

**Sana'a University
Faculty of Engineering**



Master of Science in Mechatronics Engineering

Program Specifications

June - 2021

Faculty of Engineering, Sana'a University

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Program Specification

1. Program Introduction/Description

Mechatronics is an exciting, growing field that combines mechanical, electrical and control systems to create a complete device. Mostly it relates to the engineering systems, which perform relatively fast and precise motions and therefore require sophisticated electronic devices and control algorithms.

The Master's program aims to qualify the student to solve complex technical problems, design and implement complex technological products and systems in a social context. The contents of the program aim to provide the student with advanced professional competences within mechatronics engineering.

The Master's program is a full-time program which is rated at 36 credit hours. Corresponding to the work of a full-time study for 3-years average. The program consists of essential course elements related to the program's specific professional competences and identity, elective courses and a Master's thesis.

2. Program Identification and General Information

Program Title	Master of Science in Mechatronics Engineering
Awarding Institution	Sana'a University
Department	Mechatronics Engineering
Other Departments with major Teaching Contributions	Mechanical Engineering & Electrical Engineering
Language of study	English Language.
Date of Specification Preparation/Revision	July 2021
Mode of Study	Full time
Study System	Courses & Thesis
Main Location of Study	Faculty of Engineering/Sana'a University
Mode of Delivery	Full-time
Study Duration	Minimum: 2 Academic years (Two terms each, full-time) Maximum: 4 Academic years (two terms each - full time)
Award(s) or Final Award	Master of Science (MSc.) in Mechatronics Engineering
Qualification required to join the program:	BSc. in Mechatronics Engineering and/or related fields
Minimum grade requirements to enroll in the program	Good
Other admission requirements	Detailed below
Name of the program coordinator	Dr. Abdullah Dhaiban
Approval date:	

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Program Specification

3. Program Curriculum Committee:	
Prof. Mohammed Al-Bukhaiti Assoc. Prof. Abdul-Malik Momin Prof. Omar Al-Sakaf Assoc. Prof. Khalil Al-Hatab Assoc. Prof. Farouk Al-Fahaidy Assoc. Prof. Radwan Albuthaigy Dr. Abdul-Salam Al-Mekhalafie	Dr. Hamoud Al-Nehari Dr. Hatem Aldoaies Dr. Muhammad Al-yadoumi Dr. Sami Al-Maqtari Dr. Mohammad Abdulla Algorafi

4. Vision, Mission & Aims of the University
Vision of the University
Sana'a University aspires to achieve a national leading role in teaching, learning, scientific research and community service; and to be among the best regional universities and the foremost house of expertise and think tank in Yemen.
Mission of the University
To contribute to the sustainable development efforts by providing an accredited higher education environment and excellent research services within a fruitful national partnership based on transparency, professionalism and creativity.
Aims of the University
The University seeks to achieve the following objectives:
<ul style="list-style-type: none"> • To provide specialized and in-depth academic opportunities for students in different fields of knowledge to meet the country's needs of specialties, technicians and experts, with special focus on the following: • To boost the level and quality of preparation and qualification tasks. • To create a general culture aiming at developing the elements of sound Islamic personality and the proper cognitive and scientific training. • To stabilize the true Islamic vision emanating from the broad horizons of Islamic knowledge and its perception of the universe, man and life. • To develop innovative and critical scientific thinking skills. • To provide students with the required knowledge and scientific and applied skills for solving problems effectively and efficiently.

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Program Specification

5. Vision, Mission & Aims of the Faculty
Vision of the Faculty
To excel in engineering education & scientific research with distinction at the local and regional levels.
Mission of the Faculty
To provide excellent and accredited engineering education to meet the development needs and match the labor market requirements locally and regionally.
Aims of the Faculty
1. To offer study programs in various fields of knowledge and equip students with required knowledge and scientific and know-how skills to utilize them in resolving problems effectively and efficiently.
2. To develop positive trends towards engineering science and its accelerating developments and enable students to use the techniques and methods of conducting scientific research in engineering fields.
3. To develop skills of scientific, innovative and critical thinking as well as the concept of continuous self-education.
4. To strengthen scientific ties with national and international colleges, scientific bodies, and research & development centers.
5. To provide technical and specialized studies and consultations to various state bodies and institutions, both public and semi-public, and utilize them in resolving the environment and society issues to promote sustainable development.
6. To develop a spirit of co-operation, group work, effective leadership, sense of responsibility, and ethical commitment.

6. Mission & Aims of the Department
Mission of the Department
The department of Mechatronics Engineering at the Faculty of Engineering has an important mission to provide quality engineering education as well as scientific research development in this vital area of engineering..
Aims of the Department

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Program Specification

6. Mission & Aims of the Department

1. To graduate flexible engineering graduates with skills required to access entry level positions in the mechatronics engineering industry as well as in a wider range of employment in commerce, research, manufacturing and maintenance where mechatronics engineers play a vital role.
2. To deliver a program which equips graduates with a high level of understanding of mechatronics concept complemented by professional, practical, and transferable skills that enable graduates to solve a wide range of mechatronics problems.
3. Ensure that graduates are able to make a rapid and effective contribution to their employers' enterprise.
4. Promote a culture amongst graduates of continuous personal and professional development.
5. Ensure that graduates have competencies that enable them to communicate both orally and in writing in the Arabic and English Languages.
6. Ensure that graduates have group skills that will enable them to work professionally in teams.

7. Mission & Aims of the Program

Mission of the Program

To graduate distinguished Master holders in the field of Mechatronics Engineering through a strong academic program, qualified staff, and suitable research infrastructure that meet local development requirements and labor market needs.

Aims of the Program

1. To provide advanced studies in the field of mechatronics and encourage applied research in different Mechatronics engineering discipline.
2. To bridge the gap between the academic educational and industrial /technological environment.
3. To provide graduates with up-to-date knowledge and skills needed to develop successful mechatronics systems, and solve the technical problems and challenges in industry.
4. To conduct scientific research in specific topics related to Mechatronics engineering.
5. To enhance ethical practices, communication skills, sharing innovative ideas, and engage in life-long learning.

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Program Specification

6. To provide graduates able to effectively contribute to the mechatronics engineering profession by applying ethical practices and communication skills, sharing innovative and clear ideas and pursuing further education through lifelong learning.

8. Program Standards & Benchmarks
Program Standards
<ul style="list-style-type: none"> • Rules and Regulations of the Ministry of Higher Education and Scientific Research, Yemen. • Accreditation Board for Engineering and Technology (ABET) • Post-graduate Studies Rules and Regulations of the Ministry of Higher Education and Scientific Research, Yemen.
Program Benchmarks
<p>1. Newcastle University, UK Faculty of Engineering Master of Science in mechanical /Mechatronics</p>
<p>2. Kingston University, UK Faculty of Engineering MSc Mechatronic Systems</p>
<p>3. Jordan University of Science & Technology, Jordan Faculty of Graduate study M.Sc.. of Mechatronics Engineering</p>
<p>4. Lawrance Technological University, USA Faculty of Engineering Master of Science in Mechanical/Mechatronics Track</p>
<p>5. University of Bath, UK Faculty of Engineering Master of Science in Mechatronics</p>
<p>6. Mansoura University, Egypt Faculty of Engineering Master of Science in Mechatronics Engineering</p>
<p>7. University of Technology, Malaysia Faculty of Engineering Master of Engineering (Mechatronic & Automatic Control)</p>
<p>8. University of Southern Denmark, Sdu, Denmark Faculty of Engineering M.Sc.. of Mechatronics Engineering</p>
<p>9. Palestine Polytechnic University, Palestine</p>

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University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

Faculty of Graduate Study Master of Science in Mechatronics Engineering
10. University of Applied Science (FH Technikum Wien), Germany Faculty of Engineering Master Mechatronics/Robotics
11. International Islamic University, Malaysia Faculty of Engineering MSc (Mechatronics Engineering)

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 Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

ملحق (٤) مسح ملخص البرامج المماثلة لبرنامج ماجستير هندسة الميكاترونكس

Annex-4, Summary of Similar Programs (Benchmarks) for Master of Science in Mechatronics Engineering Program

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
The program title	Master of science in mechatronics	Msc mechatronic systems	M.Sc. of mechanical engineering - mechatronics	Master of science in mechatronic systems engineering	M,Sc mechatronics	Master of science in mechatronics engineering	Master of engineering (mechatronics & automatic control)	M.Sc Of mechatronics engineering	M.Sc.. Of mechatronics engineering	M.Sc.. Of mechatronics engineering	M.Sc.. Of mechatronics engineering	Master of science in mechatronics engineering
The Faculty	Faculty of engineering	Faculty of engineering	Faculty of graduate study	Faculty of engineering	Faculty of engineering	Faculty of engineering	Faculty of engineering	Faculty of Engineering	Faculty of Graduate study	Faculty of Engineering	Faculty of Engineering	Faculty of engineering
The University	Newcastle University	Kingston University	Jordan University Of Science	Lawrance Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH)	International Islamic University	Sana'a University

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University of Sana'a
 Faculty of Engineering
 Department: Mechatronics Engineering
 Title of the Program: Master of Science in Mechatronics
 Engineering



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
			& Technology							Technikum Wien)		
The Country	UK	UK	Jordan	USA	UK	Egypt	Malaysia	Denmark	Palestine	Germany	Malaysia	Yemen
Type of program	Courses + individual project	Courses + thesis	Courses +thesis	Courses +thesis	Courses +thesis	Courses +thesis	Courses + Research thesis	Courses + Research thesis	Courses + Research thesis	Courses + Research thesis	Courses + Research thesis	Courses and Research
Study methods in the program:	Full time regular	full-time and part-time mode,	Fulfillment	full-time and part-time mode	Full time	Full time	Full time					Regular
Number of semesters	3 semester	4-6 semester	4	2 to 4			4-6 (extension 2)					4-6 (extension 2)
Total Credit Hours (withou	60	120	34	31	60	24	33		30		20	36

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University of Sana'a
 Faculty of Engineering
 Department: Mechatronics Engineering
 Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
Thesis	1 credit \equiv 10 study hours, including timetabled contact hours and private study											
Credit Hours for compulsory courses	120		16	12	18	24	12		18		20	27
No. of Courses for Electives courses			3	(optional) 3 course or thesis	3		5		4			1
No. of Courses for compulsory	5		6 (5*3+1)	4	2	8 at least	4 compulsory		6		7	9

