



School of Engineering Technology

Electrical Engineering Department

**Bachelor Degree in Electrical Engineering
Study Plan**

2022

Program Objectives

1. Provide world-class, flexible, STEM-based education which combines in-depth technical knowledge with professional, leadership, and entrepreneurial skills.
2. Build advanced practical and technical skills to enable the student to conceive, design, build, and test complex engineering systems.
3. Provide the student with a hands-on understanding of the evolving market needs through a tailored and intensive industry-based apprenticeship scheme.
4. Create opportunities to enhance the student's character, soft skills and adaptation abilities within different multidisciplinary teams and various professional environments.
5. Emphasize the necessity of engaging in life-long independent learning and professional development.
6. Equip the student with the relevant up-to-date skills for employment in a variety of technical and engineering fields, or initiating an innovative entrepreneurial venture or a technology startup.
7. Enable the student to progress in graduate studies in relevant technical or engineering fields.

Learning Outcomes

Upon graduation, the graduate of the Electrical Engineering Program should be able to:

1. Apply the knowledge of science, mathematics, technology, and engineering fundamentals to electrical engineering applications.
2. Design and conduct experiments, as well as analyze and present results in a professional manner.
3. Design, model, analyze and build practical electrical systems to meet specific requirements and realistic constraints.
4. Use the techniques, skills and modern engineering and computing tools necessary for engineering practices.
5. Identify, formulate and solve engineering problems.
6. Communicate effectively and function in multidisciplinary teams.

7. Understand professional and ethical issues and the responsibilities of the engineering practice.
8. Recognize contemporary issues and environmental, cultural, and economical considerations of the engineering profession.
9. Appreciate the need for professional development and engage in life-long learning.
10. Engage in entrepreneurial activity and understand the value of technology innovation.
11. Understand the requirements and constraints of the professional employment environment.

Assessment of Learning Outcomes

Assessment model requires the students to engage with a variety of assessment tools including design and practical projects, laboratory activities and simulations, take-home assignments and conventional in-class examinations. The assessment tools are designed to support the development of the students' knowledge, deep understanding, self-efficacy and confidence. Examinations are required to be based on practical scenarios to maintain the connection between the theoretical and experimental parts of knowledge delivered through the courses. A robust quality assurance system relying on systematic internal-verification procedures is used, monitoring the assignments in terms of content and grading, ensuring that the best implementation is adopted. Feedback to the students is given in the form of formative and summative feedback. Formative support is continuously provided to the students throughout the course, leading them constructively towards enhancing their understanding and skills, based on their performance that is measured by various assessment tools.

Framework of Bachelor's Degree

Classification	Credit Hours		
	Compulsory	Elective	Total
University Requirements	24	3	27
School Requirements	35	0	35
Program Requirements	77	9	86
Professional Apprenticeship Training	18	0	18
Total	154	12	166

1. University Requirements: (27 credit hours)

1.1. Compulsory: (24 credit hours)

Course ID	Course Title	Credit Hours	Contact Hours		Prerequisite
			Lecture	Practical	
30301121	Pre-Intermediate English Intensive + Lab	4	3	6	30301120 Pre-Foundation English Elementary Intensive
30301122	English Intermediate	3	6	0	30301121
30301123	English Upper-Intermediate	3	6	0	30301122
30301124	English Advanced	3	6	0	30301123
40302111	Professional Skills	1	2	0	-
40302211	Professional Practice	3	4	0	40302111
40302231	Entrepreneurship Bootcamp	4	2	6	30301123 & 40302211
30302232	Leadership Camp	1	3	0	30302231 or 40302231
30301111	Arabic Language & Communication Skills	1	1	0	30301110
30302129	Military Science	1	0	0	-
Total		24			

1.2. Elective: 3 Credit Hours (three courses out of the following)

Course ID	Course Title	Credit Hours	Contact Hours		Prerequisite
			Lecture	Practical	
30301130	Foundational French Language	1	3	0	-
30301131	French Language Level 1	1	3	0	30301130
30301232	French Language Level 2	1	3	0	30301131
30301233	French Language Level 3	1	3	0	30301232
30301140	Foundational German Language	1	3	0	-
30301141	German Language level 1	1	3	0	30301140
30301150	Foundational Spanish Language	1	3	0	-
30301160	Foundational Turkish Language	1	3	0	-
30301170	Foundational Italian Language	1	3	0	
30301171	Italian Language	1	3	0	30301170
30301180	Chinese 1	1	3	0	
30301221	Development Academic Writing	1	3	0	30301124
30301222	Research and Technical Writing	1	3	0	30301124
30302121	Science & Society Seminar I: Arab Contributions to Science and Arts	1	3	0	-
30302122	Science & Society Seminar II: Philosophy of Science	1	3	0	-
30302123	Art Appreciation and Techniques	1	3	0	-
30302124	Civil & Professional Culture	1	3	0	-
30302125	Rights and Responsibilities: Understanding Human Rights	1	3	0	-

30302126	Introduction to cultural Anthropology-Focus on Urban Anthropology	1	3	0	-
30302127	Jerusalem, History and Civilization	1	3	0	-
30302128	Jordan: History and Civilization	1	3	0	-
30302133	Principles of Management	1	3	0	-
30302134	Strategies for Industry Competitiveness: Tools & Techniques	1	3	0	-
30302135	Principles of Accounting	1	3	0	-
30302136	Principles of Economics	1	3	0	-
30302237	Free Choice Elective	1	0	0	-
40302233	Business Analytics	1	3	0	-
40302221	Speech and Debate	1	3	0	-
30301223	Introduction to Translation	1	3	0	30301124
Total		3			

2. School Requirements: (35 credit hours)

Course ID	Course Title	Credit Hours	Contact Hours		Type	Prerequisite
			Lecture	Practical		
30303111	Functional Math	3	3	0	HTU	30303110
30303112	Functional Physics	3	3	0	HTU	-
40303130	Fundamentals of Computing	4	6	0	HTU	-
00101100	Introduction to Engineering Drawing	1	0	3	HTU	-
00103101	STEM Lab I	1	0	3	HTU	-
00102102	STEM Lab II	1	0	3	HTU	00103101
00101103	Workshop I	2	0	6	HTU	-
00101104	Workshop II	1	0	3	HTU	00101103
00103110	Engineering Math	4	3	3	HNC	30303111
00102111	Engineering Science	4	3	3	HNC	30303112
00101112	Engineering Design	4	3	3	HNC	00101100
00102220	Managing a Professional Engineering Project	4	3	3	HNC	00101112
00103375	Introduction to AI and Data Sciences	3	2	3	HTU	40303130 & 00103110
Total		35				

