Sana'a University
Faculty of Engineering

Mechanical Engineering

Program Specifications

October - 2020

Faculty of Engineering, Sana'a University

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Prof. Dr. Al-Qassim Mohammed Abbas

Sana'a University
Faculty of Engineering
Mechanical Engineering Department
Mechanical Engineering Program

Mechanical Engineering Program Specifications

Program Identification and General Information	
Program Title	Mechanical Engineering Program.
Host Element	Faculty of Engineering.
Responsible Department	Mechanical Engineering Department.
Other Departments with major Teaching Contributions	Basic Engineering Sciences and Electrical Engineering Departments.
Media of Instruction	Arabic & English Language.
Mode of Delivery	Semesters.
Total credit hours needed for completion of the program	183 hours.
Length full time	5 years (10 Semesters).
Award granted on completion of the Program	Bachelor Degree in Mechanical Engineering.
Location(s) where the program is offered	Faculty of Engineering.
Approval date:	October 2020

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Vision, Mission & Objectives of the Department

Vision:

To provide quality education in Mechanical Engineering according to standard criteria and to conduct scientific research enables to reach the requirements of the labor market locally and regionally.

Mission of the Department

To prepare engineers having high skills who can meet social needs through delivering higher quality educational programs and scientific research and to deliver required consultancy work for local industry.

Objectives of the Department

1. To prepare graduates in mechanical engineering with high knowledge and skills in different applications of the mechanical engineering.
2. To participate as leaders and contribute locally and regionally.
3. To prepare the ability and skills and to encourage them to work as a teamwork.
4. To establish the soul of innovations in the graduates while conducting small scientific projects and to prepare them for the higher studies.
5. To contribute in the preparation of the scientific papers in the area of mechanical engineering.

Program Mission

To prepare engineers having high skills who can meet the needs of local and regional labor markets through delivering higher quality education and research.

Program Objectives

1. To prepare graduates in mechanical engineering with high knowledge of technical skills in thermal/fluid systems, mechanical systems and design, materials and manufacturing in

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	industry and government settings.
2.	To prepare the ability and skills and to encourage them to work as a team work with ethics.
3.	To establish the soul of innovations in the graduates while conducting small scientific projects and to prepare them for the higher studies.
4.	To participate as leaders and contribute locally and regionally.

Graduate Attributes

Upon successful completion of an undergraduate Mechanical Engineering Program, the graduates will be able to:

1. Describe Mechanical Engineering fundamentals and apply appropriate science, mathematical methods, tools and techniques for the analysis and solution of Mechanical Engineering problems.
2. Identify, analyze, and be innovative in developing alternative solutions for Mechanical Engineering problems using different techniques.
3. Carry out investigations of engineering problems using appropriate experiments, analysis and interpretation of data.
4. Design and implement systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural, and societal considerations.
5. Apply necessary resources and modern engineering tools to Mechanical Engineering activities with an understanding of the associated limitations.
6. Work productively, communicate effectively, and undertake lifelong learning.
7. Perform feasibility studies, prepare budgets, and manage Mechanical Engineering projects to reach substantiated conclusions.
8. Apply professional ethics, accountability, and equity to Mechanical Engineering discipline.

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Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding:

Upon successful completion of the undergraduate Mechanical Engineering Education Programs, the graduates will be able to:

A.1 Demonstrate knowledge & understanding of Mathematics, Science, and Engineering relevant to Mechanical Engineering.

A.2 Clarify General principles of design, design techniques, and characteristics of engineering materials and components

A.3 Explain the principles of different mechanical systems and their effects on global environment and societal contexts.

A.4 Show understanding of knowledge tools and analytical skills in solving problems relevant to Mechanical Engineering.

B. Cognitive / Intellectual Skills:

Upon successful completion of an undergraduate Mechanical Engineering Education Program, the graduates will be able to:

B.1 Apply the principles of engineering, basic science and mathematics to model, analyze, design, and realize physical systems, components or processes in innovative ways.