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University of Sana'a
 Faculty of Engineering
 Department: Mechatronics Engineering
 Title of the Program: Master of Science in Mechatronics
 Engineering



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
sory courses							+2 other required					
Credit Hours for Electives courses			9	9	12		15		12			3
Complementary courses to join the program and their number	5			•		16 credits For student who have (mechanical or electrical eng.) Then 12 credits for diploma						
Credit Hours for Thesis	60 (project)	60 (credits)	9	9	30	12	10		6		20	6

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University of Sana'a
 Faculty of Engineering
 Department: Mechatronics Engineering
 Title of the Program: Master of Science in Mechatronics
 Engineering



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
Total Credit Hours for courses & Thesis	120	180	34	31	90	36	43		36		40	36
The period for thesis completion	3 semesters		2 semesters	2	12 months	2 semester (one year)			2-3 years		2-3 years	12 month
The min. period to complete the program	3 semesters	one-two years full-time		1-2 years		2-years						3 years
The max. period to	3 semesters	Two-three years part-time.				4 years						4 years

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University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program

complete the program												
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Program Specification

9. Program Intended Learning Outcomes (PILOs)

A. Knowledge and Understanding

Upon successful completion of the Master of Science in Mechatronics Engineering Program, graduates should be able to:

A1.	Demonstrate in-depth understanding of applied mathematics in Mechatronics engineering, control system, computer engineering and science, and electronics to design more functional, adaptable and cost-effective products.
A2.	Recognize and explain the contemporary engineering technologies and issues in the field of Mechatronics engineering.
A3.	Explain in-depth the principles of sustainable design and development of Mechatronics engineering.
A4	Demonstrate research principles and methods applicable to the field of work or academic in Mechatronics engineering and related fields.

B. Intellectual Skills

Upon successful completion of the Master of Science in Mechatronics Engineering Program, graduates should be able to:

B1.	Apply appropriate principles, methodologies, techniques, tools and packages in the analysis, development and evaluation of mechatronics engineering systems.
B2.	Identify, formulate and analyze research and solve complex Mechatronics engineering problems.
B3.	Design Mechatronics system, component, or process to meet desired needs within realistic constraints.

C. Practical and Professional Skills

Upon successful completion of the Master of Science in Mechatronics Engineering Program, graduates should be able to:

C1.	Conduct research to solve mechatronics engineering problems.
C2.	Use advanced methodologies and skills to solve Mechatronics engineering problems.
C3.	Apply acquired knowledge of analysis and design for mechatronics engineering systems and implementation process.

D. Key Transferrable Skills

Upon successful completion of the Master of Science in Mechatronics Engineering Program, graduates should be able to:

D1.	Prepare a complete thesis and term-courses works/ tasks, write their documents and defend on them.
D2.	Demonstrate ethical principles, awareness of professional and ethical responsibility as well as knowledge of the standards utilized in related fields.
D3.	Conduct independently and communicate research that advances and extends knowledge and scholarship in related fields.
D4	Independent learning ability, self-direction and independence leading to the ability to continue to develop their knowledge understanding and skills through further professional development

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Program Specification

10. Teaching Strategy to Achieve Program Learning Outcomes

ILOs	Teaching Strategy	Assessment Methods
A1	Lectures, seminars, laboratory works, self-learning, independent study, active learning, computer hands-on sessions.	Experimental and field work, laboratory report, survey, written exam, assignments
A2		
A3		
A4		
B1	Project supervision, laboratory works, self-learning, simulation exercises, independent study, analysis and problem solving, lectures, brain storming Presentations, presenting researches	Experimental and field work, laboratory report, survey, written exam, assignments.
B2		
B3		
C1	Project supervision, lectures, laboratory works, independent study, simulation exercises, analysis and problem solving	Seminar report, written research proposal, thesis and publication.
C2		
C3		
D1	Dissertation and presentation, independent study, presenting reports, brainstorming, Presenting researches, publish research papers.	Written research proposal, thesis and publication, written exam, assignments, experimental and field work, laboratory report, survey, presentation, written report.
D2		
D3		
D4		

Teaching Strategy	Description of the Main Strategy Used
Lectures.	These are interactive lectures weekly conducted according to course plan in a classroom and supported with variety of teaching formats including, lectures and multimedia presentations, use of whiteboard and solved examples, and class discussions, in which concepts, approaches, and case studies are presented, explored, and shown students what they need to know.
Independent study	Independent study is an individualized learning experience that allows students to select a topic focus, define problems or questions, gather and analyze information, apply skills, and create a product to show what has been learned.
Self-Learning.	Students are encouraged to undertake independent study to both supplement and consolidate what are being learned.

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Program Specification

Teaching Strategy	Description of the Main Strategy Used
Active learning	is an approach to instruction that involves actively engaging students with the course material through discussions, problem solving, case studies, role plays and other methods
Computer hands-on sessions.	Practical applications using a variety of software before the real design and implementation. A variety of web-based searches students will be assigned to learn how they can search for solutions using the Web.
Simulation exercises	Practical applications of software modeling program through modeling of real structures.
Analysis and Problem Solving.	The study of ----- Engineering involves applying knowledge and problem-based learning. This allows students to become more active in their learning as they work out wat information, they need to find out how to solve a particular problem. They can work out a problem collaboratively, practice research as well as testing different components to come up with a valid solution.
Laboratory works.	During laboratory sessions, students will be given experiments to work in groups where they can apply the theories and principles gained. This gives them the opportunity to have hands-on experience to design and conduct experiments in addition to analyzing, interpreting data obtained from experiments, and maximize their learning through actual simulation
Presentations/ Presenting researches	students present their work to the whole group, for discussion, criticism, and suggestions for improvement. Presentation sessions provide an opportunity to address questions, queries, and problems.
Project supervision	The teacher needs to set advance work for students, and then have the students present their work to the whole group, for discussion, criticism, and suggestions for improvement. Project sessions provide an opportunity to address questions, and problems.
Brain storming	Brainstorming is an effective technique for generating lists of ideas and creating interest and enthusiasm for new concepts or topics. Brainstorming provides teachers and students with an overview of what

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Program Specification

Teaching Strategy	Description of the Main Strategy Used
	students know and/or think about a specific topic. Students can use brainstorming to organize their knowledge and ideas.
Dissertation supervision	Guiding, reviewing, and approving the MSc research work at all stages.
Publish research	Guiding and reviewing MSc student to write a research paper to be accepted for publication.
Seminar	The teacher needs to set advance work for a selected number of students, and then have the selected students present their work to the whole group, for discussion, criticism, and suggestions for improvement. Seminar sessions provide an opportunity to address questions, queries, and problems.
Research activities	Research-led activities envisage activities in which students learn about current research in the discipline and are frequently an audience. The emphasis is put on the research content.

Assessment Strategy	Description of the main strategy used.
Written Exam	Mid-term test is conducted in the 8 th week and final exam is conducted at the end of each course. Both tests are closed or open book, notes and resources. At least two quizzes must be done through the course.
Oral Discussion	To know the knowledge of the students.
Presentations	For final results displaying, to enhance the level of students in different subjects.
Quizzes	The entire assessment of quizzes activities during the teaching period of each course.
Laboratory Reports	To demonstrate the personal skills, practical expertise, communication skills, report writing skills, and team work expertise they are expected to be learned and gained through their education.

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Program Specification

Assessment Strategy	Description of the main strategy used.
Experimental and field work	For evaluation, to demonstrate the personal skills, practical expertise, communication skills, report writing skills, and team work expertise they are expected to be learned and gained through their education.
Survey	Searching and investigating previous scientific papers, studies, reports, thesis, case studies.
Assignments	The entire assessment of coursework activities during the teaching period of each course (which includes group and individual work, tests and presentations, etc.)
Seminar	The teacher needs to set advance work for a selected number of students, and then have the selected students present their work to the whole group, for discussion, criticism, and suggestions for improvement. Seminar sessions provide an opportunity to address questions, queries, and problems.
Written report	a document that presents specific information as accurately and as concisely as possible to a particular audience.
Written research proposal	is essentially a road map showing clearly the location from which a journey begins, the destination to be reached, and the method of getting there.
Thesis and publications	where the core chapters of your thesis consist of papers you have submitted for publication, have been accepted for publication, or have already been published.

11. Intended Learning Outcomes Mapping:

See Annex 10

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Program Specification

12. Program Structure			
Program Requirement	No. of Courses	Credit Hours	%
Complementary courses (if any)	8	0	0
Compulsory courses	8	24	66.66%
Faculty Requirements	1	3	8.3%
Elective course (if any)	1	3	8.3%
Thesis	-	6	16.7%
Total	10	36	100%

Complementary Courses (00 hrs)

No	Course Code	Course Title	Th.	Pr.	Tu	Cr. Hrs.
1.	MTE333	Digital Control System	2	2		3
2.	MTE352	Power Electronics and Drives	2	2	2	4
3.	MTE346	Manufacturing Processes	2	2		3
4.	MTE242	Theory of Machines	2	2		3
5.	MTE223	Pneumatic and Hydraulic Systems	2	2		3
6.	MTE244	Design of Machine Elements	2	2		3
7.	MTE261	Microcontrollers and Microprocessors	2	2		3
8.	MTE362	Embedded Systems and Interfacing	2	2		3
9.	MTE355	Industrial Automation	2	2		3
10.	MTE466	Mechatronics System Design	2		2	3
11.	MTE465	Artificial Intelligence	2		2	3
12.	MTE364	Robotics	2	2	2	4

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Program Specification

Compulsory Courses(9) / Credit Hours(27)						
No.	Code	Course Title	L	T	P	Credit
1	MTE569	Advanced Mechatronics System Design				3
2	MTE506	Programing Tools for Mechatronics Engineers				3
3	MTE547	Modern Manufacturing Systems				3
4	MTE548	Advanced Mechanical design				3
5	MTE535	Advanced Control System				3
6	MTE570	Advanced Power Electronics and Drives				3
7	MTE580	Advanced Robotics and Automation				3
8	MTE581	Advanced Embedded Systems Design				3
9	FR501	Research Methodology				3
Total						27

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Program Specification

Elective Courses(1) / Credit Hours(3)						
No.	Code	Course Title	L	T	P	C.H
1	MTE582	Advanced Artificial Intelligence				3
2	MTE583	Finite Element Analysis (Elective)				3
3	MTE584	Modeling and simulation of Engineering Systems				3
4	MTE506	Advanced Project Management				3
Total						3