3. Program Requirements (86 credit hours)

3.1. Compulsory: (77 credit hours)

Course ID	Course Title	Credit Hours	Contact Hours		Type	Prerequisite
			Lecture	Practical		
00103205	Advanced Workshop for Electrical Engineers	1	0	3	HTU	00101104
00103230	Electrical and Electronic Principles	4	3	3	HNC	00102111
00103282	Digital Design	3	2	3	HTU	40303130
00103240	Electronic Circuits and Devices	4	3	3	HNC	00103230
00103250	Instrumentation and Control Systems	4	3	3	HNC	00103230
00103213	Further Mathematics	4	3	3	HND	00103110
00103383	Programmable Logic Controllers	3	2	3	HTU	00103282, 00103250
00102321	Professional Engineering Management	4	3	3	HND	00102220
00103331	Industrial Power, Electronics and Storage	4	3	3	HND	00103240
00103351	Industrial Systems	4	3	3	HND	00103250, 00103282
00103232	Further Electrical, Electronic and Digital Principles	4	3	3	HND	00103230, 00103213
00103352	Further Control Systems	4	3	3	HND	00103250, 00103213
00103490	Research Project for Electrical Engineers	4	2	6	HND	Passed 90 credit hours
00103568	Engineering Electromagnetics	3	3	0	HTU	00103230. 00103213
00103367	Telecommunication Principles	4	3	3	HNC	00103282, 00103110
00103333	Electrical Machines	3	2	3	HTU	00103232
00103534	Power Systems	3	2	3	HTU	00103232
00103581	Embedded Systems	3	2	3	HTU	00103282
00102541	Photovoltaic Systems	3	2	3	HTU	00103232
00103546	Advanced Electronics	3	2	3	HTU	00103240
00103566	Speech and Image Processing	3	2	3	HTU	00103375, 00103213
00103553	Industry 4.0	1	0	3	HTU	00103351, 00103367

00102523	Health, Safety, and Environment	1	1	0	HTU	00102321
00103595	Capstone Project for Electrical Engineering	1	0	3	HTU	00103490
00103596	Capstone Project for Electrical Engineering Continuation	2	0	6	HTU	00103595
Total		77				

3.2. Electives: (9 credit hours) (Three courses out of the following)

A minimum of 9 credit hours of engineering coursework are required. This list is considered to be open for modifications on the base of the decision of the school council before registration.

Course ID	Course Title	Credit Hours	Contact Hours		Type	Prerequisite
			Lecture	Practical		
00103574	Algorithms and Optimization	3	2	3	HTU	00103375, 00103213
00103571	Data Analytics	3	3	0	HTU	00103375, 00103213
00103572	Artificial Intelligence and Engineering Applications	3	3	0	HTU	00103375, 00103213
00103573	Machine Learning	3	3	0	HTU	00103375, 00103213
00101535	Mechatronics	3	2	3	HTU	00103250
00103554	Mobile Robotics	3	2	3	HTU	00103250
00103555	Industrial Robotics	3	2	3	HTU	00103250
00102544	Green Buildings	3	2	3	HTU	00102111
00102551	Smart Grids	3	2	3	HTU	00103331
00102505	Energy Storage	3	2	3	HTU	00103331
00103522	Electrical Installations for Buildings	3	3	0	HTU	00103232
00102552	Electric and Hybrid Vehicles	3	2	3	HTU	00103333
00103539	Power Electronics and Drives	3	3	0	HTU	00103333, 00103232
00103535	Power System Quality, Reliability and Protection	3	3	0	HTU	00103534
00103537	Special Topics in Power Systems	3	3	0	HTU	00103534
00103545	Special Topics in Clinical Engineering	3	3	0	HTU	00103240
00103565	Special Topics in Communications	3	3	0	HTU	00103367
00103584	Special Topics in Computer Engineering	3	3	0	HTU	00103375
00103422	Special Topics 1	1	1	0	HTU	-
00103453	Special Topics 2	2	2	0	HTU	-
Total		9				

4. Professional Apprentice Requirements (18 credit hours) (8 months)

Course ID	Course Title	Credit Hours	Contact Hours		Type	Prerequisite
			Lecture	Practical		
00103497	Practical Training for Electrical Engineering (PATH)	6	0	10	HTU	40302231 Department Approval Passed 100 CHs
00103498	Practical Training for Electrical Engineering (PATH) Continuation	12	0	30	HTU	00103497
Total		18				

Course Identification Convention

Version (1 st Digit)	School (2 nd &3 rd Digit)	Department (4 th &5 th Digit)	Level (6 th Digit)	Knowledge Group (7 th Digit)	Sequence
0	01: Engineering Technology	01: Mechanical Engineering 02: Energy Engineering 03: Electrical Engineering	1: 1 st Year 2: 2 nd Year 3: 3 rd Year 4: 4 th Year 5: 5 th Year	0: Engineering Skills 1: Engineering Science 2: Engineering Management 3: Power & Energy 4: Electronics 5: Industrial & Control 6: Communications & Networking 7: Data Science 8: Computer 9: Research & Professional Skills	

Study Plan Knowledge Groups

		Course ID	Course Title
Group 0	Engineering Skills	40303130	Fundamentals of Computing
		00101100	Introduction to Engineering Drawing
		00103101	STEM Lab I
		00102102	STEM Lab II
		00101103	Workshop I
		00101104	Workshop II
		00103205	Advanced Workshop for Electrical Engineers
Group 1	Engineering Science	30303111	Functional Math
		30303112	Functional Physics
		00103110	Engineering Math
		00102111	Engineering Science
		00101112	Engineering Design
		00103213	Further Mathematics

Group 2	Engineering Management	00102220 00102321 00103522 00103422	Managing a Professional Engineering Project Professional Engineering Management Electrical Installations for Buildings Special Topics 1
Group 3	Power & Energy	00103230 00103331 00103232 00103333 00103534 00103535 00103537 00103539	Electrical and Electronic Principles Industrial Power, Electronics and Storage Further Electrical, Electronic and Digital Principles Electrical Machines Power Systems Power System Quality, Reliability and Protection Special Topics in Power Systems Power Electronics and Drives
Group 4	Electronics	00103240 00103542 00103545 00103546	Electronic Circuits and Devices Digital Electronic Systems Special Topics in Clinical Engineering Advanced Electronics
Group 5	Industrial Control and Robotics	00103250 00103351 00103352 00103553 00103554 00103555 00103453	Instrumentation and Control Systems Industrial Systems Further Control Systems Industry 4.0 Mobile Robotics Industrial Robotics Special Topics 2
Group 6	Communications and Signal Processing	00103565 00103566 00103567 00103568 00103565	Special Topics in Communications Speech and Image Processing Telecommunication Principles Engineering Electromagnetics Special Topics in Communications
Group 7	Data Science	00103570 00103571 00103572 00103573 00103574 00103375	Data Structures and Algorithms Data Analytics Artificial Intelligence and Engineering Applications Machine Learning Algorithms and Optimization Introduction to AI and Data Sciences
Group 8	Computer	00103581 00103282 00103383 00103584	Embedded Systems Digital Design Programmable Logic Controllers Special Topics in Computer Engineering
Group 9	Research & Professional Skills	00103490 00103591 00103492 00103494 00103595 00103596 00103497 00103498	Research Project for Electrical Engineers Capstone Project for Electrical Engineers Practical Training for Electrical Engineers Practical Training for Electrical Engineers Continuation Capstone Project for Electrical Engineering Capstone Project for Electrical Engineering Continuation Practical Training for Electrical Engineering (PATH) Practical Training for Electrical Engineering (PATH) Continuation

Course Descriptions

University Compulsory Course Descriptions

30301120: Pre-Foundation English Elementary Intensive + Lab, 4 Cr (6,3)

This foundation course deals with all language skills: speaking, listening, reading, writing, grammar review, and vocabulary building. The overall objective of the course is to ensure that students will be able to understand straightforward information in the spoken and written language and to express themselves in speech and in writing for simple practical purposes in everyday situations requiring a simple and direct exchange of information.

By the end of the course, students will reach an A2 level on the Global Scale of English (GSE). Students will be evaluated on their ability to understand sentences and frequently used expressions related to areas of most immediate relevance. Students will be able to describe in simple terms aspects of their background, immediate environment, and matters in areas of immediate need.

This course also includes scheduled lab time, dedicated to practice and/or other work assigned by the instructor to enhance students' communication skills [including assigned homework/in-class practice], writing or speaking workshops, and projects.