B.2 Design the Mechanical systems or processes within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

B.3 Consider the principles of management and its various functions to work professionally in Mechanical Engineering fields.

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C. Practical and Professional Skills:

Upon successful completion of an undergraduate Mechanical Engineering Education Program, the graduates will be able to:

C.1 Use the various techniques, skills, equipment and modern engineering tools and methods necessary for Mechanical Engineering practice.

C.2 Conduct experiments; analyze data and present results for various mechanical systems.

C.3 Apply rules and regulations of industrial safety in Mechanical Engineering practices

C.4 Perform feasibility studies, prepare budgets and apply operations management knowledge and skills in engineering projects.

D. General and Transferable Skills:

Upon successful completion of an undergraduate Mechanical Engineering Education Program, the graduates will be able to:

D.1 Show capability to work in stressful environments, work productively within a team and possess leadership skills.

D.2 Manage tasks, time, processes and resources of mechanical engineering systems effectively.

D.3 Recognize the needs for, and engage in life-long learning.

D.4 Perform searches of literature, use databases, as well as, evaluate information and evidence from various sources.

D.5 Communicate effectively both orally and in writing technical reports.

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System of Study		
Semesters		**180 Hours**
Study Credit.		
Program Requirement	**Credit Hours**	**%**
• University Requirements	17	9.3 %
• Faculty Requirements	14	7.7 %
• Basic Requirements	30	16.0 %
• Program Requirements	122	67.0 %

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Study Plan by Requirements:

Mechanical Engineering Program

UR stands for University Requirements.

FR stands for Faculty Requirements.

BR stands for Basic Requirements.

ME stands for Department Requirements.

PME stands for Electrical Engineering Requirements.

University Requirements

No	Course No.	Course Name	اسم المقرر	CH	L	T	P
				س. م	م	ت	ع
1.	UR001	Arabic Language 1	لغة عربية ١	2	2	0	0
2.	UR00٢	English Language 1	لغة انجليزية ١	2	2	0	0
3.	UR00٣	Computer Skills	مهارات حاسوب	3	2	0	2
4.	UR00٤	Arabic Language 2	لغة عربية ٢	2	2	0	0
5.	UR00٥	English Language 2	لغة انجليزية ٢	2	2	0	0
6.	UR00٦	Islamic Culture	ثقافة اسلامية	2	2	0	0
7.	UR00٧	Arabic Israel Conflict	الصراع العربي الاسرائيلي	2	2	0	0
8.	UR10٨	National Culture	الثقافة الوطنية	2	2	0	0
Total				17	16	0	2

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Faculty Requirements

No	Course No.	Course Name	اسم المقرر	CH	L	T	P
				س .م	م	ت	ع
1.	FR001	Mathematics 1	رياضيات ١	3	2	2	0
2.	FR002	Engineering Physics	فيزياء هندسية	4	2	2	2
3.	FR00٣	Mathematics 2	رياضيات ٢	3	2	2	0
4.	FR50٤	Engineering Project Management	إدارة مشاريع هندسية	2	1	2	0
٥.	FR405	Entrepreneurship & Communication Skills	ريادة اعمال ومهارات تواصل	2	1	2	0
Total				14	8	10	2

Basic Requirements

No	Course No.	Course Name	اسم المقرر	CH	L	T	P
				س .م	م	ت	ع
1.	BR001	Engineering Mechanics – Statics	ميكانيكا هندسية – ستاتيكا	3	2	2	0
2.	BR002	Engineering Workshop	ورش هندسية	3	2	0	2
3.	BR003	Engineering Drawing	رسم هندسي	3	1	0	4
5.	BR005	Engineering Chemistry	كيمياء هندسية	3	2	2	0
6.	BR006	Engineering Mechanics – Dynamic	ميكانيكا هندسية – ديناميكا	3	2	2	0
8.	BR111	Scientific English	انجليزي علمي	2	2	0	0
9.	BR112	Technical Writing	تقارير فنية	2	2	0	0

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10.	BR121	Linear Algebra	جبر خطي	3	2	2	0
11.	BR222	Differential Equations	معادلات تفاضلية	3	2	2	0
12.	BR323	Engineering Mathematics	رياضيات هندسية	3	2	2	0
13.	BR331	Probability and Statistics for Engineers	الاحتمالات والاحصاء للمهندسين	2	2	0	0
			Total	30	21	12	6

Program Requirements:

0. General Courses

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
3	2	ME201	Computer Programming & Applications	3	2	-	2
4	1	ME302	Maintenance of Mechanical Systems	2	2	-	-
4	2	ME303	Research Methodology	2	2	-	-
5	1	ME404	Renewable Energy Systems	3	2	2	-
5	1	ME405	Introduction to Finite Element Method	2	2	-	-
5	2	ME406	Industrial Safety and Training	3	2	-	2
5	1	ME407	Graduation Project - 1	٢	-	-	-
5	2	ME407	Graduation Project - 2	٢	-	-	-
Total				19	12	2	4

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1. Materials and Manufacturing Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
2	1	ME111	Materials Science and Engineering	3	2	-	2
2	1	ME112	Manufacturing Processes - 1	3	2	-	2
2	2	ME113	Manufacturing Processes - 2	3	2	-	2
4	1	ME314	Theory of Metal Forming	3	2	2	-
5	1	ME415	Product Design and development	2	2	-	-
Total				14	10	2	6

2. Mechanical Systems Dynamics and Control Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
2	1	ME120	Kinematics and Dynamics of Machines	3	2	2	-
2	2	ME121	Mechanics of Machines	3	2	2	-
3	2	ME222	Mechanical Vibrations	3	2	2	-
3	2	ME223	Mechanical Measurements and Metrology	3	2	-	2
4	1	ME324	Automatic Control	3	2	-	٢
4	2	ME325	Fluid Power Systems	3	2	-	2
4	2	ME326	Automotive Engineering	3	2	-	2
4	1	ME327	Introduction to Mechatronics Systems	2	2	-	-
4	2	ME328	Introduction to Robotics	2	2	-	-
4	2	ME329	Modern Automotive Technology	2	2	-	-
Total				27	20	6	8

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3. Mechanical Design Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
2	1	ME131	Machine Drawing	3	1	-	4
2	2	ME132	Mechanics of Materials - 1	4	2	2	2
3	1	ME233	CAD/CAM	3	2	-	2
3	1	ME234	Mechanics of Materials - 2	3	2	2	-
3	2	ME235	Machine Design - 1	3	2	2	-
4	1	ME336	Machine Design - 2	3	2	2	-
4	1	ME337	Tribology	2	2	-	-
Total				21	13	8	8

4. Fluid Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
3	1	ME241	Fluid Mechanics - 1	3	2	2	-
3	2	ME242	Fluid Mechanics - 2	3	2	2	-
4	2	ME343	Turbo Machines	3	2	2	-
Total				9	6	6	-

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5. Thermal Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
3	1	ME251	Thermodynamics - 1	3	2	2	-
3	2	ME252	Thermodynamics - 2	3	2	2	-
4	1	ME353	Heat and Mass Transfer	4	3	2	-
4	1	ME354	Thermal/Fluid Lab	٢	-	-	٤
4	1	ME355	Internal Combustion Engines	4	2	2	2
4	2	ME356	Refrigeration & Air-conditioning	4	2	2	2
5	1	ME457	Refrigeration and air conditioning systems	2	2	-	-
5	1	ME458	Thermal Power Plants	3	2	2	-
Total				25	15	12	8

6. Industrial Engineering Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
4	2	ME361	Introduction to Industrial Engineering	3	2	2	-
5	1	ME462	Industrial Operation Research	3	2	2	-
5	1	ME463	Quality Engineering	3	2	2	-
Total				9	6	6	-

7. Electrical Engineering Field

Year	Sem.	Course code	Course Name	Credit	Lec.	Tu.	Pr.
2	1	PME110	Electrical Circuits	3	2	-	2
2	2	PME117	Electronic Circuits	3	2	-	2
3	1	PME 225	Electrical Machines	4	2	2	2
Total				10	6	2	6

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Study Plan 2020

Year	Sem.	Course Code	Course Name	Credit	Lec.	Tu.	Pr.	المقررات
First	1	UR001	Arabic Language - 1	2	2	-	-	لغة عربية - ١
		UR002	English Language - 1	2	2	-	-	لغة انجليزية - ١
		UR00٣	Computer Skills	3	2	-	2	مهارات حاسوب
		UR007	Arabic Israeli Conflict	2	2	-	-	الصراع العربي الإسرائيلي
		FR001	Mathematics -1	3	2	2	-	رياضيات - ١
		FR002	Engineering Physics	٤	2	٢	2	فيزياء هندسية
		BR00١	Engineering Mechanics – Statics	3	2	2	-	ميكانيكا هندسية - ستاتيكا
		BR002	Engineering Workshops	3	2	-	2	ورش هندسية
	Total			**22**				
	2	UR004	Arabic Language - 2	2	2	-	-	لغة عربية - ٢
		UR005	English Language - 2	2	2	-	-	لغة انجليزية - ٢
		UR00٦	Islamic Culture	2	2	-	-	ثقافة اسلامية
		UR00٨	National Culture	2	2	-	-	الثقافة الوطنية
		FR003	Mathematics – 2	3	2	2	-	رياضيات - ٢
		BR003	Engineering Drawing	3	1	-	4	رسم هندسي
		BR005	Engineering Chemistry	٣	2	٢	-	كيمياء هندسية
		BR006	Engineering Mechanics –Dynamics	3	2	2	-	ميكانيكا هندسية - ديناميكا
	Total			**20**				
Second	1	BR1١1	Scientific English	2	2	-	-	انجليزي علمي

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Year	Sem.	Course Code	Course Name	Credit	Lec.	Tu.	Pr.	المقررات
		BR121	Linear Algebra	3	2	2	-	جبر خطي
		ME111	Materials Science and Engineering	3	2	-	2	علم وهندسة المواد
		ME112	Manufacturing Processes - 1	3	2	-	٢	عمليات التصنيع - ١
		ME120	Kinematics and Dynamics of Machines	3	2	2	-	علم حركة وديناميكا الآلات
		ME131	Machine Drawing	3	1	-	4	رسم الآلات
		PME110	Electrical Circuits	3	2	-	2	دوائر كهربائية
	Total			**20**				
	2	BR١٦2	Technical Writing	2	2	-	-	تقارير فنية
		BR١٢٢	Differential Equations	3	2	2	-	معادلات تفاضلية
		ME113	Manufacturing Processes - 2	3	2	-	2	عمليات التصنيع - ٢
		ME121	Mechanics of Machines	3	2	2	-	ميكانيكا الآلات
		ME132	Mechanics of Materials - 1	4	2	2	2	ميكانيكا المواد - ١
		PME117	Electronic Circuits	3	2	-	2	دوائر الكترونية
	Total			**18**				
Third	**1**	BR231	Engineering Mathematics	3	2	2	-	رياضيات هندسية
		ME233	CAD/CAM	3	2	-	2	التصميم والتصنيع بمساعدة

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Year	Sem.	Course Code	Course Name	Credit	Lec.	Tu.	Pr.	المقررات
								الحاسوب
		ME234	Mechanics of Materials - 2	3	2	2	-	ميكانيكا المواد - ٢
		ME241	Fluid Mechanics - 1	3	2	2	-	ميكانيكا الموائع - ١
		ME251	Thermodynamics - 1	3	2	2	-	ديناميكا حرارية - ١
		PME225	Electrical Machines	4	2	2	2	آلات كهربائية
	Total			**19**				
	2	BR231	Probability and Statistics for Engineers	2	2	-	-	الاحتمالات والاحصاء للمهندسين
		ME201	Computer Programming & Applications	3	2	-	2	برمجة الحاسوب وتطبيقاته
		ME222	Mechanical Vibrations	3	2	2	-	اهتزازات ميكانيكية
		ME223	Mechanical Measurements and Metrology	3	2	-	2	قياسات ميكانيكية وعلم القياس
		ME235	Machine Design - 1	3	2	2	-	تصميم آلات - ١
		ME242	Fluid Mechanics - 2	3	2	2	-	ميكانيكا الموائع - ٢
		ME252	Thermodynamics - 2	3	2	2	-	ديناميكا حرارية – ٢
	Total			**20**				
Fourth	**1**	ME314	Theory of Metal Forming	3	2	2	-	نظرية تشكيل معادن
		ME324	Automatic Control	3	2	-	٢	تحكم تلقائي
		ME336	Machine Design - 2	3	2	2	-	تصميم آلات - ٢

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Year	Sem.	Course Code	Course Name	Credit	Lec.	Tu.	Pr.	المقررات
		ME353	Heat and Mass Transfer	4	3	2	-	انتقال الحرارة والكتلة
		ME354	Thermal/Fluid Lab	٢	-	-	٤	معمل الحراريات والموائع
		ME355	Internal Combustion Engines	4	2	2	2	محركات احتراق داخلي
		ME3xx	Elective Course (1)	2	-	-	-	مقرر اختياري (١)
	Total			**21**				
	2	FR٣05	Entrepreneurship & Communication Skills	2	1	2	-	ريادة اعمال ومهارات تواصل
		ME325	Fluid Power Systems	3	2	-	2	انظمة قدرة الموائع
		ME326	Automotive Engineering	3	2	-	2	هندسة السيارات
		ME343	Turbomachines	3	2	2	-	آلات توربينية
		ME356	Refrigeration & Air-conditioning	4	2	2	2	تبريد وتكييف الهواء
		ME361	Introduction to Industrial Engineering	3	2	2	-	مقدمة في الهندسة صناعية
		ME3xx	Elective Course (2)	2	-	-	-	مقرر اختياري (٢)
	Total			**20**				
Fifth	**1**	FR40٤	Engineering Project Management	2	1	2	-	ادارة مشاريع هندسية
		ME404	Renewable Energy Systems	3	2	2	-	أنظمة طاقة متجددة
		ME407	Graduation Project - 1	٢	-	-	-	مشروع التخرج - ١

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Year	Sem.	Course Code	Course Name	Credit	Lec.	Tu.	Pr.	المقررات
		ME458	Thermal Power Plants	3	2	2	-	محطات القدرة الحرارية
		ME462	Industrial Operation Research	3	2	2	-	بحوث العمليات الصناعية
		ME463	Quality Engineering	3	2	2	-	هندسة الجودة
		ME4xx	Elective Course (3)	2	-	-	-	مقرر اختياري (٣)
	Total			**١٨**				
	2	ME406	Industrial Safety and Training	3	2	-	2	السلامة الصناعية والتدريب
		ME407	Graduation Project - 2	٢	-	-	-	مشروع التخرج - ٢
	Total			**5**				
			CH Total	**183**				

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Academic Development
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Emad

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Elective Courses

Course Code.	Course Name	Credit	Lec.	Tu.	Pr.	المقررات
	Elective Course (1) :					
ME302	Maintenance of Mechanical Systems	2	2	-	-	صيانة الأنظمة الميكانيكية
ME327	Introduction to Mechatronics Systems	2	2	-	-	مقدمة في أنظمة الميكاترونكس
ME337	Tribology	2	2	-	-	ترايبولوجي
	Elective Course (2):					
ME303	Research Methodology	2	2	-	-	مناهج البحث العلمي
ME328	Introduction to Robotics	2	2	-	-	مقدمة في الروبوتات
ME329	Modern Automotive Technology	2	2	-	-	تكنولوجيا السيارات الحديثة
	Elective Course (3):					
ME405	Introduction to Finite Element Method	2	2	-	-	مقدمة في طريقة العناصر المحدودة
ME415	Product Design and development	2	2	-	-	تصميم وتطوير المنتج
ME457	Refrigeration and air conditioning systems	2	2	-	-	أنظمة التبريد وتكييف الهواء

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