



**ABDULLAH AL SALEM UNIVERSITY (AASU)**

**College of Engineering & Energy Undergraduate  
Academic Programs**

**2023/2024**

1) General Introduction .....	3
2) The Vision .....	3
3) The Mission .....	3
4) Program Development .....	3
5) Graduate Attributes .....	3
6) College of Engineering & Energy Programs .....	4
a) Biomedical and Instrumentation Engineering.....	4
i) Program Overview .....	4
b) Energy Systems Engineering .....	8
i) Program Overview .....	8
c) Mechatronics and Robotics Engineering .....	12
i) Program Overview .....	12

## 1) General Introduction

The College of Engineering and Energy is dedicated to practically applying mathematics and scientific principles, fostering a lifelong learning experience for students, and enabling them to adapt to the rapidly changing world. Abdullah al Salem University offers a wide array of engineering disciplines, allowing students to focus and specialize in their areas of interest, such as:

- 1) Biomedical and Instrumentation Engineering.
- 2) Energy Systems Engineering.
- 3) Mechatronics and Robotics Engineering.

At the College of Engineering and Energy, we take pride in offering students an internship program that seamlessly combines their academic studies with real-world experiential learning. Furthermore, we incorporate more practical learning tools into our educational approach, providing students with essential training and mentorship alongside their academic pursuits. Abdullah al Salem University is committed to equipping students with state-of-the-art equipment and tools, ensuring their educational journey is both successful and enriched.

## 2) The Vision

The AASU shall be an institution of choice that will contribute to socio-economic development of Kuwait by promoting innovation in education, world-class research, creativity, and entrepreneurship.

## 3) The Mission

To establish a strong and balanced academic programs, research, and outreach programs, that contribute to the development and advancement of Kuwait and the region.

## 4) Program Development

The University of Abdullah Al Salem has meticulously designed all its academic programs in alignment with the comprehensive framework outlined by the Kuwait Vision 2035. These programs have been developed with a keen focus on addressing the evolving needs of the job market, as highlighted in studies conducted by esteemed institutions such as the Supreme Council for Planning and Development, the Kuwait Foundation for the Advancement of Sciences, and the World Bank. Furthermore, the university has closely examined the required skill sets for the workforce through research conducted by the Kuwait Institute for Scientific Research. The curriculum also draws inspiration from insights gathered during interviews with both public and private sector entities. This integration extends to the diverse specializations offered at Kuwait University, facilitating a multidisciplinary approach. Additionally, the University of Abdullah Al Salem aims to enhance its regional and global presence in academic fields. Through the above-mentioned points, the university ensures its programs are not only forward-thinking but also responsive to the demands of the modern world.

## 5) Graduate Attributes:

- Highly employable individuals able to immediately contribute to their respective workforce and link the core concepts and applications of the discipline to intended fields of occupation.
- Creative thinkers and problem solvers able to use their intellectual curiosity and critical thinking to find sustainable solutions to complex, real-life problems.

- Effective collaborators able to communicate professionally, adapt, debate and act as team players.
- Entrepreneurial individuals able to identify an opportunity and transform a concept into reality.
- Responsible global citizens and lifelong learner able to act in a manner that promotes professionalism, ethical behavior, accountability, social responsibility, and engage in a self-motivated pursuit of knowledge for either personal fulfillment or professional growth.

## **6) College of Engineering & Energy Programs**

### **a) Biomedical and Instrumentation Engineering**

#### **i) Program Overview**

Graduating with a Bachelor of Science in Biomedical and Instrumentation Engineering necessitates the successful completion of a total of 132 credit hours (CH). These credit hours are distributed across different university (36 CH), college (43 CH), and program requirements (53 CH), encompassing courses that are essential as well as those that can be chosen based on the stream preference. The following table 1 shows the recommended study plan distributed over eight semesters.