Prerequisites: Placement test score: Pearson 0-35, VTEST A1, A2.1, A2.2 (0-34), TOEFL IBT: 0-31, IELTS: 0-4.0, TOEFL ITP: 0-399

30301121: Pre-Intermediate English Intensive + Lab, 4 Cr (6,3)

This foundation course deals with all language skills: speaking, listening, reading, writing, grammar review, and vocabulary development. The overall objective of the course is to ensure that students could understand and express in speech and writing: information, ideas, feelings, opinions, and common functions about situations relating to English skills.

By the end of the course, students will reach a B1 level on the Global Scale of English (GSE). Students will be evaluated on their ability to understand the main points of clear standard input on familiar matters regularly encountered in the typical work-related environment/setting, specifically in relation to technical-English related communication skills. In addition, students are required to be able to deal with most situations likely to arise while at the workplace or in the field where English is spoken; in addition to the type of setting they would need to communicate to other stakeholders (customer/ client, supervisor, sponsor/funding entity/ supplier and so on). Students will be able to produce simple connected text on topics which are familiar in their field of study, and in relation to basic communication skills needed. Finally, students will be able to describe experiences and work-related skills, their opinion, plans, and other practical, relevant communication skills.

This course also includes a scheduled lab time, dedicated to practice and/or other work assigned by the instructor to enhance students' communication skills [including assigned homework/in-class practice], writing or speaking workshops, and projects pertaining.

Prerequisites: Placement test score: Pearson 36-46, VTEST B1.1 (35-45), TOEFL IBT: 32-42 (Minimum score of 6 in each of the four sections), IELTS: 4.5 (Minimum score of 4.0 in each of the four sections), TOEFL ITP: 400-442, or 30301120

30301122: English Intermediate, 3 Cr (6,0)

This course is meant to follow on from 30301121; it is for students who have completed level 2 and now require an intermediate course in Technical English, and it is benchmarked against CEFR level B1+. This course targets students in technical or vocational education who want to develop their careers and technical skills, as it aims to prepare them for the successful and effective use of English in their studies and occupations.

The course adopts a practical task-based approach, consisting of work-specific communicative functions, technology-specific notions or concepts, grammar, vocabulary, and skills. The syllabus is designed to reflect current and future developments in technology, whereby everything is selected based on high frequency of use and relevancy of needs across a range of technical contexts, including technical training and work contexts.

Prerequisites: Placement test score: Pearson 47-58, VTEST B1.2 (46-55), TOEFL IBT: 43-52 (Minimum score of 10 in each of the four sections), IELTS: 5.0 (Minimum score of 4.5 in each of the four sections)
TOEFL ITP: 443-476, or 30301121

30301123: English Upper-Intermediate, 3 Cr (6,0)

This course is for students in technical or vocational education, and for company employees in training at work. It covers the core language and skills that students need to communicate successfully in all technical and industrial specializations. It is for students who have an intermediate level of general English and now require an upper intermediate course in English for specific purposes. This is benchmarked against CEF level B2.

The course uses a multi-thread syllabus consisting mainly of communicative functions, notions, grammar, vocabulary, and skills. The work-specific communicative functions (e.g., giving instructions, making recommendations) and technology-specific notions or concepts (e.g., causation, resistance) are selected on the basis of relevance to the needs of students in technical training and work contexts. Grammatical exponents of functions and notions are selected based on frequency and relevance to needs. In this level, the syllabus organization is increasingly driven by topics, skills and genre or text type, within which appropriate grammar, vocabulary, functions, and notions are introduced or recycled. The vocabulary of the course is a selection of common core lexical items that have a high frequency of use across a range of technical and industrial contexts. Many of these items can be found in general contexts but have a greater frequency and often a more specific meaning in technical contexts. Many of them are the kind of words which a specialist in one field might use to explain technical concepts and specialized terms to the public, or to specialists in other fields.

Prerequisites: Placement test score: Pearson 59-68, VTEST: B2.1 (56-68), TOEFLIBT: 53-78 (Minimum score of 14 in each of the four sections), IELTS: 5.5-6.0 (Minimum score of 5.0 in each of the four sections), TOEFL ITP: 477-547, or 30301122

30301124: English Advanced Course, 3 Cr (6,0)

This course is meant to follow 30301123. This course deals with all language skills: speaking, listening, reading, writing, grammar review, and vocabulary building. The overall objective of the course is to ensure that students can understand and respond appropriately in the spoken and written form to a wide range of demanding, longer texts and recognize implicit meaning.

By the end of the course, students will reach a C1 level on the Global Scale of English (GSE). Students will be evaluated on their ability to express themselves fluently and spontaneously without much obvious searching for expressions. In addition, students are required to be able to use language flexibly and effectively for social, academic, and professional purposes. Students will be able to produce clear, well-structured, detailed text on complex subjects, showing controlled use of organizational patterns, connectors, and cohesive devices. (Exempted if Placement test score: Pearson ≥ 81 , VTEST $\geq C1 (\geq 81)$, TOEFL IBT: ≥ 102 (Minimum score of 22 in each of the four sections), IELTS: ≥ 7.5 (Minimum score of 6.5 in each of the four sections), TOEFL ITP: ≥ 608).

Prerequisites: Placement test score: Pearson 69-80, VTEST B2.2 (69-80), TOEFL IBT: 79-101 (Minimum score of 18 in each of the four sections), IELTS: 6.5-7.0 (Minimum score of 6.0 in each of the four sections), TOEFL ITP: 548-607, or 30301123

40302111: Professional Skills, 1 Cr (2,0)

This course introduces students to the basic personal and interdependent competencies necessary to have a successful career and lead a fulfilling life. The course focuses on developing students' self-awareness, self-esteem, and confidence relative to goal development, values, interests, and skills. The course gives special attention to interpersonal and communication skills including listening, speaking, and writing. In addition, the course introduces students to effective time management and organizational skills, the dynamics of working within a team, and how attitude affects interpersonal relationships. The course serves as a prerequisite for a later course, Soft Skills II, which focuses on professional practice and career readiness.

Prerequisites: -

40302112: Professional Practice, 3 Cr (4,0)

This course aims to cover the general aspects of employability skills and to provide students with the tools and resources needed to make informed career decisions. The course put special emphasis on skills that can be transferable among a variety of professions and careers and are considered essential in any employment setting. Students will learn to assess and identify the skills required to increase their chances of finding a job and perform better in the workplace. The course covers personal and interpersonal skills, written communication, teamwork, and leadership development. The course introduces students to critical thinking and problem-solving techniques in addition to personal and professional development planning.

Prerequisites: 40302111 & 30301122

40302231: Entrepreneurship Bootcamp, 4 Cr (2,6)

HTU's Accelerated Innovation and Entrepreneurship Bootcamp is an experiential learning journey that all HTU students undergo as part of their degree program at HTU. Students are formed into high-performing teams with the mission to develop a desirable, feasible and viable solution that targets a specific customer segment with an attractive market size, while addressing one or more of the UN's Sustainable Development Goals (SDG's).

Students leverage human-centered design and lean startup methodology to develop their prototypes and iterate on their solutions, while building an investable business case delivered through a final mission report and rocket pitch.

The Bootcamp equips students with the necessary business acumen than enhances their entrepreneurial and intrapreneurial mindset, skillset, and toolset while providing a transformative opportunity to upgrade their modes of being, thinking and doing, and to challenge what is possible for themselves and the world around them.

