Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation
International Accreditation Dept.

Academic Program Specification Form For The Academic Year 2022-2023

University: Al-Kitab
College: Technical college of Engineering
Number of Departments in The College: 4 Date Of Form Completion: 7/12/2021

Dean's Name Hussien Ibear
Date : 19 / 12 / 2022
2022 Signature

Dean's Assistant For Scientific Affairs
Date : 19 / 12 / 2022
2022 Signature

The College Quality Assurance And University Performance Manager
Date : 19 / 12 / 2022
Signature

Quality Assurance And University Performance Manager Date : 19/12 2022
Signature

Ahmed Abdul salam Jabr

19/12/2022

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	Al-Kitab University
2. University Department/Centre	Aeronautical Technical Engineering
3. Program Title	ABET
4. Title of Final Award	Bachelor of Aeronautical Engineering Techniques
5. Modes of Attendance offered	Annual
6. Accreditation	ABET
7. Other external influences	There is a strong relationship with the labor market, which is willing to hire graduates.
8. Date of production/revision of this specification	7/12/2022
9. Aims of the Program	
• Graduating cadres of technical engineers with a high level of understanding, knowledge and psychological qualification, in the field of aeronautical engineering. Lies on them the responsibility of studying the country needs in developing the aeronautical field. Those cadres capable of providing the needsof business market in the civil and military airports. • preparing en educated generation armed with science to be used to make a dramatically changes and put the scientific knowledge and scientific manner inthinking and analyzing for serving the country goals with the ability of continuing his higher education and adapting with the technical evolving in	

order to convey the human needs expansion.

- develop a generation of technical engineers and prepare a future scientific leaders in aeronautical technical engineering and work on strengthen the status of al-Kitab university in general and the aeronautical technical engineering department specially

- Focusing on students to ensure building them on a strong foundation of scientific knowledge specially in aeronautical field and strive to support them in all aspects to make them capable of solving problems, and possess a communication skill which is necessary to work in airplanes field and presenta high quality services for community. that what the department and college seek for community and that is the fundamental matter of sustainable development through guidance to choose the best means to expand their activity and reinforce their professional and scientific specialties.

- balance in concentration on the theoretical and applied principles of aeronautical technical engineering , and work on providing the students with tools and analytical, experimental , computer and methodological means to identify and solve the engineering problems, and focus on enter modern methods in learning systems which increase the students ability on designing, creativity and invention. provide the self -taught and continuing education and spread the engineering knowledge in aeronautical field through short courses , workshops, seminars, and conferences with provide consulting and lectures.

- provide academic environment suitable for study and search to contribute in finding solutions for engineering problems using appropriate techniques as well as active contribution in deepen and ensuring the department relation with community through training and develop the teaching and administrative staff.

10. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1. The aeronautical technical engineering graduated will possess the ability of critical thinking, solving problems, manage resources and time, and describe the airplanes specialty with its concepts in engineering and scientific methods.

A2. The ability to engineering analyzes and scientific thinking by implementing the laws in science, mathematics and engineering with committing by gaudiness and special instructions of maintenance workshops in airports or by facing engineering problem with the ability of resolve, assess it and propose a suggestion or plan or reformulate or translate and explain it.

A3. Enable student to talk and speak in engineering scientific effected manner in both Arabic and English languages.

A4. hold on ethics of profession with the ability to Demonstrate the professional competence and high precision in addition to commitment in personal appearance and behavior
A5. knowing the international standers and syllabus of aeronautical engineering and implement the quality management concepts in engineering work acquired the skills in information technology
A6. being interested in environmental protection from contamination.

B. Subject-specific skills
B1. The ability to implement the technique of aeronautical engineering with consideration of commercial and industrial restrictions.
B2. Analyze the engineering problems and resolve them with the ability to suggest appropriate alternatives
B3. Scientific survey and correction
B4. Effective Engineering discussions.

Teaching and Learning Methods

- Theoretical and practical lectures.
- Homework and extra-curricular activities.
- Research and reports.

Assessment methods

- Daily Sudden Exams
- Semester exams
- Mid-year and end-of-year exams
- Additional assessments of extra-curricular activities

C. Thinking Skills
C1. Present the engineering problem or design and request thinking for solutions or possible developments.
C2. Encourage improving the engineering thinking of students in memorizing and guessing and stimulate it to criticize thinking.
C3.Develope internet searching skills to expand the cognitive knowledge.
C4. Use brainstorming in drawing the creative thoughts for some distinct students.

Teaching and Learning Methods

- Ongoing guidance from the department's professors in general, as well as the department's and college's educational and psychological guidance committees.
- Ongoing conversations with students.
- Continuous communication with students through the department's page on social networking sites;

Assessment methods

- Consistent interviews with students, as well as listening to the most important problems and obstacles that students face in order to avoid them.
- Creating customized questionnaires for this purpose.
- Constant monitoring of students and an attempt to assess those who are sluggish.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1. The ability to work in a multidisciplinary team.
D2. The ability to communicate and communicate effectively and efficiently.
D3. Understand the impact of engineering solutions on economic and environmental activities and the societal context.
D4. The ability to use modern engineering techniques and skills and tools necessary to practice the engineering profession.

Teaching and Learning Methods

- Groups for graduation project preparation.
- Additional courses in the area of specialization.
- Courses in Information Technology and Networking (IT & Cisco).
- Summer training within companies with a competence close to the nature of the program.

Assessment Methods

Taking online assessment exams for courses in communications systems, information technology and networks, preparing scientific reports and conducting scientific discussions.

11. Program Structure				12. Awards and Credits
Level/Year	Course or Module Code	Course or Module Title	Credit rating	
Year 1	CREQ141	Electrical Engineering	5	Bachelor Degree Requires (x) credits
Year 1	CREQ142	Eng. Drawing &Descriptive	4	

Year 1	UREQ 161	Human Right & Democracy	4	
Year 1	MATH 151	Mathematics I	6	
Year 1	ANTE112	Mechanics I	6	
Year 1	ANTE 111	Properties of Materials	4	
Year 1	ANTE121	Thermodynamics	6	
Year 1	CREQ143	Programming I	4	
Year 1	CREQ 144	Work Shop	4	

Year 2	ANTE 223	Fluid Mechanics	6	Bachelor Degree Requires (x) credits
Year 2	ANTE215	Manufacturing Processes	5	
Year 2	CREQ 246	Mechanical Drawing	4	
Year 2	MATH 252	Mathematics II	6	
Year 2	ANTE 213	Mechanics II	6	
Year 2	ANTE 214	Strength of Material	6	
Year 2	ANTE 231	Theory of Flight	4	
Year 2	ANTE 222	Thermodynamics	6	
Year 2	CREQ 245	Programming	4	

Year 3	ANTE 324	Aerodynamics	6	Bachelor Degree Requires (x) credits
Year 3	ANTE 332	Aircraft Elec. and instrument	6	
Year 3	ANTE 316	Mech. Eng. Design I	6	
Year 3	CREQ 347	Eng. & Num. Analysis	4	
Year 3	ANTE 325	Heat Transfer	6	

Year 3	CREQ348	Industrial Engineering	4	
Year 3	ANTE 317	Theory of Machines	6	
Year 3	ANTE326	Aircraft Engines	6	
Year 3	ANTE 326	Gas Dynamics	5	

Year 4	ANTE 436	Aircraft Design	7	Bachelor Degree Requires (x) credits
Year 4	ANTE 435	Aircraft Engines &Propulsion	5	
Year 4	ANTE 438	Aircraft Stability & Control	5	
Year 4	ANTE 434	Aircraft Structures	5	
Year 4	ANTE 439	Aircraft &Maintenance	6	
Year 4	CREQ 449	Computer Aided Engineering	2	
Year 4	CREQ 418	Automatic Control	5	
Year 4	ANTE37	Aircraft Vibration	6	
Year 4	CREQ 4410	Final project	3	

13. Personal Development Planning
Striving to develop curricula and study programs and vaccinate them with all that is modern to keep pace with the rapid development within the field of specialization.
14. Admission criteria .
The admission criteria in the college is linked to the regulations of the Ministry of Higher Education and Scientific Research, since admission is central.

15. Key sources of information about the programme
Technical University, since the curricula are unified for this specialization in all Iraqi colleges and universities and international universities related to the specialization.

Curriculum Skills Map																		
please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed																		
				Programme Learning Outcomes														
Year / Level	Course Code	Course Title	Core (C) Title or Option (O)	Knowledge and understanding				Subject-specific skills				Thinking Skills				General and Transferable Skills (or) Other skills relevant to employability and personal development			
				A1	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Year 1	CREQ141	Electrical Engineering	Core	•													•	•	
	CREQ142	Eng. Drawing &Descriptive	Core	•	•														
	UREQ 161	Human Right & Democracy	Core	•	•	•		•				•	•	•	•		•	•	
	MATH 151	Mathematics I	Core	•	•	•		•				•	•	•	•		•	•	
	ANTE112	Mechanics I	Core	•	•	•		•				•	•	•	•		•	•	
	ANTE 111	Properties of Materials	Core	•								•	•	•	•		•		
	ANTE121	Thermodynamics	Core					•		•	•						•	•	•
	CREQ143	Programming I	Core	•			•										•		
	CREQ		Core					•			•						•		

Year 2	ANTE 324	Aerodynamics	Core	•	•	•		•		•		•	•	•	•		•	•	
	ANTE 332	Aircraft Elec. and instrument	Core	•	•	•		•				•	•	•	•		•	•	
	ANTE 316	Mech. Eng. Design I	Core	•								•	•	•	•		•	•	
	CREQ 347	Eng. & Num. Analysis	Core	•								•	•	•	•		•	•	
	ANTE 325	Heat Transfer	Core	•								•	•	•			•		
	CREQ348	Industrial Engineering	Core	•				•									•	•	
	ANTE 317	Theory of Machines	Core	•	•	•						•	•	•	•		•	•	
	ANTE326	Aircraft Engines	Core					•		•	•						•	•	•
	ANTE 326	Gas Dynamics	Core				•	•			•					•	•		
Year 3	ANTE 324	Aerodynamics	Core	•	•	•		•		•		•	•	•	•		•	•	
	ANTE 332	Aircraft Elec. and instrument	Core	•	•							•	•	•	•		•		
	ANTE 316	Mech. Eng. Design I	Core	•	•	•		•		•		•	•	•	•		•		
	CREQ 347	Eng. & Num. Analysis	Core	•	•							•	•	•	•		•	•	

	ANTE 325	Heat Transfer	Core	•	•	•		•		•		•	•	•	•		•	•	•
	CREQ348	Industrial Engineering	Core		•				•							•	•		•
	ANTE 317	Theory of Machines	Core	•								•	•	•	•		•		•
	ANTE326	Aircraft Engines	Core					•		•	•		•	•					
	ANTE 326	Gas Dynamics	Core	•	•	•		•		•		•	•	•	•		•		
Year 4	ANTE 436	Aircraft Design	Core	•	•							•	•	•	•		•		
	ANTE 435	Aircraft Engines &Propulsion	Core	•	•	•		•		•		•	•	•	•	•	•	•	•
	ANTE 438	Aircraft Stability & Control	Core	•	•	•		•		•		•	•	•	•		•		
	ANTE 434	Aircraft Structures	Core		•				•							•	•		•
	ANTE 439	Aircraft &Maintenance	Core	•				•		•		•	•	•	•		•	•	
	CREQ 449	Computer Aided Engineering	Core					•		•	•						•	•	•
	CREQ 418	Automatic Control	Core	•		•	•						•	•			•	•	
	ANTE37	Aircraft Vibration	Core	•	•	•				•	•		•	•		•	•		

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	College of Engineering Techniques
2. University Department/Centre	Al-kitab University
3. Course title/code& Description	Engineering & Numerical Analysis This course introduces the description of phenomena associated: **Engineering Analysis:** Topics covered: Laplace Transform method and solution of known Partial D.Es. **Numerical Analysis:** Topics covered: Numerical Methods, Finite Differences, Numerical Differentiation And Integration, Numerical Solution Of Partial Differential Equations, Numerical Double Integration, Trapezoidal Method, Simpson Method. The course is taught through 3 hrs per week, 2 theories, 1 tutorial.
5. Modes of Attendance offered	Annual System ; electronic system

6. Semester/Year	1st & 2nd / Academic Year 2022 – 2023
7. Number of hours tuition (total)	90 hrs. / 3 hrs. per week

9. Aims of the Course

- To learn the engineering student how to analyze the mechanical engineering problem and convert it into a mathematical model, then how to solve this equations theoretically to obtain the needed results for completing the design and solving the problem.
- To obtain an understanding of numerical methods and how they can be used to solve mechanical engineering problems.

10·Learning Outcomes

At the end of the class, the student will be able to:

19. Able to solve all the types of first order ordinary differential equations.
20. Able to analyze all the engineering problems after converting the physical problem to mathematical model then solving the resulting first order D.E.
21. Able to solve many types of the second order D.Es. using several types of mathematical tools.
22. Converting the problems concerning with the mechanical vibration systems into mathematical model in the form of D.E and the solving it.
23. Using the power series technique to solve the complicated D.E.
24. Able to use the Laplace Transformation technique to solve all the types of Ordinary D.E. for assisting to analyze the control operation on many mechanical systems.
25. Solving theoretically Partial D.E. especially the heat equation, laplace equation, wave equation, … etc.
26. Define numerical methods and numerical errors and distinguish between truncation and round-off errors, and evaluate the roots of algebraic equations.
27. Solve a system of linear equations by utilizing the direct and indirect methods.
28. Determine a continuous function which results in the best fit of experimentally measured values by using two general approaches for curve fitting: least-squares regression and interpolation.

29. Integrate and differentiate numerically any continuous function.
30. Solve numerically any ordinary differential equation by using Euler's or Runge-Kutta methods.
31. Find numerically the solution of the partial differential equation with its three types of elliptic, parabolic, and hyperbolic differential equations.
32. Engineering computations.
33. Organization of computations.
34. Error analysis and its relation to the numerical methods covered.
35. Understanding the implications of approximations.
36. Familiarization with MATLAB syntax and development environment, includingsoftware design.

11.Teaching and Learning Methods

6. Lectures.
7. Tutorials.
8. Homework and Assignments.
9. Tests and Exams.
10. electronic Questions and Discussions.

12. Assessment Methods

5. Homework. Assignment questions are provided so that students will have the opportunity to use the information provided in the lectures and textbooks and to test their degree of understanding of the discussed topics.
6. Quizzes. Topics discussed during the period shall be included in the quiz. This enables the students to develop self-confidence, accuracy and readiness for the major exams.
7. Major Exams. There will be two (2) major exams, i.e. midterm and final. All exams will be in-class, closed-book, and closed-notes.
8. Problem Sets (Exercises). Working on assigned problems is one way to gain detailed understanding of the topic and prepares the students to pass the examinations. There will be regular problem sets to be solved and to be submitted before the schedule of every major exam. While the students are encouraged to discuss the problem sets with their classmates, they must do the

exercises on their own. Copying someone else's work is unacceptable.

13. Grading Policy

5. Quizzes: There will be a (8 – 10) closed books and notes quizzes during the academic year. The quizzes will count 20% of the total course grade.
6. Tests, 2-3 Nos. and will count 10% of the total course grade.
7. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
8. Final Exam: The final exam will be comprehensive, closed books and notes.

14. Course Structure

Week	Hours	Unit / Module or Topic Title	Teaching Method	Assessment Method
1	3 2 the. 1 tut.	Laplace Transformations (L.T) - Introduction - Definition of L.T	Theoretical method	Electronic
2	3 2 the. 1 tut.	Inverse Laplace Transformations (I.L.T.) - Introduction - Definition of I.L.T	Theoretical method	Electronic
3	3 2 the. 1 tut.	Solution of differential equations using L.T - Method of solution – Examples	Theoretical method	Electronic
4	3 2 the. 1 tut.	Applications - Using L.T. for solving practical problems	Theoretical method	Electronic
5	3 2 the. 1 tut.	Solution of 2 nd order D.E. using power series method - Introduction - Solution near the ordinary point and singular point	Theoretical method	Electronic
6	3 2 the. 1 tut.	Bessel's equation + Legendre's equation - Introduction - Application of solution	Theoretical method	Electronic
7	3 2 the. 1 tut.	Solution of partial D.E - Definition - Methods of solution of P.D.E.	Theoretical method	Electronic
8	3 2 the. 1 tut.	Using of separation method - Definition of separation method – Examples	Theoretical method	Electronic
9	3 2 the. 1 tut.	Applications of heat transfer - Solution of unsteady one dimensional	Theoretical method	Electronic

		heat equation		
01	3 2 the. 1 tut.	Matrices - Introduction and definitions - Special matrices -Properties of matrices, Adj A, A -1	Theoretical method	Electronic
00	3 2 the. 1 tut.	- Rank of a matrix - Vectors - Linear transformation -	Theoretical method	Electronic
02	3 2 the. 1 tut.	Orthogonal transformation - Eigen values - Eigen vectors	Theoretical method	Electronic
03	3 2 the. 1 tut.	Solution of non- linear equations - Introduction - Application of non-linear equations	Theoretical method	Electronic
04	3 2 the. 1 tut.	Simple iteration method + Bisection method - Introduction - Description of methods – Examples	Theoretical method	Electronic
05	3 2 the. 1 tut.	Newton –Raphson method - Derivation - Applications Square Roots Roots of an arbitrary order Reciprocal of any number	Theoretical method	Electronic
06	3 2 the. 1 tut.	Solution of simultaneously linear equations - Definition of equations - Methods of solution	Theoretical method	Electronic
07	3 2 the. 1 tut.	Direct methods - Matrix inversion - Gauss-Elimination - Gauss - Jordan Elimination	Theoretical method	Electronic
08	3 2 the. 1 tut.	Indirect methods - Jacob's method - Gauss- Seidle method	Theoretical method	Electronic
09	3	Applications - Examples	Theoretical	Electronic

	2 the. 1 tut.	– problems	method	
21	3 2 the. 1 tut.	Curve fitting - linear Regression - Applications of linear regression - Transformation of nonlinear regression to linear regression	Theoretical method	Electronic
20	3 2 the. 1 tut.	Numerical interpolation - Introduction - Linear interpolation - Quadratic interpolation	Theoretical method	Electronic
22	3 2 the. 1 tut.	Finite differences method + Forward and Backward and center expressions - Introduction to finite differences method - Derivation of formulas with equal step size	Theoretical method	Electronic
23	3 2 the. 1 tut.	Newton and Lagrange forms - Using this method for equal segment and unequal segments	Theoretical method	Electronic
24	3 2 the. 1 tut.	Numerical differentiation - First derivative - Second derivative	Theoretical method	Electronic
25	3 2 the. 1 tut.	Numerical Integration - trapezoidal rule - Simpson Rule (1/3) - Simpson Rule(3/8)	Theoretical method	Electronic
26	3 2 the. 1 tut.	Two dimensions integration - Applications - Examples	Theoretical method	Electronic
27	3 2 the. 1 tut.	Solution of ordinary differential equations O.D.E. - Taylor series method - Simple Euler method	Theoretical method	Electronic

28	3 2 the. 1 tut.	- Modified Euler method - Runge-kutta method	Theoretical method	Electronic
29	3 2 the. 1 tut.	Finite differences method for solution of differential equations - Ordinary differential equations	Theoretical method	Electronic
31	3 2 the. 1 tut.	- Partial differential equations Elliptic equation Parabolic equation Hyperbolic equation	Theoretical method	Electronic

15. Infrastructure

Required reading:
· CORE TEXTS
· COURSE MATERIALS
· OTHER

References

6. Advanced Engineering Mathematics , by Erwin Kreyszig ,Tenth Edition, 2011.

7. Advanced Modern Engineering Mathematics, by Glyn James, Fourth Edition, 2011.

8. "Numerical Methods For Engineers"; by Steven C. Chapra, and Raymond P. Canale, McGraw-Hill, Sixth Edition, 2010.

9. "Numerical Analysis"; by G. Shanker Rao, New Age International Ltd., Third Edition, 2006.

10. "Numerical Analysis"; by Richard L. Burden, and J. Douglas Faires, Cengage Learning, Ninth Edition, 2011.

Others:

Collection of sheets of solved and unsolved problems and Exams questions

Special requirements (include for example workshops, periodicals ,IT software, websites)

- Available websites related to the subject.

Community-based facilities (include for example, guest Lectures , internship, field studies)	
16. Admissions	
Minimum number of students	
Maximum number of students	
17. Course Instructors	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

1. Teaching Institution	College of Engineering Techniques
2. University Department/Centre	Al-kitab University
3. Course title/code& Description	The general learning objective of this course is for students to develop a firm understanding of the basic principles describing the mathematics methods, and at the same time become generally proficient in applying these principles to practical engineering problems
5. Modes of Attendance offered	Annual System ; electronic system
6. Semester/Year	1st& 2nd / Academic Year 2022-2023
7. Number of hours tuition (total)	90 hrs. / 3 hrs. per week

9. Aims of the Course

1-improving student ability in mathematics which is the most important basic science in engineering studies.

2-Improving the academic abilities of the faculty and attracting highly skilled personnel.

3-Improve the abilities of management and technical support staff and attract the highly skilled for employment.

4-Cooperation, academic exchange programs, partnerships with other universities and academic centers in developed countries.

10·Learning Outcomes

a) An ability to apply knowledge of mathematics, science, and engineering.
b) An ability to function on multi-disciplinary teams.
c) An ability to identify, formulates, and solves mathematics problems.
d) An understanding of professional and ethical responsibility.
e) An ability to communicate effectively.
f) A recognition of the need for, and an ability to engage in life-long learning.
g) Knowledge of contemporary issues.
h) An ability to use knowledge and skills in mathematics practice.

11.Teaching and Learning Methods

1-. Lectures.
2- Tutorials
3- Homework and Assignments
4- Tests and Exams.
5- electronic Questions and Discussions.
6- Connection between Theory and Application.
.

12. Assessment Methods

1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students' Questionnaire about Curriculum and Faculty Member (Instructor).

13. Grading Policy

9. Quizzes: There will be a (8 – 10) closed books and notes quizzesduring the academic year. The quizzes will count 20% of the total

course grade.

10. Tests, 2-3 Nos. and will count 10% of the total course grade.
11. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.
12. Final Exam: The final exam will be comprehensive, closed books and notes.

14. Course Structure

Week	Hours	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	3 2 the. 1 tut.	General Concepts, Slope - Cartesian Coordinates - Slope of a line - Equations and distances	Theoretical method	Electronic
2	3 2 the. 1 tut	Graphing of functions, Limits - Graphs of equations - Limits and intervals	Theoretical method	Electronic
3		Continuity - Domain and Range - Continuity test	Theoretical method	Electronic
4	3 2 the. 1 tut	Matrices - Elementary Operations with matrices and Vectors	Theoretical method	Electronic
5	3 2 the. 1 tut	Determinants and Properties - Transpose and inverse of matrices	Theoretical method	Electronic
6	3 2 the. 1 tut	Solution of System of Equations - Solution of system of equations using Gramer's rule method	Theoretical method	Electronic
7	3 2 the. 1 tut	Complex Numbers - Introduction to complex numbers	Theoretical method	Electronic
8	3 2 the. 1 tut	Mathematical Operations for Complex Numbers - Argrand diagrams and product quotients	Theoretical method	Electronic
9	3 2 the. 1 tut	Demaiver's Theorem - Powers and roots	Theoretical method	Electronic
01	3 2 the. 1 tut	Trigonometric functions - Trigonometric functions - Properties - Rules - Graphing	Theoretical method	Electronic
00	3 2 the. 1 tut	Inverse trigonometric functions - Applications - Rules - Properties	Theoretical method	Electronic
02	3 2 the. 1 tut	Logarithmic and exponential functions - Logarithmic and exponential functions - Properties – Rules	Theoretical method	Electronic

03	3 2 the. 1 tut	Hyperbolic functions - Graphing - Properties – Rules	Theoretical method	Electronic
04	3 2 the. 1 tut	Inverse hyperbolic functions - Properties - Rules – Graphing	Theoretical method	Electronic
05	3 2 the. 1 tut	Derivatives of functions - Rules of derivatives - Chain rule - Implicit derivatives	Theoretical method	Electronic
06	3 2 the. 1 tut	Derivatives of logarithmic and exponential functions - Rules of derivatives of logarithmic and exponential functions	Theoretical method	Electronic
07	3 2 the. 1 tut	Derivatives of trigonometric functions - Derivatives of trigonometric and inverse trigonometric functions	Theoretical method	Electronic
08	3 2 the. 1 tut	Derivatives of hyperbolic functions - Derivatives of hyperbolic and Inverse hyperbolic functions	Theoretical method	Electronic
09	3 2 the. 1 tut	Application of Derivatives - L'Hapital rule - Velocity and acceleration - Max. and Min. - Point of inflection	Theoretical method	Electronic
21	3 2 the. 1 tut	Indefinite Integrals - Integration formulas - Integration of logarithmic and exponential functions	Theoretical method	Electronic
20	3 2 the. 1 tut	Integrals of functions - Trigonometric and inverse trigonometric functions	Theoretical method	Electronic
22	3 2 the. 1 tut	Integrals of other functions - Hyperbolic and Inverse hyperbolic functions	Theoretical method	Electronic
23	3 2 the. 1 tut	Methods of Integration - Integration by parts - Integration for odd and even powers of sine and cosine	Theoretical method	Electronic
24	3 2 the. 1 tut	Integration of Trigonometric Substitutions - Trigonometric Substitutions - Integral involving a x 2 + b x + c	Theoretical method	Electronic
	3 2 the. 1 tut	Integration of Partial fractions and Rational functions - Partial fractions - Rational functions of sinx and cosx and other trigonometric	Theoretical method	Electronic

		functions		
26	3 2 the. 1 tut	Applications of Integration - Definite integral and area	Theoretical method	Electronic
27	3 2 the. 1 tut	General Substitutions - Length of the curve and surface area	Theoretical method	Electronic
28	3 2 the. 1 tut	Triple Integrals (volume) - Triple Integrals (volume)	Theoretical method	Electronic
29	3 2 the. 1 tut	Double Integrals - Area between two curves	Theoretical method	Electronic
31	3 2 the. 1 tut	General Substitutions and quiz - Quiz, answers and solutions	Theoretical method	Electronic

15. Infrastructure

Required reading:
· CORE TEXTS
· COURSE MATERIALS
· OTHER

Textbook

Mathematics -Saad Al-Jumaily

References

1- Thomas' Calculus ,7th Edition
2- Any related Websites ,which facilitate the materials to the students such as :
-calculus@math.ucdavis.edu.
- www.zweigmedia.com/
-www.gigapediA.org

16. Admissions

Pre-requisites	
Minimum number of students	
Maximum number of students	

17. Course Instructors

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	Collage of technical engineering technical Engineering Department
2. University Department/Centre	Aeronautical Technical Engineering
3. Course title/code & Description	Engineering Mechanics/ME102 This course introduces the description of Newtons, laws. Topics covered: Equilibrium of particles and rigid body in two dimensions and three dimension, study equilibrium of some practical structures such as truss, frame and machines also study friction force and some its application as in screw and belts. While in dynamic analyses the kinematics and kinetics of particles in 2and 3 dimensions and rigid body in two

	dimension . The course is designed to provide a background to higher level courses involving forces , stress analysis and dynamic. The course is taught through 5 hrs per week, 4theories and 1 tutorial.
4. Programme(s) to which it Contributes	B.Sc. in Aeronautical Technical Engineering
5. Modes of Attendance offered	Annual System ; There is only one mode of delivery, which is a "Day Program". The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects. mode.
6. Semester/Year	1st & 2nd / Academic
7. Number of hours tuition (total)	150 hrs. / 5 hrs. per week
8. Date of production/revision of this specification	April – 3 /
9. Aims of the Course	
1- Introduce basic definitions and introductory concepts of statics and dynamics. 2- give a review to vectors analyses 3- give the principles of force system in 2and 3 dimensions and kinematics of particles and rigid body in two and three dimensions. 4- explain Newton laws for equilibrium of particles and rigid body in two and three dimensions and kinetics of particles in two and three dimensions and rigid body in two dimensions. mechanics. The student will have a base that make him capable to study and deal with more advance subjects that concerns engineering structures design under different load conditions.	

10· Learning Outcomes

1. Understand the methods for calculating force system.
2. Analyze body and structures equilibrium.
3. Analyze and understand the procedures to calculate the center and center of gravity of a body and second moment of area and mass.
4. Understand the methods for investigation kinematics of particles and rigid body.
5. Understand the methods for investigation kinetics of particles and rigid body.
6. Be able to apply modern knowledge and to apply mathematics ,science, engineering and technology to engineering mechanics problems and applications.
7. Work in groups and function on multi-disciplinary teams.
8. Identify, formulate and solve engineering mechanics problems.
9. Understand professional, social and ethical responsibilities.
10. Communicate effectively.

11. Teaching and Learning Methods

1. Lectures.
2. Tutorials.
3. Homework and Assignments.
4. Tests and Exams.
6. In-Class Questions and Discussions.
7. Connection between Theory and Application.
8. In- and Out-Class oral conservations.

12. Assessment Methods :

1. Examinations, Tests, and Quizzes.
2. Student Engagement during Lectures.
3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor).

13. Grading Policy

1. Quizzes:

- There will be a (20 – 25) closed books and notes quizzes during the academic semester. The quizzes will count 30% of the total course grade.

2. Final Exam:

- The final exam will be comprehensive, closed books and notes, and will take place on January 2018 from 9:00 AM - 12:00 PM

in rooms (M12 + M13)
- The final exam will count 70% of the total course grade

14. Course Structure

Week	Hours per week	LOs (Article 10)	Unit/Module or Topic Title	Teaching Method	Assessment Method
1	5 2stat. 2dyn. 1tut.	1,4,5,6, 7,8,9,10	**Vectors analysis & international system of units** Dynamics of particles, introduction	1-8 of article 11	1-3 of article 12
2	5 2stat. 2dyn. 1tut.	1,4,5,6, 7,8,9,10	**Force system in two dimensions** Dynamics of particles, introduction	1-8 of article 11	1-3 of article 12
3	5 2stat. 2dyn. 1tut.	1,6,7,8, 9,10	**Force system in two dimensions** Kinematics of particles, rectilinear motion	1-8 of article 11	1-3 of article 12
4	5 2stat. 2dyn. 1tut.	1,4,5,6, 7,8,9,10	**Force system in three dimensions** Kinematics of particles, rectilinear motion	1-8 of article 11	1-3 of article 12
5	5 2stat. 2dyn. 1tut.	1,4,5,6, 7,8,9,10	**Exam+ Force resultants in three dimensions** Kinematics of particles, curvilinear motion, normal and tangential coordinates	1-8 of article 11	1-3 of article 12
6	5 2stat. 2dyn. 1tut.	1,4,5,6, 7,8,9,10	**Moment system resultants in three dimensions** Kinematics of particles, curvilinear motion, normal and tangential coordinates	1-8 of article 11	1-3 of article 12
7	5 2stat. 2dyn. 1tut.	1,4,5,6, 7,8,9,10	**Exam+Force system resultants in three dimensions** Kinematics of particles polar coordinates (r-Θ)	1-8 of article 11	1-3 of article 12
8	5 2stat. 2dyn. 1tut.	1,4,5,2, 6,7,8,9, 10	**Equilibrium of particles -2Dim.** Kinematics of particles polar coordinates (r-Θ)	1-8 of article 11	1-3 of article 12
9	5 2stat. 2dyn. 1tut.	1,4,5,2, 6,7,8,9, 10	**Equilibrium of particles -2Dim.** Dependent Motion and Relative Motion	1-8 of article 11	1-3 of article 12

01	5 2stat. 2dyn. 1tut.	1,4,5,2, 6,7,8,9, 10	**Exam+Equilibrium of particles-3Dim.** Dependent Motion and Relative Motion	1-8 of article 11	1-3 of article 12
00	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Equilibrium of particles-3Dim.** Work and Kinetics energy, Potentialenergy	1-8 of article 11	1-3 of article 12
02	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Equilibrium of rigid body- 2Dim.** Work and Kinetics energy, Potentialenergy	1-8 of article 11	1-3 of article 12
03	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Equilibrium of particles -2Dim.** Kinetics of particles, Force, mass, andacceleration	1-8 of article 11	1-3 of article 12
04	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Exam+Equilibrium of particles-3Dim.**Kinetics of particles, Force, mass, and acceleration	1-8 of article 11	1-3 of article 12
05	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Equilibrium of rigid body-3Dim.** Plane kinematics of rigid bodies, rotation	1-8 of article 11	1-3 of article 12
06	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Equilibrium of rigid body-3Dim.** Plane kinematics of rigid bodies, rotation	1-8 of article 11	1-3 of article 12
07	5 2stat. 2dyn. 1tut.	1,3,4,5, 6,7,8,9, 10	**Exam+Center of gravity and Centroid** Plane kinematics of rigid bodies, absolute motion	1-8 of article 11	1-3 of article 12
08	5 2stat. 2dyn. 1tut.	1,3,4,5, 6,7,8,9, 10	**Center of gravity and Centroid** Plane kinematics of rigid bodies, absolute motion	1-8 of article 11	1-3 of article 12
09	5 2stat. 2dyn. 1tut.	1,3,4,5, 6,7,8,9, 10	**Center of gravity and Centroid** Relative velocity, Instantaneous center of zero velocity	1-8 of article 11	1-3 of article 12
21	5	1,4,5,6,	**Exam+Moment of Inertia of area** Relative velocity, Instantaneous center of	1-8 of	1-3 of

	2stat. 2dyn. 1tut.	7,8,9,10	zero velocity	article 11	article 12
20	5 2stat. 2dyn .1tut.	1,3,4,5, 6,7,8,9, 10	**Moment of Inertia of area** Relative acceleration, Motion relative to rotating axes	1-8 of article 11	1-3 of article 12
22	5 2stat. 2dyn .1tut.	1,3,4,5, 6,7,8,9, 10	**Moment of Inertia of area** Relative acceleration, Motion relative to rotating axes	1-8 of article 11	1-3 of article 12
23	5 2stat. 2dyn .1tut.	1,3,4,5, 6,7,8,9, 10	**Exam+Moment of Inertia of Mass** Work and energy, Virtual work	1-8 of article 11	1-3 of article 12
24	5 2stat. 2dyn .1tut.	1,3,4,5, 6,7,8,9, 10	**Moment of Inertia of Mass** Work and energy, Virtual work	1-8 of article 11	1-3 of article 12
25	5 2stat. 2dyn .1tut.	1,3,4,5, 6,7,8,9, 10	**Moment of Inertia of Mass** Impulse an momentum equations	1-8 of article 11	1-3 of article 12
26	5 2stat. 2dyn .1tut.	1,2,4,5, 6,7,8,9, 10	**Exam+Truss analysis-2Dim.** Impulse an momentum equations	1-8 of article 11	1-3 of article 12
27	5 2stat. 2dyn .1tut.	1,2,4,5, 6,7,8,9, 10	**Truss analysis-2Dim.** Plane kinetics of rigid bodies, Translation, Fixed- axes rotation, General plane motion	1-8 of article 11	1-3 of article 12
28	5 2stat. 2dyn. 1tut.	1,2,4,5, 6,7,8,9, 10	**Truss analysis-2Dim.** Plane kinetics of rigid bodies, Translation, Fixed- axes rotation, General plane motion	1-8 of article 11	1-3 of article 12

29	5 2stat. 2dyn.1tut.	1,2,4,5, 6,7,8,9, 10	**Exam+Friction analysis** Plane kinetics of rigid bodies, Translation, Fixed- axes rotation, General plane motion	1-8 of article 11	1-3 of article 12
31	5 2stat.	1,2,4,5, 6,7,8,9,	**Friction analysis** Plane kinetics of rigid bodies, Translation, Fixed- axes rotation,	1-8 of article 11	1-3 of article 12

	2dyn. 1tut.	10	General plane motion		

15. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	**1- Engineering Mechanics (Statics) by R.C. Hibbler and S.C. Fan 1997.** **2- Engineering Mechanics (Statics) by J.L. Meriam and L.G. Kriage 2002.** **3- Vector analysis for engineers(statics) by Fedinand P.Beer,E. Russell Johunston and Elliot R. Eisenberg 2004.** **4- Meriam, J. L and Kraige, L. G, Engineering Mechanics: Vol 1. Statics and Vol 2.Dynamics, Wiley Student Edition** **5- Engineering Mechanics (Dynamics) by Beer** **6- Bedford, A., and Fowler, W., *Engineering Mechanics: Dynamics*, Prentice Hall, Fourth Edition,** **7- Example Problems (optional; available at University Copying Center and course website)** **8- Lecture Notes Powerpoint files (available at the course website)** **9- Beer, F. P. and Johnston, E. R. Vector Mechanics for Engineers: Statics and Dynamics, TATA McGraw-Hill**
Special requirements (include for example workshops, periodicals, IT software, websites)	• Available websites related to the subject. • Extracurricular activities.

Community-based facilities (include for example, guest Lectures , internship , field studies)	Extra lectures by foreign guest lecturers.
16. Admissions	
Pre-requisites	Mechanical Physics and mathematics
Minimum number of students	/
Maximum number of students	72
17. Course Instructors	

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TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program .

1. Teaching Institution	College of Technical Engineering University of Al-kitab
2. University Department/Centre	Aeronautical Technical Engineering college
3. Program Title	Introduction to Aircraft Design science This course introduces the description of phenomena associated with airplane desing, wings, airfoils, Fuselage design, Tile Design, .undercarriage design The course is taught through 4hrs per week
4. Title of Final Award	Mechanical Aeronautical Technical Engineering
5. Modes of Attendance offered	Annual System ; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.
6. Accreditation	60 hrs. / 4 hrs. per week
7. Other external influences	
8. Date of production/revision of this specification	25-10-2021
9. Aims of the Program: To study the principles of aircraft design.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

At the end of the class, the student will be able to know fundamentals of aircraft design.

Teaching and Learning Methods

-Lectures.1
-Homework and Assignments.2 .
-Tests and Exams.3 .
-In-Class Questions and Discussions.4 .
-Connection between Theory and Application.5 .
.In- and Out-Class oral conservations -6

Assessment methods

.Examinations, Tests, and Quizzes
.Extracurricular Activities .
Student Engagement during Lectures .

Teaching and Learning Methods

Grading Policy .03
Quizzes-0
There will be a (8) closed books and notes quizzes during the academic year in -
Introduction to aeronautical science
The quizzes will count 30% of the total course grade -
-Final Exam:2
The final exam will be comprehensive, closed books and notes, and will take place on -
))June 2022 from 9:00 AM - 12:00 PM
,The final exam will count 50% of the total course grade -

14. Course Structure

Week	Contents
1	Introduction Design and development of aircraft - Design stages - - Preliminary design department
2	Airworthiness Definition - BCAR - FAR - Crash airworthiness -
3, 4, 5	Fuselage design Main characteristics - Fuselage design requirements - Shape of fuselage - Cabin cross section layouts - Cabin cross-section dimensions - Cabin length - Cockpit - Fuselage main dimensions - Quick method General method Fuselage weight -
6, 7, 8, 9	Wing design Basic requirements - Wing location - Wing geometric characteristics - Evaluation of wing size - Evaluation of SMC - Evaluation of MAC - Analytical method - Graphical method -

	Diagrammatical method - Airfoils, requirements & definitions - Airfoils coding - High lift devices - Wing aerodynamic characteristics - Lift coefficient increment due to - T.E. flaps Split flaps Single slotted flaps Double slotted flaps Wing weight -
10, 11	Empennage design Tail surfaces functions - Types of surface control system - Tail surface configuration - Horizontal tail plane - Vertical tail plane - Empennage weight -
12, 13, 14	Under-carriage design General requirements - Runways classification - Types of undercarriage - Tailoring u.c. to bearing capacity of A/F - LCN For single wheel - LCN For two or more wheels - Type, size and inflation pressure of tires - Shock absorption. Leg length - Ground load factor - Ground load cases - Structural load cases - Weight of u.c -
15, 16	Preliminary weight analysis Weight break down - Surface controls group -

	Engine section or nacelle group - Propulsion group. Engine weight -)dry(Airframe services and equipments - Operational loads - Crew weight - Payload - Fuel weight (based on flight stages) - Fuel weight (based on aircraft type) (calculation by using -)graphics
17, 18, 19	Choice of engines Take off stages - Computing of static thrust - Computing minimum required thrust - Center of gravity Evaluation of aircraft center of - gravity Loading and balancing diagram - Wing location according to aircraft center of gravity -
20	Payload-range diagram Limiting weight definitions - For turbo-jet aircraft - For turbo-prop aircraft -
21, 22, 23	Flight and gust envelope Load factor - Load factor at steady pullout - Load factor at correctly banked turn - Flight envelope - Gust envelope - Flight - gust envelope - 32 Wing and tail loads (for flight-gust)envelope

	Aircraft pitching moment of inertia - Load calculation at level flight with angular acceleration -
24, 25, 26	Span wise air and inertia load distribution Air load distribution - Schrenk method Air load distribution - Diederich method Wing group inertia load distribution - Fuselage group inertia load distribution -
27, 28, 29	Drag estimation :Area drag method - Wing Empennage Fuselage Area drag method: Cockpit Undercarriage - Nacelle Wing/fuselage interference Empirical method for cruising stage - Induced drag coefficient of wing with part-span flap -
30	Structural design Aircraft main part structural - design

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1-Aircraft Design Project for engineering student Lloyd R. Jenkinson James F. Marchman III Third edition 2-Aircraft Design Ajoy Kumar Kundu 3-Aircraft Design A Conceptual App Daniel P. Raymer OTHERS
Special requirements (include forexample workshops, periodicals,IT software, websites)	•□Available websites related to the subject.
Community-based facilities (include for example, guest Lectures , internship,field studies)	•□Field and scientific visits
16. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	
17. Course Instructors	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

1. Teaching Institution	College of Technical Engineering University of Al -kitab
2. University Department/Centre	Aeronautical Technical Engineering college
3. Program Title	Introduction to Gas Dynamics (incompressible Fluid Flow) science This course introduces the description of phenomena associated with airplane design, wings, airfoils, Fuselage design, Tile Design, .undercarriage design The course is taught through 4hrs per week
4. Title of Final Award	Mechanical Aeronautical Technical Engineering
5. Modes of Attendance offered	Annual System; There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.
6. Accreditation	60 hrs. / 4 hrs. per week
7. Other external influences	
8. Date of production/revision of this specification	25-10-2021
9. Aims of the Program: To study the principles of aircraft design.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods
At the end of the class, the student will be able to know fundamentals of aircraft design.
Teaching and Learning Methods
-Lectures.1 -Homework and Assignments.2 . -Tests and Exams.3 . -In-Class Questions and Discussions 4. -Connection between Theory and Application.5 . .In- and Out-Class oral conservations -6
Assessment methods
.Examinations, Tests, and Quizzes . Extracurricular Activities. Student Engagement during Lectures.
Teaching and Learning Methods
Grading Policy .03 Quizzes-0 There will be a (8) closed books and notes quizzes during the academic year in - Introduction to aeronautical science The quizzes will count 30% of the total course grade - -Final Exam:2 The final exam will be comprehensive, closed books and notes, and will take place on -))June 2022 from 9:00 AM - 12:00 PM ,The final exam will count 50% of the total course grade -

14. Course Structure	
Week	Contents
1, 2, 3,	Introduction to Compressible Flow

	2 3 Basic Equation of Compressible Flow :Conservation of mass .Conservation of energy .Conservation of momentum .st law of thermodynamics1 .nd law of thermodynamics3 .Equation of State Thermodynamics Relations
4	Wave Propagation Wave formulation
5, 6	Isentropic flow of a perfect gas in varying area duct .Equations of motion Stagnation concept and relations
7, 8, 9, 10, 11	Subsonic and Supersonic Flow through a Varying Area Channels Isentropic Table Isentropic Flow in Converging Nozzles Isentropic Flow in Converging–Diverging Nozzles
12, 13, 14, 15	Thrust of Rocket Engine Stationary Normal Shock Waves; partI Formation of a Normal Shock Wave Equations of Motion for a Normal Shock Wave
16, 17, 18, 19, 20	Under-carriage designStationary Normal Shock Waves; part 2 Area ratio Entropy Change Velocity Change Normal shock in converging–diverging nozzles Converging–Diverging Supersonic Diffusers Shock absorption. Leg length -
21, 22, 23, 24, 25	Supersonic Wind Tunnel Moving Normal Shock Waves .Reflected Waves Shock Tube Oblique Shock Waves Equations of Motion for a Straight Oblique Shock Wave

	Detached shock Wave Oblique Shock Reflections Conical Shock Waves .Supersonic oblique Shock Diffuser
26, 27	Prandtl Meyer Flow Thermodynamic Considerations Gradual Compressions and Expansions Flow Equations for a Prandtl Meyer Expansion Fan Plug, Under expanded and Overexpanded Supersonic Nozzles Exit Flow for Under expanded and Overexpanded Supersonic Nozzles Plug Nozzle
28, 29, 30	Supersonic Airfoils Supersonic lift and drag coefficients .Existence of an Oblique Shock and an Expansion Fan 32 Fanno flow-Part 1 Working Relations for Fanno Flow Reference state and Fanno Flow Table 23 Fanno Flow-Part 2 Fanno Flow line Friction factor Fanno Flow through a Nozzle-Duct System Converging–Diverging Nozzle and Duct Combination

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1-Compressible fluid flow by Michel Saad 2- Compressible fluid flow By Shapirrow 3- Compressible fluid dynamics By Philip a. Thompson
Special requirements (includefor example workshops, periodicals, IT software, websites)	•□Available websites related to the subject.
Community-based facilities (include for example, guest Lectures , internship, field studies)	•□Field and scientific visits
16. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	
17. Course Instructors	

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program .

1. Teaching Institution	College of Technical Engineering University of Al-kitab
2. University Department/Centre	Aeronautical Technical Engineering college
3. Program Title	Introduction to Dynamics of Mechanics science This course introduces the description of phenomena associated with Dynamics of .objects, Newton's lows , relative motion The course is taught through 3hrs per week
4. Title of Final Award	Mechanical Aeronautical Technical Engineering
5. Modes of Attendance offered	Annual System ; There is only one mode of delivery, which is a "Day Program". The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.
6. Accreditation	60 hrs. / 3 hrs. per week
7. Other external influences	
8. Date of production/revision of this specification	25-10-2021
9. Aims of the Program: To study the principles of aircraft design.	

10. Learning Outcomes, Teaching, Learning and Assessment Methods

At the end of the class, the student will be able to know fundamentals of aircraft design.

Teaching and Learning Methods

-Lectures.1
-Homework and Assignments.2 .
-Tests and Exams.3 .
-In-Class Questions and Discussions.4 .
-Connection between Theory and Application.5 .
.In- and Out-Class oral conservations -6

Assessment methods

.Examinations, Tests, and Quizzes
.Extracurricular Activities .
Student Engagement during Lectures .

Teaching and Learning Methods

Grading Policy .03
Quizzes-0
There will be a (8) closed books and notes quizzes during the academic year in - Introduction to aeronautical science
The quizzes will count 30% of the total course grade -
-Final Exam:2
The final exam will be comprehensive, closed books and notes, and will take place on -))June 2022 from 9:00 AM - 12:00 PM
,The final exam will count 50% of the total course grade -

14. Course Structure

Week	Contents
1, 2, 3,4	Rectilinear motion Curvilinear motion x-y coordinates- Normal – tangential coordinates- -Polar – coordinates Thermodynamics Relations
5	Relative motion Motion relative to a frame in translation-
6, 7, 8	Kinetics of particles Newton's 2nd law- rectilinear motion - curvilinear motion - Work and energy of particles Work of a force-
9, 10, 11, 12, 13	Work and energy Kinetic energy of a particle- Potential energy- Impulse and momentum of particles Impulsive motion- Angular momentum of a particle- Conservation of liner momentum liner impact-
14, 15, 16	Conservation of momentum Conservation of angular momentum- impact- Impulse and momentum of particles-
17, 18	Angular momentum Rate of changed of angular momentum- Conservation of angular momentum-
19, 20	Kinematics of rigid bodies Translation of rigid bodies-

	Rotation of rigid bodies- .
21, 22, 23, 24	Absolute motion General motion- Absolute and relative velocity in plane motion- Instantaneous center of rotation- Absolute and relative acceleration-
25, 26, 27, 28, 29, 30	Moment of inertiaMass moment of inertia- Force/mass/acceleration Force/mass/acceleration for rigid bodies- Work and energy Work for rigid bodies- Energy for rigid bodies- Impulse and momentum Impulse for rigid bodies- Momentum for rigid bodies-

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	1-Mechanics of dynamics By Meriam 2- Mechanics principle By Khourmi
Special requirements (includefor example workshops, periodicals, IT software, websites)	•□Available websites related to the subject.
Community-based facilities (include for example, guest Lectures , internship, field studies)	•□Field and scientific visits
16. Admissions	
Pre-requisites	
Minimum number of students	
Maximum number of students	
17. Course Instructors	

TEMPLATE FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification.

1. Teaching Institution	Technical engineering collage
2. University Department/Centre	Aeronautical Eng. Dep
3. Course title/code& Description	**Jet Proportion / ME310** Jet propulsion theory, Axial single and multi-stage compressors, Centrifugal compressors, Axial Turbines, Air intake , Combustion Chamber, Nozzles, afterburning , Thrust Augmentation, Machining technique, rocket engine
4. Program(s) to which itContributes	B.Sc in Mechanical Engineering
5. Modes of Attendance offered	Annual system. There is only one mode of delivery, which is a day program. The students are full time students and on campus. They attend a fill day program on face to face mode. The academic year is composed of 30 weeks regular subjects.
6. Semester/Year	2021-2022
7. Number of hours tuition (total)	150 hours / 3 hours per week

8. Date of production/revision of this specification	Nov-1-2021

9. Aims of the Course

Study principles of jet propulsion theory and the types of jet engines based on their thermodynamic characteristics and the main parts of these engines.
Understand the main design criteria that have to be taken under consideration for such type of engines.

10·Learning Outcomes

9. Understand the main fundamental laws that are used in propulsion theory.
10. Study the physical phenomena of the of the main jet engine items.
11. Understand the main principles that are used for jet engines classification and main characteristics of each type..
12. Study the main characteristics of the axial compressors and their elementary theory based on thermodynamic properties of the fluid and the interaction of these properties with their dynamic features along its passage through the rotor and stator stages.
13. Study the main characteristics of the centrifugal compressors and their elementary theory based on thermodynamic properties of the fluid and the interaction of these properties with their dynamic features along its passage through the rotor and stator stages.
14. Study the main characteristics of the axial turbines and their elementary theory based on thermodynamic properties of the fluid and the interaction of these properties with their dynamic features along its passage through the rotor and stator stages.
15. Study the main characteristics of the Air intake and their elementary theory based on thermodynamic properties
16. Study the main characteristics of the Combustion chamber and afterburner and their elementary theory based on thermodynamic properties
17. Study the main characteristics of the Nozzles and their elementary theory based on thermodynamic properties
18. study of the machining technique. between compressor and turbine
19. Study of the thrust augmentation characteristics .

11.Teaching and Learning Methods

1. Lectures
2. Tutorials.
3. Home works.
4. Lab experiments
5. Tests and Exams
6. Seminars.
7. Reports.

12. Assessment Methods

1. Examinations, tests and quizzes.
2. Student engagement during lectures.
3. Responses obtained from students according to lecturer questionnaires.

13. Grading Policy

1. Quizzes:
- There will be eight quizzes during the academic year. The quizzes will counts 20 degrees of the total course grade.
2. Exams:
- There will be two closed books and notes exam during the academic year. This exam is executed on the mid-term. It counts 20% of the total course grade.
3. Final Exam:
- The final exam will be comprehensive, closed books and notes. It counts 46% of the total course grade.

GRADING UNITS:

Comprehensive Course Exam	40%
Quizzes	10%
Final Course Exam	50%
Total	100%

14. Course Structure

Week	hours	LO,s article 12	Unit/ model of topic title	Teaching method	Assessment method
1	4 2 theo 1 tutotial 1 exp.	10-1	Jet propulsion theory, The fundamental laws	1-7 of article 11	1-3 of article 12
2	4 2 theo 1 tutotial 1 exp.	10-1	Thrust equation, Fundamentals of jet engines	1-7 of article 11	1-3 of article 12
3	4 2 theo 1 tutotial 1 exp.	10-2	History of Propulsion Devices and Turbo-machines	1-7 of article 11	1-3 of article 12
4	4 2 theo 1 tutotial 1 exp.	10-2	Thermodynamic Cycles	1-7 of article 11	1-3 of article 12
5	4 2 theo 1 tutotial 1 exp.	10-3	Classification of engines types, Ramjet, Turbojet, Turbofan	1-7 of article 11	1-3 of article 12
6	4 2 theo 1 tutotial 1 exp.	10-3	Classification of engines types, Ramjet, Turbojet, Turbofan	1-7 of article 11	1-3 of article 12
7	4 2 theo 1 tutotial 1 exp.	10-4	Propulsion Measures, Power Generation Measures	1-7 of article 11	1-3 of article 12
8	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Ram Jet	1-7 of article 11	1-3 of article 12
9	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Ram Jet	1-7 of article 11	1-3 of article 12
01	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Ram Jet	1-7 of article 11	1-3 of article 12
00	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Ram Jet	1-7 of article 11	1-3 of article 12
02	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Jet Engine	1-7 of article 11	1-3 of article 12
03	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Jet Engine	1-7 of article 11	1-3 of article 12

04	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Jet Engine	1-7 of article 11	1-3 of article 12
05	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Jet Engine	1-7 of article 11	1-3 of article 12
06	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Turbo Fan	1-7 of article 11	1-3 of article 12
07	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Turbo Fan	1-7 of article 11	1-3 of article 12
08	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Turbo Fan	1-7 of article 11	1-3 of article 12
09	4 2 theo 1 tutotial 1 exp.	10-5	Engine Cycle Analysis: Turbo Fan	1-7 of article 11	1-3 of article 12
21	4 2 theo 1 tutotial 1 exp.	10-6	Axial single and multi-stage compressors	1-7 of article 11	1-3 of article 12
20	4 2 theo 1 tutotial 1 exp.	10-6	Axial single and multi-stage compressors	1-7 of article 11	1-3 of article 12
22	4 2 theo 1 tutotial 1 exp.	10-6	Axial single and multi-stage compressors	1-7 of article 11	1-3 of article 12
23	4 2 theo 1 tutotial 1 exp.	10-6	Axial single and multi-stage compressors	1-7 of article 11	1-3 of article 12
24	4 2 theo 1 tutotial 1 exp.	10-7	Centrifugal compressors	1-7 of article 11	1-3 of article 12
25	4 2 theo 1 tutotial 1 exp.	10-7	Centrifugal compressors	1-7 of article 11	1-3 of article 12
26	4 2 theo 1 tutotial 1 exp.	10-7	Centrifugal compressors	1-7 of article 11	1-3 of article 12
27	4 2 theo 1 tutotial 1 exp.	10-7	Centrifugal compressors	1-7 of article 11	1-3 of article 12
28	4 2 theo 1 tutotial 1 exp.	10-8	Axial Turbines	1-7 of article 11	1-3 of article 12

29	4 2 theo 1 tutotial 1 exp.	10-8	Axial Turbines	1-7 of article 11	1-3 of article 12
31	4 2 theo 1 tutotial 1 exp.	10-8	Axial Turbines	1-7 of article 11	1-3 of article 12

15. Infrastructure

Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	**1. Fundamentals of Jet Propulsion and their applications / Roland D. Flack, CAMBRIDGE University press /1st printing/ 2005** **References:** **1. Mechanics and thermodynamics of propulsion / Philip G. Hill $ Carl R Peterson/ ADDISON WEISLY publishing company / 3rd printing / 1970**
Special requirements (include for example workshops, periodicals ,IT software, websites)	1. Experimental tests in Heat and Fluid Labs. 2. Available websites related to subject.
Community-based facilities (include for example, guest Lectures , internship, field studies)	1. Demonstrations related to practical examples. 2. Scientific visits.

16. Admissions

Pre-requisites	202 & ME203
Minimum number of students	/
Maximum number of students	1

17. Course Instructors

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CRITERIA FOR A SUCCESSFUL REVIEW AND EVALUATION OF THE PROCESS

CRITERIA FOR A SUCCESSFUL REVIEW

1. The criteria for a successful review that informs the arrangements for Program Review andits evaluation are as follows:
    i. The program being reviewed is supported by existing or developing internal systems including specifications and review with a culture of self-evaluation and continuing improvement. These features of internal review provide a sound basis for the external review.
    ii. The timing of the external review is appropriate.
    iii. The profile of the visiting peer review panel matches in broad terms the profile of the academic activities in the institution.
    iv. There is due attention to detail in planning and preparation, by -
        a. The Quality Assurance and Academic Accreditation Directorate applies consistently its procedures for working with the institution and the reviewers and provides appropriate support for the external review as required
        b. The review coordinator: ensures that the evidence base generated by internal review and reporting systems is available on time to the visiting peer reviewers, and any requirements for clarification and supplementary information are satisfied
        c. The institution: provides a self-evaluation report for the program to be externally reviewed
        d. The peer reviewers: undertake their preparation for the visit including reading the advance documentation and preparing initial commentaries that inform the conduct of the visit
    v. There is consistency in the application of the published review method and the protocols by all participants in a way that respects and supports the mission and philosophy of the overall process for continuing review and continuing improvement.
    vi. Reviewers and representatives of the institution conduct an open dialogue throughout the review that shows mutual respect.
    vii. The judgements reached by the reviewers are clear, based on the evidence available and systematically recorded.
    viii. The review report is produced on time in line with the standard report structure and is confirmed by the institution to be factually accurate.
    ix. The set of conclusions arising from the review are constructive, offering a fair and balanced view of the program.
    x. The institution is able to benefit from the external review by giving due reflection and consideration to the findings and preparing where appropriate a realistic improvement plan

EVALUATION

2. The Quality Assurance and Academic Accreditation Directorate wishes to establish and implement procedures for the systematic evaluation of all external Program Reviews arranged by it. The institution, the review chairperson and the peer reviewers will all routinely be asked to evaluate each external review by completing a short questionnaire. The structured comments will be analyzed by the Quality Assurance and Academic Accreditation Directorate and where necessary the Quality Assurance and Academic Accreditation Directorate will take action to follow-up any difficulties highlighted. In addition, the Quality Assurance and Academic Accreditation Directorate will collate the structured comments to compile regular summary reports indicating the main features of the review process in practice, including the

overall levels of satisfaction expressed by the participants, together with examples of good practice and opportunities for continuing improvement.

GLOSSARY OF TERMS IN PROGRAMME RE-VIEW

DEFINITIONS OF TERMS USED IN THE PROGRAMME REVIEW HANDBOOK

Some of the terms used in the Handbook and/or used in internal and external review and reporting may have different meanings according to the context in which they are used. To remove possible ambiguities, the following working definitions of the terms are offered.

ADEMIC FIELDS/SUBJECT AREAS/DISCIPLINES

Academic fields categorise recognisable and coherent domains or the scope of study such as Mathematics, Medicine, Engineering and Philosophy. Fields that have a wide scope are often subdivided; for example, Humanities include subjects like History and Literature and Arts may include separate disciplines of Fine Arts and Photography. The curriculum of some programmes may combine academic fields, or may include different subjects and disciplines such as Mathematics in Engineering or Accountancy in Business Administration.

ACADEMIC STANDARDS

Specific standards decided by the institution, and informed by external reference points. They include the minimum or threshold level of knowledge and skills to be gained by the graduates from the programme, and can be used in evaluation and review.

ACCREDITATION

The recognition accorded by an agency or other organization to either an education programme or to an institution to confirm that it can demonstrate that the programme(s) meet acceptable standards and that the institution has effective systems to ensure the quality and continuing improvement of its academic activities, according to published criteria.

ACTION OR IMPROVEMENT PLANS

Realistic plans for improvement derived from the consideration of available evidence and evaluations; they may be implemented for more than one year, but should be prepared and reviewed annually at each level of courses, programmes and the institution.

ADMITTED STUDENTS

Students registered on a programme, including those accepted holding prior credits for admission after year 1.

BENCHMARK/REFERENCE POINTS

Benchmark statements represent general expectations about the standards of achievement and general attributes to be expected of a graduate in a given academic field or subject. Reference standards may be external or internal. External reference points allow comparison of the academic standards and quality of a programme with equivalent programmes in Iraq and internationally. Internal reference points may be used to compare one academic field with another, or to identify trends over a given time period.

COMMUNITY

A defined segment of wider society served by the institution, as determined in its mission and

bylaws. It may be defined geographically or in terms of the range of organizations, groups and individuals engaged in its activities.

COURSE AIMS

Overall course aims should be expressed as the outcomes to be achieved by students completing the course as significant and assessable qualities. They should contribute to the achievement of defined aims within one or more education programs.

CURRICULUM OR (IN THE PLURAL) CURRICULA

The complete organized learning as designed and managed by an institution for an admitted student, determined by the intended learning outcomes (ILOs) and comprising the content, the arrangements for teaching and learning and assessments of students' achievements together with the access to the range of facilities available within the University and, by arrangement, outside it, including libraries, computers studies, social, sports, internships and field studies.

DIRECTED SELF-LEARNING/INDEPENDENT LEARNING

The active promotion of personal skills included in the curriculum that support the student and graduate to seek, assimilate and learn from a range of structured and unstructured experiences. Methods of promotion include e-learning, personal and autonomous learning and fieldwork, assignments, internships, and reflexive learning. Devices commonly used that support directed self-learning beyond formal teaching lectures include logbooks, self-assessment reports, interactive learning tools or the equivalent.

E-LEARNING

Electronic-based learning using information technology may be the primary or secondary element in material associated with a program or a course. It may be stand-alone or integrated with other teaching and learning approaches. It may include self-determination of aims, ILOs and materials using self-selection and will usually include self-assessment. It generally increases the levels of autonomy in, and responsibility for, learning. Converting existing texts or lecture notes to a website or pre-recorded media alone is generally not considered to be e-learning.

EXTERNAL EVALUATOR/EVALUATION

An appointment to a specific program , part of a program or course(s) by the institution to establish an independent and external professional opinion on the academic standards set and achieved in the examinations for the award of the degree.

FRAMEWORK FOR EVALUATION

The framework for evaluation provides a standard structure for evaluation of programmes. It will form the basis for self-evaluation, the site visit by external peer reviewers and the Program Review report. It is designed to operate in all academic fields and institutions, and to apply to internal and external reviews.

GENERAL PRECEPTS/BY-LAWS

Principles, by-laws and regulations, which the educational institution must have as part of the policies covering its operations.

HIGHER EDUCATION INSTITUTE (HEI)/INSTITUTION

A Faculty, College or University providing higher education programs leading to a first university degree (B.Sc. or B.A.) or a higher degree.

INTENDED LEARNING OUTCOMES (ILOS)

The ILOs are the outcome-related definition of knowledge, understanding and skills which the institution intends for its programs. They should be mission-related, capable of measurement (assessable) and reflect the use of external reference standards at appropriate level.

INTERNAL SYSTEM FOR QUALITY MANAGEMENT AND ASSURANCE

The system adopted by the institution to ensure that its education programs and contributing elements meet specified needs and are continually reviewed and improved. An outcomes-related system of quality management involves precise specifications for quality from design to delivery; evaluation; the identification of good practice as well as of learning deficiencies and obstacles; performance follow-up; suggestions for development and enhancement; and the systematic review and development of processes for establishing effective policies, strategies and priorities to support continuing improvement.

JOB/LABOUR MARKET

The availability of professional, commercial, research-oriented or other fields of employment that a graduate is qualified to join upon graduation.

MISSION STATEMENT

A brief statement clearly identifying the educational institution's duty and its role in the development of the community; a mission statement may also offer brief supporting statements on the vision, values and strategic objectives of the institution.

PEER REVIEWER

A person who is professionally equal in caliber and with management and/or subject expertise to those delivering the provision, but not from the same institution and without any conflict of interest, who can contribute to the review of an education program for internal and external quality assurance or for accreditation purposes.

PROGRAMME

For the purpose of Program Review an education program is defined as one which admits students who, on successful completion, receive an academic award.

PROGRAMME AIMS

The broad purposes for providing the program which in turn guide the development and implementation of strategic objectives (to ensure that the aims are met) and ILOs (to ensure that the students work towards attaining the specified outcomes).

PROGRAMME REVIEW

Program Review applies to all education programs in all higher education institutions. Where the program i s studied in more than one institution, the whole program isincluded in Program Review. Program Review in Iraq has three objectives:

1) To provide decision-makers (in the higher education institutions, Quality Assurance and Academic Accreditation Directorate, parents, students, and other stakeholders) with evidence-based judgements on the quality of learning programs
2) To support the development of internal quality assurance processes with information on emerging good practice and challenges, evaluative comment and continuing improvement
3) To enhance the reputation of Iraq's higher education internationally.

QUALITY ASSURANCE

The institution has the means of assuring that for each education program, academic standards are defined and achieved in line with equivalent national and international standards, that the quality of the curriculum and related infrastructure are appropriate and fulfil the expectations of the range of stakeholders, that its graduates represent the range of attributes specified and that the organization is capable of sustained, continuing improvement.

REVIEW COORDINA

The nominee of an institution to coordinate a Program Review to assist in the gathering and interpretation of information and to support the application of published methods of review.

REPORT

The regular reports prepared on the basis of Program Reviews and evaluations of its education program.

SELF-EVALUATION

n institution's process of evaluating a program as part of Program Review and within an internal system of quality management and assurance.

SITE VISIT

A scheduled visit by external peer reviewers as part of Program Review. Normally the site visit will be for two or three days. A typical outline timetable is provided in Appendix (1).

SPECIFICATION

The detailed description of the aims, construction and intended outcomes of a program me, andany courses, specific facilities or resources that contribute to it. The specification provides information to design, manage, deliver and review the program.

STAKEHOLDER

Those organizations, groups or individuals which have a legitimate interest in the educational activities of the institution both in respect of the quality and standards of the education and also in respect of the effectiveness of the systems and processes for assuring the quality. An effective strategic review process will include the key stakeholder groups. The precise range of stakeholder groups and their differentiated interests depend upon the mission of the institution, its range of educational activities and local circumstances. The range is usually defined by a scoping study. Examples of groups with a legitimate interest include current students, graduates, intending students and their parents or family, staff in the institution, the employing community, the relevant Government ministries, the sponsors and other funding organizations and, where appropriate, professional organizations or syndicates.

STRATEGIC OBJECTIVES/PLANS

A collection of institution-specific objectives that are derived from its mission and developed into a realistic plan based on evidence-based evaluations. Objectives concentrate on the means by which an institution seeks to deliver its mission. The plan sets out the matters to be addressed, timeframe, person responsible and estimate of costs, and is accompanied by an implementation plan with arrangements for monitoring the progress and evaluating impact.

STUDENTS'ASSESSMENT

A set of processes, including examinations and other activities conducted by the institution to measure the achievement of the intended learning outcomes of a program and its courses. Assessments also provide the means by which students are ranked according to their achievement. Diagnostic assessment seeks to determine the existing range of knowledge and skills of a student with a view to constructing an appropriate curriculum. Formative assessment provides information on the student's performance and progress to support further learning, without necessarily counting a grade towards graduation. Summative assessment determines the final level of attainment of the student on the program or at the end of a course that contributes credits to the program.

STUDENTS' EVALUATIONS

The systematic gathering of students 'opinions on the quality of their program in a standardized structure together with the analysis and outcomes. Surveys using questionnaires are the most frequently used methods to collect opinions; other mechanisms include websites conferences, panels or focus groups, and representation on councils or other committees.

TEACHING AND LEARNING METHODS

The range of methods used by teachers to help students to achieve the ILOs for the course.
Examples include: lectures, small group teaching such as tutorials, seminars and syndicate groups; a case study to teach students how to analyze information and reach a decision; assignments such as writing a review paper for the students to gain the skills of self-learning and presentation; field trips; practical sessions for the students to gain practical skills; and carrying out experiments to train the students to analyze the results, reach specific conclusions and prepare a report, presentation or poster.