Table 1. Recommended Study Plan

	Course Code	Course Name	Course Type	Pre-R	Co-R	Credit Hours	Contact Hours
Semester 1	ENL101	English for Academic Studies	UM			3	3
	GEN150	Professionalism and Ethics	UM			3	3
	MAT101	Calculus I	UM			3	3
	PHY101	Physics I	UM			3	3
	CHM101	Chemistry I	CM			3	3
	PHY105	Physics I Lab	CM		PHY101	1	3
	CHM105	Chemistry I Lab	CM		CHM101	1	3
<b>Total</b>						<b>17</b>	<b>21</b>
Semester 2	ENL102	English Composition	UM			3	3
	XXXX	Arts and Humanities Elective	UM			3	3
	BIE101	Human Biology for Engineers	PM			3	3
	MAT102	Calculus II	CM	MAT101		3	3
	PHY102	Physics II	CM	PHY101		3	3
	PHY107	Physics II Lab	CM		PHYS102	1	3
<b>Total</b>						<b>16</b>	<b>18</b>
Semester 3	INF120	Computer and Information Systems	UM			3	3
	MAT201	Calculus III	CM	MAT102		3	3
	MAT202	Introduction to Linear Algebra	CM	MAT102		3	3
	MAT240	Ordinary Differential Equations	CM	MAT102		3	3
	ENG205	Electrical and Electronic Circuits	CM	MAT101		3	3
	ENG206	Electrical and Electronic Circuits Lab	CM		ENG205	1	3
<b>Total</b>						<b>16</b>	<b>18</b>
Semester 4	ENI200	Global awareness and social Resp.	UM			3	3
	ENG304	Engineering Probability & Statistics	CM	MAT201 & MAT202		3	3
	ENG207	Programing	CM	MAT201 & PHY102		3	3
	ENG308	Numerical Methods	CM	MAT201 & MAT240		3	3
	ENG209	Statics and Strength of Materials	CM	PHY102		3	3
	ENG208	Introduction to Sustainable Energy	CM			3	3
<b>Total</b>						<b>18</b>	<b>18</b>

	Course Code	Course Name	Course Type	Pre-R	Co-R	Credit Hours	Contact Hours
Semester 5	ENL201	Writing and Research	UM			3	3
	BIE201	Biochemistry	PM	CHM101 & BIE101		3	3
	BIE202	Biochemistry Lab	PM		BIE202	1	3
	BIE203	Human Anatomy and Physiology	PM	BIE101		3	3
	BIE301	Biofluids and Biomedical Transport Phenomena	PM	ENG209 & MAT240		3	3
	BIE350	Measurement Principles and Control Systems	PM	ENG205 & CHM101		3	3
	BIE351	Signal and control systems Lab	PM		BIE350	1	3
<b>Total</b>						<b>17</b>	<b>21</b>
Semester 6	XXXX	Innovation and Creativity Elective	UM			3	3
	BIE302	Biomaterials	PM	BIE203 & BIE202		3	3
	BIE303	Biomaterials Lab	PM		BIE302	1	3
	BIE304	Biomechanics	PM	BIE203 & BIE301		3	3
	BIE305	Medical Imaging Systems	PM	BIE351 & ENG304		3	3
	BIE352	Industrial Instrumentation and Data Acquisition	PM	BIE350		3	3
	BIE353	Data Acquisition Lab	PM		BIE352	1	3
<b>Total</b>						<b>17</b>	<b>21</b>
Semester 7	XXXX	Arts and Humanities Elective	UM			3	3
	XXXX	Arts and Humanities Elective	UM			3	3
	BIE451	Instrumentation Design	PM	BIE352		3	3
	BIE452	Instrumentation Design Lab	PM		BIE451	1	3
	BIE490	Capstone Design Experience 1	PM	90 CH		3	3
	ENG309	Engineering Economy	CM	ENG304		3	3
<b>Total</b>						<b>16</b>	<b>18</b>
Semester 8	BIE491	Capstone Design Experience 2	PM	BIE490		3	3
	BIE401	Biomedical Molecular and Nano Devices	PM	BIE304 & BIE305		3	3
	BIEXXX	Program Elective (Table 3)	PE	90CH		3	3
	BIEXXX	Program Elective (Table 3)	PE	90CH		3	3
	BIEXXX	Program Elective (Table 3)	PE	90CH		3	3
<b>Total</b>						<b>15</b>	<b>15</b>

Table 2. Program Elective Courses

Streams	Course Code	Course Name	Pre-R	Co-R	Credit Hours	Contact Hours
Instrumentation	BIE360	Instrumentation Electronics	BIE352		3	3
	BIE460	Process Instrumentation	BIE451		3	3
	BIE461	Safety and Reliability	BIE451		3	3
	BIE462	Communication Protocols	BIE352		3	3
	BIEXXX	Internship	75CH		3	3
Biomedical	BIE410	Biomechanics and Modelling of Human Movement	BIE302 & BIE304		3	3
	BIE411	Cellular and Molecular Biomechanics	BIE201 & BIE304		3	3
	BIE412	Rehabilitation Engineering	BIE304		3	3
	BIE413	Biomedical Algorithms and Solutions	BIE304		3	3
	BIE414	Image Processing	BIE305			
	BIE415	Biomedical Optics	BIE302 & BIE305		3	3
	BIE416	Medical Devices Design and Manufacturing	BIE302 & BIE304			

## **b) Energy Systems Engineering**

### **i) Program Overview**

Graduating with a Bachelor of Science in Energy Systems Engineering necessitates the successful completion of a total of 132 credit hours (CH). These credit hours are distributed across different university (36 CH), college (43 CH), and program requirements (53 CH), encompassing courses that are essential as well as those that can be chosen based on the stream preference. The following table 3 shows the recommended study plan distributed over eight semesters.



Table 3. Recommended Study Plan

	Course Code	Course Name	Course Type	Pre-R	Co-R	Credit Hours	Contact Hours
Semester 1	ENL101	English for Academic Studies	UM			3	3
	GEN150	Professionalism and Ethics	UM			3	3
	MAT101	Calculus I	UM			3	3
	PHY101	Physics I	UM			3	3
	CHM101	Chemistry	CM			3	3
	PHY105	Physics I Lab	CM		PHY101	1	3
	CHM105	Chemistry Lab	CM		CHM101	1	3
<b>Total</b>						<b>17</b>	<b>21</b>
Semester 2	ENL102	English Composition	UM			3	3
	XXXX	Arts and Humanities Elective	UM			3	3
	INF120	Computer and Information Systems	UM			3	3
	MAT102	Calculus II	CM	MAT101		3	3
	PHY102	Physics II	CM	PHY101		3	3
	PHY107	Physics II Lab	CM		PHYS102	1	3
<b>Total</b>						<b>16</b>	<b>18</b>
Semester 3	ENI200	Global awareness and social Resp.	UM			3	3
	MAT201	Calculus III	CM	MAT102		3	3
	MAT202	Introduction to Linear Algebra	CM	MAT102		3	3
	MAT240	Differential Equations	CM	MAT102		3	3
	ENG205	Electrical and Electronic Circuits	CM	PHY102 MAT102		3	3
	ENG204	Engineering Mechanics	CM	PHY102 MAT102		3	3
<b>Total</b>						<b>18</b>	<b>18</b>
Semester 4	ENL201	Writing and Research	UM			3	3
	ENG304	Engineering Probability & Statistics	CM	MAT201 MAT202		3	3
	ENG207	Programing	CM	MAT201 PHY102		3	3
	ESE201	Industrial Electronics	PM	ENG205		3	3
	ENG308	Numerical Methods	CM	MAT201 MAT240		3	3
	ENG206	Electrical and Electronic Circuits Lab	CM	ENG205		1	3
<b>Total</b>						<b>16</b>	<b>18</b>

	Course Code	Course Name	Course Type	Pre-R	Co-R	Credit Hours	Contact Hours
Semester 5	XXXX	Arts and Humanities Elective	UM			3	3
	XXXX	Innovation and Creativity Elective	UM			3	3
	ESE310	Instrumentation and Measurements	PM	ESE201		3	3
	ESE301	Applied Thermodynamics	PM	MAT240		3	3
	ESE312	Electrical Machines and Drives	PM	ESE201		3	3
	ENG208	Introduction to Sustainable Energy	CM	MAT240		3	3
<b>Total</b>						<b>18</b>	<b>18</b>

Semester 6	ESE311	Digital Systems and Microcontrollers	PM	ENG206 ESE201 ESE310		3	3
	XXXX	Arts and Humanities Elective	UM	75CH		3	3
	ESE314	Power Systems	PM	ESE312 ENG308		3	3
	ESE313	Electrical Machines and Drives Lab	PM	ESE312		1	3
	ESE302	Fluid Thermal Systems	PM	ESE301 ENG308		3	3
	ESE304	Thermal systems lab	PM	ESE301	ESE302	1	3
	ESE321	Renewable Energy Conversion Systems	PM	ESE312 ENG208&ESE301		3	3
<b>Total</b>						<b>17</b>	<b>21</b>

Semester 7	ESE401	Thermal Systems Design	PM	CHM101 ESE301 ESE302		3	3
	ESE315	Power Systems Lab	PM	ESE314		1	3
	ESE305	Computer Aided Design of Thermal Systems	PM	ESE301 ESE302		1	3
	ESE490	Capstone Design Experience 1	PM	90 CH	ENG401	3	3
	ENG401	Engineering Project Management and Economics	CM	ENG304		3	3
	ESE421	Modeling and Control of Energy Systems	PM	ESE321		3	3
	ESE422	Renewable Energy Lab	PM	ESE321	ESE421	1	3
<b>Total</b>						<b>15</b>	<b>21</b>