Prerequisites: 40302112 & 30301123

30302232: Leadership Camp, 1 Cr (0,3)

A fundamental principle in teaching leadership is engaging students in experiential learning so they can mature into their leadership capacity. This course provides students with the diagnostic tools and strategic foundation for leading organizations, communities, and society. Students will practice a set of tools and behaviors that will allow them to improve their self-efficacy and develop their leadership skills. The course provides a safe and supportive environment where students will learn from actual experience and apply the concepts in real life settings and situations. The emphasis will be on experiential learning and the application of leadership concepts.

Prerequisites: 30302231 or 40302231

30301110: Remedial Arabic, 3 Cr (3,0)

The course aims to improve the student's abilities in reading and comprehending texts' primary, secondary, and missing ideas and how to extract them; recognizing words' equivalent meanings in texts; differentiating opinion from fact; recognizing similarities contained therein; comparing texts read with texts that are similar to them; and reasoning on the writer's attitude toward a topic by determining the implicit meanings contained. The course also aims to teach students the fundamentals of writing in Arabic, so that they can write a paragraph and a summary in a sound Arabic language that is free of spelling and linguistic errors, expressing their thoughts and feelings while adhering to the correct language rules, using the correct conjunctions, punctuation marks, and Arabic styles, and developing speaking skills about their family and community while adhering to the correct language rules respecting his teacher and fellow students, responding to their queries with a declaration of his views and supporting it with facts. The course also aims to improve the student's listening abilities so that he can comprehend the speaker's main idea and supporting ideas, recognize the connections between them, and classify the ideas he heard with the ability to remember the right ones and be able to recognize strengths and weaknesses in the speaker's text.

Prerequisites: Arabic Placement test 0-59

30301111: Arabic Language & Communication Skills, 1 Cr (1,0)

In this level, students should understand the main ideas of complex texts on both concrete and abstract topics. Further, they should understand a wide range of demanding, long texts, and recognize implicit meanings. Analytical thinking is stressed at this stage as students should use the language skills they have developed to engage in discussions about different topics.

They will also develop and use their writing skills in different genres. They will be asked to present reports, articles, and essays on a wide variety of topics. Students will also develop their media skills tools and learn how to critically talk about and respond to a wide range of media reports. In addition, functional syntax will be deployed and will serve the aforementioned skills and goals. Finally, compiled authentic teaching materials will be used in this level.

Prerequisites: Arabic Placement test score ≥60 or 30301110

30302129: Military Science, 1 Cr (1,0)

The Military Science course is one of many components of the National Strategy for Higher Education in Jordan and is thus an extension of the Ministry of Education's philosophy for Higher Education. The course covers the concept of a comprehensive national security strategy, both its traditional and social definitions, with the aim of consolidating the values of loyalty and belonging to the nation, which includes the land and its people, the system of governance, and the national security systems and military institutions; the course thus prepares students to fulfil their roles in society as self-aware and responsible citizens who hold the power to advance positive change and maintain a safe and stable nation. Furthermore, the course aims to enrich students' knowledge about the history of the Hashemite Kingdom of Jordan and its development, and to provide essential information about the Jordanian armed forces and security systems, highlighting their crucial role in protecting our nation's greater interests, and in serving and supporting the development of the local, Arab, and global communities. Moreover, the course aims to increase students' awareness of the concept of national security through a comprehensive study of critical issues, including psychological warfare and the dangers of drugs and terrorism. Ultimately, the course aims to highlight the benefits of holding on to our treasured Jordanian values of loyalty, belonging, citizenship, and the importance of utilizing our national resources.

Prerequisites: -

University Elective Course Descriptions

30301130: Foundational French Language, 1 Cr (3,0)

By the end of this course, the student will be able to communicate in French using basic greetings, asking directions, writing short simple notes and emails, understanding simple question on familiar topics, and introducing him/herself to others. By the end of the course, the student will have attained a high-A1 level on the CEFR scale.

Prerequisites: -

30301131: French Language Level 1, 1 Cr (3,0)

By the end of this course, the student will be able to use a wide variety of verb tenses and lexical items in Italian. The student will be able to understand simple questions in questionnaires on familiar topics, recognize phrases and content words related to basic personal and family information, make, and accept a simple apology, and write simple sentences about personal skills. By the end of the course, the student will have attained a low-A2 level on the CEFR scale.

Prerequisites: 30301130

30301232: French Language Level 2, 1 Cr (3,0)

By the end of this course, students can understand the main points of clear standard speech on familiar subjects in work, school, leisure activities, etc. Students will be able to conduct conversations in most situations when travelling in a region where the language is spoken. They will be able to produce a simple and cohesive text on familiar subjects or subjects of personal interest. Students will be able to narrate an event, an experience or a dream, describe a desire or goal, and outline reasons or explanations behind a project or idea.

Prerequisites: 30301131

30301233: French Language Level 3, 1 Cr (3,0)

By the end of this course, students will be able to understand the main ideas of concrete or abstract topics, including technical articles in the user's area of expertise. They will be able to communicate with a degree of spontaneity and fluency during a conversation with a native speaker. Students will be able to speak in a clear, detailed way on a number of subjects and express an opinion on current affairs, giving the advantages and disadvantages of the various options.

Prerequisites: 30301232

30301140: Foundational German Language, 1 Cr (3,0)

By the end of this course, the student will be able to communicate in German basic greetings, asking directions, writing short simple notes and emails, understanding simple question on familiar topics, and introducing him/herself to others. By the end of the course, the student will have attained a high-A1 level on the CEFR scale.

Prerequisites: -

30301141: German Language level 1, 1 Cr (3,0)

By the end of this course, the student will be able to use a wide variety of verb tenses and lexical items in German. The student will be able to understand simple questions in questionnaires on familiar topics, recognize phrases and content words related to basic personal and family information, make, and accept a

simple apology, and write simple sentences about personal skills. By the end of the course, the student will have attained a mid-A2 level on the CEFR scale.

Prerequisites: 30301140

30301150: Foundational Spanish, 1 Cr (3,0)

By the end of this course, the student will be able to communicate in Spanish using basic greetings, asking directions, writing short simple notes and emails, understanding simple question on familiar topics, and introducing him/herself to others. By the end of the course, the student will have attained a high-A1 level on the CEFR scale.

Prerequisites: -

30301160 Foundational Turkish, 1 Cr (3,0)

By the end of this course, the student will be able to communicate in Turkish basic greetings, asking directions, writing short simple notes and emails, understanding simple question on familiar topics, and introducing him/herself to others. By the end of the course, the student will have attained a high-A1 level on the CEFR scale.

Prerequisites: -

30301170: Foundational Italian, 1 Cr (3,0)

By the end of this course, the student will be able to communicate in Italian using basic greetings, asking directions, writing short simple notes and emails, understanding simple question on familiar topics, and introducing him/herself to others. By the end of the course, the student will have attained a high-A1 level on the CEFR scale.

Prerequisites: -

30301171: Italian Language Level 1, 1 Cr (3,0)

By the end of this course, the student will be able to use a wide variety of verb tenses and lexical items in Italian. The student will be able to understand simple questions in questionnaires on familiar topics, recognize phrases and content words related to basic personal and family information, make, and accept a simple apology, and write simple sentences about personal skills. By the end of the course, the student will have attained a low-A2 level on the CEFR scale.

