جامعة الفيصل
Alfaisal University

Bachelor of Mechanical Engineering

College of Engineering & Advanced Computing, Alfaisal University

Effective: Fall 2026 with track, minor and double major

About the Program

The Bachelor of Mechanical Engineering at Alfaisal University provides a broad and rigorous education across the core areas of the mechanical engineering discipline, including design, energy, materials and manufacturing, mechanics, structural analysis and thermalfluids. The curriculum includes essential computing and computational principles to prepare students for contemporary engineering practice. Breadth is supported through university electives drawn from the arts and humanities, social sciences, and natural sciences. The program is accredited by the Engineering Accreditation Commission of ABET, reflecting alignment with international standards.

Students in the program gain depth through technical electives and tailor their studies through a track in Digital Design and Manufacturing. Additional opportunities exist to complement the major with minors or double majors across the university. Students apply academic knowledge to real-world projects and gain exposure to engineering practice through a mandatory internship and a year-long capstone design project.

Graduates of ME are equipped with strong analytical skills, hands-on engineering competence, and professional readiness. They pursue careers across industrial sectors such as automotive, building and construction, consulting, consumer electronics, manufacturing, oil and gas, transport, and other technology domains, or pursue advanced study.

Curriculum Structure and Study Plan

The Bachelor of Mechanical Engineering curriculum is composed of **137** Credit Hours (CRHs) divided as follows:

I. University General Education Requirements (18 CRHs)
- a. Arts & Humanities (9 CRHs)
- b. Social Sciences (6 CRHs)
- c. Sciences (3 CRHs)

II. College Requirements (45 CRHs)
- a. Mathematics and Statistics (21 CRHs)
- b. Basic Sciences (12 CRHs)
- c. Engineering requirements (12 CRHs)

III. Major Requirements (74 CRHs)
- a. Core Major Requirements (65 CRHs)
- b. Technical Electives (9 CRHs)
- c. Internship (0 CRHs)

I. University General Education Requirements (18 CRHs)

a) Arts & Humanities (9 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
ENG 101	University Writing	3	3	0	0		
ENG 222	Technical Writing	3	3	0	0	ENG 101	
____	Arts & Humanities Elective*	3	3	0	0		

* Select any 3-CRHs course from the University-approved list of Arts & Humanities courses.

b) Social Sciences (6 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
____	Social Sciences Elective I*	3	3	0	0		
____	Social Sciences Elective II *	3	3	0	0		

* Select any two 3-CRHs courses (i.e., 6 CRHs in total) from the University-approved list of Social Sciences courses.

c) Sciences (3 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
AI 102	AI for Everyone: Foundation and Applications	3	3	0	0		

II. College Requirements (45 CRHs)

a) Mathematics and Statistics (21 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
MAT 101	Calculus I	3	3	0	0		
MAT 112	Calculus II	3	3	0	0	MAT 101	
MAT 211	Calculus III	3	3	0	0	MAT 112	
MAT 212	Linear Algebra	3	3	0	0	MAT 112	
MAT 213	Differential Equations	3	3	0	0	MAT 112	MAT 212
MAT 224	Numerical Methods	3	3	0	0	MAT 212	
STA 212	Probability and Statistics	3	3	0	0	MAT 112	

b) Basic Sciences (12 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
CHM 101	General Chemistry I	3	3	0	0		
CHM 101 L	General Chemistry I Lab	1	0	2	0		CHM 101
PHU 103	Physics I	3	3	0	0		MAT 101
PHU 103 L	Physics I Lab	1	0	2	0		PHU 103
PHU 124	Physics II	3	3	0	0	PHU 103, MAT 101	
PHU 124 L	Physics II Lab	1	0	2	0	PHU 103, MAT 101	PHU 124

c) Engineering Requirements (12 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
COE 100	Student Orientation and Academic Success	1	1	0	0		
EE 207	Foundations of Electrical Engineering	3	3	0	0	PHU 124	
EE 207 L	Foundations of Electrical Engineering Lab	1	0	2	0	PHU 124	EE 207
SE 100	Programming for Engineers	3	3	0	0		
SE 100 L	Programming for Engineers Lab	1	0	2	0		SE 100
IE 315	Engineering Economy and Cost Analysis	3	3	0	0	STA 212	

III. Major Requirements (74 CRHs)

a) Core Major Requirements (65 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
ME 201	Materials Science and Engineering	3	3	0	0	CHM 101 or CHM 102	
ME 201 L	Materials Science and Engineering Lab	1	0	2	0		ME 201
ME 203	Applied Mechanics I: Statics	3	3	0	0	PHU 103, MAT 112	
ME 205	Introduction to Computer Aided Design	3	3	0	0		
ME 208	Mechanics of Materials I	3	3	0	0	ME 201, ME 203	
ME 208 L	Mechanics of Materials I Lab	1	0	2	0		ME 208
ME 216	Fluid Mechanics	3	3	0	0	PHU 103	
ME 216 L	Fluid Mechanics Lab	1	0	2	0		ME 216
ME 305	Manufacturing and Workshop Training	3	3	0	0	ME 201	
ME 305 L	Manufacturing and Workshop Training Lab	1	0	2	0		ME 305
ME 306	Instrumentation and Control Engineering	3	3	0	0	EE 207	
ME 306 L	Instrumentation and Control Engineering Lab	1	0	2	0		ME 306
ME 308	Advanced Manufacturing Processes	3	3	0	0	ME 305	
ME 308 L	Advanced Manufacturing Processes Lab	1	0	2	0		ME 308
ME 310	Mechanical Component Design	3	3	0	0	ME 311, ME 312	
ME 310 L	Mechanical Component Design Lab	1	0	2	0	ME 311, ME 312	ME 310

ME 311	Applied Mechanics II: Dynamics	3	3	0	0	ME 203	
ME 312	Mechanics of Materials II	3	3	0	0	ME 208	
ME 312 L	Mechanics of Materials II Lab	1	0	2	0		ME 312
ME 315	Machine Design	3	3	0	0	ME 208	
ME 316	Engineering Thermodynamics	3	3	0	0	ME 216	
ME 317	Heat and Mass Transfer	3	3	0	0	ME 216	
ME 317 L	Heat and Mass Transfer Lab	1	0	2	0		ME 317
ME 403	Finite Element Methods	3	3	0	0	ME 311, ME 312	
ME 403 L	Finite Element Methods Lab	1	0	2	0		ME 403
ME 407	Heating, Ventilation, and Air-Conditioning	3	3	0	0	(ME 316 & ME 317) or (ME 206)	
ME 495	Mechanical Engineering Capstone Project I	3	0	6	0	ME 317, ME 310	
ME 496	Mechanical Engineering Capstone Project II	3	0	6	0	ME 495	
ME 499	Ethics and Professional Development	1	1	0	0		

b) Technical Electives (9 CRHs)

Select three courses from the following list:

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut.		
ME 314	Vibration and Damping	3	3	0	0	ME 311	
ME 400	Special Topics in Mechanical Engineering	3	3	0	0	Department approval	
ME 401	Computational Fluid Dynamics and Heat Transfer	3	3	0	0	ME 317	
ME 405	Engineering Safety and Risk Analysis	3	3	0	0	STA 212	
ME 406	Mechatronics	3	3	0	0	ME 306	

ME 410	Energy Conversion and Cogeneration Systems	3	3	0	0	ME 316	
ME 412	Renewable Energy Systems	3	3	0	0	ME 316	
ME 414	Introduction to Compressible Flow Turbomachinery	3	3	0	0	ME 316	
ME 415	Incompressible Flow Machines	3	3	0	0	ME 216	
ME 416	Automotive Engineering	3	3	0	0	ME 316	
ME 418	Water Desalination	3	3	0	0	ME 317	
ME 419	Product Design and Development	3	3	0	0	ME 308	
ME 420	Advanced Visualization and Simulation	3	3	0	0	ME 308	
ME 422	Corrosion Engineering	3	3	0	0	ME 316	
ME 435	Undergraduate Research in Mechanical Engineering	3	0	6	0		

*** ME 435 requires department chair approval, a minimum 3.0 GPA, and a signed research contract.**

c) Internship (0 CRHs)

Course Code	Course-Title	Credit Hours (CRHs)				Prerequisite Course Code	Co-Requisite Course Code
		Total-CRHs	Lect.	Lab	Tut		
ME 390	Mechanical Engineering Internship	0	0	0	0	Department approval	

Typical Study Plan-Mechanical Engineering Program

4-Year Curriculum: *137 Credit Hours Total*

Each course below follows the following format:
Course Code, Course Title, and Course Credit Hours (Lecture contact hours – Lab contact hours – Tutorial contact hours)

1st Year			
Fall	**Course Code**	**Course-Title**	**CRHs**
	CoE 100	**Student Orientation and Academic Success**	**1**
	CHM 101	**General Chemistry I**	**3 (3-0-0)**
	CHM 101 L	**General Chemistry I Lab**	**1 (0-2-0)**
	MAT 101	**Calculus I**	**3 (3-0-0)**
	PHU 103	**Physics I**	**3 (3-0-0)**
	PHU 103 L	**Physics I Lab**	**1 (0-2-0)**
	ENG 101	**University Writing**	**3 (3-0-0)**
	AI 102	**AI for Everyone: Foundation and Applications**	**3 (3-0-0)**
		Total	**18**
Spring	**Course Code**	**Course-Title**	**CRHs**
	SE 100	**Programming for Engineers**	**3 (3-0-0)**
	SE 100 L	**Programming for Engineers Lab**	**1 (0-2-0)**
	ME 201	**Materials Science and Engineering**	**3 (3-0-0)**
	ME 201 L	**Materials Science and Engineering Lab**	**1 (0-2-0)**
	MAT 112	**Calculus II**	**3 (3-0-0)**
	PHU 124	**Physics II**	**3 (3-0-0)**
	PHU 124 L	**Physics II Lab**	**1 (0-2-0)**
		Total	**15**

* Refer to the ME department guidelines on University Requirements in this Study Plan.

2nd Year			
Fall	Course Code	Course-Title	CRHs
	ME 203	Applied Mechanics I: Statics	3 (3-0-0)
	ME 205	Introduction to Computer Aided Design	3 (3-0-0)
	ME 305	Manufacturing and Workshop Training	3 (3-0-0)
	ME 305 L	Manufacturing and Workshop Training Lab	1 (0-2-0)
	MAT 211	Calculus III	3 (3-0-0)
	MAT 212	Linear Algebra	3 (3-0-0)
	MAT 213	Differential Equations	3 (3-0-0)
		Total	19
Spring	Course Code	Course-Title	CRHs
	ME 208	Mechanics of Materials I	3 (3-0-0)
	ME 208 L	Mechanics of Materials I Lab	1 (0-2-0)
	ME 216	Fluid Mechanics	3 (3-0-0)
	ME 216 L	Fluid Mechanics Lab	1 (0-2-0)
	EE 207	Foundations of Electrical Engineering	3 (3-0-0)
	EE 207 L	Foundations of Electrical Engineering Lab	1 (0-2-0)
	MAT 224	Numerical Methods	3 (3-0-0)
	STA 212	Probability and Statistics	3 (3-0-0)
		Total	18

* Refer to the EE department guidelines on University Requirements in this Study Plan.

3rd Year			
Fall	Course Code	Course-Title	CRHs
	ME 311	Applied Mechanics II: Dynamics	3 (3-0-0)
	ME 312	Mechanics of Materials II	3 (3-0-0)
	ME 312 L	Mechanics of Materials II Lab	1 (0-2-0)
	ME 315	Machine Design	3 (3-0-0)
	ME 316	Engineering Thermodynamics	3 (3-0-0)
	ENG 222	Technical Writing	3 (3-0-0)
		Total	16
Spring	Course Code	Course-Title	CRHs
	ME 306	Instrumentation and Control Engineering	3 (3-0-0)
	ME 306 L	Instrumentation and Control Engineering Lab	1 (0-2-0)
	ME 308	Advanced Manufacturing Processes	3 (3-0-0)
	ME 308 L	Advanced Manufacturing Processes Lab	1 (0-2-0)
	ME 310	Mechanical Component Design	3 (3-0-0)
	ME 310 L	Mechanical Component Design Lab	1 (0-2-0)
	ME 317	Heat and Mass Transfer	3 (3-0-0)
	ME 317 L	Heat and Mass Transfer Lab	1 (0-2-0)
	IE 315	Engineering Economy and Cost Analysis	3 (3-0-0)
		Total	19

Summer	Course Code	Course-Title	CRHs
	ME 390	Mechanical Engineering Internship	0 (0-0-0)
		Total	0

* Refer to the ME department guidelines on University Requirements in this Study Plan.

4th Year			
Fall	Course Code	Course-Title	CRHs
	ME 403	Finite Element Methods	3 (3-0-0)
	ME 403 L	Finite Element Methods Lab	1 (0-2-0)
	ME 407	Heating, Ventilation, and Air-Conditioning	3 (3-0-0)
	ME 495	Mechanical Engineering Capstone Project I	3 (3-0-0)
	ME 4**	Technical Elective	3 (0-6-0)
		Social Sciences Elective I	3 (3-0-0)
		Total	16
Spring	Course Code	Course-Title	CRHs
	ME 496	Mechanical Engineering Capstone Project II	3 (0-6-0)
	ME 499	Ethics and Professional Development	1 (1-0-0)
	ME 4**	Technical Elective	3 (3-0-0)
	ME 4**	Technical Elective	3 (3-0-0)
		Social Sciences Elective I	3 (3-0-0)
		Art and Humanities Elective	3 (3-0-0)
		Total	16

Mechanical Engineering Track: Digital Design and Manufacturing

ME students have the option to select electives in the fourth year according to their desired academic objective in consultation with their academic advisor.

Regular, non-track students select any three of the offered ME electives in the fourth year. Alternatively, ME students can select the Digital Design and Manufacturing track. Irrespective of whether a student opts for the Digital Design and Manufacturing track or the non-track option, the total credit for electives must be 9 CRHs. All offered technical electives are available for regular non-track students, whether they opt for the track or not. In summary, all ME students follow the same curriculum and take the same required courses, with the difference being the designation of the electives in the fourth year.

A regular **non-track** student would have the following electives distribution in the fourth year.

4th Year Electives			
Fall	**Course Code**	**Course-Title**	**CRHs**
	ME 4**	**Technical Elective**	**3 (3-0-0)**
		Total	**3**
Spring	**Course Code**	**Course-Title**	**CRHs**
	ME 4**	**Technical Elective**	**3 (3-0-0)**
	ME 4**	**Technical Elective**	**3 (3-0-0)**
		Total	**6**

Per standing policy, and with the approval of the department chair, a student may opt to take one of the 3 CRH technical electives from another engineering program.

ME department, in conjunction with the Industrial Engineering (IE) department, offers the **Digital Design and Manufacturing** track to prepare students for Industry 4.0. Students opting for this track will gain focused knowledge by taking electives offered by ME and IE departments in this interdisciplinary area. In addition to completing the core courses ME 308 Advanced Manufacturing Processes and IE 315 Engineering Economy and Cost Analysis, students should also complete **three** courses from the following technical electives:

- ME 419 Product Design and Development (3 CRHs)
- ME 420 Advanced Visualization and Simulation (3 CRHs)
- IE 455 Data Mining and Application in Engineering (3 CRHs)
- IE 460 Industrial IoT (3 CRHs)

A student opting for the Digital Design and Manufacturing track can take two and one electives in the Fall and Spring semesters, respectively or vice versa as in the following electives distribution in the fourth year.

4th Year Electives			
Fall	**Course Code**	**Course-Title**	**CRHs**
	IE 4**	**Technical Elective**	**3 (3-0-0)**
		Total	**3**
Spring	**Course Code**	**Course-Title**	**CRHs**
	IE 4**	**Technical Elective**	**3 (3-0-0)**
	ME 4**	**Technical Elective**	**3 (3-0-0)**
		Total	**6**

OR

4th Year Electives			
Fall	**Course Code**	**Course-Title**	**CRHs**
	IE 4**	**Technical Elective**	**3 (3-0-0)**
	ME 4**	**Technical Elective**	**3 (3-0-0)**
		Total	**6**
Spring	**Course Code**	**Course-Title**	**CRHs**
	ME 4**	**Technical Elective**	**3 (3-0-0)**
		Total	**3**

Mechanical Engineering: Minor and double major

Students in the college of engineering and advanced computing may choose to pursue a minor or a double major in mechanical engineering. Taking a minor and double major in mechanical engineering is not allowed.

Minor

To minor in mechanical engineering, a student must complete 15 CRH on top of his or her main major requirements. The additional 15 CRH comprise of 7 CRH worth of courses from Group A and 8 CRH from Group B.

Group A: Take all courses in this group (7 CRH)

1. ME 311 Applied Mechanics II: Dynamics
2. ME 312 Mechanics of Materials II
3. ME 312 L Mechanics of Materials II Lab (1 credit hour)

Group B: Take 8 CRH worth of courses from this group

4. ME 315 Machine Design
5. ME 316 Engineering Thermodynamics
6. *ME 316 L Engineering Thermodynamics Lab (1 credit hour)
7. ME 317 Heat and Mass Transfer
8. *ME 317 L Heat and Mass Transfer Lab (1 credit hour)
9. ME 310 Mechanical Component Design
10. *ME 310 L Mechanical Component Design Lab (1 credit hour)
11. ME 407 Heating, Ventilation, and Air-Conditioning

*If a lab is selected, it must be taken with the accompanying course.

Students from other colleges or programs are responsible for completing all stated prerequisites or approved equivalents. Additional prerequisites may apply for students from other colleges, in accordance with University and College regulations.

Double major

To double major in mechanical engineering, a student must complete 25 CRH on top of his or her main major requirements. The additional 25 CRH comprise of 14 CRH worth of courses from Group C and 11 CRH from Group D.

Group C: Take all courses in this group (14 CRH**)**

1. ME 310 Mechanical Component Design
2. *ME 310 L Mechanical Component Design Lab (1 credit hour)
3. ME 311 Applied Mechanics II: Dynamics
4. ME 312 Mechanics of Materials II
5. *ME 312 L Mechanics of Materials II Lab (1 credit hour)
6. ME 315 Machine Design

Group D: Take 11 CRH worth of courses from this group

7. ME 306 Instrumentation and Control Engineering
8. *ME 306 L Instrumentation and Control Engineering Lab (1 credit hour)
9. ME 316 Engineering Thermodynamics
10. ME 317 Heat and Mass Transfer
11. *ME 317 L Heat and Mass Transfer (1 credit hour)
12. ME 403 Finite Element Methods
13. *ME 403 L Finite Element Methods (1 credit hour)
14. ME 407 Heating, Ventilation, and Air-Conditioning

*If a lab is selected, it must be taken with the accompanying course.

Students from other colleges or programs are responsible for completing all stated prerequisites or approved equivalents. Additional prerequisites may apply for students from other colleges, in accordance with University and College regulations.

Course Descriptions

Descriptions of Mechanical Engineering courses are given below. Each course below follows the following format:
Course Code: Course Title Credit Hours (Lecture contact hours – Lab contact hours – Tutorial contact hours)
Course Description
Pre-requisites
Co-requisites

ME 201 Materials Science and Engineering 3 (3-0-0)
This course provides an overview of the fundamental principles of materials science and engineering that are essential to an engineer. The broad areas covered are structure of crystalline solids, mechanical behavior of commonly encountered engineering materials and phase transformations. Students will encounter the inter-relationship between processing, structure and performance and how this affects design and materials selection in engineering practice.
Pre-requisites: CHM 101 or CHM 102
Co-requisites: none

ME 201 L Materials Science and Engineering Lab 1 (0-2-0)
Laboratory experiments reinforcing concepts of materials science and engineering such as microstructure, structure-property relationships, and mechanical properties.
Pre-requisites: CHM 101 or CHM 102
Co-requisites: ME 201

ME 203 Applied Mechanics I: Statics 3 (3-0-0)
The course teaches: fundamentals of forces and moments in 2 dimensions and 3 dimensions, moment about a point and about an axis, equivalent force systems, vector operations, 2D and 3D equilibrium of particles and rigid bodies, free body diagrams, center of mass, analysis of beams, trusses, frames and machines, and dry friction.
Pre-requisites: PHU 103, MAT 112
Co-requisites: none

ME 205 Introduction to Computer Aided Design 3 (3-0-0)
The course teaches computer-aided design of mechanical systems, and includes the preliminary design, analysis, and documentation of a mechanical system. This will include first and third angle projections, solid modeling and the use of commercially available CAD software.
Pre-requisites: none
Co-requisites: none

ME 206 Thermal Fluids Engineering I 3 (3-0-0)
The course teaches thermodynamics, pressure, temperature, heat and work, properties of pure materials, first law, closed and open system, second law, heat engines and cycles, including fluid mechanics, conservation laws, boundary layers, laminar and turbulent flows, pipe flows, incompressible one-dimensional flow, external flows, ideal flows, compressible flows, heat transfer, conduction, convection and radiation. This course is not offered for ME majors.
Pre-requisites: PHU 103
Co-requisites: none

ME 206 L Thermal Fluids Engineering I Lab 1 (0-2-0)

Laboratory experiments dealing with thermodynamics, pressure, temperature, heat and work, properties of pure materials, first law, closed and open system, second law, heat engines and cycles, including fluid mechanics, conservation laws, boundary layers, laminar and turbulent flows, pipe flows, incompressible one-dimensional flow, external flows, ideal flows, compressible flows, heat transfer, conduction, convection and radiation. This course is not offered for ME majors.

Pre-requisites: PHU 103
Co-requisites: ME 206

ME 208 Mechanics of Materials I 3 (3-0-0)

The course teaches mechanics of deformable bodies. Topics covered include concepts of stress and strain, classification of materials behaviour, stress-strain relations, generalized Hook's law. It also covers applications to engineering problems: members under axial loads, torsion of circular rods and tubes, bending and shear stresses in beams, combined stresses in beams, transformations of stresses, deflection of beams, buckling and thin-walled pressure vessels.

Pre-requisites: ME 201, ME 203
Co-requisites: none

ME 208 L Mechanics of Materials I Lab 1 (0-2-0)

Laboratory experiments dealing with materials and structures, beam bending, buckling and torsion, material and structural failure, stress, strain, and heating effects.

Pre-requisites: ME 201
Co-requisites: ME 208

ME 216 Fluid Mechanics 3 (3-0-0)

Fluid Mechanics course addresses the basic principles of fluid statics and dynamics including practical examples of the fluid devices and systems, solving techniques, and industrial applications. The course teaches introduction and basic concepts, properties of fluids, pressure distribution and fluid statics, fluid kinematics, integral analysis of fluid flow, Bernoulli and energy equations, momentum analysis of flow systems, dimensional analysis and modeling, internal flow, external flow: drag and lift, differential analysis of fluid flow, compressible flow, and open-channel flow.

Pre-requisites: PHU 103
Co-requisites: none

ME 216 L Fluid Mechanics Lab 1 (0-2-0)

Fluid Mechanics Lab course teaches experiments which address the basic principles of fluid statics and fluid dynamics. These experiments include: buoyancy force, hydrostatic pressure, pressure-volume relationship for gases, energy equation applied on pump system, pipe frictional losses laminar & turbulent flow, pressure-temperature relationship for water, velocity profile for laminar & turbulent flows for air, drag force for objects with different projected are and surface profile, pumps connected in parallel and series, jet force, energy balance calculations, and losses in bends and fittings experiments.

Pre-requisites: PHU 103
Co-requisites: ME 216

ME 238 Solid Mechanics for Engineers 3 (3-0-0)

This course introduces the fundamentals of engineering mechanics and strength of materials required for industrial engineering applications. Topics include statics of rigid bodies, force systems, equilibrium, internal forces, stress and strain, axial loading, torsion, bending, and basic deflection concepts. Emphasis is placed on understanding load behavior in industrial facilities, material handling systems, production equipment, and biomechanics. This course is offered for IE majors only.

Pre-requisites: ME 201
Co-requisites: none

ME 238 L Solid Mechanics for Engineers Lab 1 (0-2-0)
Laboratory sessions include experimental demonstrations and hands-on activities related to engineering mechanics and strength of materials. Experiments focus on basic material and structural behavior, including stress–strain relationships, axial loading, beam bending, and torsion. This course is offered for IE majors only.
Pre-requisites: ME 201
Co-requisites: none

ME 305 Manufacturing and Workshop Training 3 (3-0-0)
The course teaches an overview of modern manufacturing technology, materials and their manufacturing characteristics, casting, mould design tools and fixtures, cutting machine tools (turning, milling, drilling, broaching etc., abrasive machining processes), joining, assembly, manufacturing costs, design for manufacturing, welding, EDM, laser machining, industrial manufacturing processes (metal forming, forging, extrusion, rolling), metrology, inspection methods and quality control.
Pre-requisites: ME 201
Co-requisites: none

ME 305 L Manufacturing and Workshop Training Lab 1 (0-2-0)
Laboratory experiments dealing with modern manufacturing technology, materials and their manufacturing characteristics, casting, mould design tools and fixtures, cutting machine tools (turning, milling, drilling, broaching etc., abrasive machining processes), joining, assembly, manufacturing costs, design for manufacturing, welding, EDM, laser machining, industrial manufacturing processes (metal forming, forging, extrusion, rolling), metrology, inspection methods and quality control.
Pre-requisites: ME 201
Co-requisites: ME 305

ME 306 Instrumentation and Control Engineering 3 (3-0-0)
The course teaches an introduction to the design of feedback control systems. Topics include the properties of feedback systems, time-domain and frequency-domain performance measures, stability and degree of stability, the root locus method, Nyquist criterion, frequency-domain design, and state space methods. These concepts will be applied to a variety of mechanical and aerospace systems throughout the course.
Pre-requisites: EE 207
Co-requisites: none

ME 306 L Instrumentation and Control Engineering Lab 1 (0-2-0)

Laboratory experiments dealing with feedback control systems, time-domain and frequency-domain performance measures, stability and degree of stability, the root locus method, Nyquist criterion, frequency-domain design, and state space methods.
Pre-requisites: EE 207
Co-requisites: ME 306

ME 308 Advanced Manufacturing Processes 3 (3-0-0)
The course teaches the integration of design, engineering and management disciplines and practices for analysis and design of manufacturing enterprises. The course emphasizes the physics and stochastic nature of manufacturing processes and systems, and their effects on quality, rate, cost and flexibility, process physics and control, design for manufacturing and manufacturing systems and a team project where the students design and build elements using mass-production methods to produce a product in quantity.
Pre-requisites: ME 305
Co-requisites: none

ME 308 L Advanced Manufacturing Processes Lab1 (0-2-0)

Laboratory experiments dealing with integration of design, engineering and management disciplines and practices for analysis and design of manufacturing enterprises, the physics and stochastic nature of manufacturing processes and systems, and their effects on quality, rate, cost and flexibility, process physics and control, design for manufacturing and manufacturing systems and a team project where the students design and build elements using mass-production methods to produce a product in quantity.

Pre-requisites: ME 305
Co-requisites: ME 308

ME 310 Mechanical Component Design 3 (3-0-0)

The course teaches the creative design process via the application of appropriate physical laws and learning to complete projects on schedule. Topics include synthesis, analysis, design robustness, machine elements, manufacturability, idea generation, estimation, concept selection, visual thinking, communication, design and analysis, design for manufacturing, professional responsibilities and ethics.

Pre-requisites: ME 311, ME 312
Co-requisites: none

ME 310 L Mechanical Component Design Lab 1 (3-0-0)

The course teaches the creative design process via the application of physical laws and learning to complete projects on schedule. Topics include synthesis, analysis, design robustness, machine elements, manufacturability, idea generation, estimation, concept selection, visual thinking, communication, design and analysis, design for manufacturing, professional responsibilities and ethics.

Pre-requisites: ME 311, ME 312
Co-requisites: ME 310

ME 311 Applied Mechanics II: Dynamics 3 (3-0-0)

This course teaches basic principles of kinematics and kinetics of 3D particles and planer rigid bodies. It establishes and develops the analytical skills to solve dynamics problems based on application of basic principles such as Newton's laws of motion, concepts of work and energy as well as impulse and momentum, and force and acceleration.

Pre-requisites: ME 203
Co-requisites: none

ME 312 Mechanics of Materials II 3 (3-0-0)

The course teaches an introduction to mechanical behaviour of engineering materials and the use of materials in mechanical design. The course emphasizes the fundamentals of mechanical behaviour of isotropic and anisotropic materials, as well as design with materials, including elasticity, plasticity, limit analysis, fatigue, fracture, creep, three-dimensional stress and strain problems and the selection of materials for engineering design.

Pre-requisites: ME 208
Co-requisites: none

ME 312 L Mechanics of Materials II Lab 1 (0-2-0)

The course focuses on experiments reinforcing concepts in mechanical behavior of engineering materials and the use of materials in mechanical design, including elasticity, plasticity, limit analysis, fatigue, fracture, creep, and deformation in pressurized cylinder.

Pre-requisites: ME 208
Co-requisites: ME 312

ME 314 Vibration and Damping 3 (3-0-0)

The course teaches single-degree and multi-degree of freedom systems. Topics covered include undamped and damped free and forced vibrations, impulse and arbitrary force response vibration, absorbers and isolators, rotating machinery fault diagnosis, modal analysis and mode shapes.

Pre-requisites: ME 311

Co-requisites: none

ME 315 Machine Design 3 (3-0-0)

This course teaches the function, design and performance of basic machine elements commonly used by mechanical engineers, such as shaft, temporary and permanent fasteners, key, thick wall vessel, etc. Students will develop skills in designing and analysing performance capabilities of these elements based on static and dynamic combined loading. The course will also cover potential topics such as part geometry, material choice, loading and environmental conditions, static and fatigue failure theories, factor of safety concept.

Pre-requisites: ME 208

Co-requisites: none

ME 317 Heat and Mass Transfer 3 (3-0-0)

The Heat and Mass Transfer course addresses the basic concepts and applications of heat and mass transfer in real life practices and industrial processes and systems. This includes practical examples of analysis and design of various engineering systems and devices. Furthermore, the course introduces the modeling and analysis methods as well as solving techniques related to thermal-fluids residential and industrial related applications. The course covers and teaches introduction and basic concepts, heat conduction equation, steady heat conduction, transient heat conduction, numerical methods in heat conduction, fundamentals of convection, external forced convection, internal forced convection, natural convection, boiling and condensation, heat exchangers, fundamentals of thermal radiation, radiation heat transfer, and mass transfer.

Pre-requisites: ME 216

Co-requisites: none

ME 317 L Heat and Mass Transfer Lab 1 (0-2-0)

The Heat and Mass Transfer Lab course teaches basic experiments related to heat and mass transfer. These experiments include: conduction heat transfer, heat transfer by natural convection, basics of radiation heat transfer, natural convection, forced convection, and boiling and condensation experiments.

Pre-requisites: ME 216

Co-requisites: ME 317

ME 400 Special Topics in Mechanical Engineering 3 (3-0-0)

The course will focus on advanced topics and recent developments in one or more of areas: control and robotics, dynamic systems, fluid mechanics, materials science and engineering, solid mechanics and structures, thermal sciences or other areas in mechanical engineering.

Pre-requisites: Department Approval

Co-requisites: none

ME 401 Computational Fluid Dynamics and Heat Transfer 3 (3-0-0)

The course teaches the working principles of computational fluid dynamics and heat transfer and applies these concepts using commercially available software packages used in industry. Topics include the application, analysis and limitations of design evaluation using CFD approach. The course will equip students to model real engineering problems and correlate the working principles of fluid dynamics and heat transfer using numerical techniques.

Pre-requisites: ME 317

Co-requisites: none

ME 403 Finite Element Methods 3 (3-0-0)

The course teaches the working principles of the non-linear finite element method (FEM) and applies the concepts involved using commercially available software packages used in industry. Topics include the application, analysis and limitations of design evaluation using FEM approach. The course will equip students to model real engineering problems and correlate the working principles of Mechanics and Dynamics using numerical methods.

Pre-requisites: ME 311, ME 312

Co-requisites: none

ME 403 L Finite Element Methods Lab 1 (0-2-0)

Laboratory experiments dealing with the working principles of the non-linear finite element method (FEM) and apply the concepts involved using commercially available software packages used in industry, the application, analysis and limitations of design evaluation using FEM approach. The course will equip students to model real engineering problems and correlate the working principles of mechanics and dynamics using numerical methods.

Pre-requisites: ME 312, ME 311

Co-requisites: ME 403

ME 405 Engineering Safety and Risk Analysis 3 (3-0-0)

The course aims to introduce students to hazard identification, risk assessment, risk control in industrial or commercial workplace. The course will also equip students with knowledge on health, and safe work practices, recognition and elimination of health hazards, design material handling and emergency treatment for industrial accidents. Students are expected to understand different hazard identification and control methods and able to develop risk management systems.

Pre-requisites: STA 212

Co-requisites: none

ME 406 Mechatronics 3 (3-0-0)

The course teaches the acquisition of the knowledge and skills required to design and control electromechanical systems. The basic material will be covered in classroom lectures and discussions. Much of the learning will take place in the laboratory where students will learn to build and operate representative electromechanical systems. The class includes a final project.

Pre-requisites: ME 306

Co-requisites: none

ME 407 Heating, Ventilation, and Air-Conditioning 3 (3-0-0)

The course introduces basic concepts of heating, ventilation, and air conditioning systems (HVAC). These include: HVAC components and distribution systems, moist air properties and conditioning processes, indoor comfort conditions, heat transmission in building structures, calculation of heating loads, cooling load, duct design, fans and building air distribution, and the performance of refrigeration systems.

Pre-requisites: (ME 316 & ME 317) or (ME 206)

Co-requisites: none

ME 410 Energy Conversion and Cogeneration Systems 3 (3-0-0)

The course introduces various types of energy conversion and cogeneration systems. These include; advanced steam power plants, gas turbine power plants, nuclear power plants, co-generation and tri-generation, internal combustion engine, and renewable energy conversion systems. The student will learn how to do an analysis for any energy conversion system. Moreover, students will learn about the regeneration, binary, supercritical, and other advanced steam power cycles. In addition, this course teaches student how to design components of the power conversion system such as boilers, condensers, steam turbines, compressors, combustors, gas turbines, and others. The knowledge about the nuclear power plants and recent technologies is covered as well in this course. Furthermore, the course gives an introduction to the power generation using the new and renewable energy sources as well as energy storage and economy of energy.

Pre-requisites: ME 316

Co-requisites: none

ME 412 Renewable Energy Systems 3 (3-0-0)

The course gives an overview of renewable energy sources including biomass, hydroelectricity, geothermal, tidal, wave, wind and solar power. And it also presents the fundamentals of different renewable energy systems with a main focus on technologies with high development potential. Furthermore, it integrates maths, engineering, climate studies and economics, and enabling students to gain a broad understanding of renewable energy technologies and their potential.

Pre-requisites: ME 316

Co-requisites: none

ME 414 Introduction to Compressible Flow Turbomachinery 3 (3-0-0)

The course introduces various types of compressible flow turbomachineries and describes their fundamental working and design concepts. This includes; turbomachinery classification, apply dimensional analysis and similitude to turbomachines, basic governing equations for turbomachines, Euler equation, centrifugal compressors, axial flow compressors and fans, radial and axial flow turbines.

Pre-requisites: ME 316

Co-requisites: none

ME 416 Automotive Engineering 3 (3-0-0)

This course teaches the fundamentals of Internal Combustion engines, its classifications and applications, as well as deign and operating parameters. Topics include the thermodynamic analysis of fuel-air cycle, firing order, concept of combustion process in SI engines, Scavenging and design aspects of SI engines, supercharging and turbocharging, lubrication system, engine cooling system and engine heat transfer, fuel injection system in SI engines, Compression Ignition (CI) engines, conventional and non-conventional fuels in SI and CI engines.

Pre-requisites: ME 317

Co-requisites: none

ME 418 Water Desalination 3 (3-0-0)

The course aims to introduce students to fundamentals of water desalination. The course provides an overview and classification of desalination techniques such as single and multiple effect evaporation, vapor compression, single and multi- stage flash distillation, reverse osmosis, hybrid processes. It will also cover potential topics such as resources and needs for desalination, dual purpose power and desalination plants, desalination powered by renewable energy sources. Other topics such as economic analysis and brine discharge management may also be presented.

Pre-requisites: ME 317

Co-requisites: none

ME 419 Product Design and Development 3 (3-0-0)

This course will introduce students to thought frameworks, tools and methods for product design and development. The course will teach students a set of product development procedures that can be practiced in multidisciplinary teams. Topics include opportunity identification, product planning, identifying customer needs and specification, concept generation, selection and testing as well as designing of environment and manufacturing. The course will include projects-based assignments.
Pre-requisites: ME 308
Co-requisites: none

ME 420 Advanced Visualization and Simulation 3 (3-0-0)

This course will introduce students to use computer-aided packages in the product design and manufacturing process. Students will be exposed to CAD/CAE/CAM packages which are used in the industry to perform analysis and evaluate performance of engineering products and to optimize manufacturing processes. The course will be hands-on and will involve ample project-based activities along with lecture-based instructions.
Pre-requisites: ME 308
Co-requisites: none

ME 435 Undergraduate Research in Mechanical Engineering 3 (0-6-0)

Students participate in supervised research with a faculty member. Supervised research can be: 1) independent research undertaken by the student (thesis, independent study), or 2) assistance on a faculty member's research project. Students must find a faculty member who is willing to supervise him/her as an assistant on an existing project or as the author of an individual project. The student and the faculty supervisor will complete and sign a research contract which will be turned in to the chair of the Industrial and Mechanical Engineering Department. Drafting the contract will allow the student to develop ideas about what should be accomplished and what the faculty supervisor's expectations are. All academic requirements are at the discretion of the supervising faculty member. Students should agree on a plan for the semester with the faculty mentor before the research begins. The plan should include academic requirements, the basis for grading the experience, and a plan for student/professor meetings for the semester. It is the student's responsibility to report progress and seek guidance when needed. Students are expected to be active and reliable participants in the research experience.
Pre-requisites: Department Approval
Co-requisites: none

ME 495 Mechanical Engineering Capstone Project I 3 (0-6-0)

This capstone course is a semester-long design project, undertaken individually or in a small team under supervision of an academic staff. The project involves an introduction to the life cycle of a project from a technical and management perspective and is based on extensive oral and written communication. The capstone project is typically the foundation of the student's engineering portfolio for application to industry or graduate school.
Pre-requisites: ME 317, ME 310
Co-requisites: none

ME 496 Mechanical Engineering Capstone Project II 3 (0-6-0)

This capstone course is the continuation of ME 495. Students working individually or in a small team under supervision of an academic staff will be expected to continue and complete prior work initiated in ME 495. The project involves an introduction to the life cycle of a project from a technical and management perspective and is based on extensive oral and written communication. The capstone project is typically the foundation of the student's engineering portfolio for application to industry or graduate school.
Pre-requisites: ME 495
Co-requisites: none

Alfaisal University
Bachelor of Mechanical Enginneering
Study Plan Summary
Effective: Fall 2026

كلية الهندسة والحوسبة المتقدمة
College of Engineering and Advanced Computing

4-Year Curriculum: 137 Credit Hours Total

Freshman Year - Fall Semester		
Course Code	Course-Title	CRHs
COE 100	Student Orientation and Academic Success	1
CHM 101	General Chemistry I	3
CHM 101 L	General Chemistry I Lab	1
MAT 101	Calculus I	3
PHU 103	Physics I	3
PHU 103 L	Physics I Lab	1
ENG 101	University Writing	3
AI 102	AI for everyone: Foundation and Applications	3
	Total	18

Freshman Year - Spring Semester		
Course Code	Course-Title	CRHs
SE 100	Programming for Engineers	3
SE 100 L	Programming for Engineers Lab	1
ME 201	Materials Science and Engineering	3
ME 201 L	Materials Science and Engineering Lab	1
MAT 112	Calculus II	3
PHU 124	Physics II	3
PHU 124 L	Physics II Lab	1
	Total	15

Sophomore Year - Fall Semester		
Course Code	Course-Title	CRHs
ME 203	Applied Mechanics I: Statics	3
ME 205	Introduction to Computer Aided Design	3
ME 305	Manufacturing and Workshop Training	3
ME 305 L	Manufacturing and Workshop Training Lab	1
MAT 211	Calculus III	3
MAT 212	Linear Algebra	3
MAT 213	Differential Equations	3
	Total	19

Sophomore Year - Spring Semester		
Course Code	Course-Title	CRHs
ME 208	Mechanics of Materials I	3
ME 208 L	Mechanics of Materials I Lab	1
ME 216	Fluid Mechanics	3
ME 216 L	Fluid Mechanics Lab	1
EE 207	Foundations of Electrical Engineering	3
EE 207 L	Foundations of Electrical Engineering Lab	1
MAT 224	Numerical Methods	3
STA 212	Probability and Statistics	3
	Total	18

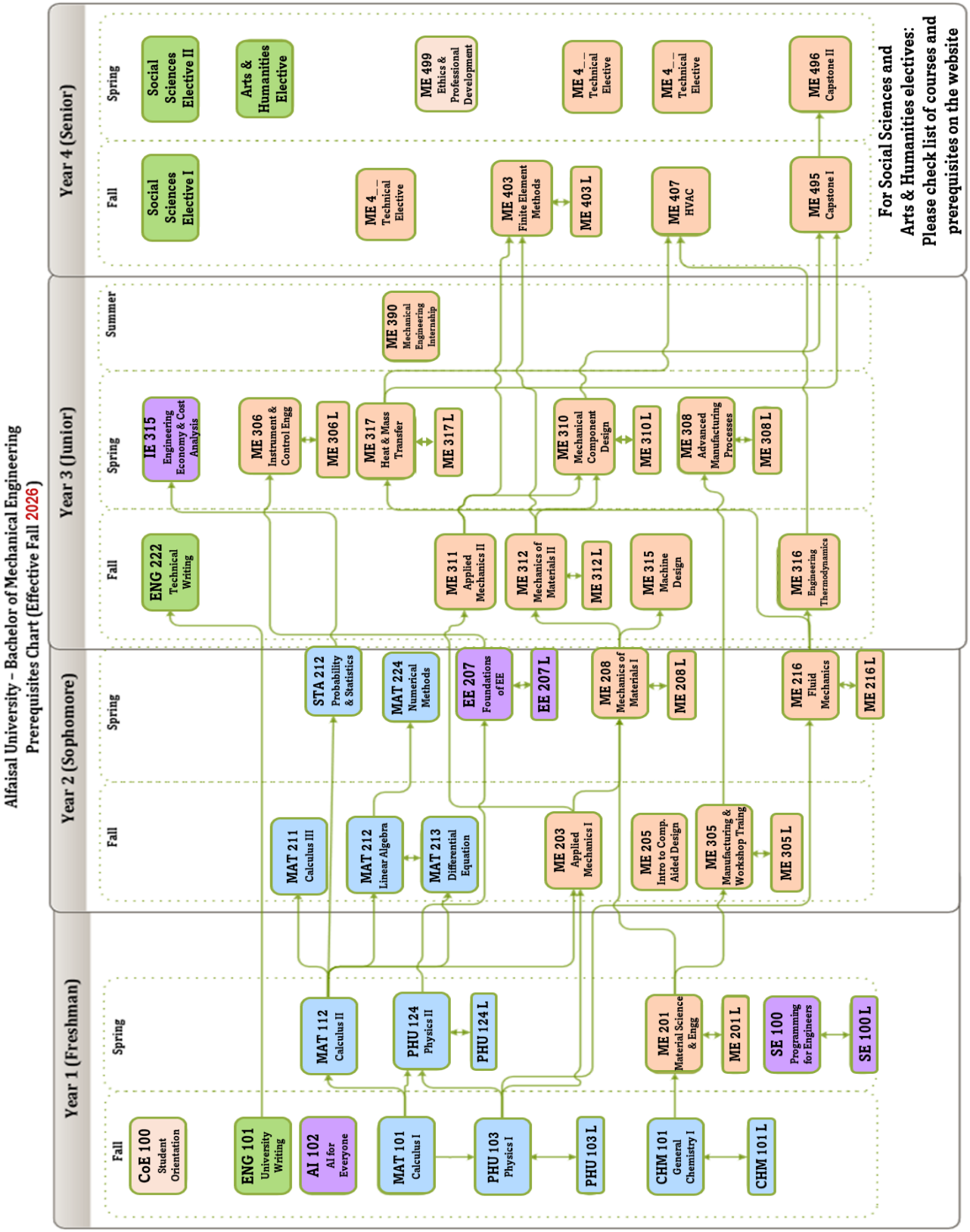
Junior Year - Fall Semester		
Course Code	Course-Title	CRHs
ME 311	Applied Mechanics II: Dynamics	3
ME 312	Mechanics of Materials II	3
ME 312 L	Mechanics of Materials II Lab	1
ME 315	Machine Design	3
ME 316	Engineering Thermodynamics	3
ENG 222	Technical Writing	3
	Total	16

Junior Year - Spring Semester		
Course Code	Course-Title	CRHs
ME 306	Instrumentation and Control Engineering	3
ME 306 L	Instrumentation and Control Engineering Lab	1
ME 308	Advanced Manufacturing Processes	3
ME 308 L	Advanced Manufacturing Processes Lab	1
ME 310	Mechanical Component Design	3
ME 310 L	Mechanical Component Design Lab	1
ME 317	Heat and Mass Transfer	3
ME 317 L	Heat and Mass Transfer Lab	1
IE 315	Engineering Economy and Cost Analysis	3
	Total	19

Junior Year - Summer Semester		
Course Code	Course-Title	CRHs
ME 390	Mechanical Engineering Internship	0
	Total	0

Senior Year - Fall Semester		
Course Code	Course-Title	CRHs
ME 403	Finite Element Methods	3
ME 403 L	Finite Element Methods Lab	1
ME 407	Heating, Ventilation, and Air-Conditioning	3
ME 495	Mechanical Engineering Capstone Project I	3
ME 4 _ _	Technical Elective	3
	Social Sciences Elective I	3
	Total	16

Senior Year - Spring Semester		
Course Code	Course-Title	CRHs
ME 499	Ethics and Professional Development	1
ME 496	Mechanical Engineering Capstone Project II	3
ME 4 _ _	Technical Elective	3
ME 4 _ _	Technical Elective	3
	Social Sciences Elective II	3
	Arts and Humanities Elective	3
	Total	16


Alfaisal University – Bachelor of Mechanical Engineering
Prerequisites Chart (Effective Fall 2026)
Year 1 (Freshman)
Year 2 (Sophomore)
Year 3 (Junior)
Year 4 (Senior)
Fall
Spring
Summer
CoE 100 Student Orientation
ENG 101 University Writing
AI 102 AI for Everyone
MAT 101 Calculus I
PHU 103 Physics I
PHU 103 L
CHM 101 General Chemistry I
CHM 101 L
MAT 112 Calculus II
PHU 124 Physics II
PHU 124 L
ME 201 Material Science & Engg
ME 201 L
SE 100 Programming for Engineers
SE 100 L
MAT 211 Calculus III
MAT 212 Linear Algebra
MAT 213 Differential Equation
ME 203 Applied Mechanics I
ME 205 Intro to Comp. Aided Design
ME 305 Manufacturing & Workshop Traing
ME 305 L
STA 212 Probability & Statistics
MAT 224 Numerical Methods
EE 207 Foundations of EE
EE 207 L
ME 208 Mechanics of Materials I
ME 208 L
ME 216 Fluid Mechanics
ME 216 L
ENG 222 Technical Writing
ME 311 Applied Mechanics II
ME 312 Mechanics of Materials II
ME 312 L
ME 315 Machine Design
ME 316 Engineering Thermodynamics
IE 315 Engineering Economy & Cost Analysis
ME 306 Instrument & Control Engg
ME 306 L
ME 317 Heat & Mass Transfer
ME 317 L
ME 310 Mechanical Component Design
ME 310 L
ME 308 Advanced Manufacturing Processes
ME 308 L
ME 390 Mechanical Engineering Internship
Social Sciences Elective I
Social Sciences Elective II
Arts & Humanities Elective
ME 4__ Technical Elective
ME 403 Finite Element Methods
ME 403 L
ME 407 HVAC
ME 495 Capstone I
ME 499 Ethics & Professional Development
ME 4__ Technical Elective
ME 4__ Technical Elective
ME 496 Capstone II
For Social Sciences and Arts & Humanities electives: Please check list of courses and prerequisites on the website