

Bachelor of Science in Mechatronics Engineering

Profile of the Study Program

The **Engineering Faculty at GIU** offers a vivid environment for research and teaching. An excellent national and international faculty is committed to a curriculum with a broad spectrum of courses in advanced sciences and technologies. Aligning with the department of Mechatronics Engineering of the German University in Cairo, it enables students to develop innovative and intelligent ideas for autonomous and intelligent products and systems to meet today's most pressing challenges and prepare them for careers in industry, academia, and research (local, regional and global).

The study program **Bachelor of Science in Mechatronics Engineering** contributes to the university's mission of providing an anchor for cooperation with German partners and partner universities abroad. Thus, opening new possibilities for knowledge transfer, students exchange, making significant contributions to international collaboration between science and industry. The overall study program objectives are to:

- Demonstrate deep knowledge of the principles of mechanics, electronics, control theory, and computer programming
- Demonstrate the ability to think critically, solve problems and make decisions
- Be able to function effectively as members of multi-disciplinary teams and individually
- Be well-prepared to pursue further studies and research nationally and internationally
- Demonstrate insight into current research
- Be prepared for a variety of professional engineering careers and interfacing with other functions

The **qualification goals** of the undergraduate study program in Mechatronics are:

- Apply knowledge of math, science, technical knowledge, and mechatronics engineering to formulate and solve engineering problems in a creative and innovative way
- Demonstrate knowledge of contemporary engineering topics
- Integrate theory and practice and solve problems across various areas related to mechatronics
- Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs

- Design components and systems creatively and innovatively that integrate computers, sensors, and actuators in mechanical systems to meet desired needs
- Conduct experiments and analyze and interpret the results
- Communicate technical matters effectively in oral, written, and graphical forms with professionals and the public
- Function effectively as members of multi-disciplinary teams, plan and manage tasks, time and resources and demonstrate interpersonal skills, also in intercultural contexts
- Discuss a scientific problem in a written paper as well as in a presentation

The **teaching method** emphasizes learning, interaction, teamwork and personal guidance in small groups (max. 25 participants). Therefore, all modules with lectures include also tutorials and/or practical applications, assignments and projects. The teaching language is English throughout the entire curriculum.

The **target group** of the study program are mainly students from abroad who seek German university education provided in English language. The Faculty offers also a double degree program in cooperation with the Mechatronics Engineering department of the German University in Cairo.

In the future, there will be a high demand for mechatronics engineers as more industries seek to apply the technological advancements in computers, electronics, sensors, and actuators to improve their products, processes and services.

Graduates of the Mechatronics Study Program can work in multidisciplinary design teams in industry, manufacturing, and research and development. Product developers and manufacturers are common employers for Mechatronics engineers. Graduates can also start their own companies and businesses.

Many existing jobs currently or will soon require Mechatronics skills among workers who currently design, implement, manufacture, and repair a wide range of equipment. Mechatronics engineers are involved in robotics, automated manufacturing, automobiles, airplanes, oil and gas industry, and renewable energy systems. Graduates are also sought after for management positions because of their broad skill base, knowledge of state-of-the-art technology and their ability to coordinate between different Engineering specialties.

Another option for the graduates of the Mechatronics Study Program would be pursuing further studies and research nationally and internationally as they will be qualified for that.

There is a need for mechatronics engineers wherever there is potential for improvement and development through the integration of computer and electrical hardware with mechanical systems.

Curriculum

L = Lecture, E = Exercise (Tutorials), P = Practical (all in contact hours)

First Semester

	Code	No.	Course Name	L	E	P	ECTS
1	CSEN	B102	Introduction to Computer Programming	4	4	4	12
2	EDPT	B101	Engineering Drawing and Design	1	2	0	3
3	MATH	B103	Mathematics I	4	4	0	8
4	PHYS	B102	Physics I	3	2	0	5
5	HUMA	B102	Critical Thinking and Scientific Methodology	0	2	0	2
Total							30

Second Semester

	Code	No.	Course Name	L	E	P	ECTS
1	CSEN	B201	Data Structures and Algorithms	2	2	2	6
2	ENME	B201	Mechanics I	2	2	0	5
3	ELCT	B201	Electric Circuits I	2	2	2	5
4	MATH	B201	Mathematics II	4	4	0	7
5	ELCT	B202	Digital Logic Design	2	2	0	5
6	HUMA	B204	Communication and Presentation Skills	0	2	0	2
Total							30

Third Semester

	Code	No.	Course Name	L	E	P	ECTS
1	CSEN	B301	Computer Programming Lab	2	0	2	5
2	CSEN	B302	Computer Organization and System Programming	2	2	0	4
3	ELCT	B301	Electric Circuits II	2	2	2	5
4	ENME	B301	Strength of Materials I	2	2	0	5
5	ENME	B302	Mechanics II	2	2	0	4
6	ENME	B304	Introduction to Materials Engineering	2	1	1	5
7	HUMA	B305	Research Paper Writing	0	2	0	2
Total							30

Fourth Semester

	Code	No.	Course Name	L	E	P	ECTS
1	EDPT	B401	CAD Lab	0	0	4	4
2	EDPT	B402	Engineering Design I	3	3	0	6
3	ELCT	B401	Digital System Design	2	2	0	5
4	ENME	B403	Control Engineering	2	2	0	5
5	ENME	B402	Fluid Mechanics	2	2	0	5
6	MCTR	B401	Engineering Thermodynamics	2	2	0	5
Total							30

Fifth Semester

	Code	No.	Course Name	L	E	P	ECTS
1	EDPT	B501	Materials Manufacturing Technology	2	0	2	4
2	EDPT	B502	Engineering Design II	3	3	0	6
3	ELCT	B509	Electronic Circuits	2	2	0	5
4	ENME	B502	Numerical Analysis	2	2	0	4
5	HUMA	B501	Introduction to Management	2	0	0	2
6	MCTR	B501	Mechatronics Engineering	2	2	2	9
Total							30

Sixth Semester

	Code	No.	Course Name	L	E	P	ECTS
1	EDPT	B603	Machine Design	2	2	0	4
2	ELCT	B604	Power Electronics	2	2	0	5
3	ELCT	B608	Electric Machines	2	2	0	4
4	MCTR	B602	Modern Control Engineering	2	2	0	4
5	MCTR	B604	Mechatronics Lab	0	0	4	5
6	MCTR	B603	Pneumatic and Hydraulic Control	2	0	2	4
7	MCTR	B601	Industrial Automation	2	1	1	4
Total							30

Seventh Semester

	Code	No.	Course Name	Duration	ECTS
	MCTR	B701	Internship/Training	3 Months	15
	MCTR	B702	Bachelor Thesis & Seminar	3 Months	15
				6 Months	30