Prerequisites: 30301170

30301180: Chinese 1, 1 Cr (3,0)

This course introduces students to the standard Chinese language and is designed for students with no or minimal previous background in spoken or written Chinese. Students in this course focus on learning essential vocabulary, practicing pronunciation, and understanding simple grammatical structures. This knowledge prepares students to effectively communicate in Chinese on a limited range of topics related to

everyday situations. Students practice listening and speaking in real-life situations, learn to read and write Chinese characters, and examine how culture and language interact in China. In-class activities and course assignments aim to assist students as they develop the oral proficiency and confidence necessary to initiate simple conversations. Out-of-classroom experiences such as field trips and guided interactions with native speakers supplement formal classroom instruction and provide ample opportunities for practical engagement.

Prerequisites: -

30301221: Development Academic Writing, 1 Cr (3,0)

This course develops students' abilities in academic writing. Focus will be given to sentence structure, paragraph writing, revision, punctuation, parallelism, and cohesion. Students, in conjunction with the instructor, will decide on a topic for the culminating paper, which will be developed throughout the semester. Students will have weekly writing assignments to develop the writing features being discussed. This course is meant for students who have passed or tested out of Advanced English in the Intensive English program.

Prerequisites: 30301124, or by permission of the department

30301222: Research and Technical Writing, 1 Cr (3,0)

This course follows 30301220, or any student who has exempted out of English courses. Research and Technical Writing develops students' abilities in writing persuasive and explanatory texts in several formats: emails, reports, theses, among others. Focus will be given to establishing a clear thesis statement, developing a cohesive argument throughout the text, and creating a compelling summary. Various rhetorical devices will be discussed, such as alliteration, anaphora, hedging, hyperbole, litotes, metaphor, simile, etc. Students, in conjunction with the instructor, will decide on a topic for the culminating paper, which will be developed throughout the semester. Students will learn proper citation of quoted material according to APA or MLA standards. Students will have weekly writing assignments using various expository devices, such as descriptive essays, process essays, comparison essays, cause and effect essays, and problem and solution essays.

Prerequisites: 30301124, or by permission of the department

30302121: Science and Society Seminar I: Arab Contributions to Science and Arts, 1 Cr (3,0)

This seminar-based course highlights Arab contributions to science and arts since the early Mesopotamian and Phoenician civilizations with particular emphasis on contributions during the Middle Ages under Islam.

Prerequisites: -

30302122: Science & Society Seminar II: Philosophy of Science, 1 Cr (3,0)

This course explores the effects of scientific and technological developments on various aspects of society. It is designed to illuminate the distinctive character of science and its relevance to the challenges facing our

world, including environmental concerns, public and global policy, international competitiveness, and legal and ethical liabilities.

Prerequisites: -

30302123: Art Appreciation and Techniques, 1 Cr (3,0)

This course affords students a basic understanding of the main elements of art. It covers context and subject and analyzes the main arguments around aesthetics. The course also presents an overview of art history as it relates to other historical, sociocultural, and political aspects. The course aims to prepare students to be critically observant and to assess different symbolic values within artwork. The course is intended to raise students' awareness of the role of the arts and culture in their everyday lives regardless of students' areas of concentration and to promote an appreciation for, and interest in, the arts.

Prerequisites: -

30302124: Civil and Professional Culture, 1 Cr (3,0)

This course aims to consolidate and enhance students' knowledge of their native Jordan, the efforts of the Hashemite Kings in serving the Arab nation, its causes, and the establishment and development of the Jordanian state. It introduces students to the development of Jordanian political and constitutional life as well as to the emergence and development of Jordanian civil society. This course focuses on building students' professionalism and defining the concepts of professional work and ethics. Students will learn about legislation related to professional work as well as trade union institutions, professionalism, and labor.

Prerequisites: -

30302125: Rights and Responsibilities: Understanding Human Rights, 1 Cr (3,0)

This course aims to introduce students to the basic concept of human rights. Students will be expected to understand and internalize human rights values including tolerance, gender equality; and freedom from discrimination based on race, color, and ethnicity. The course aims to contribute to the full development of students' personalities by increasing their sense of dignity and appreciation for the rights of others. Students will also cultivate a sense of responsibility to promote and defend others' rights. Students will develop their advocacy skills by identifying key human rights issues in their local context and proposing courses of action to advance human rights.

Prerequisites: -

30302126: Introduction to cultural Anthropology-Focus on Urban Anthropology, 1 Cr (3,0)

An introductory course in cultural anthropology with a focus on urban anthropology is an important course for students in various areas of study, since it offers them training in cross-cultural perspectives, whether on a local or global level. It is also increasingly important for students of the built environment and the local communities they work with. Through looking at different anthropological case studies, from Jordan, the region and globally, the course will consider such issues as the meaning of culture from an anthropological perspective and how it affects society; cultural diversity and sociocultural communication; the relationship of people to the land, their environment and their experiences of space and place; urban anthropology from

a theoretical and historical context; changing city structures and “temporary” dwellings such as local refugee camps; ethics in social research and methods in ethnographic fieldwork; and qualitative data gathering, amongst other areas.

Prerequisites: -

30302127: Jerusalem, History and Civilization, 1 Cr (3,0)

This course focuses on introducing Jerusalem in terms of geography and history across the ages, and its religious and cultural importance since the Arab Islamic conquest in the period of the Rightly Guided Caliphs era and through the successive Islamic periods. Moreover, the course sheds light on the Ottoman period, and the political, civilizational and administrative realities during that period, as well as treating the genesis of the movement of Jewish migration and settlement in the latter part of the Ottoman period. The course focuses on the practices of the British Mandate and its contribution to the attempts to Judaize the city, culminating with the Israeli occupation of western Jerusalem in 1948, and subsequently the Israeli occupation of East Jerusalem in 1967. Furthermore, light is shed on Israeli practices targeting the Arab identity of Jerusalem in terms of the demographic composition and holy places, and Islamic and Christian endowments. The course explains the Jordanian Hashemite efforts and its role in defending Jerusalem and safeguarding its Arab character.

Prerequisites: -

30302128: Jordan: History and Civilization, 1 Cr (3,0)

Jordan: History and Civilization course is concerned with introducing Jordan's history, sheds light on Jordan's geography, topography, climate, and natural resources, and is interested in studying Jordan's prehistoric history and ancient historical times. To examine Jordan's position and role in successive Islamic times. The course also highlights Jordan's administrative, economic, and social conditions during the Ottoman period 1516-1918, and is interested in studying Jordan's circumstances and conditions during the first world war of 1914-1918, the establishment of the Emirate of Eastern Jordan in 1921, and the most prominent political, economic, and social developments occurred in Jordan during the emirate in 1921-1946. It explained the importance of the achievements took place in Jordan during the reign of the Hashemite kings Talal bin Abdullah and Hussein bin Talal from 1951 to 1999. To study the origins and development of Jordanian constitutional authorities (executive, legislative and judicial), and Jordanian educational, economic, social, military and security institutions. Introducing Jordan's role in the Palestinian cause, the Jordanian-Palestinian unity phase 1950-1988, and Jordan's sacrifices in the Arab Israeli wars and their consequences and effects on it. It examined King Abdullah II's efforts in building and modernizing the Hashemite Kingdom of Jordan from 1999 to 2021. Assess the Jordanian state's march in its centenary, and a future look.

Prerequisites: -

30302133: Principles of Management, 1 Cr (3,0)

This course introduces students to the management process of a business organization. The course emphasizes basic concepts and functions of management by examining the processes of planning, organizing, leading, and controlling. Students will develop the skills and tools required to work with people

and resources to achieve organizational goals. Students will also develop their strategic management and decision-making capacities.

Prerequisites: -

30302134: Strategies for Industry Competitiveness: Tools & Techniques, 1 Cr (3,0)

This course covers the role of policy in industry competitiveness. The course examines firm strategies, cluster vitality, and the quality of the business environment in which competition takes place, all of which can determine a nation's productivity.

Prerequisites: -

30302135: Principles of Accounting, 1 Cr (3,0)

This course provides students with the basic accounting principles, concepts, and terminology. Students will become familiar with the basic financial statement analysis. Students will be able to understand and apply the basic elements of financial accounting information such as assets, liabilities, revenue, and expenses. Students will be able to understand and interpret income statement, balance sheet, and cash flow statement.

Prerequisites: -

30302136: Principles of Economics, 1 Cr (3,0)

This course covers the basic concepts of both microeconomics and macroeconomics. The first part of the course looks at resource allocation under scarcity, supply and demand analysis, and the theory behind consumer behavior. The course further examines production decisions taken by firms under different types of market structure such as perfect competition, oligopoly, and monopoly. The second part of the course examines the wider economic phenomena and introduces the basic principles of the aggregate economy, such as determinates of national product, inflation, unemployment, and fiscal and monetary policy.

Prerequisites: -

30302237: Free Choice Elective, 1 Cr (3,0)

The free choice elective is designed to offer students the opportunity to explore a subject of interest under the supervision of a faculty member. The course may include coursework offered by online platforms (i.e. HTUx, Coursera), directed readings, applied projects, independent research projects, or other appropriate activities.

Prerequisites: -

40302233: Business Analytics, 1 Cr (3,0)

The Business Analytics course provides students with the tools they need to put data to work; how to set up experiments, how to collect data, how to learn from data and make decisions to how to navigate the organizational, legal, and ethical issues involved in data-based decision making. The course teaches widely

used frameworks of business analytics: biases, experimentation, descriptive analytics, prescriptive analytics, predictive analytics. Students then implement the frameworks they have learned through assignments. The course includes case studies and examples from Google, Netflix, and others. The assignments and cases focus on interpreting the results of analysis and taking decisions based on those analysis. The course does not require coding.

Prerequisites: -

40302221: Speech and Debate, 1 Cr (3,0)

The Speech and Debate course aims to provide students with linguistic and basic debate skills in Arabic. This course aims to improve the student's level of Arabic grammar as well as his vocabulary, linguistic structures, and linguistic style so that he can address political, social, and ethical issues through scientific debates and discourses presented in the classroom, by familiarizing him with unique and authentic models of ancient and modern discourses so that he can understand them. And walk according to the structure of his own speech. The course is also designed to teach students research skills, independent and collaborative learning, logical argumentation, problem-solving skills through critical and creative thinking, organizing ideas, presentation skills, and confidence. The course contains theoretical sections that describe debate, public speaking, and other historical and contemporary speech forms. Examples include debating forms, speaker roles and arguments, developing team positions, interventions, and response speeches based on active learning techniques focused on discussion, working groups, and communication.

Prerequisites: -

30301223: Introduction to Translation, 1 Cr (3,0)

This course is aimed at beginners who would like to improve their translation skills in translating from Arabic to English and vice versa. This is a highly practical course whereby students will translate excerpts from technical, scientific, literary, and media texts. Students will learn the most effective translation practices guided by theoretical knowledge in the field, so that they produce high quality work and learn how to critically evaluate translations. They will also learn how to search for information from a variety of available resources and develop an awareness of linguistic and cultural differences, and the multiple levels of meanings and contexts. By the end of the course, students will have learned different translation strategies and methods and will be able to tackle source texts with competence, translating them professionally and critiquing their own and others' work. Students will be assessed on their practical application of what we learned in class and on their ability to evaluate and critique translations.

Prerequisites: 30301124, or by permission of the department

30303110: Remedial Math, 2 Cr (2,0)

This course serves as an introductory course designed specifically for students that lack a foundational knowledge in mathematics required to pursue a post high school degree (HNC, HND, or Bachelor's). This course revisits topics typically covered in high school for students that failed to pass the mathematics placement test upon the admission process. The topics included in this unit are numbers, algebra and functions, geometry, and vectors. (Exempted if Math placement test (1) score $\geq 60\%$).

Prerequisites: Placement test

30303111: Functional Math, 3 Cr (3,0)

This course reviews the fundamental concepts in numerical analysis, linear algebra, geometry, statistics, and probabilities. It strengthens problem-formulation skills (i.e., the ability to translate real application problems into a series of mathematical processes). It also focuses on developing the mathematical reasoning skills, such as mathematical deductions and proofs.

Prerequisites: Placement Test

30303112: Functional Physics , 3 Cr (3,0)

This course demonstrates understanding and application of essential physics topics such as: Physics and measurements, motion in one dimension, vectors, motion in two dimensions, the laws of motion, forces and motion, applications of Newton's laws (projectile, angular velocity, etc.), energy of a system, static equilibrium, and electricity and magnetism.

Prerequisites: -

40303130: Fundamentals of Computing, 4 Cr (3,3)

This course provides a comprehensive route to developing an in-depth exposure to personal computers, hardware, a range of operating systems, and in-depth programming in C. Students learn the functionality of various hardware and software components and best practices in maintenance and safety issues as well as programming in C, including variables, operations, functions, structures, and pointers.

Prerequisites: -

00101100: Introduction to Engineering Drawing, 1 Cr (0,3)

This course provides the fundamentals of engineering graphics and drawing. Among the topics covered are: drawing of orthographic, isometric and auxiliary projections, sectioning, dimensioning, scaling and documentation. Students learn and use the interface, structure, and commands of the latest version of a conventional computer-aided design (CAD) software.

Prerequisites: -

00103101: STEM Lab I, 1 Cr (0,3)

This course develops the basic skills in the fields of science, technology, engineering and mathematics through a set of practical experiments covering mechanical, electrical, electronics, automation, mechanics of materials, robotics, computer applications and process control.

Prerequisites: -

00102102: STEM Lab II, 1 Cr (0,3)

This course provides students with a modern hands-on technical perspective of STEM education as they are applied in professional settings. The lab is equipped with state-of-the-art educational technologies in fields related - but not limited - to electromechanical systems, robotics, pneumatic systems, automation, image processing, sensor installation and calibration and material manufacturing processes.

Prerequisites: 00103101

00101103: Workshop I, 2 Cr (0,6)

This course develops the following basic skills: Hand filing, turning, welding, piping and plumbing, carpentry, brick laying, constructional works, surveying measurements, sheet metal fabrication, household electric circuits and installation of simple computer networks.

Prerequisites: -

00101104: Workshop II, 1 Cr (0,3)

This course covers hands-on training on manual and electric driven tools, electric arc welding, spot welding, resistance welding, sand casting, sheet-metal forming, longitudinal lathing, longitudinal and inclined turning and metal milling.

Prerequisites: 00101103

00103110: Engineering Math, 4 Cr (3,3)

This course aims to develop students' skills in the mathematical principles and theories that are directly applicable to the engineering industry. Students will be introduced to mathematical methods and statistical techniques that enable them to analyze and solve problems within an engineering context. Among the topics included in this course are: Arithmetic and geometric progressions (exponential, logarithmic, circular and hyperbolic functions), mean and standard deviation of grouped data, linear regression, binomial and normal distributions. In addition to sine waves and their applications, trigonometric and hyperbolic identities, vector functions and the use of differential and integral calculus in solving engineering problems.