Thesis
The student must prepare and discuss a Thesis by (6) credit hours. THESIS599 MS Thesis
Thesis and Its Requirements (if any)
<p>1. Registration of the thesis: (Requirements/conditions and procedures for registration of the thesis as well as controls, responsibilities and procedures of scientific guidance)</p> <ul style="list-style-type: none"> - Completion of all required Compulsory & Elective Courses with average grade more than or equal to 75% . - Completion of all university requirements. - Field of Research and precise research topic with short Description and suggested time plan. - First Department Seminar. - Decision letter (Supervisors) of acceptance of the research topic. - Thesis work should be done in at least 2-semesters. - Thesis work should be done in at most 4-semesters. - Any further requirements and controls based on post-graduate deanship regulations.
<p>2. Scientific Supervision: (The regulations of the selection of the scientific supervisor and his/her responsibilities, as well as the procedures/mechanisms of the scientific supervision and follow-up)</p>

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Rector of Sana'a University Prof. Dr. Al-Qassim Mohammed Abbas			



Program Specification

Thesis
<ul style="list-style-type: none"> - At most 2-supervisors are selected for the supervision of a thesis. - At least 1-Associate (or Full) Professor is appointed as supervisor either from the department or from another department outside the faculty. - Any Assistant Professor appointed as supervisor should have at least 4-year experience in the field of research and have published at least one paper. <p>Candidates may apply for one-year extension (full-time) for completion of the thesis to the Postgraduate Program Administration at the Faculty of Engineering, which will be granted if the candidate provides a valid reason for extension.</p> <p>The supervisor responsibilities are - :</p> <ul style="list-style-type: none"> - Help and assist the candidate/researcher in preparing the research plan. - Guide the candidate to adhere to certain standards of academic integrity and research ethics, including combating plagiarism. - Monthly, follow up and meeting with the researcher (at least one meeting per month) . - Guide the researcher at every step to be done during thesis work. - Write follow-up (progress report) after each meeting - Write a follow-up (evaluation report) every semesters. - The supervisor shall submit copies of these reports to the Postgraduate-Program coordinator, the Head of the Department and the Head of the Faculty Post-graduate. - Write the final thesis acceptance report in order to prepare the final department seminar and then initiating the preparation for thesis presentation, defense and approve. <p>The candidate/student responsibilities are - :</p> <ul style="list-style-type: none"> - Student present his/her accomplishment at the end of every semesters - plan and actively pursue the research. - identify and deal with any research-related problems. - comply with administrative requirement. - meet ethical guidelines. - take responsibility for the final form of the thesis - A thesis or research portfolio is the outcome of independent research, or creative activity conducted under supervision. - The length of a 6 credit hours thesis or research portfolio will be appropriate to the discipline and must not exceed 30,000 words, including bibliography, footnotes or endnotes and essential appendices, unless specific permission has been granted by the Department.

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Program Specification

Thesis
<p>3.Thesis Defense/Examination: (The regulations for selection of the defense/examination committee and the requirements to proceed for thesis defense, the procedures for defense and approval of the thesis, and criteria for evaluation of the thesis)</p>
<ul style="list-style-type: none"> - A thesis proceeds for defense following completion of: - At least one research paper is accepted in a journal or conference in the field of research. - Final acceptance letters provided by the supervisor(s) and the department final seminar committee (at least 3-department members)‘ - The examination committee should consist of - : - One -Associate (or Full) Professor specialized in the field of research from an external university ‘ - One -Associate (or Full) Professor from the department of electrical engineering in addition to the supervisor of the thesis. - A session for presentation, defense and approval of the thesis should be done based on the following- : - At least two members of the examination committee accept their assignment and reply by acceptance letter and approve the thesis for defense within one month. - The session of defense should be declared within two weeks after receiving of examination committee members’ approval letters.

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Program Specification

12. System of Study	
Type of program	Courses and Research
Study methods in the program:	Regular
The period to complete the program	Min. 2 Years (4 Terms) Max. 4 Years (8 Terms)
Total Credit Hours for courses & Research	36

13. Study Plan	
FR stands for Faculty Requirements.	
MTE 5XX stands for Mechatronics Department Requirements.	

First Semester								
No.	Course Code	Course Name	اسم المقرر	Credit Hours				Prerequisites
				Lec.	Pr.	Tut.	Total C.H.	
1	MTE561	Advanced Mechatronics System Design	تصميم أنظمة ميكاترونكس متقدمة	3			3	
2	MTE541	Advanced Mechanical design	تصميم ميكانيكي متقدم	3			3	
3	MTE532	Advanced Control Systems	انظمة تحكم متقدمة	3			3	
4	MTE552	Advanced Power Electronics and Drives	إلكترونيات ومحركات الطاقة المتقدمة	3			3	
5	MTE551	Modern Manufacturing Systems	أنظمة التصنيع الحديثة	3			3	
Total Credit Hours							15	

Head of the Department Assoc. Prof. Abdul-Malik Momin	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad
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Program Specification

Second Semester								
No.	Course Code	Course Name	اسم المقرر	L	P	T	C.H.	Prerequisites
1	MTE501	Programming Tools for Mechatronics Engineering	أدوات البرمجة لهندسة الميكاترونكس				3	
2	MTE563	Advanced Robotics and Automation	الروبوتات المتقدمة والأتمتة				3	
3	MTE531	Advanced Embedded Systems Design	تصميم الأنظمة المدمجة المتقدمة				3	
4	FR501	Research Methodology	مناهج البحث العلمي				3	
5	MTE5XX	Elective					3	
Total Credit Hours							15	

Elective Courses(1) / Credit Hours(3)								
No.	Code	Course Title	اسم المقرر	L	P	T	Credit	
1	MTE562	Advanced Artificial Intelligence	الذكاء الاصطناعي المتقدم				3	
2	MTE542	Finite Element Analysis	التحليل بالعناصر المحدودة				3	
3	MTE543	Modeling and simulation of Engineering Systems	نمذجة ومحاكاة النظم الهندسية				3	
4	MTE553	Advanced Project Management	إدارة المشاريع المتقدمة				3	
Total							3	

Course Code	Course Name	Cr. Hrs.
THESIS599	Research	٦

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Program Specification

14. Admission Requirements:

1. Bachelor of Mechatronics Engineering Certificate with not less than 65 % passing ratio, or equivalent.
2. Interview
3. TOEFL 65
4. ICDL (Computer Skills):
5. Arabic Language:
6. Student number capacity of 20 students per year
7. Transfer Requirements, and Courses Equivalency
8. Annex -13: shows the Admission Requirements for the Program.

15. Graduation Requirements:

Student attendance should not be less than 75%.
Student will graduate after successfully passing the 30 credit hours courses and 6 credit hours Research.
Student must achieve a minimum average score for all courses is 75% degree
Minimum score for any student to pass any credit hours course is 65% degree.
Grading System:
From 90% to 100% of total marks Excellent
From 80% to less than 90% Very Good
From 75% to less than 80% Good
From 65% to less than 75% Pass
Less than 65% Poor/Fail

16. Learning Resources, Facilities, and Equipment for Running the Program

<p>Learning Resources. Policies and Procedure for providing and quality assurance of learning resources textbooks, references and other resource materials, including electronic and web-based resources, Journal Database, etc.</p> <p>- textbooks, reference university database which allows access to most of the international publishing houses</p>
<p>Facilities and Equipment Policies and Procedure for providing and quality assurance of Facilities and Equipment (Library, laboratories (Structure, material Labs), medical facilities, classrooms, etc.).</p> <p>:List of laboratories</p> <ul style="list-style-type: none"> • Automation Technology Lab. (Not Available) • Robotics Lab. (Not Available) • PLC Lab. (Need to be upgraded) • Industrial Automation and /(CAD). Lab (Not Available)

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Program Specification

<ul style="list-style-type: none"> Digital electronics and microcontroller. (Need to be upgraded) Power Electronics and drives. (Not Available) 				
17. Teaching staff:				
	Professor	Associate Professor	Assistant Professor	Technicians Assistants
Required Number	1	5	5	3
Available Number	2	4	6	2
Note:				

18. Program Management and Regulations	
1. Program Management	
1.1 Program Structure (including boards, councils, units, committees, etc.)	
Mechatronics Engineering Department Board Postgraduate Studies Administration Vice Dean for Postgraduate Studies Faculty of Engineering Board Vice Presidency of the University for Postgraduate Studies	
1.2 Stakeholders' Involvement	
Describe the representation and involvement of stakeholders in the program planning and development. (students, professional bodies, scientific societies, alumni, employers, etc.)	
The stakeholders were involved in designing the program, including universities, research centers, the public and private sectors, through their participation in a workshop as well as in responding to and submitting a questionnaire.	
2. Program Regulations	
Provide a list of related program regulations, including their link to online version: admission, study and exams, recruitment, appeals and complaint regulations, etc.)	
Decision of the Presidency of the Council of Ministers No. 40 of 2008 Decision of the Presidency of the Council of Ministers No. 141 of 2008 Graduate Studies Guide to Sana'a University	

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Program Specification

19. Evaluation of Program Quality Matrix:

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time

Note:
Evaluation Areas/Aspects (e.g., leadership, effectiveness of teaching & assessment, learning resources, partnerships, etc.)
Evaluation Sources (students, graduates, alumni, faculty, program leaders, administrative staff, employers, independent reviewers, and others (specify)
Evaluation Methods (e.g., Surveys, interviews, visits, etc.)
Evaluation Time (e.g., beginning of semesters, end of academic year, etc.)

20. List of Annexes

Annex (1)	Academic Standards Curriculum Criteria of Accreditation Board for Mechatronics Engineering program.
Annex (2)	Survey of names of Similar Accredited Programs at International Universities (Benchmarks) for Mechatronics Engineering Programs.
Annex (3)	Survey of Intended Learning Outcomes for similar Accredited Mechatronics Engineering Programs at International Universities.
Annex (4)	Summary of similar Programs (Benchmarks) for Master of Science in Mechatronics Engineering Program.
Annex (5)	Survey of course names of Similar Programs.
Annex (6)	Survey/Mapping of Vision, Mission and Objectives of similar Accredited Programs at International Universities (Benchmarks) for Masters of Science in Mechatronics Engineering programs.
Annex (7)	Mapping of the mission and objectives of the program with the vision, mission and objectives of faculty, and the university.
Annex (8)	Main Themes/Sub-Themes with Relative weight for Program (if need)
Annex (9)	PILOs Distribution to General Themes for Program (if need)
Annex (10)	Matrix of mapping program P- ILO's with courses
Annex (11)	Mapping the benchmarks with PILO's (if need)

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Rector of Sana'a University Prof. Dr. Al-Qassim Mohammed Abbas			

University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

Annex (12)	Mapping Program's Goals with Intended Learning Outcomes
Annex -13	The Admission Requirements for the Program.