Semester 8	ESE491	Capstone Design Experience 2	PM	ENE490		3	3
	ESE402	Energy Efficient Buildings	PM	ESE302&ESE401		3	3
	ESEXXX	Program Elective (Table 3)	PE	90CH		3	3
	ESEXXX	Program Elective (Table 3)	PE	90CH		3	3
	ESEXXX	Program Elective (Table 3)	PE	90CH		3	3
<b>Total</b>						<b>15</b>	<b>15</b>

Table 4. Program Elective Courses

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
ESE440	Solar Thermal Energy	(3 credits)	3	ESE302 ESE321	
ESE441	Nuclear Energy Technology	(3 credits)	3	ESE302	
ESE442	Energy Storage	(3 credits)	3	ESE314 ESE321 ESE421	
ESE443	Power Plant Engineering	(3 credits)	3	ESE302 ESE321	
ESE444	Applied Refrigeration	(3 credits)	3	ESE302 ESE321	
ESE445	Petroleum Engineering	(3 credits)	3	ESE302 ESE321	
ESE450	Automatic Control Systems	(3 credits)	3	MAT240 ESE312 ESE421	
ESE451	Power Electronics Conversion Systems	(3 credits)	3	ESE201 ESE421	
ESE452	Power Systems operation and Control	(3 credits)	3	ESE314 ESE421	
ESE453	Power Systems Protection	(3 credits)	3	ESE314 ESE421	
ESE454	Power System Generation, Transmission and Distribution	(3 credits)	3	ESE314 ESE421	
ESE455	Smart Grids	(3 credits)	3	ESE314 ESE421	
ESE456	Communication Protocols	(3 credits)	3	ESE314 ESE421	
ESE460	Life Cycle Assessment and Decarbonization	(3 credits)	3	ESE321 ESE421	
ESE461	Contemporary Topics in Energy Engineering	(3 credits)	3	90 CH	
ESE462	Optimization of Energy Systems	(3 credits)	3	ESE314 ESE421	
ESE463	Bioenergy Technology	(3 credits)	3	ESE421	
ESE464	Energy Efficiency and Management	(3 credits)	3	ENG401 ESE421	ESE401
ESE465	Technoeconomic Modeling of Energy systems	(3 credits)	3	ESE314 ESE321 ENG401	
ESE466	Fuel Cell & Hydrogen Production Technology	(3 credits)	3	ESE303 ESE305 ESE421	
ESE470	Special Topics in Energy Systems Engineering A	(1 credits)	1	90 CH	
ESE471	Special Topics in Energy Systems Engineering B	(2 credit)	2	90 CH	
ESE480	Engineering Training	(3 credits)	3	90 CH	

## **c) Mechatronics and Robotics Engineering**

### **i) Program Overview**

Graduating with a Bachelor of Science in Mechatronics and Robotics Engineering necessitates the successful completion of a total of 132 credit hours (CH). These credit hours are distributed across different university (36 CH), college (43 CH), and program requirements (53 CH), encompassing courses that are essential as well as those that can be chosen based on the stream preference. The following table 5 shows the recommended study plan distributed over eight semesters.

Table 5. Recommended Study Plan

	Course Code	Course Name	Course Type	Pre-R	Co-R	Credit Hours	Contact Hours
Semester 1	ARB101	Arabic Communication Skills	UM			3	3
	ENL101	English for Academic Studies	UM			3	3
	MAT101	Calculus I	UM			3	3
	PHY101	Physics I	UM			3	3
	CHM101	Chemistry I	CM			3	3
	PHY105	Physics I Lab	CM		PHY101	1	3
	CHM105	Chemistry I Lab	CM		CHM101	1	3
<b>Total</b>						<b>17</b>	<b>21</b>
Semester 2	GEN150	Professionalism and Ethics	UM			3	3
	ENL102	English Composition	UM			3	3
	ENG209	Statics and Strength of Materials	CM	MAT101		3	3
	MAT102	Calculus II	CM	MAT101		3	3
	PHY102	Physics II	CM	PHY101		3	3
	PHY107	Physics II Lab	CM		PHYS102	1	3
<b>Total</b>						<b>16</b>	<b>18</b>
Semester 3	INF120	Computer and Information Systems	UM			3	3
	MAT201	Calculus III	CM	MAT102		3	3
	MAT202	Introduction to Linear Algebra	CM	MAT102		3	3
	MAT240	Ordinary Differential Equations	CM	MAT102		3	3
	ENG205	Electrical and Electronics Circuits	CM	MAT101		3	3
	ENG206	Electrical and Electronics Circuits Lab	CM		ENG205	1	3
<b>Total</b>						<b>16</b>	<b>18</b>
Semester 4	ENI200	Global awareness and social Resp.	UM			3	3
	ENG304	Engineering Probability & Statistics	CM	MAT201 & MAT202		3	3
	ENG207	Programing	CM	MAT201 & PHY102		3	3
	ENG308	Numerical Methods	CM	MAT201 & MAT240		3	3
	MRE362	Material Science and Engineering	CM	ENG209		3	3
	ENG208	Introduction to Sustainable Energy	CM			3	3
<b>Total</b>						<b>18</b>	<b>18</b>

	Course Code	Course Name	Course Type	Pre-R	Co-R	Credit Hours	Contact Hours
Semester 5	ENL201	Writing and Research	UM			3	3
	XXXX	Arts and Humanities Elective	UM			3	3
	MRE350	Introduction to Electronic Analysis & Design	PM	ENG205 & ENG206		3	3
	MRE360	Control Systems Analysis & Design	PM	MAT201 & MAT240		3	3
	MRE301	Introduction to Mechatronics and Robotics	PM	ENG205 & ENG209		3	3
	MRE302	Mechatronics and Robotics Lab	PM		MRE301	1	3
<b>Total</b>						<b>16</b>	<b>18</b>

Semester 6	XXXX	Arts and Humanities Elective	UM			3	3
	MRE352	Digital Systems Design & Microcontrollers	PM	MRE350		3	3
	MRE363	Engineering Mechanisms for Automation	PM	ENG209		3	3
	MRE304	Instrumentation, Sensors and Actuators	PM	MRE350		3	3
	ENG301	Engineering Economy	CM	ENG304		3	3
	MRE361	Control Systems Lab	PM		MRE360	1	3
	MRE353	Digital Systems Design Lab	PM		MRE352	1	3
<b>Total</b>						<b>17</b>	<b>21</b>

Semester 7	XXXX	Innovation and Creativity Elective	UM			3	3
	MRE430	Digital Signal Processing	PM	ENG304		3	3
	MRE431	Digital Signal Processing Lab	PM		MRE430	1	3
	MRE490	Capstone Design Experience 1	PM	90 CH		3	3
	MRE401	Robotics, Dynamics & Controls	PM	MRE301		3	3
	MRE402	Robotics, Dynamics & Controls Lab	PM		MRE401	1	3
	MRE403	Computer-Integrated Manufacturing Systems	PM	MRE301		3	3
<b>Total</b>						<b>17</b>	<b>21</b>

Semester 8	MRE460	Design of Machine Elements	PM	ENG209		3	3
	MRE491	Capstone Design Experience 2	PM	MRE490		3	3
	MREXXX	Program Elective (Table 3)	PE	90CH		3	3
	MREXXX	Program Elective (Table 3)	PE	90CH		3	3
	MREXXX	Program Elective (Table 3)	PE	90CH		3	3
<b>Total</b>						<b>15</b>	<b>15</b>

Table 6. Program Elective Courses

Course Code	Course Title	Credit hours	Contact hours	Pre-requisite	Co-requisite
MRE901	Autonomous and Intelligent Mobile Robots	(3 credits)	3	MRE301 & MRE360	
MRE902	Machine Vision and Image Processing	(3 credits)	3	MRE301 & MRE430	
MRE903	Robotic Manipulators Design	(3 credits)	3	MRE301 & MRE362	
MRE904	Robotics Project Management	(3 credits)	3	MRE301	
MRE990	Internship/Industry Placement	(3 credits)	3	75CH	
MRE801	Advanced Programmable Logic Controllers	(3 credits)	3	MRE301	
MRE802	Power Electronics & Drives	(3 credits)	3	MRE301 & MRE350	
MRE803	Nano Mechatronics	(3 credits)	3	MRE301	
MRE804	Machine Learning for Mechatronics Systems	(3 credits)	3	MRE301 & MAT201	
MRE805	Analog Integrated Circuits Design	(3 credits)	3	MRE301 & MRE350	