Prerequisites: 30303111

00102111: Engineering Science, 4 Cr (3,3)

This course introduces the fundamental laws and applications of the physical sciences within engineering and the application of this knowledge in finding solutions to a variety of engineering problems. Among the topics included in this course are: international system of units, interpreting data, static and dynamic forces, fluid mechanics and thermodynamics, material properties and failure, in addition to A.C./D.C. circuit theories.

Prerequisites: 30303112

00101112: Engineering Design, 4 Cr (3,3)

This course introduces the methodical steps that engineers use in creating functional products and processes, starting from a design brief to the work and the stages involved in identifying and justifying a solution to a given engineering need. Among the topics included in this course are: Gantt charts and critical path analysis, stakeholder requirements, market analysis, design process management, modelling and prototyping, manufacturability, reliability life-cycle, safety and risk management, calculations, drawings and concepts and ergonomics.

Prerequisites: 00101100

00102220: Managing a Professional Engineering Project, 4 Cr (3,3)

This course introduces students to the techniques and best practices required to successfully create and manage an engineering project designed to identify a solution to an engineering need. Among the topics covered in this course are: roles, responsibilities and behaviors of a professional engineer, planning a project, project management stages, devising solutions, theories and calculations, management using a Gantt chart, evaluation techniques, communication skills, and the creation and presentation of a project report.

Prerequisites: 00101112

00103375: Introduction to AI and Data Science, 3 Cr (2,3).

This course is an introduction to Artificial Intelligence and Data Science. It provides an overview of AI development history, explains AI ethics, and discusses future trends. The course reviews basic math concepts in Calculus, Linear Algebra, and Probability Theory. The math exposure will be limited and only essential concepts will be discussed. The course will introduce the following topics: Data Visualization, Data Pre-Processing, Missing Data, Normalization and Standardization, Log Transformation, Cross and Auto Correlation, Linear and Nonlinear Regression, Clustering and Classification, Machine Learning, Artificial Neural Networks, Deep Learning, Supervised and Unsupervised learning. Different examples and case studies will be provided and discussed. The course will introduce Python with its most popular packages (NumPy, Pandas, Matplotlib, Scikit-learn, and TensorFlow) and introduce available platform environments. This is a hands-on and projects-based course and will include laboratory that will enhance the students' coding skills.

Prerequisites: 40303130 & 00103110

00103205: Advanced Workshop for Electrical Engineers, 1 Cr (0,3)

This course develops high-level skills in designing and building industrial control systems. It includes a set of practical experiments covering a variety of topics, such as: starting and driving circuits of different motor types in addition to different low-current systems (fire alarm, security and IP-based CCTV systems).

Prerequisites: 00113104

00103230: Electrical and Electronic Principles, 4 Cr (3,3)

This course provides students with a good and wide-ranging grasp of the fundamental principles of electrical and electronic circuits and devices. Topics included in this course are: Analysis of simple circuits with constant voltages and currents, using circuit laws, Kirchhoff's and Thevenin's laws, and the superposition principle. In addition to the analysis of simple circuits with sinusoidal voltages and currents, basis of semiconductor action and its applications to simple electronic devices, such as junction diode, Zener diode, light emitting diode, bipolar transistor, junction field-effect transistor (FET), and metal-oxide-semiconductor FET (MOSFET), highlighting the difference between analogue and digital electronics and their applications.

Prerequisites: 00102111

00103282: Digital Design, 3 Cr (2,3)

This course introduces the two main branches of digital electronics: Combinational and sequential. Topics included in this course are: Fundamental elements of digital circuits, various techniques used for analyzing digital logic circuits, such as truth tables, Boolean algebra, Karnaugh maps, and timing diagrams. In addition to key digital technologies, such as conventional TTL (transistor-transistor logic) and CMOS (complementary metal-oxide-semiconductor), field programmable gate array (FPGA) and some standard digital subsystems such as microprocessors.

Prerequisites: 40303130

00103240: Electronic Circuits and Devices, 4 Cr (3,3)

This course introduces students to the use of electronics manufacturers' data to analyze the performance of circuits and devices, the operational characteristics of amplifier circuits, the types and effects of feedback on circuits performance, and the operation and application of oscillators. Students will also be introduced to the application of testing procedures to electronic devices and circuits, and the use of the findings of the tests to evaluate their operation. Among the topics included in this course are: Power amplifiers (classes A, B, and AB), operational amplifiers (inverting, non-inverting, differential, summing, integrator, differentiator), feedback types, such as open, closed, positive, and negative feedback, in addition to frequency response, stability, frequency drift, distortion, amplitude, wave shapes, and testing procedures.

Prerequisites: 00103230

00103250: Instrumentation and Control Systems , 4 Cr (3,3)

This course discusses the main components of measuring systems including various types of sensing elements (such as: displacement, speed, pressure, temperature and strain), variable conditioning and signal processing techniques, in addition to signal representation methods. The course also introduces the concepts and terminology of control systems, such as: open and closed loop, discrete and analogue systems. It focuses on process controllers as a main part of control systems. Proportional-Integral-Differential (PID) controllers are investigated in details according to their mathematical models. Multiple practical experiments and simulation exercises are conducted throughout the course demonstrating conventional instrumentation circuits.

Prerequisites: 00103230

00103213: Further Mathematics, 4 Cr (3,3)

This course introduces additional mathematical topics to students, advancing their knowledge of the underpinning mathematics gained in the Engineering Mathematics course. The purpose of this course is to prepare the students to analyze and model engineering problems using mathematical techniques. Among the topics included in this course are: Number theory, complex numbers, matrix theory, linear equations, numerical integration and graphical representation of curves within an engineering context. Furthermore, this course expands students' knowledge of calculus to discover how to model and solve engineering problems using first and second order differential equations.

Prerequisites: 00103110

00103383: Programmable Logic Controllers, 4 Cr (3,3)

This course introduces automation system definition as a method designed to reduce labor costs and improve the quality, accuracy and precision of the finished products. Also, to be familiar with the sight of dancing robots, not only in the production of cars but in everything from washing machines to pharmaceuticals. In addition to benefit from a reduction in costs and improvement in quality. The aim of this course is to investigate how Programmable Logic Controllers (PLCs) and industrial robots can be programmed to successfully implement automated engineering solutions. This course covers PLC system operational characteristics, different types of programming languages, and types of robots and cell safety features. Moreover, it includes programming PLCs and robotic manipulators to achieve a set task, with straightforward commands and safety factors.

Prerequisites: 00103282, 00103250

00102321: Professional Engineering Management, 4 Cr (3,3)

This course aims to continue building-up the knowledge gained by Managing a Professional Engineering Project course, to provide the students with common professional standards and guide them on how to develop a range of employability skills. Among the topics included in this course are: engineering strategy and services delivery planning, the role of sustainability, Total Quality Management (TQM), engineering management tools, managing people and becoming a professional engineer.

Prerequisites: 00102220

00103331: Industrial Power, Electronics and Storage , 4 Cr (3,3)

This course reviews the main issues related to energy demand and production, efficiency measures and policies, and interfacing methodologies used to connect renewable energy sources to the grid. It reviews the historical perspective of energy production and demand, their environmental effects and the necessity of renewable, or sustainable, energy sources. Energy auditing and management skills are delivered through this course, discussed through examples of energy efficiency in buildings and electric vehicles. Renewable energy sources are then investigated in detail, concentrating on their theoretical models, control circuits,

and grid interfacing techniques. The impact of connecting renewable energy sources to the grid is also discussed, introducing the principle of smart grid.