Head of the Department Assoc. Prof. Abdul-Malik Momin	Quality Assurance Unit Assoc. Prof. Dr. Mohammad Algorafi	Dean of the Faculty Prof. Dr. Mohammed AL-Bukhaiti	Academic Development Center & Quality Assurance Assoc. Prof. Dr. Huda Al-Emad
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University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

21. Attachment of Courses specification and Syllabi of the Program

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University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

ملحق (١) المعايير الأكاديمية للمحتوى لهيئة الاعتماد المقترحة لبرنامج ماجستير هندسة الميكاترونكس

(Annex-1): Academic Standards Curriculum Criteria of Accreditation Board for Master of Science in Mechatronics engineering program

- Rules and Regulations of The Ministry of higher education and scientific research, Yemen.
- Accreditation Board for Engineering and Technology (ABET).



Program Specification

ملحق (2) مسح أسماء البرامج المعتمدة المماثلة لبرنامج ماجستير هندسة الميكاترونكس

Annex (2) Survey of names Similar Accredited Programs at International Universities (Benchmarks) for Master of Science in Mechatronics Engineering Program

#	The Academic Program اسم البرنامج المماثل	The University الجامعة	The Faculty الكلية	The Department القسم	The Country الدولة	Program Accrediting Body جهة اعتماد البرنامج	Degree Award at Program Completion التي يمنحها الدرجة البرنامج للخريج	Year of accreditation سنة الحصول على الاعتماد	Type of program
The 1 st Program البرنامج الأول	Master of Science in Mechatronics	Newcastle University	Faculty of Engineering	Mechanical Engineering	United Kingdom	Imeche, Iet (2011)	M.Sc.	2011	Courses + Individual Project
The 2 nd Program البرنامج الثاني	Mechatronic Systems	Kingston university	Faculty of engineering		UK	Institute of mechanical engineers	M.Sc.		Courses + individual project
The 3 rd Program البرنامج الثالث	M.Sc of Mechanical Engineering - Mechatronics	Jordan University of Science & Technology	Faculty of Graduate Study	Mechatronics Engineering	Jordan		(M.Sc. Thesis track) and comprehensive exam track)		Courses +thesis
The 4 th Program البرنامج الرابع	Master of Science In Mechatronic Systems Engineering	Lawrance Technological University	Faculty of Engineering		USA		Master of Science In Mechatronic Systems Engineering		Courses +thesis
The 5 th Program البرنامج الخامس	Mechatronics	University of Bath	Faculty of Engineering	Mechatronics Engineering	UK		Master of Science In Mechatronic		Courses +thesis



Program Specification

The 6th Program البرنامج السادس	Master of Science In Mechatronics Engineering	Mansoura University	Faculty of Engineering		Egypt		Master of Science In Mechatronics Engineering		Courses +thesis
The 7th Program البرنامج السابع	Master of Engineering (Mechatronic & Automatic Control)	University of Technology, Malaysia	Faculty of Engineering	Electrical Engineering	Malaysia	Malaysian Qualification Agency (Mqa)	Master of Engineering (Mechatronic & Automatic Control)		Courses +thesis
The 8th Program البرنامج الثامن	M.Sc. of Mechatronics Engineering	University of Southern Denmark, Sdu	Faculty of Engineering	Mechatronics Engineering	Denmark		M.Sc. of Mechatronics Engineering		Courses +thesis
The 9th Program البرنامج التاسع	Master of science in mechatronics engineering	Palestine polytechnic university	Faculty of graduate study	Mechatronics engineering	Palestine		M.Sc. of Mechatronics Engineering		Courses +thesis
The 10th Program البرنامج العاشر	Master Mechatronics/Robotics	University of Applied Science (fh technikum wien)	Faculty of Engineering	Mechatronics Engineering	Germany		M.Sc. of Mechatronics Engineering		Courses +thesis
The 11th Program البرنامج الحادي عشر	M.Sc. (Mechatronics Engineering)	International Islamic University	Faculty of Engineering	Mechatronics Engineering	Malaysia		M.Sc. of Mechatronics engineering		Courses +thesis



Program Specification

ملحق (٣) مسح مخرجات التعلم في البرامج المماثلة لبرنامج ماجستير هندسة الميكاترونكس

Annex-3, Survey of Intended Learning Outcomes for Similar Accredited for Master of Science in Mechatronics Engineering Program at Sana'a Universities

		1st Program	2nd Program	3rd Program	4th Program	5th Program	6th Program	7th Program	8th Program	9th Program	10th Program	11th Program	
Program Intended Outcomes	Suggested PILOs for the Current Program: Mechatronics Engineering Program at Sana'a University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology	University of Southern Denmark				
A. Knowledge and understanding	Upon successful completion of a Master of Science in mechatronics Engineering Program, graduates should be able to:												
	A1. Demonstrate in-depth understanding of applied mathematics in Mechatronics engineering,	A1	A1		1	A1	1						



Program Specification

	control system, computer engineering and science, and electronics to design more functional, adaptable and cost-effective products.											
A2.	Recognize and explain the contemporary engineering technologies and issues in the field of Mechatronics engineering.		A2, A3		1	A2,A3	1					
A3.	Explain in-depth the principles of sustainable design and development of Mechatronics engineering.	A2	A3		1,2	A3,A4	1					
A4.	Demonstrate research principles and methods applicable to the field of work or academic in Mechatronics engineering and	A3	A2		1	A4-A7	1					



Program Specification

		related fields.												
B. Cognitive/ Intellectual Skills		Upon successful completion of a Master of Science in Mechatronics Engineering program, graduates should be able to:												
	B1.	Apply appropriate principles, methodologies, techniques, tools and packages in the analysis, development and evaluation of mechatronics engineering systems.	B1	B2		2	B2	2						
	B2.	Identify, formulate and analyze research and solve complex Mechatronics engineering problems.	B2	B3		2,3	B1,B2	2						
	B3.	Design Mechatronics system, component, or process to meet	B2, B3	B4		2,3	B2	2						



Program Specification

	desired needs within realistic constraints.												
C. Practical and Professional Skills	Upon successful completion of a Master of Science in Mechatronics Engineering program, graduates should be able to:												
	C1. Conduct research to solve mechatronics engineering problems.	C2	C2		3	C1,C2	3,4						
	C2. Use advanced methodologies and skills to solve Mechatronics engineering problems.	C1	C1		3	C1,C2	3,4						
	C3. Apply acquired knowledge of analysis and design for mechatronics engineering systems and implementation process.	C1, C2	C3		2,3	C1,C2	3,4						



Program Specification

D. General and Transferable Skills	Upon successful completion of a Master of Science in Mechatronics Engineering program, graduates should be able to:												
	D1.	Prepare a complete thesis and term-courses works/ tasks, write their documents and defend on them.	D1			5	6,7						
	D2.	Demonstrate ethical principles, awareness of professional and ethical responsibility as well as knowledge of the standards utilized in related fields.	D2			4	6,7						
	D3.	Conduct independently and communicate research that advances and extends knowledge and scholarship in related fields.				4	6,7						



Program Specification

	D4.	Independent learning ability, self-direction and independence leading to the ability to continue to develop their knowledge understanding and skills through further professional development				5	6,7						
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Intended Outcomes for Similar Programs

Program 1: Newcastle University, Master of Science in Mechatronics

A- Knowledge and Understanding: On completing the program students should have:

A1- -An advanced level of knowledge and understanding of the relevant underlying mechanical engineering principles, practices, materials, components and systems for this field of advanced study.

A2- A good awareness (sufficient for critical evaluation and effective application) of relevant terminology, concepts and practices in this field of specialization, including those from other engineering disciplines and from outside engineering.

A3- Knowledge of current and developing practices in the field of specialization, with critical awareness of the constraints on and limitations of these, leading to the potential for continuous improvement and the emergence of new approaches.

B- Intellectual Skills: On completing the program students should be able to:

B.1 Critically evaluate the state-of-the-art in the specialist field and apply their specialist knowledge to identify potential opportunities for improvement or innovation in the field.



Program Specification

- B.2 Exploit acquired relevant knowledge innovatively in the application of appropriate methods or solutions for processes, products or systems in the specialist field.
- B.3 Apply relevant research and information retrieval, data collection and analysis and systematic engineering methods and models appropriately to new or uncertain or complex problems in the field of specialization.
- B.4 Apply relevant knowledge to support informed decisions with complex or uncertain problems or risks in the field of specialization.

C- Practical Skills On completing the program students should be able to:

- C.1 Assess effectiveness of planning and evaluate implementation progress towards solutions and designs.
- C.2 Operate within the professional context of safe systems of work and compliance with relevant codes of practice and conduct in ways that promote sustainability. (UKSpec E1, E2 & E3)

D- Transferable/Key Skills: On completing the program students should have demonstrated:

- D.1 Independent learning ability, self-direction and autonomy leading to the ability to continue to develop their knowledge understanding and skills through further professional development. (UKSpec E4, QAA Q6, Q7 & Q10)
- D.2 Ability to communicate effectively in English presenting and discussing their work with others in the field of specialization. (UKSpec D1, D2 & D3)



Program Specification

Program 2: Kingston University, Master of M.Sc. Mechatronics Systems

A Knowledge and understanding on completion of the course students will be able to:

Intellectual skills – able to: On completion of the course students will be able to:

- A.1** Demonstrate a critical awareness of the current developments in the mechatronics in a variety of application areas such as robotics
- A.2** Design and deploy mechatronic systems showing a detailed understanding of principles and practical techniques of modelling and simulation
- A.3** Reflect on the ethical legal and professional issues in the deployment of mechatronic systems

B Intellectual skills – On completion of the course students will be able to:

- B.1** Learn independently, think logically and critically and demonstrate a systematic approach to problem-analysis and to finding solutions.
- B.2** Critically analyses, evaluate and communicate research in the chosen area.
- B.3** Identify current issues and trends in the areas of electronic, mechanical, software and control systems.
- B.4** To reflect on their experiences and identify opportunities for incremental future improvement.

C Subject Practical skills on completion of the course students will be able to:

- C.1 Design, implement and test the major components required for a practical mechatronic system for applications such as robotics, assistive technologies, avionics and automotive engineering.
- C.2 Analyze and specify user requirements for mechatronic systems.
- C.3 Express jointly mechanical, electronic, software and control designs using a standard notation and to select and apply a suitable modelling and simulation/ CAD software to coordinate the development and deployment of mechatronic systems.



Program Specification

Program 3: Jordan University of Science & Technology, M.Sc. in Mechatronic

The primary objectives of the program are:

- 1- To provide industry with highly trained engineers having interdisciplinary skills necessary to deal with state-of-the-art tools in design, development and advancing of modern engineering systems.
- 2- To develop graduates confident in addressing open-ended problems and who possess an attitude of self-learning.
- 3- To develop appropriate skills of modeling and simulation of modern integrated engineering products, thus enabling participants to carry out the design and development of 'smart' products.
- 4- To apply the latest techniques in precision mechanical engineering, control theory, computer science and engineering, and electronics to the design process to create more functional, adaptable, and cost-effective products
- 5- To ensure that all students are familiar with advanced systems elements and able to apply mechatronics principles in their own disciplines and in the broad context of engineering system design.

Program 4: Lawrance Technological University, M.Sc. in Mechatronic

The 31-credit-hour MSMSE program is designed to provide students with advanced knowledge in mechatronics. Students will be expected to:

- 1- Learn and apply mechatronic engineering principles and theories.
- 2- Develop analytical and problem-solving skills for mechatronic systems.
- 3- Evaluate technical mechatronics engineering publications.
- 4- Effectively communicate technical information.
- 5- Understand the importance of lifelong learning and the professional and ethical responsibilities of the engineering profession.

Program 5: University of Bath, M.Sc. in Mechatronic

A- Intended learning outcomes: (including teaching, learning and assessment methods, specifying those applicable for interim awards where appropriate)

- A.1 To provide a thorough understanding of and high competence in the material covered.
- A.2 To recognize the principal subsystems of a complex mechatronic system.
- A.3 To recognize and explain the functional purpose of each subsystem.
- A.4 To provide a mathematical model and analysis of each subsystem.
- A.5 To provide an initial design of particular subsystems and mechatronic systems.
- A.6 To successfully apply the fundamental principles of electrical, electronic and mechanical engineering to a range of technical problems.
- A.7 To provide competence at an advanced level in compulsory and chosen specialist subjects.



Program Specification

A.8 Familiarity with planning an engineering project, and monitoring progress to ensure completion on schedule.

A.9 Familiarity with research methods to ensure that work extends from the state of the art and makes.

B- Intellectual Skills

B.1 Ability to locate, analyses, interpret, criticize and report on scientific information from published sources at a specialist level.

B.2 Ability to apply the concepts and principles of mechanical engineering science to the solution of engineering problems in complex (both familiar and unpredictable) professional and research environments.

B.3 To have completed a substantial full-time research project (or equivalent for part-time) in an area relevant to their selected program, in sufficient depth to form a dissertation.

C- Professional Practical Skills

C.1 To be able to employ a range of techniques to review and critically analyses information concerning engineering problems and to propose and implement solutions in a professional manner.

C2 To deal with complex engineering issues in a systematic yet creative way, and to communicate the conclusions clearly to both specialist and no specialist audiences

The ability to work within a group



Program Specification

Program 6: Mansoura University, Faculty of Engineering, Master of Science in Mechatronics Engineering

The M.Sc. engineering graduate must be able to:

- 1-Identify, formulate and solve specific problems with the lack of data by integrating knowledge of different fields.
2. Asses and develop the methods and tools existing in the area of specialization. 3. Asses the risks in the field of specialization and plan to improve the performance.
4. Write and evaluate technical reports, carry out a research study and write a scientific study for research problem.
5. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and make good decisions in different professional aspects.
6. Communicate effectively- graphically, verbally and in writing- with a range of audiences using contemporary tools.
7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. 8. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

In addition to general competencies for the M.Sc. engineering program the graduate of Master of Science in Mechatronics Engineering program must be able to:

- 1- Demonstrate the ability to apply the acquired scientific knowledge to real mechatronics engineering problems.
- 2- Demonstrate the ability to conduct experiments or use mathematical skills in an intensive research assignment that deals with the fields of mechatronics.
- 3- Using appropriate computer-aided design (CAD) and analysis techniques to provide solutions to practical problems related to mechatronics systems.
- 4- Identify in-depth knowledge of a specific topic related to the fields of Mechatronics engineering as part of a research project.
- 6- Use of software packages and measuring equipment related to mechatronics systems.



Program Specification

Program 7: University of Technology, Malaysia, Faculty of Engineering, Master of Engineering (Mechatronic & Automatic Control)

Program Educational Objectives (PEOs)

1. **PEO1:** To produce postgraduates with multidisciplinary knowledge needed for designing, integrating and optimizing solutions, central to modern control and mechatronic engineering systems.
2. **PEO2:** To produce postgraduates who are able to generate new knowledge, idea and technique in computer and microelectronics systems.
3. **PEO3:** To produce postgraduates who are able to function in R&D research team and innovative industrial ventures.
4. **PEO4:** To produce postgraduates who are able to consistently perform their responsibilities ethically and professionally.

Program 8 University of Southern Denmark, SDU, Denmark, Faculty of Engineering, Master of Science in MECHATRONICS Engineering

- A.1 . Knowledge, based on the highest international research, of the different components such as actuators, sensors, electromechanical systems, control systems and the corresponding tools and scientific methods unintelligent mechatronic products and systems.
- A.2 . The ability to understand and reflect on the scientific methods used in mechatronics product development, and to apply these methods into an engineering context.
- A.3 . Knowledge about the mathematical modelling process including derivation of governing equations, solution of the resulting equations using state of the art analytical and numerical methods, design of experiment a subsequent verification of the developed models.
- A.4 . Knowledge about linear and nonlinear control theory and the ability to reflect the most suitable control strategies. This includes intelligent solutions based on machine learning.
- B.1 The ability to master the scientific methods and tools used in the mechatronic development process. This includes the ability to build mathematical models of given systems, and use numerical methods/simulation system and create the appropriate solutions.
- B.2 The ability to evaluate and select the appropriate scientific theories, methodologies, tools and development set-ups for the purpose of choosing the solution model for a given mechatronic research and development.



Program Specification

- B.3 The ability to document, present and discuss one's own research and development results in a context of engineers/scientists – that is software- hardware- electronic- mechanic- mechatronic- engineers - as well professionals.
- B.4 The ability to analyze a given problem, determine the most important physical effects, derive models including in a coupled manner the physical effects (Multiphysics), chose appropriate solution strategies, determ parameters based on experiments and verifying the developed models, and design and implement feedback controllers, including neural network learning algorithms.
- B.5 The ability to independently acquire knowledge, skills and competences within a new field by analyzing a given problem, searching the literature for key papers, understanding those papers, recreating the results methods learned to given problem.
- C.1 The ability to manage one's own work situation as an engineer and expert in a highly international engineering context. This includes the ability to create a carrier in a private company as well as in a complex interuniversity environment.
- C.2 The ability to initiate, take part in, take the responsibility of and carry out research and development of mechatronic systems with special emphasis on modelling and control aspects of the process, alone and in a context with many stakeholders.
- C.3 The ability to independently take responsibility for one's own professional development, specialization, and learning during the study and as part of one's future career.
- C.4 The competency to analyze and model systems, seeking out new knowledge and utilizing research results within the field of specialization in order to develop new concepts and product type.



Program Specification

ملحق (٤) مسح ملخص البرامج المماثلة لبرنامج ماجستير هندسة الميكاترونكس

Annex-٤, Summary of Similar Programs (Benchmarks) for Master of Science in Mechatronics Engineering Program

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
The program title	Master of science in mechatronics	M.Sc. mechatronic systems	M.sc of mechanical engineering - mechatronics	Master of science in mechatronic systems engineering	M.Sc. mechatronics	Master of science in mechatronics engineering	Master of engineering (mechatronic & automatic control)	M.Sc. of mechatronics engineering	M.Sc. of mechatronics engineering	M.Sc. of mechatronics engineering	M.Sc. of mechatronics engineering	Master of science in mechatronics engineering
The Faculty	Faculty of engineering	Faculty of engineering	Faculty of graduate study	Faculty of engineering	Faculty of engineering	Faculty of engineering	Faculty of engineering	Faculty of Engineering	Faculty of Graduate study	Faculty of Engineering	Faculty of Engineering	Faculty of engineering
The University	Newcastle University	Kingston University	Jordan University of	Lawrance Technological	University of Bath	Mansoura University	University of Technology	University of Southern	Palestine Polytech	University of applied	International Islamic	Sana'a University



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
	ty	ty	Science & Technology	University		ty	y, Malaysia	Denmark, SDU	nic University	science (FH Technikum Wien)	University	
The Country	UK	UK	Jordan	USA	UK	Egypt	Malaysia	Denmark	Palestine	Germany	Malaysia	Yemen
Type of program	Courses + individual project	Courses + thesis	Courses +thesis	Courses +thesis	Courses +thesis	Courses +thesis	Courses + Research thesis	Courses + Research thesis	Courses + Research thesis	Courses + Research thesis	Courses + Research thesis	Courses and Research
Study methods in the	Full time	full-time and part-	Fulfillment	full-time and part-	Full time	Full time	Full time					Regular



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
program:	regular	time mode,		time mode								
Number of semesters	3 semester	4-6 semester	4	2 to 4		4-6 (extension 2)						4-6 (extension 2)
Total Credit Hours (without Thesis)	60 1 credit ≡ 10 study hours, including timetabled contact hours and private study	120	34	31	60	24	33		30		20	36



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
Credit Hours for compulsory courses	120		16	12	18	24	12		18		20	27
No. of Courses for Electives courses			3	(optional) 3 course or thesis	3		5		4			1
No. of Courses for compulsory courses	5		6 (5*3+1)	4	2	8 at least	4 compulsor y +2 other required		6		7	9
Credit Hours for Electives			9	9	12		15		12			3



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
courses												
Complementary courses to join the program and their number	5			4 <ul style="list-style-type: none"> • Intro to Mechanical Systems • Intro to Thermal Systems • Circuits and Electronics • Mechatronics 		16 credit For student who have (mechanical or electrical eng.) Then 12 credit for diploma						8



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
Credit Hours for Thesis	60 (project)	60 (credits)	9	9	30	12	10		6		20	6
Total Credit Hours for courses & Thesis	120	180	34	31	90	36	43		36		40	36
The period for thesis completion	3 semester s		2 semester s	2	12 months	2 semester (one year)			2-3 years		2-3 years	12 month
The min. period to complete the program	3 semester s	one-two years full-time		1-2 years		2-years						2 years
The max. period to	3 semester	Two- three				4 years						4 years



Program Specification

Summary of Similar Programs (Benchmarks) for Mechatronics Engineering Program												
	The Similar Programs (Benchmarks)											
	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program	Current program
complete the program	s	years part- time.										



Program Specification

ملحق (5) مسح أسماء المقررات الدراسية في البرامج المماثلة لبرنامج ماجستير هندسة الميكاترونكس

Annex-5, Survey of Course Names of Similar Program

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Faculty			Faculty of Graduate study	Faculty of engineering	Faculty of Engineering	Faculty of Engineering	Faculty of Engineering	Engineering	Faculty of Graduate study	Faculty of engineering	Faculty of Engineering	Faculty of Engineering
Program	Master of Science in mechanical /Mechatronics	M.Sc. Mechatronic Systems	M.Sc. of MECHATRONICS Engineering		Master of Science in Mechatronics	Master of Science in Mechatronics Engineering	Master of Engineering (Mechatronics & Automatic Control)	M.Sc. of MECHATRONICS Engineering	Master of Science in Mechatronics Engineering	Master Mechatronics/Robotics	M.Sc. (Mechatronics Engineering)	Master of Science in Mechatronics Engineering
Country	UK	UK	Jordan	USA	UK	Egypt	Malaysia	<u>Denmark</u>	Palestine	Germany	Malaysia	Yemen
No. of Courses	4	5 with thesis	9 Compulsory 6 (5**3+1) Elective (3*3)	7	8	8 to 12	13		10 Compulsory 6 (6*3) Elective (4*3)		7	10



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Total Cr. Hrs.		300 equivalent to 30 credit	34	31	90	36 minimum	43	-	36	36	40 (20 for courses) & (20 for thesis)	36
Total Years		1 to 2			1	3		2	2 to 3	At least 2 years	2 to 3	
Term	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	Course Name	<u>Course Name</u>	Course Name	Course Name	Course Name	Course Name
Research Methodology		Engineering Research Techniques/					Introduction to Research Methodology in Electrical Engineering	-	Engineering Research and Development		· Research Methodology in Mechatronics Engineering	· Research Methodology



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Mechatronic Design		Mechatronic Design and Automation	Embedded Systems for Mechatronics · Special Topics in Mechatronics System Applications A · Special Topics in Mechatronics System Applications B · Mechatronics System Design-I · Mechatronics System Design-II	Mechatronic Systems I Mechatronic Systems II		Mechatronic Systems Micro-Electromechanical systems			· Automotive Mechatronics · Mechatronics Applications for Renewable Energy Systems	· Mechatronics 1 (BMECH) · Optomechatronics (BOPT) · Mechatronics 2 (BMECH)	· Mechatronics System Design	Advanced Mechatronics System Design



Program Specification

University	Newcastle University	Kingst on Univer sity	Jordan University of Science & Technology	Lawra nce Techno logical Univer sity	Univer sity of Bath	Mansour a Univer sity	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	Internatio nal Islamic University	Sana'a University
Computer Engineering and programming			<ul style="list-style-type: none"> · Programm ing Tools and Methods for Mechatronics Engineers · Introductio n to Computer Networkin g 				<ul style="list-style-type: none"> · Design of Microprocess or-Based Mechatronic Systems 	<ul style="list-style-type: none"> · Embedded Software Design T350002401 (5 ects) · SES Software for Embedded Systems T350001401 		<ul style="list-style-type: none"> · Modern Programmin g Concepts (BMPK) · Service-Oriented and Object-Oriented Algorithms in Robotics 	<ul style="list-style-type: none"> MCT E 6103 Microprocessors in Mechanical Systems 	<ul style="list-style-type: none"> · Programm ing Tools for Mechatronics Engineers



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Industrial field	Industrial Automation	Advanced CAD/CAM Systems	Automated Manufacturing Systems			Numerically Controlled Machines		-	Modern Manufacturing Systems including Advanced CAD/CAM or CIM	·Industrial Handling (BIHA)	MCT Industrial Sensing Systems	Modern Manufacturing Systems
Instrumentation	Instrumentation and Drive Systems		Advanced Industrial Instrumentation and Control				Advanced Instrumentation & Measurement	-	·Robotics		Control and Instrumentation Advanced Instrumentation and Measure	



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
											ment	
Sensors and actuator			Sensors and Actuators			Sensors and Actuators		-		Advanced Sensor Systems (BASS)		
Robotica	PLCs and Robotics	Advanced Control and Robotics	Introduction to Robotics Advanced Robotics Control Mobile Robots			Robotics Engineering	Advanced Robotics Autonomous Mobile Robotics	- - -		Industrial Robotics (Mobile and Service Robotics 1) Mobile and service robotics 2 Mobile and service robotics 2 (BMUS2)	Robotics and Automation (choose one) Advanced Topics in Robotics	Advanced Robotics and automation



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Control System		Control Systems with Embedded Implementation	Advanced Control Systems · Distributed Control Systems · Intelligent Control Systems	Modern Control Systems Digital Control Systems	Control Engineering	Modern Control Systems	Discrete-Time Systems & Computer Control Advanced Process Control Adaptive & Self-Tuning Control Multivariable and Optimal Control System Nonlinear and Robust Control Systems · Advanced Digital Control · MKEM	· Control Systems (10 ects) · Adaptive Nonlinear Control - - - - -	Computer-Controlled Systems Process Control Micro Systems Advanced Control · Human-Movement Control	Advanced Control System (BACS)	Advanced Control System Digital Control System Design Nonlinear and Adaptive Control Active Vibration Control	Advanced Control System



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Mechanical Designe			Advanced Vibration	Mechanical Vibrations Advanced Dynamics		Mechanical Design Introduction to Continuum Mechanics		Analytical Mechanics -			Mechanical Vibration	Advanced Machine design



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Modeling and simulation			Modeling and Simulation of Dynamics Systems	Engineering Analysis I	Engineering Systems simulation	Finite Element Analysis	Modeling & Simulation of Dynamical Systems	Computational Multi-Physics -	Finite Element Methods	Modelling and Simulation of mechatronic Systems Computer Aided Engineering (BCAE)	Modelling and Simulation	Modeling and simulation of Engineering Systems Finite Element Analysis (Elective)



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
Artificial Intelligence			Artificial Intelligent Systems		Computational Intelligence	Artificial Intelligence	Artificial Intelligence	Artificial Neural Networks	<ul style="list-style-type: none"> · Artificial Intelligence · Intelligent Systems and Control · Machine Learning including Pattern Recognition 	<ul style="list-style-type: none"> · Intelligent Manufacturing Systems (BIMS) 	<ul style="list-style-type: none"> · Intelligent Machines 	Advanced Artificial Intelligence



Program Specification

University	Newcastle University	Kingst on Univer sity	Jordan University of Science & Technology	Lawra nce Techno logical Univer sity	Univer sity of Bath	Mansour a Univer sity	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechni c University	University of applied science (FH Technikum Wien)	Internatio nal Islamic University	Sana'a University
Power electronics/ Integrated Systems	0 0		Power Electronics and Electrical Drives	0	Power Electronics & Drives1 Integrat ed Engineer ing	Power Electronics and Control	0	- - -	Autonom ous Systems	Power Electronics and Electrical Drives (BEL) Advanced Automation (BAAU)	Power Electron ics and Drives Autono mous Agents Machine Vision	Power Electron ics and Drives Advance d Embedde d Systems Design and optimizat ion
Safety and project managem ent	Entrepre neurship and Quality Manage ment		Project Managem ent			Fire Safety Engineer ing		Safety Critical Systems		Production Management	Value s, Technol	Advance d Project Manage ment



Program Specification

University	Newcastle University	Kingst on Univer sity	Jordan University of Science & Technology	Lawra nce Techno logical Univer sity	Univer sity of Bath	Mansour a Univer sity	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechni c University	University of applied science (FH Technikum Wien)	Internatio nal Islamic University	Sana'a University
								-		· Internationa l project management (BIPM) Business Management (BUNF)	ogy and Society	
	· Core Skills						· Linear System Theory					
Fluid and thermal			· Electro-Pneumatic and Hydraulic Systems			Fluid Power Control Systems		-				
						Comput ational Fluid Dynami cs		-				
						Design of Thermo-Fluid		-				



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
						systems						
PLC						•Programmable Logic Controllers						
								-	•Real-Time Systems			
							•Other required courses (6 credits)		•Group Projects			
		•Year 2 CI7900	•Seminar		•Professional skills for engineering practice		•U**** ###3 Non-technical subject					



Program Specification

University	Newcastle University	Kingst on Univer sity	Jordan University of Science & Technology	Lawra nce Techno logical Univer sity	Univer sity of Bath	Mansour a Univer sity	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechni c University	University of applied science (FH Technikum Wien)	Internatio nal Islamic University	Sana'a University
		Pro fessio nal Place ment										
		(12 0 credits)									(chose one)	
								·Optimizati on and Image Processing T35000040 1 (5 ects)				
					·Sign als and Informa tion							



Program Specification

University	Newcastle University	Kingst on Univer sity	Jordan University of Science & Technology	Lawra nce Techno logical Univer sity	Univer sity of Bath	Mansour a Univer sity	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechni c University	University of applied science (FH Technikum Wien)	Internatio nal Islamic University	Sana'a University
										· Mobile and Service Robotics 1 (BMUS)		
								-				
								T350003401				
								(5 ects)				
										· Planning and controlling (BPUC)		
								-				
										· Mobile and service robotics 2 (BMUS2)	MCTE 6202 Discrete Time Signal Processin g	



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
										· Service-Oriented and Object-Oriented Algorithms in Robotics		
										· Agile development methods in the innovation cycle (BINN)		
								Second semester		· Technical English (BENG)		
								· Statistical Signal Processing T35000740 1 (5 ects)				



Program Specification

University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrence Technological University	University of Bath	Mansoura University	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	International Islamic University	Sana'a University
								· Electromechanics				
									· Systems Identification			
									· Optimization and Optimal Control			



Program Specification

University	Newcastle University	Kingst on Univer sity	Jordan University of Science & Technology	Lawra nce Techno logical Univer sity	Univer sit y of Bath	Mansour a Univer sit y	University of Technology, Malaysia	University of Southern Denmark, SDU	Palestine Polytechni c University	University of applied science (FH Technikum Wien)	Internatio nal Islamic University	Sana'a University
		ptions 3	· Real-Time Systems									
		Digita l Signal Proces sing					· MKEM 1763 System Identification & Estimation					
									· Assistive and Prostheti c Technolo gies (for disabled persons)			
			· Machine vision						· Machine Vision			



Program Specification

ملحق (٦) مسح الرؤية والرسالة والاهداف البرامج المعتمدة المماثلة لبرنامج هندسة الميكاترونكس

Master of (Benchmarks) for Survey/ Mapping of Vision, Mission and Objectives of Similar Accredited Programs at International Universities^١ Annex (Science in Mechatronics engineering program

	The 1 st Program	The 2 nd Program	The 3 rd Program	The 4 th Program	The 5 th Program	The 6 th Program	The 7 th Program	The 8 th Program	The 9 th Program	The 10 th Program	The 11 th Program
Country	UK	UK	Jordan	USA	UK	Egypt	Malaysia	Denmark	Palestine	Germany	Malaysia
University	Newcastle University	Kingston University	Jordan University of Science & Technology	Lawrance Technologic al University	University of Bath	Mansoura University	University of Technology, Malaysia ng	University of Southern Denmark, SDU	Palestine Polytechnic University	University of applied science (FH Technikum Wien)	Internationa l Islamic University
Faculty	Faculty of engineering	Faculty of Engineering	Faculty of graduate study	Faculty of engineering	Faculty of Engineering		Faculty of Engineering	Engineering	Faculty of Graduate study	Faculty of engineering	Faculty of Engineering
Department/ Program	Mechanical Engineering		MECHATRONICS			Master of Science in Mechatronics Engineering	Master of Engineering (Mechatronic & Automatic Control)				
Study Duration		1 to 2			1	4-6 semesters with maximum 2-semester extensions (total 4 years)		2	2 to 3		2 to 3
Program Accrediting Body											



Program Specification

Website Link	http://www.ncl.ac.uk/postgraduate	http://www.kingston.ac.uk/postgraduate-course/mechatronics-systems-M.Sc./					https://engineering.utm.my/electrical/postgraduate/master-of-engineering-mechatronic-automatic-control/?_gl=1*1kt7wga*_ga*MTYxODcyNTkxNS4xNjE5MDU4ODc2*_ga_N3HJW8G3P7*MTYxOTIzMzM2OC4yLjEuMTYxOTIzMzU0NC4w	https://www.sdu.dk/en/uddannelse/kandidat/mekatronik	http://dsr.ppu.edu/gs/Mechatronic	https://www.technikum-wien.at/en/study-programs/master/mechatronicsrobotics/mechatronicsrobotics-curriculum/	
Department Vision							The School of Electrical Engineering in UTM is committed to be a world-class center of excellence and a leader in teaching and learning within the field of electrical engineering				
Department Mission							To provide world-class program in teaching				



Program Specification

							<p>and learning within the field of Electrical Engineering</p> <p>To develop technology and technologists in the field of Electrical Engineering possessing high values and morals; and</p> <p>To spearhead technology knowledge in the field of Electrical engineering.</p>				
Department Objectives							<p>To produce professionals who are responsible to their Creator and the society.</p> <p>To produce professionals who are very well trained, skilled, and efficient through the establishment</p>				



Program Specification

							<p>ment of excellent academic programs. To establish good university – industry relationship. To develop and establish high quality academic and support personnel. To create an excellent environment for consultancy, research and development activities.</p>				
Program Mission											
Program Objectives	<p>This degree program (for suitably qualified graduates from engineering and science first degree backgrounds</p>	<p>1-Provide students with knowledge, skills and a critical appreciation of the principles of operation and the main components of mechatronic systems: control systems, modelling and simulation of</p>	<p>The primary objectives of the program are: 1. To provide industry with highly trained engineers having</p>	<p>The 31-credit-hour MSMSE program is designed to provide students with advanced knowledge in</p>	<p>To enable students to acquire understanding and competence of the material covered in their selected</p>	<p>The M.Sc. engineering graduate must be able to: 1-Identify, formulate and solve specific problems</p>	<p>Program Learning Outcomes (PLOs) Graduates from this program are expected to have the following outcomes:</p>	<p>extend students' professional knowledge and competences and increase their</p>			



Program Specification

<p>cognate to mechanical engineering) aims to:</p> <p>1. Develop their knowledge, understanding and skills, as well as awareness and “know how”, in the field Mechatronics based on mechanical engineering and related disciplines (materials, electrical, electronic and computer engineering) so that as Masters graduates they will be equipped to enter employment as professional engineers (progressing on to Chartered Engineer or equivalent status) or in other professional</p>	<p>mechanical and robotic devices, image and signal processing, artificial intelligence methods and embedded software engineering.</p> <p>2-Provide students with the ability of conceiving, designing, prototyping and producing creative mechatronic systems solutions.</p> <p>3- Provide students with the professional attitudes, entrepreneurial spirit and many transferable skills necessary to develop and exploit their technical abilities in the furtherance of their careers within the evolving mechatronic systems industry.</p> <p>3-Adopt a disciplined engineering approach and sound practical skills in the development and deployment of</p>	<p>interdisciplinary skills necessary to deal with state of the art tools in design, development and advancing of modern engineering systems. 2. To develop graduates confident in addressing open-ended problems and who possess an attitude of self-learning. 3. To develop appropriate skills of modeling and simulation of modern integrated engineering products, thus enabling participants to carry out the design and development of ‘smart’ products. 4. To apply the</p>	<p>mechatronics. Students will be expected to:</p> <p>1. Learn and apply mechatronic engineering principles and theories. 2. Develop analytical and problem-solving skills for mechatronic systems. 3. Evaluate technical mechatronics engineering publications. 4. Effectively communicate technical information. 5. Understand the importance of lifelong learning and the professional and ethical responsibilities</p>	<p>programme. Many aspects of understanding will be attained, or informed by, the current boundaries of the discipline.</p> <ul style="list-style-type: none"> To equip students with an ability to analyse, interpret, criticise and report on scientific information at a specialist level. To develop problem-solving and creative abilities in laboratory and project work. To acquire instrumentation and/or numerical skills. To develop an understanding of research 	<p>with the lack of data by integrating knowledge of different fields.</p> <p>2. Assess and develop the methods and tools existing in the area of specialization. 3. Assess the risks in the field of specialization and plan to improve the performance.</p> <p>4. Write and evaluate technical reports, carry out a research study and write a scientific study for research problem.</p> <p>5. Use creative, innovative and flexible thinking and acquire</p>	<p>PL</p> <p>O1: Attain advanced knowledge on theories, methods and applications in control and mechatronic engineering field.</p> <p>PL</p> <p>O2: Able to demonstrate proficiency in relevant analytical methods, simulations, and/or experiments to perform research.</p> <p>PL</p> <p>O3: Able to critically solve problems and apply engineering knowledge in design and development.</p> <p>PL</p> <p>O4: Able to plan and perform research undertakings</p>	<p>theoretical and methodical qualifications and level of independent work beyond the level attained at the bachelor level.</p> <p>provide students with the opportunity for in-depth academic study via the use of advanced elements of the disciplines and methods of the academic area, including training in scientific work and methodology to</p> <p>student's competences to perform more specialised</p>				
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Program Specification

	<p>careers, providing the engineering industry and professions (in the UK and elsewhere) with employable and enterprising graduates who have an appreciation of the value of education to the wider community.</p> <p>2. Prepare for engagement in life-long learning (eg professional CPD or further Higher Education) with capability in critical enquiry, research and knowledge acquisition through studying in depth a range of aspects of modern Mechatronics , with</p>	<p>mechatronic systems using modern engineering design tools, methods and standards.</p> <p>4-Acquire specialised knowledge and skills in selected areas of mechatronics. For example, digital image and signal processing, modelling and simulation, and industrial control.</p> <p>5- Demonstrate an understanding of the major technical, economic, organizational, and human factors which guide the design, implementation, and management of mechatronic systems.</p> <p>6- Practise the theoretical concepts and knowledge acquired using the taught modules in a substantial research or industrial based project.</p>	<p>latest techniques in precision mechanical engineering, control theory, computer science and engineering, and electronics to the design process to create more functional, adaptable, and cost effective products</p> <p>5. To insure that all students are familiar with advanced systems elements and able to apply mechatronic s principles in their own disciplines and in the broad context of engineering system design.</p>	<p>ies of the engineering profession.</p> <p>careers in engineering, in both industry and universities.</p> <ul style="list-style-type: none"> • To develop team working and communication skill • To equip the programme graduates with the ability to perform in-depth engineering work on a defined task requiring research, personal project management and innovative thinking. 	<p>entrepreneurial and leadership skills to anticipate and make good decisions in different professional aspects.</p> <p>6. Communicate effectively-graphically, verbally and in writing-with a range of audiences using contemporary tools.</p> <p>7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.</p> <p>8. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.</p>	<p>responsibly, professionally and ethically.</p> <p>PL O5: Able to communicate, and express knowledge and ideas effectively.</p> <p>PL O6: Able to continue life-long learning and apply technology for the betterment of humanity</p>	<p>vocational functions and participate in scientific development work, and to qualify the student for further education, including PhD programmes , cf. the Danish Ministerial Order on the PhD Programme at Universities .</p>			
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Program Specification

	<p>exposure to specialist modules on, eg, mechatronics design, instrumentation and drives, mechanical power transmission, robotics, industrial automation, distributed control systems, microprocessor systems, machine vision.</p> <p>3. Gain an internationally recognised qualification which meets the requirements of the Framework for Higher Education Qualifications at Masters Level 7 with particular reference to the QAA Subject Benchmark Statement for</p>	<p>7-Initiate, plan and sustain a disciplined personal effort with academic rigour during the project, leading to an original, individual and innovative academic dissertation.</p> <p>8- Give students on the 2 year version an opportunity to develop further skills, preparing them for higher levels of employment.</p>				<p>In addition to general competences for the M.Sc. engineering program the graduate of Master of Science in Mechatronics Engineering program must be able to:</p> <p>1- Demonstrate the ability to apply the acquired scientific knowledge to real mechatronics engineering problems.</p> <p>2- Demonstrate the ability to conduct experiments or use mathematical skills in an intensive research assignment that deals with the fields of</p>					
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Program Specification

