courses of Non-Common College Requirements (7 credits, 5.7% of total 175 credits)

	Code	Course Title	Credits
1	MDPN117	Machine Drawing	3
2	AEMN201	Introduction to Microcontroller	2
3	MDPNXXX	Machine Elements	2

6.4 Discipline Requirements

The program aims to produce basically bi-specialized graduates. Students need be furnished with core courses both in aeronautical engineering and transport management.

1. twenty-two (22) compulsory courses equivalent to 51 credits (**29.15**%), as listed in Table 3.

Table 3 Compulsory Courses of Discipline Requirements (54credits, 29.15% of total 175 credits)

	Code	Course Title	Credits
1	AEMN111	Fundamentals of Flight	2
2	AEMN122	Properties and Strength of Aerospace Materials	2
3	MCNN101	Thermodynamics	3
4	MDPN132	Materials Science	3
5	MDPN135	Manufacturing processes for Aerospace	3
6	INTN203	Mechanical and Electrical Systems	2
7	MCNN202	Fluid Mechanics	3
8	AEMN211	Gas Dynamics	3
9	AEMN212	Analysis of Structures	3
10	AEMN214	System Dynamics and modeling	3
11	AEMN215	Engineering Standards and Specifications	2
12	AEMN224	Automatic Control	3
13	AEMN225	Aviation Organization	2
14	AEMN222	Thin Walled Structures	3
15	MCNN326	Heat Transfer	3
16	MDPN331	Engineering Operations Research	3
17	AEMN323	Airtransport System Analysis	3
18	MDPN424	Project Management	3
19	AEMN429	Aviation Laws, Legislations and Airworthiness	2
20	EPMN101	Electrical Engineering Fundamentals	3

6.5 Major Requirements

To prepare the graduate for airline job the program offers major courses in two disciplines:

- Airplane engineering maintenance
- Aviation management

1. Fifteen (15) compulsory courses equivalent to 41 credits (23.4%), as listed in Table 4a, of which seven (7) courses equivalent to 19 credits (10.9%) are common with track PPC-P.
2. Five (5) elective courses equivalent to 13 credits (7.5%), as listed in Table 5a.

Table 4a Compulsory Courses of MajorRequirements (30credits, 17.7% of total 175 credits)

	Code	Course	Credit
1	AEMN221	Aerodynamics	3
2	AEMN223	Aircraft Jet Engine Components	3
3	AEMN311	Aircraft Performance and Stability	3
4	EPMN311	Power Electronics Applications	3
5	AEMN312	Aircraft Structures	3
6	AEMN324	Flight Mechanics, Stability and Control	3
7	AEMN313	Aircraft Engine Performance	3
8	AEMN322	Aircraft Engine Construction	2
9	AEMN326	Aircraft Systems	2
10	AEMN413	Aircraft Engine Systems	3
11	AEMN216	Aviation Economics	2

Table 4b Elective Courses of Major Requirements: Aeronautical Engineering and Aviation Management(18 credits, 7.5% of total 175 credits)

	Code	Course Title	Credits	Group
1	AEMN327	Human Resource Management	2	E-3 (1)
2	AEMN328	Logistics and Transportation	2	
3	AEMN414	Digital Control Systems	2	
4	AEMN417	Air traffic Management	2	
5	AEMN424	Avionics	3	
6	AEMN331	Introduction to Composite materials	2	
7	AEMN419	Airtransport Market Analysis and Forecasting	2	
8	AEMN431	Information Technology for Airtransport Industry	2	
9	AEMN423	Aircraft Piston Engines	2	
10	AEMN421	Aircraft Maintenance Systems Engineering	2	
12	AEMN321	Hydraulic and Pneumatic Systems	3	E-4 (2)
13	AEMN412	Fracture Mechanics and Structural Repair	3	
14	AEMN415	Airline Planning and Operation	3	
15	AEMN416	Airport Planning, Operation and Management	3	
16	AEMN422	Aircraft Engine maintenance systems	3	
17	AEMN425	Airline Operation and Management	3	
18	AEMN426	Maintenance systems Management and Reliability	3	
19	AEMN427	Strategic Planning and Management	3	
20	AEMN428	Fundamentals of Nondestructive Testing	3	

Remarks:

(1) Student selects at least 1 course from group E-3 equivalent to 2 credits.

(2) Student selects at least 7 courses from groups E-3, and E4 equivalent to 18 credits.

6.6 Conformity to SCU Requirements

The classification and categorization of the coursesoffered by the Aeronautical Engineering and Aviation Management program follow the guidelines provided by the Supreme Council of Universities (SCU), as shown in Tables6a and 6b. The classification is based on the "Sample Study Plan and Course Sequence" described in Section7. The categorization is given for the following five student levels according to the regulations of the credit hours systemof education at the Faculty of Engineering, CairoUniversity:

- **Freshman**: a student who completed less than 35 credits
- **Sophomore**:a student who completed more than 34 credits but less than 69 credits
- **Junior**: a student who completed more than 68 credits but less than 104 credits
- **Senior-1**: a student who completed more than 103 credits but less than 140 credits
- **Senior-2**: a student who completed more than 139 credits

Table 6a Conformity to Supreme Council Criterion

Category	Freshman	Sophomore	Junior	Senior-1	Senior-2	Total Credits	%
Humanities and Social Sciences	3	4	3	2	4	16	9.1
Basic Sciences	22	16	4	0	0	42	24
Basic Engineering Sciences	5	12	15	4	0	36	20.6
Computer Application	2	0	1	7.7	8	18.7	10.7
Applied Engineering Sciences	3	4	9	10	9	35.3	20.2
Projects and Practice	0	0	0	6.2	8.5	14.7	8.4
Discretionary	0	0	5	4.8	2.5	12.3	7.1
Total	35	36	37	35	32	175	100
University Requirements	5	2	6	6	0	19	10.86
College Requirements	30	11	7	2	4	54	29.14
Discipline Requirements	0	16	24	9	5	54	30.85
Major Requirements	0	0	8	26	14	48	29.14
Total	35	29	45	43	23	175	100

7. SAMPLE STUDY PLAN and COURSE SEQUENCE

A sample study plan for the AEM program is presented as one recommended sequence to complete the graduation requirements over 10 main semesters, the Fall and Spring semesters per academic year. Since the program is based on the credit hours system of education, the student does not have to take the courses during the semester indicated in the study plan as long as the course prerequisites are satisfied. The AEM curriculum encourages students to interact with the industrial sector and government agencies by offering two industrial training courses in at least two summer sessions. Also, the students will be trained on teamwork and be exposed to large engineering projects during their practical training and graduation projects.

FreshmanYear Course Schedule

	Semester-1: Fall		Semester-2: Spring	
	Course Code	CR	Course Code	CR
1.	GENN005	2	GENN001	1
2.	GENN004	2	GENN003	2
3.	MDPN001	3	CHEN001	3
4.	MECN001	2	MDPN002	3
5.	MTHN001	3	MECN002	2
6.	MTHN002	3	MTHN003	3
7.	PHYN001	3	PHYN002	3
Semester Credit Hrs		18		17

AEM Program Study Plan

	Semester-3: Fall		Semester-4: Spring		Semester-5: Fall		Semester-6: Spring	
	Course Code	CR	Course Code	CR	Course Code	CR	Course Code	CR
1.	MTHN102	3	MTHN103	3	MTHN203	3	AEMN221	3
2.	MDPN117	3	MCNN202	3	AEMN211	3	AEMN222	3
3.	MDPN132	3	MDPN135	3	AEMN212	3	AEMN223	3
4.	MCNN101	3	AEMN122	2	AEMN214	3	AEMN224	3
5.	AEMN111	2	EPMN101	3	AEMN215	2	EPMN311	3
6.	GENN201	2	MDPNxxx	2	INTN203	2	AEMN225	2
7.	GENN102	2	GENN224	2	AEMN216	2	GENN326	2
8.	----------	------	----------	------	----------	------	----------	------
Semester Credit Hrs		18		18		18		19

	Semester-7: Fall		Semester-8: Spring		Semester-9: Fall		Semester-10: Spring	
	Course Code	CR	Course Code	CR	Course Code	CR	Course Code	CR
1.	AEMN311	3	AEMN322	2	AEMN413	3	AEMN429	2
2.	AEMN312	3	AEMN323	3	AEMN418	2	AEMN481	3
3.	AEMN313	3	AEMN326	2	AEMN480	1	GENNxxx	2
4.	MCNN326	3	MDPN424	3	AEMNxxx	3	AEMNxxx	3
5.	MDPN331	3	AEMN324	3	AEMNxxx	3	AEMNxxx	3
6.	AEMN280	1	GENN210	2	AEMNxxx	3	AEMNxxx	2
7.	GENNxxx	2	AEMNxxx	2	AEMNxxx	2	----------	------
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Semester Credit Hrs		18		17		17		15

8. COURSE CONTENTS

8.1 University-Core Courses

GENN001	**History of Science and Engineering** **Compulsory, Credits: 1 (1+0+0)** **Prerequisite(s): none** History of Technology: Engineering and technology in a cultural, social, and historical context. Development of technology as a key to history of civilization in a comparative perspective - Exploring Humanities: Modes of thought found within humanities and social sciences. Humanities for Engineers: Humanities themes of increased complexity - Different work methodologies - Critical analysis of information & choice of argumentation - Work methodologies and pedagogical interest.
GENN003	**Basic Engineering Design** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): none** Introduction to Design: Problem description and Introduction to Internet communication - Project Management: Project Management Application, Problem Solving Techniques: Problem Definition, Design Constraints - Creative Thinking and Problem Solving: Introduction to critical and creative thinking, nature of design problems - Brainstorming seminar, list of possible and impossible solutions and generating Ideas - Creative Thinking and Decision making: Product life cycles , Selection of idea (s), Final decision matrix, Justify decision - The Design Matrix: Context, purpose and requirements of engineering design - Analyze selected solution/preliminary design - Automated Design & the Positive Attitudes for Creativity - Systematic generation and evaluation of ideas.
GENN004	**Computers for Engineers** **Compulsory, Credits: 2 (1+0+3)** **Prerequisite(s): none** Developing basic concepts of algorithmic thinking to solve problems of relevance in engineering practice and implementing these algorithms using high-level computer language. Using data types, input/output commands, loops, control structures, functions, arrays, and other programming language constructs in a computer program. Evaluating and interpreting the results of programming work.
GENN005	**Technical Writing** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): Passing required exam held in the University** Discovering and outlining ideas. Organizing outlines. Ways To begin the three parts of technical writing. Writing abstracts, summaries, and conclusions of long reports. The thesis statement. Forms: letters, memos, reports, scientific articles, job description, CV, references and footnotes. Selection of key words, titles, and subtitles. Editing, revising and proof-reading techniques. Electronic word processing and technical writing, vocabulary building, and basic types and patterns of argument.

GENN102	**Fundamentals of Management** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): 28 credits** Introduction to management, Historical view and evolution of concepts. Basic Managerial Functions: Planning, Strategies, Objectives, MBO; Organizing, Departmentation, Job Description; Elements of Human Resource Management: Staffing, Directing, Controlling. Total Quality Management, Continuous Improvement. Engineering Applications.
GENN201	**Communication and Presentation Skills** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): GENN005** Analyzing the audience. Selecting presentation topics and objectives. Recognizing different types of speeches and presentations. Overcoming nervousness and developing confidence while addressing an audience. Researching and generating information for informative presentations. Chucking presentation content. Designing effective visual aids. Using explicit and effective transitions throughout a presentation. Creating benefit statements for persuasive presentations. Using persuasive devices such as pathos and logos in speeches. Planning and delivering informative, persuasive, entertaining and inspiring presentations. Handling question and answer sessions effectively.
GENN210	**Risk Management and Environment** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): GENN102** Risk Management: Introduction. Risk Definition. Basic Axioms Behind Risk Management. Systemic Approach to Handling Risk . Principle of Risk Management: Identification of Risks. Preliminary Risk Analysis (PRA). Risk Assessment. Risk Evaluation. Risk Control. Hierarchies of Control. Monitoring and Reviewing. Documentation. Study of a practical problem in which the student applies Basic Risk Management Environment: Environmental Systems: Local, Regional and Global. Influence of Air Pollutants on the, Environment, Water Pollutants, Industrial Waste, Hazardous Wastes, Management of Pollutant Releases, Pollution Prevention, Recycling of Waste Materials, Waste Treatment Technologies, Ultimate Disposal of Wastes, Water Treatment Technologies. Control of Air Pollution, Contaminated Land and Its Reclamation, Principals and Uses of the Environmental Risk Assessment, Environmental Risk Assessment Methodology, Environmental Impact Assessment Environmental Health Risk Assessment. National and International regulations**.**
GENN224	**Fundamentals of Economics and Accounting** **Compulsory, Credits: 2(2+0+0)** **Prerequisites (s): 42 credits** The main objective of this course is to provide engineers with the basic concepts of Economics and Accounting where the engineer has to be able of conceiving a business' vision from financial & strategic dimensions alongside to his/her technical skills.

	The course includes introduction to financial accounting, overview of managerial accounting, and economic concepts. The financial accounting includes the accounting cycle and financial statements. It also includes financial ratios for measuring the organization's performance. The Managerial accounting and behavior of cost includes the cost volume relationships and its further use in Budgeting & Forecasting. Economic concepts are addressed in microeconomics & macroeconomics where microeconomics includes the basic principles of economics, theory, assumptions, and models of economics as a social science, it also includes market forces of supply and demand, and elasticity & its applications. Another important topic addressed in this part is the competitive markets where decisions regarding maximizing profit, shutting down or exiting the market are discussed through computational methods & formulas. Macroeconomics includes measuring the nation's income where it explains the gross domestic product (GDP), its components & types.
GENN301	**Ethics and Legislation** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): 80 credits** Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical Responsibilities of Technologists. Codes of professional ethics. Case studies. Value Crisis in contemporary society. Nature of values: Psychological values, Societal values, Aesthetic values, Moral and ethical values. Work ethics and professional ethics. The legal rule: Mandatory and complementary. Sources of Law. Formal sources: Statutory Law, Custom, the Principles of natural Law and rules of justice. Informal sources: Jurisprudence, Doctrine. Application of Law. Holders of right; Natural persons, Juristic persons. Theory of Obligation; definition, forms. Sources of Obligations. The contract; Parties, Formation, Validity, Effect, and compensation of Damage. Introduction to Engineering Contracts. Contracting Contract.
GENN303	**Critical Thinking** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN003** The aim of the course is to apply critical thinking in the context of problem solving in the engineering field. Critical thinking and abstract thought are invaluable tools, which complement an engineer's technical expertise. Critical Thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. The following terms and applications are also discussed: Analysis, breaking down the problem into parts and finding the relationships between them; Synthesis, thinking about other ways to solve the problem either by incorporating new information or combining the parts in a different way; and finally, Evaluation is making a judgment about the results using the evidence at hand.

GENN305	**Interdisciplinary Project** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): 108 credits** The course aims to give students more space for creativity, out of box thinking, collaboration and involvement in team work. It's a free specialization course where the subject is to be determined by the student team. The team consists of up to 6 students and minimum of 4 students. A maximum of two students of the same credit hour program can be members of the same student team. The team shall register the topic of the project with the course coordinator and follow up with him/her at least 3 times during the semester. No mid-term Exam for the course and the final Exam jury will be nominated by the course coordinator depending on the project subject, but not necessarily on the student(s) cr. Hr. program. The course is graded as a normal graded course. Final grade consists of: 20% for Semester work + 80% for Final Exam.
GENN310	**Advanced Risk Management** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN210 + MTHN203** Review of the Basic Risk Axioms and Concepts. Evolution of Risk Concepts and Terminology. Financial and Industrial Risk: Comparison and Contrast. Probabilistic Nature of Risk. System Decomposition. Legal and Regulatory Risks. Tools for Risk Assessment: Probability and Consequences: Event Tree, Fault Tree, FMECA, FEMEA, MOSAR (The French Approach), Simulation, Optimization and Operations Research. HACCP: principles and applications. HAZOP.Qualitative and Quantitative Risk Assessments (QRA). Quantitative Risk Assessment: Qualitative Aspects of System Analysis (Quantification of Basic Events. Confidence Interval. Quantitative Aspects of System Analysis. System Quantification for Dependent Events. Human Reliability. Uncertainty Quantification). Operational Risk. Reporting Risk Operations. Sectoral Risk Management. Specific Risk Topics: Risk Specific to Confined Spaces. The Special Case of BLEVE and Explosive Mixtures. Social and Psychological Risk. Social Risk Management and Social Protection. Disaster Risk Management and Vulnerability Reduction. Can Risk be a Management Style?
GENN311	**Technical Writing in Arabic** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN005 + 80 credits** Review of the Basics of Arabic Grammar and Mechanics. Writing Effective Sentences and Paragraphs Using Arabic Language. Discovering and Outlining Ideas. Writing Abstracts, Summaries, and Conclusions of Long Reports. The thesis Statement. Writing Technical Forms Using Arabic Language: Letters, Memos, Reports, Scientific Articles, Job Description, CV. Writing References and Footnotes. Selection of Key Words, Titles and Subtitles. Editing, Revising and Proofreading Techniques. Electronic Word Processing and Technical Writing. Integrating Graphs, Tables and Charts in Technical Documents. Vocabulary Building. Basic Types and Patterns of Argument: Terminology, Building Sub-Arguments of Fact and Policy.

	مراجعة أسس القواعد النحوية و ميكانيكيات اللغة العربية - الأخطاء الشائعة فى استخدامات اللغة العربية - كتابة جمل وفقرات صحيحة وفعالة باستخدام اللغة العربية - خلق الأفكار (التفاكر) - كتابة مقدمات، ملخصات و خاتمات التقارير - كتابة الأبحاث - أشكال الكتابة باللغة العربية: الرسائل، المذكرات، التقارير، المقالات العلمية، الوصف الوظيفي، كتابة السيرة الذاتية وتوثيق المراجع - اختيار الكلمات المفتاحية و كذلك العناوين الرئيسية والفرعية - التعرف على تقنيات التحرير و المراجعة و القراءة الاحترافية - إمكانية معالجة النصوص والكتابة الإليكترونية - الرسوم و الجداول و المخططات البيانية في الوثائق الفنية - بناء حصيلة لغوية من الكلمات والمفردات - تعلم الانماط و الأساليب الأساسية والمبدئية للنقاش من حيثالمنهجية والبناء.
GENN321	**Foreign Language** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN201** Emphasizing the development of student's communicative skills to speak, listen, read and write in languages other than Arabic and English, such as French, German, Spanish, Italian, Japanese, Chinese, etc, and to study cultural characteristics of such foreign languages from historical, geographical, literature, economic, and social viewpoints. Topics include, but not limited to, the basics of language grammar and mechanics, writing effective sentences and paragraphs, vocabulary building, writing technical engineering documents and writing technical forms: letters, memos, reports, scientific articles, job description, resumes and curriculum vitas.
GENN326	**Marketing** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN102 + 80 credits** Introduction. The Field of Sales; Strategic Sales Force Management. The Personal Selling Process and Sales Force Organization. Profiling and Recruiting Salespeople; Selecting and Hiring Applicants, Developing the Sales Program, Sales Force Motivation, Sales Force Compensation, Expenses and Transportation; Leadership of a Sales Force, Forecasting Sales and Developing Budgets; Sales Territories, Analysis of Sales Volume, Marketing Cost & Profitability Analysis, Performance Evaluation; Ethical and Legal Responsibilities tender writing.
GENN327	**Selections of Life-Long Skills** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN201** Communicating Clearly - Managing Time and Resources - Making Decisions - Delegating Successfully - Motivating People - Managing Teams - Negotiating Successfully - Minimizing Stress - Getting Organized -Managing Changes - Interviewing People - Managing Your Career - Balancing Work and Life - Thinking Creativity and Innovation - Influencing People – Systems Thinking – Interpersonal Management Skills – Entrepreneurial Skills.
GENN328	**Scientific Research Methods** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): 108 credits** Course covers the process of scientific knowledge and practical implementation, underlying research methodology issues. To develop a

	critical and questioning mindset, critical understanding of issues related to research questions, literature review, methodological design, data collection, analysis and conclusion. Moving you toward fulfillment of the publication and dissertation requirements, perhaps will turn you into a 'Researcher'. All of which to use content to solve technical, practical, and life problems.
GENN331	**Business Communication** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN201** Skills for effective communication in the workplace; constructing and delivering persuasive business presentations; theoretical and experiential knowledge of argumentation and debate for informal and formal presentations; style, layout, and convention of business writing; writing business proposals, progress reports, and feasibility reports; common areas of miscommunication.
GENN332	**Service Management** **Elective (group E-1), Credits: 2 (2+0+0)** **Prerequisite(s): GENN102 + 80 credits** Role of services in the economy, The nature of services, Service quality, Service Strategy, Developing new services, The role of technology in supporting service delivery, Design of services, Capacity planning and managing queues, Quantitative methods for service management.
GENN333	**Creativity, Art & Design** **Elective (group E-1), Credits: 2 (1+3+0)** **Prerequisite(s): AA APROVAL** This course will provide entry level visualization, communication and design skills for a wide variety of fields including: mechanical engineering, architecture, interior and furniture design, graphic design, package design, marketing, visual arts, …etc. It will help produce innovative creative and artistic projects. To develop basic thinking, visualizing and problem-solving skills , in order to apply these skills to a realistic simple creative project ex. exhibit design, landscape design, furniture design, … etc
GENN380	**Thesis Writing for GP** **Elective (group E-1), Credits: 2 (1+3+0)** **Prerequisite(s): GENN005, AA Approval [registering in GP1]** The thesis writing course is a capstone project, presenting a well-argued piece of research on a precise architectural/engineering theme or topic independently selected by the student. The student acquires the main scientific writing skills of typical dissertations through the course to finally submit a scientific paper of 10,000 words. The student goes through the formulation of the different phases of writing starting from having an argument, writing an abstract, developing methodologies and then going through literature review, together with critical analysis of information and relevant case studies to end with developing empirical/ applied studies.

8.2 College-Core Courses

CHEN001	**Chemistry** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): none** Gases; Applications to gaseous law; Mass balance and heat balance in combustion processes of fuels; Solutions & separation techniques; Applications to electrochemistry; Corrosion; Water treatment; Building materials; Environmental Engineering; Selected chemical industries: fertilizers, dyes, polymers, sugar, petro-chemicals, semi-conductors, oil and fats, industrial systems; Chemical Vapor deposition.
GENN003	**Basic Engineering Design** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): none** Introduction to Design: Problem description and Introduction to Internet communication - Project Management: Project Management Application, Problem Solving Techniques: Problem Definition, Design Constraints - Creative Thinking and Problem Solving: Introduction to critical and creative thinking, nature of design problems - Brainstorming seminar, list of possible and impossible solutions and generating Ideas - Creative Thinking and Decision making: Product life cycles , Selection of idea (s), Final decision matrix, Justify decision - The Design Matrix: Context, purpose and requirements of engineering design - Analyze selected solution/preliminary design - Automated Design & the Positive Attitudes for Creativity - Systematic generation and evaluation of ideas.
MDPN001	**Engineering Graphics** **Compulsory, Credits: 3 (1+0+4)** **Prerequisite(s): none** Techniques and skills of engineering drawing, normal and auxiliary projections. Solid geometry. Intersections between planes and solids. Development, sectioning. Drawing and joining of steel frames. Assembly drawing of some mechanical parts. Drawing of Architectural projections and reading of blueprints.
MDPN002	**Fundamentals of Manufacturing Engineering** **Compulsory, Credits: 3 (2+1+2)** **Prerequisite(s): none** Engineering Materials - Elements of Manufacturing Processes, material flow, energy flow and information flow - Forming in the liquid state, Casting and molding processes - Forming in the solid state, metal forming, forming of plastics and powder metallurgy - Material Joining processes, welding, soldering and brazing, riveting, joining by mechanical elements, assembly processes - Material removal processes, metal cutting and finishing processes - Computer applications in manufacturing - Term mini-project.
MECN001	**Mechanics-1 (Statics)** **Compulsory, Credits: 2 (1+3+0)** **Prerequisite(s): none** Statics of particles, forces in three-dimensions, vector algebra; equivalent

	systems of forces, resultant of a group of forces, moments of forces, moment of a couple, reduction of a system of forces, wrench; equilibrium of rigid bodies in two dimensions, reactions at supports and connections for a 2D structure, 2D trusses, equilibrium of rigid bodies in three dimensions, reactions at supports and connections for a three dimensional structure; centroids and centers of gravity, center of gravity of 2D bodies, centroids of areas and lines, first moments of areas and lines, composite plates and wires; moments of inertia, moments of inertia of areas, second moment, or moment of inertia of an area, polar moment of inertia, radius of gyration of an area, parallel-axis theorem, moments of inertia of composite areas, product of inertia, principal axes and principal moments of inertia, moments of inertia of masses, moment of inertia of a mass, parallel axis theorem, moments of inertia of thin plates, moments of inertia of composite bodies, mass product of inertia, principal axes and principal moments of inertia.
MECN002	**Mechanics-2 (Dynamics)** **Compulsory, Credits: 2 (1+2+1)** **Prerequisite(s): MECN001** Kinematics of particles: rectilinear motion of particles, position, velocity and acceleration, uniform rectilinear motion, uniformly accelerated rectilinear motion, curvilinear motion, derivatives of vector functions, rectangular components of velocity and acceleration, relative motion, tangential and normal components of acceleration, motion of a particle in a circular path, velocity and acceleration of a particle in polar coordinates. Kinetics of particles: Newton's second law, linear momentum of a particle, equations of motion with applications in Cartesian coordinates, tangential and normal directions, polar coordinates, free vibrations of particles, simple harmonic motion; energy & momentum methods, work of a force, kinetic energy of a particle, principle of work and energy, applications, power and efficiency, potential energy, conservation of energy, principle of impulse and momentum, impulsive motion, impact, direct central impact and coefficient of restitution, oblique central impact.
MTHN001	**Introduction to Linear Algebra and Analytic Geometry** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): none** Matrix algebra, determinants, inverse of a matrix, row equivalence, elementary matrices, solutions of linear systems of equations; parabola, ellipse and hyperbola, eccentricity and conic sections; quadratic equations; solid geometry, line, plane, quadratic surfaces.
MTHN002	**Calculus I** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): none** Functions, graphing of functions, combining functions, trigonometric functions; limits and continuity; differentiation; inverse functions; exponential and logarithmic functions; inverse trigonometric functions; hyperbolic and inverse hyperbolic functions; indeterminate forms and L'Hopital's rule; Taylor and Maclaurin expansions.

MTHN003	**Calculus II** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): MTHN002** Anti-derivatives; indefinite integrals; techniques of integration; definite integrals, applications of definite integrals; functions of several variables; partial derivatives, applications for partial derivatives.
MTHN102	**Multivariable Calculus and Linear Algebra** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): MTHN001 + MTHN003** Double integrals, double integrals in polar coordinates; triple integrals, triple integrals in spherical and cylindrical coordinates; applications of double and triple integrals; line and surface integrals; vector analysis, gradient of a scalar function, divergence of a vector, curl of a vector, divergence and Stokes' theorems, vector identities; LU-factorization; vector spaces; inner product spaces; eigenvalues and eigenvectors; diagonalization of matrices; functions of matrices.
MTHN103	**Differential Equations** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): MTHN003** 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.
MDPN117	**Machine Drawing** **Compulsory, Credits: 3 (1+0+6)** **Prerequisite(s): MDPN001** Sketching and drafting of actual Mechanical components and Assemblies - Assembly drawing, working drawing, dimensioning, limits, fits, Geometrical and dimensional tolerances, surface roughness. Standard machine elements (threads, fasteners, locking devices, keys, splines, gears, pulleys, bearings, pipe connections, etc.) - Welding and riveting conventions. Standardization and designation of machine elements. Computer aided graphics application.
MDPNXXX	**Machine Elements** **Compulsory, Credits: 2 (1+2+1)** **Prerequisite(s): MDPN117** 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.
AEMN201	**Introduction to Microcontrollers** **Compulsory, Credits: 2(1+1+1)** **Prerequisite(s): EPMN101** Hardware and software organization of a typical microcontroller; machine

	language programming, interfacing peripheral devices, and input-output programming; real-time computer applications
MTHN203	**Probability and Statistics** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): MTHN102** Probability axioms; probability laws; conditional probability; random variables; discrete and continuous distributions; joint distribution; computer simulation; sampling; measures of location and variability; parameter estimation, testing of hypothesis.
PHYN001	**Mechanics, Oscillations, Waves and Thermodynamics** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): none** Physics and measurements; elastic properties of solids; universal gravitation and motion of planets; fluid mechanics (statics and dynamics); oscillatory motion; wave motion, sound waves; thermo-dynamics, temperature, heat and the first law of thermodynamics, the kinetic theory of gases, heat engines, entropy and the second law of thermodynamics. Laboratory experiments on course topics.
PHYN002	**Electricity and Magnetism** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): none** Electric field; Gauss' law; electrostatic potential; capacitance and dielectrics; current and resistance; direct current circuits; magnetic fields, sources of magnetic field; Faraday's law; Maxwell's equations; inductances; magnetic properties of matter. Laboratory experiments on the course topics.
AEMN280	**Engineering Seminar** **Compulsory, Credits: 1 (1+0+0)** **Prerequisite(s): 72 credits** 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 establishment. 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.
AEMN281	**Industrial Training-1** **Compulsory, Credits: 1** **Prerequisite(s): 72 credits + AA Approval** Training on industrial establishments relevant to the program. Training lasts for total of 90 hours, during a period about three 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 appointed from industry or other colleges of engineering. The course is graded as Pass/Fail grade-system.

AEMN381	**Industrial Training-2** **Compulsory, Credits: 2** **Prerequisite(s): AEMN281 + 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.
AEMN480	**Graduation Project-1** **Compulsory, Credits: 1 (0+0+3)** **Prerequisite(s): 130 credits + AA Approval** All students undertake a major project as part of the program. The aim of the project is to provide the students - in groups - with an opportunity to implement the appropriate concepts and techniques to a particular design. Students are required to choose and research the expected project to be designed and implemented in course project-2. The student is expected to give an oral presentation to be approved. This course is graded as Pass/Fail grade-system.
AEMN481	**Graduation Project-2** **Compulsory, Credits: 3 (1+0+6)** **Prerequisite(s): AEMN480 + AA Approval** All students undertake a major project as part of the program. The aim of the project is to provide the students - in groups - with an opportunity to implement the appropriate concepts and techniques to a particular design. A dissertation on the project is submitted on which the student is examined orally.

8.3 Discipline Courses

AEMN111	**Fundamentals of Flight** **Compulsory, Credits: 2 (1+2+0)** **Prerequisite(s): MECN002** 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
AEMN215	**Engineering Standards and Specifications** **Compulsory, Credits: 2 (1+2+0)** **Prerequisite(s): GENN003** 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
MDPN132	**Materials Science** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): MDPN002, PHYN001** 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, Types of cast iron, Phase transformations and isothermal heat treatments (TTT), Classification of Metals.
MDPN135	**Manufacturing processes for Aerospace** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): MDPN002 + MDPN132** **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

EPMN101	**Electrical Engineering Fundamentals** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): PHYN002** 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.
MCNN202	**Fluid Mechanics** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): MTHN003 + PHYN001** 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 and ducts. Flow measurement. General applications. Laboratory Experiments. Course project computer oriented.
MCNN101	**Thermodynamics** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): PHYN001** Basic concepts. Pure substances - First law of thermodynamics and applications – second law of thermodynamics and corollaries – entropy. May include a visit to a power plant, course project.
INTN203	**Mechanical and Electrical Systems** **Compulsory, Credits: 2 (1+3+0)** **Prerequisite(s):54 Credits** Introduction to electrical circuits; Electrical installation in residential and industrial buildings (illumination networks in rural areas, data lines, telephone lines and antenna, control of air conditioning, lift); Requirements of audio systems; Alarm devices (fire - security - gas); HVAC components and systems; Plumbing elements and features; Essential mechanical systems used in typical residential and institutional projects.
AEMN122	**Properties and Strength of Aerospace Materials** **Compulsory, Credits: 2 (1+2+0)** **Prerequisite(s): MECN002, MDPN132** Mechanical properties of aerospace materials. 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.

AEMN225	**Aviation Organization** **Compulsory, Credits: 2 (2+0+0)** **Prerequisite(s): 40 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.
AEMN211	**Gas Dynamics** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): MCNN202** 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**.**
AEMN222	**Thin Walled Structures** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN212** 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**.**
AEMN214	**System Dynamics and modeling** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): MTHN103** 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**.**
AEMN212	**Analysis of Structures** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN122** 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.
AEMN224	**Automatic Control** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN214** Root locus method, frequency domain analysis, Nyquist stability criterion, measures of relative stability, Bode diagrams, frequency domain design, phase lag and phase lead controllers.

MCNN326	**Heat Transfer** **Compulsory, Credits: 3(2+2+1)** **Prerequisite(s): MCNN101** Conduction: General equation of conduction, one dimensional steady-state conduction, steady-state conduction with internal heat generation, steady conduction with variable thermal conductivity, fins and extended surfaces, unsteady conduction. Convection: fundamentals of convection, dimensionless groups, natural and forced convection, use of empirical correlations. Radiation: Fundamentals of heat transfer by radiation. Case studies and computer applications. Laboratory Experiments**.**
MDPN331	**Engineering Operations Research** **Compulsory, Credits: 3 (2+3+0)** **Prerequisite(s): MTHN102** 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.
AEMN323	**Airtransport System Analysis** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN315** The systems approach. The analysis and modelling of the processes and operations carried out in all three parts of the air transport system, namely, airports, air traffic control and airlines. 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.
MDPN424	**Project Management** **Compulsory, Credits: 3 (2+2+1)** **Prerequisite(s): 102 credits + GENN102** Phases of project planning and monitoring, Work breakdown and coding, Time and resources estimation, project planning and network representation, project scheduling, budgeting and cash flow, project control and reporting, Industrial case studies and use of computer S/W packages, Project team management, Project bidding, contracting, and commissioning cycles.

AEMN429	**Aviation Laws, Legislations and Airworthiness** **Credits: 2 (1+3+0)** **Prerequisite(s): AEMN326** 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.

8.4 Major Courses:

EPMN311	**Power electronics applications** **Elective, Credits: 3 (2+2+1)** **Prerequisite(s): EPMN101** Analyzing and characterizing the basic power electronic circuits.Rectifier Circuit (uncontrolled/controlled). DC to DC converters (Buck, Boost, Buck-Boost converters). DC to AC converters (Inverters). Basic power electronics devices. Operational amplifier circuits and applications. Firing and driving circuits.
AEMN221	**Aerodynamics** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN211** 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, Inerference Drag. Laboratory Experiments.

AEMN223	**Aircraft Jet Engine Components** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): MCNN101, AEMN211** Classification of aircraft propulsion systems. Shaftengins: Piston Engins, Propfansn 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 (Eqm solutions). combustion chamber aerodynamic performance. Injectors. Intakes: Internal/External Performance, Nozzles.Air pollution and Environmental effects.
AEMN311	**Aircraft Performance and Stability** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN221** 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
AEMN312	**Aircraft Structures** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN222** 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.
AEMN324	**Flight Mechanics, Stability and Control** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN224** Aircraft Static Stability and Control, Longitudinal, Lateral Static Stability, Longitudinal Control. Roll Stability, Roll Control. Equations of motion of aircraft. Longitudinal Autopilot, Lateral Autopilot.
AEMN313	**Aircraft Engine Performance** **Compulsory, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN223** 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.

AEMN322	**Aircraft Engine Construction** **Compulsory, Credits: 2 (1+2+1)** **Prerequisite(s): AEMN223** 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.
AEMN326	**Aircraft Systems** **Compulsory, Credits: 2 (2+1+1)** **Prerequisite(s): AEMN324 + EPMN311** 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 and 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.
AEMN413	**Aircraft Engine Systems** **Compulsory, Credits: 3 (2+1+1)** **Prerequisite(s): AEMN322** Lubrication 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.**
AEMN216	**Aviation Economics** **Compulsory, Credits: 2 (1+3+0)** **Prerequisite(s): AEMN221** 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.

AEMN321	**Hydraulic and Pneumatic Systems** **Elective, Credits: 3 (2+1+1)** **Prerequisite(s): AEMN224** 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.
AEMN412	**Fracture Mechanics and Structural Repair** **Elective, Credits: 3 (2+1+1)** **Prerequisite(s): AEMN222** 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.
AEMN414	**Digital Control Systems** **Elective, 2 (1+2+1)** **Prerequisite(s): AEMN224** 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.
AEMN421	**Aircraft Maintenance Systems Engineering** **Elective, Credits: 2 (1+2+1)** **Prerequisite(s): 72 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 Paintings,

AEMN422	**Aircraft Engine maintenance systems** **Elective, Credits: 3 (2+1+1)** **Prerequisite(s): AEMN413** 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.
AEMN423	**Aircraft Piston Engines** **Elective, Credits: 2 (1+2+1)** **Prerequisite(s): MCNN101** 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.

AEMN424	**Avionics** **Elective, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN324** An introduction to modern avionic systems. Topics include: Terrestrial and Satellite Navigation Aids, Landing Systems, Surveillance Systems, Air-Ground and Onboard Communications, and Autopilots.
AEMN426	**Maintenance systems Management and Reliability** **Elective, Credits: 3 (2+2+0)** **Prerequisite(s): MTHN203** 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 its 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.

AEMN331	**Introduction to composite Materials** **Elective, Credits: 2 (1+3+0)** **Prerequisite(s): AEMN312** 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.
AEMN327	**Human Resource Management** **Elective, Credits: 2 (1+3+0)** **Prerequisite(s): GENN102** 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.
AEMN328	**Logistics and Transportation** **Elective, Credits: 2 (1+3+0)** **Prerequisite(s): MDPN331** Ware houses 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.

AEMN415	**Airline Planning and Operation** **Elective, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN323** Airline planning process, longer-term strategic decisions, fleet planning and route development, medium-term schedule planning, fleet assignment, maintenance and operational considerations. Tactical decisions concerning pricing, yield management and seat inventory control, as well as departure dispatch and irregular operations, practice tools and decision approaches for airline planning and operations, competitive airline environment, the operation of non-airline carriers such as corporate aviation enterprises.

AEMN416	**Airport Planning, Operation and Management** **Elective, Credits: 3 (2+2+0)** **Prerequisite(s): AEMN323** Airport organization. Planning and development of the airport system, and the airport logistics under normal and emergency operational conditions. Policy issues related to airside and landside service provision at airports. Airport fees and charges, Economic impact of airports, Airport master planning, Terminal layout, Standard and busy rates, , Conveyers, Luggage control, Ground Equipment, Security Checks, Customs, Ground transportation, Customs, immigration and quarantine, Security, Choice and location of Navigation Aids, impact of physical environmental. Wildlife Hazard Management, Overview of pavement design, The management of the interface with airport users such as Passenger, airlines, corporate fleet and general aviation operators as well as other stakeholders.
AEMN417	**Air traffic Management** **Elective, Credits: 2 (1+3+0)** **Prerequisite(s): MDPN331** This course explains the components of air traffic management and its international organization. The issues of airspace capacity and flow management. Typical controller tasks and the impact of new technology in areas such as data links are demonstrated are described in more detail. Finally, the funding of ATC services is examined, and future issues addressed.
AEMN425	**Airline Operation and Management** **Elective, Credits: 3 (2+1+01)** **Prerequisite(s): AEMN313** Longer-term strategic decisions about fleet planning and route development, medium-term schedule planning, fleet assignment, maintenance and operational considerations. Tactical decisions concerning pricing, contracting, yield management and seat inventory control, Route structure, route planning and route market analysis, Fleet Planning, Network Scheduling, Operational Control, Liaison, tasks, responsibilities, aircraft utilization, Planning and Current day control, Port Co-ordination, Crew Scheduling, Technical and Flight Attendant Crewing - tours of duty, restrictions, Maintenance Scheduling, Maintenance release hours, line and hangar servicing, Aircraft Ground Handling, Ramp, Dispatch, Gate/block functions, Ground servicing, Catering, Cabin cleaning, Refueling, Passengers and baggage and Freight unloading/loading, System Connectivity, Reservations, scheduling, crewing and operations, computer-based airline management simulation.

AEMN427	**Strategic Planning and Management** **Elective, Credits: 3 (2+1+01)** **Prerequisite(s): GENN102, MTHN203** 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.

AEMN431	**Information Technology for Airtransport Industry** **Elective, Credits: 2 (1+1+0)** **Prerequisite(s): GENN102, MTHN203** 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.
AEMN428	**Fundamentals of Nondestructive Testing** **Elective, Credits: 3 (2+1+01)** **Prerequisite(s): GENN102, MTHN203** 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.
AEMN419	**Air Transport Market Analysis and Forecasting** **Compulsory, Credits: 2 (1+1+01)** **Prerequisite(s): GENN102, MTHN203** 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