Prerequisites: 00103240

00103351: Industrial Systems, 4 Cr (3,3)

This course introduces the basics of industrial automation and discrete control systems. It summarizes the main concepts of discrete and analog, open and closed-loop control systems. Moreover, it describes each part of conventional automated industrial systems, starting from input and output devices, interfacing elements, and discrete controllers. The course also covers the creation of logic functions describing the operation of automated industrial systems, representing them using ladder diagrams, and implementing them through relay sequencers, programmable logic controllers (PLC), or modern industrial controllers such as CNC modules. Modern industrial trends are also presented in this course, such as the Internet-of-Things (IoT) and novel manufacturing technologies contributing to the fourth industrial revolution.

Prerequisites: 00103250, 00103282

00103232: Further Electrical, Electronic and Digital Principles, 4 Cr (3,3)

This course focuses on using appropriate mathematical techniques to solve a range of electrical and electronic problems by applying appropriate circuit theorems and computer simulation tools. Topics include steady state circuit analysis techniques such as mesh and nodal analysis, using complex notation and phasor diagrams to analyze single and three-phase AC circuits. Terminology related to power calculations such as instantaneous power, power factor, real and reactive power are summarized based on the power triangle representation. The course also briefs the characteristics of non-linear circuits including diodes and transistors.

Prerequisites: 00103230, 00103213

00103352: Further Control Systems, 4 Cr (3,3)

This course introduces the main concepts of control systems and their theoretical modelling based on realistic physical applications. It focuses on modelling electrical and mechanical systems using differential equations and Laplace transform, forming and simplifying their corresponding block diagrams and analyzing their response in terms of dynamic characteristics and stability. The course also investigates the implementation and tuning of PID controllers by detailed mathematical analysis and computer simulations.

Prerequisites: 00103250, 00103213

00103490: Research Project for Electrical Engineers, 4 Cr (2,6)

This eight-month course introduces the skills necessary to deliver a complex, independently conducted, research project that fits within an electrical engineering context. Topics included in this course are: Finding a research problem, writing a research proposal, selecting a problem-solving approach, conducting literature review, analyzing data and interpreting findings, managing a research project and identifying key milestones, in addition to reporting, presenting, and publishing research outcomes.

Prerequisites: Passed 90 CHs

00103568: Engineering Electromagnetics, 3 Cr (3,0)

This course introduces the main theory of electromagnetism and its applications. It summarizes the theory of vector calculus required to solve mathematical problems related to electromagnetic fields. It then presents the derivation and the physical significance of Maxwell's equations based on electrostatics and magnetostatics. Topics include Coulomb's law, Gauss's Law, electric fields in materials, Biot-Savart's Law, Ampere's Circuit Law, magnetic fields, vectors, forces and materials. Electromagnetic waves propagation is also briefly discussed.

Prerequisites: 00103230, 00103213

00103367: Telecommunication Principles, 4 Cr (3,3)

This course introduces the main concepts in communication systems that deal with the transmission of information such as voice, images and data using three elements: transmitter, medium and receiver. In addition to the applications of telecommunications are all around us including mobile phones, satellite TV, computer networks, Bluetooth and Wi-Fi. This course involves with the fundamental principles of wireless communication systems including frequency spectrum, sources of noise and interference, theories and practices of analogue and digital communication . This course further covers the physical practicalities of telecommunication systems such as guided and unguided transmission media, security and network architectures.

Prerequisites: 00103282, 00103110

00103333: Electrical Machines, 3 Cr (2,3)

This course provides the theoretical background of standard electrical machines. It presents the main principles of electro-magnetism, reluctance circuits and transformers operation. It provides detailed analysis of common alternating-current machines such as single-phase and three-phase motors. Different types of machines such as induction and synchronous types are compared in terms of operation, speed-torque characteristics and applications.

Prerequisites: 00103232

00103534: Power Systems, 3 Cr (2,3)

This course represents the core of electrical engineering theory related to power generation, transmission and distribution networks. It introduces the basics of electrical power system analysis that deals with transmission lines, power networks, power flow and faults. Topics include basic concepts necessary for power system analysis such as: Complex power and the power triangle, direction of power flow, power in balanced three-phase systems, per-unit quantities and the single line diagram. The course covers in detail the series impedance model of transmission lines, the capacitance of transmission lines, current-voltage relations in transmission lines and an introduction to power-flow solutions.

Prerequisites: 00103232

00103535: Power System Quality, Reliability and Protection, 3 Cr (3,0)

This course provides a more detailed study of electrical power systems. It includes topics covering symmetrical and unsymmetrical faults, such as: Transients in RL series circuits, fault calculations, single line-to-ground faults, line-to-line and double line-to-ground faults. It also introduces the concept of power system stability, the swing and the power-angle equations, and the qual-area criterion of stability. Protection devices and their sizing calculations, in addition to economic operation and reliability of power systems are also briefly discussed in this course.

Prerequisites: 00103534

00102541: Photovoltaic Systems, 3 Cr (2,3)

This course covers an in-depth analysis of solar photovoltaic systems and technologies, and focuses on the practical design considerations. Topics covered include: Solar radiation characteristics, solar insolation over collecting surfaces and shading analysis, categories of photovoltaic systems, specification and selection of solar PV modules, types and characteristics of grid-connected inverters, fixed and tracking mounting structures, design of grid-connected PV systems using software tools, energy yield calculations, economic feasibility, testing and commissioning, operation and maintenance, off-grid PV systems, hybrid PV-systems, and storage technologies.

Prerequisites: 00103232

00103546: Advanced Electronics, 4 Cr (3,3)

This course provides a detailed investigation of the p-n junction, its characteristics and working principle, as it is considered the building concept of many conventional electronic devices like bipolar-junction (BJT) and field-effect (FET) transistors. It summarizes the theory behind the operation of field-effect transistors and metal-oxide-semiconductor field-effect transistors as discrete devices. It introduces the main principles of CMOS logic gates as the building blocks of digital logic circuits. The course also concentrates on the analysis and the design of different types of analog circuits. It also briefs the mathematical techniques used to determine the frequency response, gain and stability of analog electronic systems for the real-life applications. Moreover, it concentrates on the analysis of digital electronic circuits and their applications and delivers the ability of mathematically modelling conventional digital electronic circuits, such as: NMOS Inverters and logic circuits, CMOS inverters and logic circuits, clocked CMOS logic circuits, sequential logic circuits, memories like RAM and ROM cells. In addition to emitter- coupled logic circuits, transistor-transistor logic, Schottky transistor-transistor logic, BiCMOS digital circuits.

Prerequisites: 00103240

00103566: Speech and Image Processing, 3 Cr (2,3).

This course introduces various analytical techniques for signals and systems. Topics included in this course are Signal representation including Fourier transform, system definitions and properties, in addition to the use of convolution, transfer functions, and frequency response to determine the system response. Moreover, it covers developing robust feature extraction techniques for speech analysis, speaker recognition, and image processing with signal enhancement and features Extraction.

Prerequisites: 00103375, 00103213

00103553: Industry 4.0, 1 Cr (0,3).

The course provides a principle understanding of why and how smart factories are changing the face of manufacturing. Students are first introduced to the factors and consequences behind industrial revolutions and the definition of smart factories followed by the wide range of technologies that make smart factories work. The course will explore the integration of cyber-physical systems (CPSS) with the Internet of Things (IoT) and how high-performance computing and the internet are combined with the development of advanced manufacturing technologies. The course is designed for a lab-based lectures that works with the following technologies: Automated and Intelligent Production Systems, CPSS; IoT; Wireless Communication Protocols; Data Analytics; and Cloud Computing. