جـــامعـــة
عبـــدالله الســـالـــم
Abdullah Al Salem
University
AASU

Bachelor of Science in Material Science and Engineering

2024-2025

1) Introduction

The Bachelor of Science in Material Science and Engineering (MSE) program is designed to prepare students for careers in which material selection and design play a critical role in real-world applications. The program integrates principles from chemistry, physics, and engineering to develop materials and processes that enhance the reliability of systems used in various applications. This program addresses the growing global need for innovative solutions in material development in important fields such as sustainability and climate change, renewable energy, energy and storage, alternative fuels, and advanced materials.

2) Program Educational Objectives (PEOs)

Graduates of the Material Science and Engineering program are expected to possess the following skills:

1. Knowledge of the material science and engineering principles relevant to materials design, development, and devices engineering.
2. Understanding of the process-microstructure-property relationships and using them to control the performance of materials.
3. Ability to effectively use principles of engineering design to develop new materials or improve the performance of existing ones.
4. Ability to select, characterize, and use materials for specific applications.
5. Engage in lifelong learning and professional development to remain up-to-date in the field of materials science.
6. Work effectively in multidisciplinary teams and assume leadership roles.
7. Communicate technical information effectively to diverse audiences.
8. Uphold ethical standards and contribute to the well-being of society through professional practice.

3) Program Learning Outcomes (PLOs)

The AASU MSE program offers hands-on experience in a wide range of engineering skills areas. The main program objectives include the creation of graduates who meet the following criteria:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

4) General Program Presentation

Graduating with a Bachelor of Science in Material Science and Engineering necessitates the successful completion of a total of 132 credit hours (CH). These credit hours are distributed across different requirements, encompassing courses that are essential as well as those that can be chosen as elective courses. The table below shows how 132 credit hours are distributed across requirements:

Table 1: MSE credit hours distribution.

General Education Requirements	36 Credits
College Requirements	43 Credits
Program Requirements	53 Credits (9 Electives)
Total Credits Hours	132 Credits

5) General Education (36 Credits)

Students here are required to complete 36 credit hours distributed over five sections as follows:

Communication (9 Credits)

Table 2: General education communication courses.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
ENL101	English for Academic Studies	(3 credits)	3		ICT 095*
ENL102	English Composition	(3 credits)	3	ENL101 ICT 095	
ENL201	Writing and Research	(3 credits)	3	ENL102	

*Preparatory Program: ICT 095 Information Technology Basics.

Innovation and Creativity (6 Credits)

Table 3: Innovation and Creativity Ethics compulsory course.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
GEN150	Professionalism and Ethics	(3 credits)	3		

Table 4: General education innovation and creativity elective courses (students should select one course from the following list).

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
GEN131	Creativity and Problem Solving	(3 credits)	3		
BUS101	Entrepreneurship Essentials	(3 credits)	3		
ENI110	Intro. to Innovation and Creativity	(3 credits)	3		
ENI140	Design Thinking	(3 credits)	3		

ENI150	Innovation in Business Models	(3 credits)	3
ENI160	Innovation and Globalization	(3 credits)	3

Global Citizen (6 Credits)

Table 5: General education global citizen compulsory course.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
INF120	Computers and Information Systems	(3 credits)	3	ICT095	

Table 6: General education global citizen elective courses (students should select one course from the following list).

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
GEN201	Globalization and Sustainability	(3 credits)	3		
GEN202	Global Citizenship in the Digital Age	(3 credits)	3		
BUS201	Global Economics and Trade	(3 credits)	3		

Art and Humanities (9 Credits)

Table 7: General education art and humanities compulsory course.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
HST 101	Islamic Culture and Values	(3 credits)	3		

Table 8: General education art and humanities elective course group I (students should select one course from the following list).

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
HST102	Kuwait History	(3 credits)	3		
ARB101	Arabic Communication skills	(3 credits)	3		
ART101	Art Appreciation	(3 credits)	3		
ART102	Intro. to Media and Communication	(3 credits)	3		

Table 9: General education art and humanities elective course group II (students should select one course from the following list).

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
PHL101	Introduction to Philosophy	(3 credits)	3		
LAW101	Law and Society	(3 credits)	3		
PSY 101	Introduction to Psychology	(3 credits)	3		

SOC 101	Introduction to Sociology	(3 credits)	3

Math and Science (6 Credits)

Table 10: General education math and science courses (6 credits).

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite	Note
MAT101	Calculus I	(3 credits)	3	IMP099* or Equivalent		
PHY101	Physics I	(3 credits)	3		MAT101	

*Preparatory Program: IMP099 Precalculus.

6) College Requirements (43 Credits)

- **Math and Science (21 Credits)**

Table 11: Math and Science courses.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
PHY105	Physics I Lab	(1 credit)	3		PHY101
MAT102	Calculus II	(3 credits)	3	MAT101	
MAT201	Calculus III	(3 credits)	3	MAT102	
PHY102	Physics II	(3 credits)	3	PHY101 MAT101	
PHY107	Physics II Lab	(1 credit)	3	PHY105	PHY102
CHM101	Chemistry I	(3 credits)	3		
CHM105	Chemistry I Lab	(1 credit)	3		CHM101
MAT202	Linear Algebra	(3 credits)	3	MAT101	
MAT240	Differential Equations	(3 credits)	3	MAT102	

- **Engineering requirements (22 Credits)**

Table 12: Engineering courses.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
ENG205	Electrical and Electronic Circuits	(3 credits)	3	PHY102 MAT102	
ENG206	Electrical and Electronic Circuits Lab	(1 credit)	3	ENG205 PHY107	
ENG207	Programming	(3 credits)	3	MAT202	
ENG208	Introduction to Energy and Sustainability	(3 credits)	3	PHY102 CHM101 CHM105	
ENG209	Statics and Strength of Materials	(3 credits)	3	PHY102	

ENG304	Engineering Probability & Statistics	(3 credits)	3	MAT102
ENG308	Numerical Methods	(3 credits)	3	MAT201 MAT240
ENG309	Engineering Project Management and Economics	(3 credits)	3	ENG304

7) Program Requirements (53 Credits):

- **Program Requirements (44 Credits)**

Table 13: Program courses.

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
MSE211	Introduction to Materials Science and Engineering	(3 credits)	3	CHM101 PHY102	
MSE301	Thermodynamics of Materials	(3 credits)	3	CHM 101	
MSE302	Materials Characterization	(3 credits)	3	CHM 101 PHY 102	
MSE303	Structure & Bonding of Solids	(3 credits)	3	MSE211	
MSE304	Physical Chemistry	(3 credits)	3	MSE302	
MSE305	Electronic Properties of Materials	(3 credits)	3	MSE211	
MSE306	Mechanical and Thermal Properties of Materials	(3 credits)	3	MSE211	
MSE307	Nanomaterials	(3 credits)	3	MSE211 MSE 301	
MSE308	Materials Characterization Laboratory 1	(1 credits)	3		MSE302
MSE309	Materials Synthesis Laboratory	(1 credits)	3	MSE303	
MSE310	Electronic Device Fabrication Laboratory	(1 credits)	3		MSE305
MSE311	Material Property Measurement Laboratory	(1 credits)	3	MSE306	
MSE400	Diffusion and Kinetics in Materials	(3 credits)	3	MSE211 MSE301	
MSE401	Phase Diagrams & Phase Transformations	(3 credits)	3	MSE301	
MSE402	Materials for Renewable Energy & Storage Technologies	(3 credits)	3	MSE211	
MSE403	Materials Characterization Laboratory 2	(1 credits)	3	MSE302 MSE308	
MSE490	Capstone Design 1	(3 credits)	3	Program Approval	
MSE491	Capstone Design 2	(3 credits)	3	MSE490	

- **Program Electives (9 Credits)**

Table 14: Program elective courses (Three courses from the following list).

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
MSE382	Organic Chemistry	(3 credits)	3	CHM101	
MSE484	Material Synthesis Techniques	(3 credits)	3	MSE303	
MSE485	Material Modeling & Simulation	(3 credits)	3	MSE302	
MSE486	Polymer Science and Engineering	(3 credits)	3	MSE302	
MSE487	Composite Material Design and Engineering	(3 credits)	3	MSE302	
MSE488	Materials Engineering for Harsh Environments	(3 credits)	3	MSE302	
MSE480	Internship	(3 credits)		Program Approval	
MSE495	Special Topics in Material Science Engineering	(3 credits)		Program Approval	

- Students can take up to three credits of technical electives from another program or institution.