	<p>Engineering (Annex MEng degrees) and to the Engineering Council UK statement on Applicability of Output standards to Masters degrees.</p> <p>4. For non-native speakers of English, extend their English language skills appropriate to the application of Mechatronics in engineering and industry through experience of life and study in a UK Higher Education institution.</p> <p>5. Achieve the above in the contexts of the School,</p>						<p>mechatronics.</p> <p>3- Using appropriate computer-aided design (CAD) and analysis techniques to provide solutions to practical problems related to mechatronics systems.</p> <p>4- Identify in-depth knowledge of a specific topic related to the fields of Mechatronics engineering as part of a research project.</p> <p>5- Use of software packages and measuring equipment related to mechatronics systems.</p>					
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University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

	SAgE Faculty and University business plans, following the University's policies and procedures and conforming to the relevant sections of the QAA Code of Practice.										
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Program Specification

ملحق (٧) مؤامة رسالة وأهداف البرنامج مع رؤية ورسالة واهداف الكلية والجامعة

Annex (٧) Mapping of mission and objective of the program with vision, mission and objectives of faculty, and university

Mapping of program vision with Department, faculty, and university vision			
University Vision	Faculty Vision	Department vision	Program vision
Sana'a University aspires to achieve a national leading role in teaching, learning, scientific research and community service; and to be among the best regional universities and the foremost house of expertise and think tank in Yemen.	To excel in engineering education & scientific research with distinction at the local and regional levels.	The department of Mechatronics Engineering at the Faculty of Engineering has an important mission to provide quality engineering education as well as scientific research development in this vital area of engineering.	To be distinguished master-graduate program education & scientific research in Mechatronics systems locally and regionally.

Mapping of program mission with Department, faculty and university mission			
University Mission	Faculty Mission	Department Mission	Program Mission
To contribute to the sustainable development efforts by providing an accredited higher education environment and excellent research services within a fruitful national partnership based on transparency, professionalism and creativity.	To provide excellent and accredited engineering education to meet the development needs and match the labor market requirements locally and regionally.		To provide well qualified master students in the field of Mechatronics through qualified academic program, staff, and suitable research infrastructure that meet the development requirements as well as local and regional labor markets.



Program Specification

Mapping of program objectives with Department, faculty, and university objectives

University Objectives	Faculty Objectives	Department Objectives	Program Objectives
<p>1. To provide specialized and in-depth academic opportunities for students in different fields of knowledge to meet the country's needs of specialties, technicians and experts, with special focus on the following:</p>	<p>1. To offer study programs in various fields of knowledge and equip students with required knowledge and scientific and know-how skills to utilize them in resolving problems effectively and efficiently.</p>	<p>1. To graduate flexible engineering graduates with skills required to access entry level positions in the mechatronics engineering industry as well as in a wider range of employment in commerce, research, manufacturing and maintenance where mechatronics engineers play a vital role.</p>	<p>1. To provide advanced studies in the field of mechatronics and encourage applied research in different Mechatronics engineering discipline.</p>
<p>2. To boost the level and quality of preparation and qualification tasks.</p>	<p>2. To develop positive trends towards engineering science and its accelerating developments and enable students to use the techniques and methods of conducting scientific research in</p>	<p>2. To deliver a program which equips graduates with a high level of understanding of mechatronics concept complemented by professional, practical, and transferable skills that enable graduates to solve a wide range of mechatronics problems.</p>	<p>2. To bridge the gap between the academic educational and industrial /technological environment.</p>



Program Specification

Mapping of program objectives with Department, faculty, and university objectives

University Objectives	Faculty Objectives	Department Objectives	Program Objectives
	engineering fields.		
3. To create a general culture aiming at developing the elements of sound Islamic personality and the proper cognitive and scientific training.	3. To develop skills of scientific, innovative and critical thinking as well as the concept of continuous self-education.	3. Ensure that graduates are able to make a rapid and effective contribution to their employers' enterprise.	3. To provide graduates with up-to-date knowledge and skills needed to develop successful mechatronics systems, and solve the technical problems and challenges in industry.
4. To stabilize the true Islamic vision emanating from the broad horizons of Islamic knowledge and its perception of the universe, man and life.	4. To strengthen scientific ties with national and international colleges, scientific bodies, and research & development centers.	4. Promote a culture amongst graduates of continuous personal and professional development.	4. To conduct scientific research in specific topics related to Mechatronics engineering
5. To develop innovative and critical scientific thinking skills.	5. To provide technical and specialized studies and consultations to various state bodies and institutions, both public and semi-public, and utilize them in resolving the	5. Ensure that graduates have competencies that enable them to communicate both orally and in writing in the Arabic and English Languages.	5. To enhance ethical practices, communication skills, sharing innovative ideas, and engage in life-long learning.



Program Specification

Mapping of program objectives with Department, faculty, and university objectives

University Objectives	Faculty Objectives	Department Objectives	Program Objectives
	environment and society issues to promote sustainable development.		
6. To provide students with the required knowledge and scientific and applied skills for solving problems effectively and efficiently.	6. To develop a spirit of co-operation, group work, effective leadership, sense of responsibility, and ethical commitment.	6. Ensure that graduates have group skills that will enable them to work professionally in teams.	6. To graduate researchers in mechatronics engineering disciplines who can pursue further studies and contribute to the scientific research community.



Program Specification

ملحق (8) المساقات الرئيسية واوزانها الفرعية لبرنامج ماجستير هندسة الميكاترونكس (Not applicable)
 Appendix (8) Main Themes/Sub-Themes with Relative weight for Program.

No.	Themes	Credit Hours	Courses Number	Relative weight for Theme	Sub-Themes
0					-
1					-
2					-
3					-
4					-
5					-
6					-
7					-
	Total			100%	

* This total is the overall total of both Compulsory and Elective courses.



Program Specification

ملحق (٩) توزيع مخرجات التعلم لبرنامج ماجستير هندسة الميكاترونكس مع المساقات الرئيسية (Not applicable)
 Appendix (9) P- ILOs Distribution to Main Themes for Master of Science in Mechatronics engineering program

No	PIL Os	Themes							
		1st Theme	2nd Theme	3rd Theme	4th Theme	5th Theme	6th Theme	7th Theme	8th Theme
1	A1								
2	A2								
3	A3								
4	A4								
5	B1								
6	B2								
7	B3								
8	B4								
9	C1								
10	C2								
11	C3								
12	C4								
13	D1								
14	D2								
15	D3								
16	D4								



Program Specification

ملحق (١٠) موائمة مخرجات تعلم برنامج ماجستير هندسة الميكاترونكس مع المقررات

Appendix (10) Mapping Program Intended Learning Outcomes with courses for Master of Science in Mechatronics Engineering Program

Course Code	Courses	PILOs													
		A1	A2	A3	A4	B1	B2	B3	C1	C2	C3	D1	D2	D3	D4
I. Compulsory Courses															
MTE561	Advanced Mechatronics Systems Design	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		
MTE501	Programming Tools for Mechatronics Engineers	✓	✓	✓		✓	✓			✓		✓	✓		✓
MTE551	Modern Manufacturing Systems	✓	✓	✓			✓		✓	✓			✓		
MTE541	Advanced Mechanical design	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓		✓
MTE532	Advanced Control System	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
MTE552	Advanced Power Electronics and Drives	✓	✓	✓		✓	✓			✓		✓	✓		✓
MTE563	Advanced Robotics and Automation	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
MTE531	Advanced Embedded Systems Design	✓	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓



Program Specification

Course Code	Courses	PILOs													
		A1	A2	A3	A4	B1	B2	B3	C1	C2	C3	D1	D2	D3	D4
I. Compulsory Courses															
FR502	Research Methodology		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓
II. Elective Courses															
MTE562	Advanced Artificial Intelligence	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
MTE542	Finite Element Analysis	✓	✓		✓		✓			✓	✓	✓	✓		✓
MTE543	Modeling and simulation of Engineering Systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MTE553	Advanced Project Management	✓	✓		✓		✓			✓	✓	✓	✓		✓
TESIS599	Master Thesis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



Program Specification

ملحق (١١) موائمة مخرجات تعلم برنامج ماجستير هندسة الميكاترونكس مع المرجعيات

Appendix (11) Mapping Program Intended Learning Outcomes with the benchmarks for Master of Science in Mechatronics engineering program

(IOLs) Intended Learning Outcomes																Standards and Benchmarks
(A)				(B)				(c)				(D)				
A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4	



Program Specification

ملحق (12) موازنة أهداف البرنامج مع مخرجات التعلم المقصودة لبرنامج ماجستير هندسة الميكاترونكس
Annex-12, Alignment of Mechatronics Engineering Program Objectives with Program Intended Learning Outcomes

Program Objectives رقم ونص المعيار	Program Intended Learning Outcomes (PILOs) رموز مخرجات التعلم للبرنامج														
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
Upon successful completion of an undergraduate Mechatronics Engineering program, graduates should be able to:															
1.To provide advanced studies in the field of mechatronics and encourage applied research in different Mechatronics engineering discipline.															
2.To bridge the gap between the academic educational															



Program Specification

Program Objectives رقم ونص المعيار	Program Intended Learning Outcomes (PILOs) رموز مخرجات التعلم للبرنامج														
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
and industrial /technological environment.															
3.To provide graduates with up-to-date knowledge and skills needed to develop successful mechatronics systems, and solve the technical problems and challenges in industry.															
4.To conduct scientific research in specific topics related to															



Program Specification

Program Objectives رقم ونص المعيار	Program Intended Learning Outcomes (PILOs) رموز مخرجات التعلم للبرنامج														
	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
Mechatronics engineering															
5.To enhance ethical practices, communication skills, sharing innovative ideas, and engage in life-long learning.															
6. To graduate researchers in mechatronics engineering disciplines who can pursue further studies and contribute to the scientific research community.															

University of Sana'a
Faculty of Engineering
Department: Mechatronics Engineering
Title of the Program: Master of Science in Mechatronics Engineering



Program Specification

Program Intended Learning Outcomes (PILOs):

A. Knowledge and Understanding: