Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2025-2026

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

- **Academic Program Description**:

The Architectural Engineering program at Wasit University / College of Engineering offers a comprehensive and diverse curriculum, providing students with a strong foundation in the field of architecture. With a highly experienced and dedicated faculty, the program is designed to equip students with the necessary skills and

knowledge to excel in the architectural profession. The program emphasizes a comprehensive approach to architecture, covering various aspects of architectural design, theory, and practice. Students will explore architectural history, design principles, building construction, structural systems, environmental sustainability, and urban design. This holistic approach ensures that students develop a well-rounded understanding of the architectural discipline.

Hands-on Learning: The program integrates practical learning experiences to complement theoretical knowledge. Students will engage in design studios, architectural workshops, and real-world projects. These hands-on experiences provide students with the opportunity to apply their theoretical understanding to practical architectural challenges, fostering creativity, problem-solving skills, and design proficiency.

Collaborative Environment: Architecture is a collaborative field, and the program encourages teamwork and interdisciplinary collaboration. Students will work on group projects, collaborating with peers from disciplines such as engineering, landscape architecture, and interior design. This collaborative approach enhances students' ability to work effectively in multidisciplinary teams, reflecting the real-world practice of architecture.

Career Development: The Architectural Engineering program prepares students for a wide range of career opportunities in the architectural profession. Graduates will be equipped with the necessary skills to pursue careers in architectural firms, urban planning agencies, construction companies, and government organizations. The program also provides guidance and support for internships and professional networking opportunities to enhance students' career prospects.

The Architectural Engineering program at Wasit University / College of Engineering provides students with a comprehensive education in architecture, fostering creativity, critical thinking, and technical proficiency. Graduates will be well-

prepared to contribute to the field of architecture and make meaningful contributions to the built environment.

- **Course Description**:

In this Module, students will delve into the world of abstract art and master design elements and principles. Through captivating two-dimensional and three-dimensional artwork, they will explore the creative possibilities of abstraction. By analyzing architectural plans and models, students will develop an understanding of spatial relationships and composition, applying these insights to their own artistic decisions. Progressing from monochromatic gradients to the incorporation of colors and textures, they will explore the visual impact and expressive potential of different elements. Going beyond abstract compositions, students will delve into the abstraction of forms, stories, metaphors, or poems, fostering personal interpretation and creative expression. Additionally, they will develop communication and presentation skills to confidently convey architectural ideas both visually and verbally.

- **Program Vision:**

Our vision at the Department of Wasit Architecture is to be a leader in architectural education, promoting sustainable and community-focused design practices that enrich the built environment and improve the quality of life for all. We strive to inspire our students to think creatively, critically, and responsibly, and to empower them to become leaders in the field of architecture. With a focus on excellence in teaching, research, and community participation, we aim to shape the future of architecture and create a better world through design.

- **Program Mission:**

At the Department of Wasit Architecture, we provide the highest quality education and training in the field of architecture. Our goal is to equip our students and professionals with the skills and knowledge they need to design functional, safe,

and aesthetically pleasing buildings that are also sustainable and reflect the needs of the local community. We believe that architecture has the power to shape the world we live in, and we are committed to fostering a love of design and a sense of responsibility to the environment and public health in all of our students. Join us as we strive to create a better built environment for all.

❖ Program Objectives:

1. Providing comprehensive education and training in architecture to students and professionals.
2. Promoting sustainable design practices and raising awareness of their impact.
3. Engaging with the local community to reflect their needs in the design process.
4. Practice professional integrity and competence in performing their duties and responsibilities relative to community building through engineering projects. (PEO 1)
5. Exercise compelling managerial leadership with high regards to effective social communication skills and observing high ethical responsibility in dealing with varying kinds of people in the multidisciplinary field of engineering works, guided by the principles of sustainable development. (PEO 2)
6. Observe the principles of good governance for the benefit of the community as an architectural engineer. Display high regards to the constitutional concept wherein public office is a public trust where accountability is highly observed and respected in serving the community. (PEO 3)
7. Demonstrate a goal to pursue professional development through continuing education, lifelong learning and experiences, keeping up with new engineering trends and innovations, and membership in accredited professional societies. (PEO 4)

8. Provide extensive and workable skills to carry out technical investigations and decision-making designs within the realistic constraints such as economic, environmental, societal, safety and sustainability.(PEO 5)

❖ **Curriculum Structure:**

All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

❖ **Learning Outcomes:**

A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

❖ **Teaching and learning strategies:**

They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Wasit

Faculty/Institute: Engineering College

Scientific Department: Mechanical Engineering department

Academic or Professional Program Name: Mechanical Engineering

Final Certificate Name: Mechanical Engineering

Academic System: APET

Description Preparation Date: 1 / 9 / 2025

File Completion Date: 1 / 10 / 2025

Signature: 

Head of Department Name:

Asst. Prof. Dr. Hatem Mahmoud Samaka

Date: 25 / 9 / 2025

Signature: 

Scientific Associate Name:

Asst. Prof. Dr. Mohammed Ghaleb Mohsen

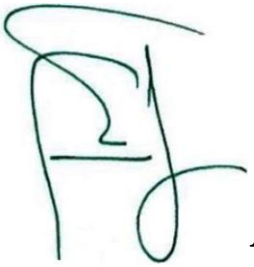
Date: 25/ 9 /2025

The file is checked by: 

Director of the Quality Assurance and University Performance Department:

Asst. Prof. Dr. Haider Majid

Date: 25/ 9 /2025



Approval of the Dean

Prof. Dr. Thaer Saud Al-Ghasham

1. Program Vision

Our vision is Striving for outstanding in education, entrepreneurship and innovation aiming toward a global knowledge hub in the science of mechanical engineering. Providing high-quality education that creates well-qualified graduates with the capabilities to meet the needs of society and contend with future challenges.

2. Program Mission

The Mission of Mechanical Engineering Department has three tends: to achieve the best service related to mechanical engineering leading to a comprehensive understanding in mechanical engineering's science and technology according to the standards of the quality management; graduating well-qualified and innovative mechanical engineers who can significantly contribute to their career and successful in advanced studies; achieving excellence in continuous development and scientific research to provide leadership and innovative solutions to technological challenges.

3. Program Objectives

The formulation of the Vision and Mission mentioned above are translated into the objectives of the Mechanical Engineering Department as follows:

1) To become a reliable department of international standards.
2) To maintain a high standard of mechanical engineering education through outstanding teaching, innovation, research and training that reflect the changing needs of society.
3) To produce competent graduates in the field of mechanical engineering capable of build up their careers upon a solid foundation of knowledge.
4) To increase the number of membership of professional bodies in Mechanical Engineering and develop them.
5) To have frequent interaction program with standard domain Industries.
6) To pursue excellence in research and technology transfer, especially those based on appropriate technology to improve the quality of people’s lives.
7) To produce community service activities that is recognized at the national level to improve the quality of people’s lives.
8) To increase the public awareness of departmental activities and the

Mechanical Engineering profession.

9) To attract highly motivated students with enthusiasm, aptitude and interest in mechanical engineering.

4. Program Accreditation

We are continuing to work on completing the accreditation file and submitting the self-assessment report and the review report.

5. Other external influences

Ministry of Higher Education and Scientific Research

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	**8**	**18**	**10%**	
College Requirements	**0**	**0**	**0%**	
Department Requirements	**10**	**300**	**60%**	
Summer Training	**1**	–	–	
Other	–	–	–	

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			Theoretical	Practical
Fourth Level 2025-2026	MEC 4340	Design of Machine Systems (1)	3	0
	MEC 4341	Design of Machine Systems (2)	3	1
	MEC 4342	Mechanical Vibrations (1)	3	1
	MEC 4343	Mechanical Vibrations (2)	3	1
	MEC 4344	Power Plants (1)	3	0
	MEC 4345	Power Plants (2)	3	0
	MEC 4346	Air Conditioning & Refrigeration (1)	3	1
	MEC 4347	Air Conditioning & Refrigeration (2)	3	1
	MEC 4348	Control and Measurements (1)	3	1
	MEC 4349	Control and Measurements (2)	3	1

	MEC 4350	Engineering Materials (1)	2	0
	MEC 4351	Engineering Materials (2)	2	0
	MEC 4352	Industrial Engineering (1)	2	0
	MEC 4353	Industrial Engineering (2)	2	0
	MEC 4354	Renewable Energy	2	0
	MEC 4355	English Language (4)	2	0
	MEC 4356	Engineering Project (1 year)	2	0

8. Expected learning outcomes of the program

Knowledge	
The ability to distinguish identifies, define, formulate, and solve engineering problems by applying the principles of engineering, science, and mathematics.	**A1**
The ability to conduct experiments, analyzes data, and interprets it to arrive at sound engineering conclusions.	**A2**
Skills	
The ability to design mechanical systems and machines that meet the needs of the specialization.	**B1**
The ability to design and conduct experiments, as well as analyze and interpret data.	**B1**
The ability to communicate effectively both orally with a group of people and in writing with various management levels.	**B2**
The ability to create and perform appropriate measurements and tests with quality assurance, analyze and interpret results, and use engineering judgment to draw conclusions.	**B2**
Ethics	
Adhering to ethics and responsibility, and working effectively within diverse, multidisciplinary teams.	**C1**
The ability to recognize ethical and professional responsibilities in engineering matters, and to make wise judgments with consideration for the consequences in global financial, environmental and societal considerations.	**C1**
The ability to recognize the ongoing need for professional knowledge growth and how to find, evaluate, compile, and apply it correctly.	**C2**

9. Teaching and Learning Strategies

The Mechanical Engineering Department program relies on multiple teaching, learning, and assessment strategies to ensure students achieve the desired graduation outcomes. Our teaching strategies include:

1) Theoretical lectures as a primary means of delivering fundamental scientific knowledge.
2) Active participation in continuing professional development and the development of new knowledge and skills to pursue new career opportunities.
3) We also work to update and adapt the core knowledge and skills of our students.
4) Learning outcomes are assessed through various student assessments, theoretical and practical, daily, termly, and annual.
5) In addition, students are required to prepare reports on the courses they study and to complete laboratory reports.

6) Graduation projects: The graduation project is designed to test the scientific and practical skills acquired by the student. Project-based learning deals with real-world engineering issues and requires extensive collaborative research and teamwork among students to complete a project or task.
7) A practical, experimental approach for students through conducting experiments in available laboratories, where students can observe, understand, and conduct experiments in various materials.
8) E-learning through the use of online platforms.

10. Evaluation methods

Generally, assessment is conducted through blended learning using various methods such as self-study, exams, quizzes, follow-up homework, reports, oral presentations and discussions, summer internships, field trips, mock exams, and the graduation project, as follows:

1) **Coursework Assessment:** through assignments, reports, essays, and short projects to measure understanding of theory and application.
2) **Examinations:** written exams at the mid-term and end of the semester to assess theoretical and technical knowledge.
3) **Practical and Laboratory Work:** assessment of workshops, experiments, and model building to test practical skills.
4) **Group Projects and Teamwork**: assessment of collaborative projects to measure teamwork and leadership.
5) **Oral Presentations and Discussions:** individual or group presentations to measure communication and critical thinking skills.
6) **Field and Professional Training Assessment:** through practical experience and feedback from supervisors.
7) **Graduation Project:** a comprehensive assessment of research, design ability, innovation, and professional readiness.

11.Faculty

Faculty Members

Names and Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr. Zeina Khalifa Kazim	Mechanical Engineering	Thermal			*	
Prof. Dr. Ali Abdulredha Farhan	Mechanical Engineering	Thermal			*	
Prof. Dr. Abbas Jassim Jubair	Mechanical Engineering	Thermal			*	

Assistant Professor Hadi Obaid Bishr	Mechanical Engineering	Fluids			*	
Assistant Professor Hussein Razaq Sabah	Mechanical Engineering	Applied			*	
Assistant Professor Alaa Rahma Kazim	Mechanical Engineering	Thermal			*	
Assistant Professor Azzam Sabah Hamid	Production Engineering	Production			*	
Assistant Professor Batool Mardan Faisal	Mechanical Engineering	Applied			*	
Assistant Professor Farouk Omar Hamdoun	Mechanical Engineering	Applied			*	
Assistant Professor Abdulsalam Dawood Mohammed	Mechanical Engineering	Thermal			*	
Assistant Professor Hatem Mahmoud Samaka	Mechanical Engineering	Applied			*	
Assistant Professor Mohammed Ghaleb Mohsen	Mechanical Engineering	Thermal			*	
Assistant Professor Hussein Kamar Mahmoud	Mechanical Engineering	Materials			*	
Assistant Professor Anwar Juma Ahmed	Materials Engineering	Applied			*	
Assistant Professor Ammar Dawood Ghali	Mechanical Engineering	Applied			*	
Assistant Professor Amer Ghazi Haws	Mechanical Engineering	Materials			*	
Assistant Professor Raghdan Mohsen Namous	Mechanical Engineering	Thermal			*	
Assistant Professor Radwan Mohammed Adai	Mechanical Engineering	Thermal			*	
Assistant Professor Ahmed Abdulredha Yassin	Production Engineering	Applied			*	
Assistant Professor Ali Faraj Hammadi	Mechanical Engineering	Materials			*	
Assistant Professor Mohammed Hussein Radhi	Mechanical Engineering	Thermal			*	
Assistant Professor Kazem Hussein Makhramesh	Mechanical Engineering	Thermal			*	
Assistant Professor Amna Hamoud Dayef	Mechanical Engineering	Applied			*	
Assistant Professor Haider Mahmoud Rahima	Mechanical Engineering	Thermal			*	
Assistant Professor Haider Karim Masraa	Mechanical Engineering	Applied			*	
Assistant Professor Nihad Kazem Farhan	Mechanical Engineering	Thermal			*	
Assistant Professor Khalil Salim Jabr	Mechanical Engineering	Thermal			*	
Assistant Professor Abdul Amir Tariq Abbas	Mechanical Engineering	Thermal			*	

Professional Development

Mentoring new faculty members

1. Definition program:

- An orientation session upon appointment covering the college's mission, program objectives (PEOs), and learning outcomes (GOs).
- An explanation of the department's systems in terms of teaching methods, quality assurance, and assessment mechanisms.
- Provision of structured orientation programs for new faculty members, covering the curriculum, teaching strategies, assessment methods, and institutional policies.

2. Orientation and Integration:

- Matching new faculty members with experienced professors (supervisor or academic advisor)
- Assistance and support in preparing lectures, teaching methods, assessment, and classroom management

3. Supporting teaching:

- Encouraging classroom observation sessions and providing feedback in collaboration with senior teachers.
- Sharing best practices in teaching methods, student interaction, and the use of technology in education.

4. **Scientific research:**

- Supporting new faculty members in developing research agendas aligned with departmental priorities.
- Assisting mentors with publication strategies, grant application writing, and networking within academic communities.

Professional development of faculty members

- Professional **Ethics and Responsibilities**
  - Emphasize academic integrity, professional ethics, and responsibilities toward students and colleagues.
  - Provide role-modeling in handling challenges in teaching, advising, and service.
- Career **and Leadership Development**
  - Guide new faculty in long-term career planning, including promotion and tenure pathways.
  - Offer workshops on leadership skills, project management, and community engagement.

12.Acceptance Criterion

1. Central Admission:

The Central Admission Guide issued by the Ministry of Higher Education and Scientific Research, through the Student Affairs Procedures Guide and the Admission Regulations and Conditions issued by the Ministry of Higher Education and Scientific Research.

2. Evening Studies:

Through the annual instructions issued by the Ministry of Higher Education and Scientific Research.

13.The most important sources of information about the program

1. **University Publications:**

The university website, e-learning platforms, digital repositories containing policies, announcements, educational resources, official academic catalogs, program specifications documents, and student guides issued by Wasit University / College of Engineering.

2. **Departmental Resources** :
   Curriculum guides, course syllabi, and orientation materials provided by the Mechanical Engineering Department.

3. **Faculty Guidance**:
   Information and advice offered directly by program coordinators, faculty members, and academic advisors.

4. **Institutional Platforms**:
   University website, e-learning platforms, and digital repositories containing policies, announcements, and learning resources.

5. **Posting on the bulletin board in the section**

6. **Official email and Classroom platform**

14. Program Development Plan

1. Curriculum Review and Enhancement

- Regular evaluation of courses to ensure alignment with international standards and market needs.
- Utilizing the engineering council cooperating with the department to practically evaluate curriculum outcomes according to actual practical needs.

2. Faculty Development

- Continuous training, research support, and mentoring for new faculty members.
- Encouragement of international collaboration and participation in academic conferences.

3. Infrastructure and Learning Resources

- Upgrading laboratories, studios, and digital platforms to enhance hands-on learning.
- Expanding access to online databases, libraries, and engineering software.

4. Industry and Community Engagement

- Strengthening partnerships with engineering firms, planning agencies, and government institutions.
- Expanding internship and field-training opportunities for students.

5. Quality Assurance and Accreditation

- Continuous monitoring of learning outcomes, assessment methods, and graduate feedback.
- Preparing for national and international accreditation processes.

6. Research and Innovation Development

- Supporting student and faculty research in sustainable engineering and digital innovation.
- Establishing specialized research groups and centers.

Program Skills Outline										
				Required program Learning outcomes						
Year/Level	Course Code	Course Name	Basic or optional	Knowledge		Skills			Ethics	
				A1	A2	B1	B2	B3	C1	C2
Level Four 2025-2026	MEC4340	Design of Machine Systems (1)	Basic	*			*	*		
	MEC4341	Design of Machine Systems (2)	Basic		*		*	*		
	MEC4342	Mechanical Vibrations (1)	Basic	*		*	*			
	MEC4343	Mechanical Vibrations (2)	Basic	*		*	*			
	MEC4344	Power Plants (1)	Basic		*		*			
	MEC4345	Power Plants (2)	Basic		*		*			
	MEC4346	Air Conditioning & Refrigeration (1)	Basic	*		*	*			

	MEC4347	Air Conditioning & Refrigeration (2)	**Basic**	*		*	*			
	MEC4348	Control and Measurements (1)	**Basic**			*	*			
	MEC4349	Control and Measurements (2)	**Basic**			*	*			
	MEC4350	Engineering Materials (1)	**Basic**		*		*			
	MEC4351	Engineering Materials (2)	**Basic**		*		*			
	MEC4352	Industrial Engineering (1)	**Basic**	*		*		*		
	MEC4353	Industrial Engineering (2)	**Basic**	*		*		*		
	MEC4354	Renewable Energy	**Basic**		*			*		
	MEC4355	English Language (4)	**Basic**			*	*			*
	MEC4356	Engineering Project (1 year)	**Basic**	*				*		

Level Four\ First semester

Subject		Hrs. /week			Units
		Theo.	Tut.	Lab.	
MEC4340	Design of Machine Systems 1	2	1	--	2
MEC4342	Mechanical Vibrations1	2	1	1	3
MEC4344	Power Plants 1	2	1	--	2
MEC4346	Air Conditioning & Refrigeration 1	2	1	1	3
MEC4348	Control and Measurements 1	2	1	1	3
MEC4350	Engineering Materials1	2	--	--	2
MEC4352	Industrial Engineering 1	2	--	--	2
MEC4354	Renewable Energy		--	--	2
MEC4356	Engineering Project	2	--	--	2
Total		**18**	**5**	**4**	**21**
		27			

Subject code: MEC 4340
Subject Name: Design of Machine systems 1
Subject content:
Power Screws, Flat Belt Drives, V-Belts and Pulleys, Rope Drives, Chain Drive, Brakes and Clutches.

Subject code: MEC 4342
Subject Name: Mechanical Vibrations 1
Subject content:
Basic Concepts Of Vibration, Introduction To Oscillatory Motion, Free Vibration Of An Undamped Single Degree Of Freedom System, Energy Method (Rayleigh Principle) , Free Vibration Of A Viscously Damped Single Degree Of Freedom System, Equivalent Springs And Dampers, Decay Rate (Logarithmic Decrement), Forced Vibration Of A Single Degree Of Freedom System, Rotating Unbalance, Whirling Of A Rotating Shaft, Base Excitation (Support Motion), Vibration Isolation, Vibration Of Measuring Instruments.

Subject code: MEC 4344
Subject Name: Power Plants 1
Subject content:
(Introduction : Power Plant , Sources Of Energy, Thermal Power Plants), (Load Curve, Ideal And Realized Load Curves, Load Variation, Demand Factor), (Steam Generator (Boiler), Classification, Steam Formation And Thermal Efficiency Improvement Methods), (Steam Generator, Boiler Heating Surface, Types Of Boilers, Various Advantages Of Water Tube Boilers, Fire Tube Boilers) , (Various Advantages Of Fire Tube Boilers , Boiler Accessories, Boiler Auxiliaries, Boiler Calculation, Boiler Heat Balance, Feed Water, Water Impurities, Requirements Of A Good Boiler), (Steam Turbine, Principles Of Operation, Types Of Steam Turbine, Impulse Type, Types Of Impulse Turbine, Velocity Diagram),(Steam Nozzles, Variation Of Specific Volume, Area And Velocity, Effect Of Friction, Nozzle Efficiency), (The Reaction Turbine, Velocity Diagram For Reaction Turbine Stage), (Steam Condensers, Surface Condensers Advantages And Disadvantages Of A Surface Condenser, Requirements Of A Modern Condenser, Jet Condensers, Types Of

Jet Condensers), (Cooling Towers, Classification Of Cooling Towers, Classification On The Basis Of Air Flow Generation Methods), (Steam Power Plant, Vapour Cycle, Reversible And Irreversible Processes, The Rankine Cycle, Energy Analysis Of The Ideal Rankine Cycle), (Superheating The Steam To High Temperatures, Reheat Cycle, Rankine Cycle With Regeneration, Types Of F.W.H, Open Or Direct Contact F.W.H.) (Closed With Drains Cascaded Backward, Closed With Drain Pumps Forward).

Subject code: MEC 4346
Subject Name: Air Conditioning & Refrigeration 1
Subject content:
Properties of air and water, vapor pressure and perfect gas, Psychrometric chart (mixing process, cooling, heating, humidification), comfort condition (Ashrae comfort chart) and inside and outside design condition, cooling load calculations (wall surface temperature, ventilation, infiltration, wall and roof loads, window load) and heating load, system of air conditioning, actual AC systems, design of air distribution systems.

Subject code: MEC 4348
Subject Name: Control and measurements 1
Subject content:
Introduction and definitions: Open-loop and closed loop control systems, elements of a general control system. Mathematical Modeling of Physical System: Mechanical systems, thermal systems, fluid system, hydraulic systems, and pneumatic systems. Transfer Functions and Systems Response: Laplace transform, transfer function, block diagram algebra, impulse, step and ramp functions, response of first order systems, response of second order systems, specifications of the response, and types of control.

Subject code: MEC 4350
Subject Name: Engineering Materials 1
Subject content:
Atomic Structure, Atomic Bonding, Arrangement of Atoms in Solid and Crystal Structures, Crystallographic Points, Plans and Directions, Equilibrium Diagrams. Part 1, Equilibrium Diagrams. Part 2, Equilibrium Diagrams. Part 3, Metals: Ferrous Metals: Carbon Steel, Metals Ferrous Metals: Alloy Steel, Metals: Ferrous Metals: Cast Iron, Metals Non-Ferrous Metals: Copper, Metals: Non-Ferrous Metals: Aluminum, Metals Non-Ferrous Metals: Magnesium And Titanium, Ceramics: Structure And Properties, Ceramics: Applications And Processing.

Subject code: MEC 4352
Subject Name: Industrial Engineering 1
Subject content:
Introduction (Industrial Engineering Fundamentals, Activities, Areas of Concentration, types of productivity), productions cost control, Planning, Control, Total cost, Improvement of productivity, Automation, Plant Location and Types of layout, Theories of Locations and effects factors, machine layout, Break-even analysis, Methods for lowering break even points, contribution, depreciation and its calculation, forecasting, Analysis of production Sequencing, Linear Programming with applications, Materials handling, equipment's, Maintenance, Industrial safety, Products design and requirements.

Subject code: MEC 4354
Subject Name: Renewable Energy
Subject content:
Solar Energy: Extra-terrestrial Solar Radiation, Terrestrial Solar Radiation, Solar Radiation Calculations, Solar-Electric Conversion Systems, Solar-Thermal Central-Receiver Systems, The Heliostats, The Receiver, The Heat-Transfer System, The Thermal-Storage System, and Other Solar-Thermal Power Systems: Solar Ponds, Photovoltaic-Energy Conversion, Satellite Solar-Power Systems (SSPS), Solar Tower Plant. Wind Energy: History Of Wind Power , Principles Of Wind Power , Wind Turbine Principle , Site Characteristics , Wind Machine , The Horizontal Axis Wind Machine , The Vertical Axis Wind Machine, Betz Limit, Wind Turbine Operation.
Energy From Oceans: Ocean Temperature Differences, Ocean Waves, Wave Motion, Energy And Power From Waves, Wave –Energy Conversion By Floats, High-Pressure Accumulator Wave Machines, Other Wave Machines, The Tides, The Simple Single-Pool Tidal System. Hydropower Resource: Determination of The Useful Power, Waterwheels, Pelton turbines, Francis turbines, Kaplan turbines, Water pumps working as turbines. Geothermal energy: Hydrothermal resources, Geo-pressurized resources, Enhanced Geothermal System or Hot dry rock (HDR), Geothermal Power Production, Operational And Environmental Problems, Vapor-Dominated Systems, and Liquid- Dominated Systems: Flashed Steam, Liquid-Dominated Systems: Total- Flow Concept, Direct Use of Geothermal Energy. Energy Storage: Energy-Storage Systems, Pumped Hydro, Compressed-Air Storage, Energy Storage By Flywheels, Electrical Battery Storage, Thermal Sensible Energy, Latent Heat Energy Storage.

Subject code: MEC 4356
Subject Name: Engineering Project (1 year)
Subject content:
This is an independent study under the supervision of department members. Each student is expected to do research trying to explore and define a potential study area suitable for a senior design project. A specific engineering problem must then be identified from within the selected study area. Results from this study must be documented and submitted in the form of a design project proposal.

Level Four\ Second semester

Subject		Hrs. /week			Units
		Theo.	Tut.	Lab.	
MEC4341	Design of Machine Systems 2	2	1	-	3
MEC4343	Mechanical Vibrations 2	2	1	1	3
MEC4345	Power Plants 2	2	1	--	3
MEC4347	Air Conditioning & Refrigeration 2	2	1	1	3
MEC4349	Control and Measurements 2	2	1	1	3
MEC4351	Engineering Materials 2	2	1	1	2
MEC4353	Industrial Engineering 2	2	--	--	2
MEC4355	English Language 4	2	--	--	2
MEC4356	Engineering Project	2	--	--	2
Total		**18**	**5**	**3**	**23**
		26			

Course Number: MEC 4341
Subject Name: Design of Machine systems 2
Subject content:
Spur Gears, Bevel Gears, Worm gears, Rolling Contact Bearings, Sliding Contact Bearings and Computer Aided Design.

Subject code: MEC 4343
Subject Name: Mechanical Vibrations 2
Subject content:
Two - Degree Of Freedom System, Lagrange's Equations, Coordinates Coupling, Undamped Vibration Absorber, Damped Vibration Absorber, Transient Vibrations Of A Single Degree Of Freedom System , Vibration Of Continuous Systems, Rayleigh And Dunkerly Methods For Determining Natural Frequencies.

Subject code: MEC 4345
Subject Name: Power Plants 2
Subject content:
(Gas Turbine Power Plant, Theory Of Operation Brayton Cycle, Advantages Of Gas Turbine Power Station, Disadvantages) , (Compressors, Centrifugal Compressor Construction, Diffusers, Characteristics Of Centrifugal Compressor, Advantage Over Axial Type, Axial Compressor), (Gas Turbine Combustors Combustion Chamber Design, Flame Stabilization, Combustion And Dilution), (Film Cooling Of The Liner, Fuel Atomization And Ignition, Typical Combustor Arrangements), (Brayton Cycle(Joule's Cycle), Thermodynamic Analysis, Thermal Efficiency), (Deviation Of Actual Gas-Turbine Cycles From Idealized Ones, Regenerative Brayton Cycle), (Different Arrangement Of Gas Turbine, Closed Cycle Gas Turbine, Combined Cycle Power Plants), (Nuclear Power Plants, Working, Types, Reactor Types, Pressurized Water Reactor (Pwr), Boiling Water Reactor), (Gas Cooled Reactors (Gcr), Advantages Of Nuclear Power Plants, Disadvantages Of Nuclear Power Plant), (Solar Power Plants, Photovoltaic Plants, Solar Thermal Power Stations, Advantages, Disadvantages), (Wind Power ,Plant, Advantages, Disadvantages, Inside The Wind Turbine,

Horizontal Axis Wind Turbines (Hawt's), Vertical Axis Wind Turbines (Vawt's)), (Geothermal Power Plant, Working, Types Of Geo Thermal Power Plants).

Subject code: MEC 4347
Subject Name: Air Conditioning & Refrigeration 2
Subject content:
Ideal vapor compression cycle, actual V. C. S, refrigeration equipment, compressor work and efficiency, fan types, evaporative cooling, cooling towers, piping system design, cold storage, absorption systems, air cycle refrigeration, steam jet refrigeration, automatic control.

Subject code: MEC 4349
Subject Name: Control and Measurements 2
Subject content:
Stability and root loci: Routh stability criterion and Root locus Method. Measurements**:** General measurement system, calibration, fixed and random errors, accuracy precision, and uncertainty of instruments. Instruments for measurements of length, force, torque, frequency, pressure, flow and temperature. Data acquisition using computers.

Subject code: MEC 4351
Subject Name: Engineering Materials 2
Subject content:
Polymers: Structure and Properties, Polymers: Applications and Processing, Composites: Definition and Characterization, Composites: Theory of Composites, Physical Properties of Materials: Electrical Properties, Semiconductor Materials, Insulators, Physical Properties: Thermal Properties of Materials Part 1, Physical Properties: Thermal Properties of Materials Part 2, Chemical Properties of Materials, Corrosion. Part 1, Corrosion. Part 2, Nano Materials: Principle Concepts, Nano Materials: Effect of Nano-scale, Nano Materials: Processing.

Subject code: MEC 4353
Subject Name: Industrial Engineering 2
Subject content:
Work study, Time study and motion study, Networks and critical path, Allowances, Inventory control and problems, Economic order and quantity and its advantage, Inventory costs, Applications, Quality control, Product's defect, Control-chart, Inspections, Types of inspections, Acceptance Sampling, Sampling plans, Statistical quality control, Reliability, Total quality measurements, Theory of probability, Engineering system analysis.

Subject code: MEC 4155
Subject Name: English Language 4
Subject content:
University Requirements

Subject code: MEC 4356
Subject Name: Engineering Project (1 year)
Subject content:

This is an independent study under the supervision of department members. Each student is expected to do research trying to explore and define a potential study area suitable for a senior design project. A specific engineering problem must then be identified from within the selected study area. Results from this study must be documented and submitted in the form of a design project proposal.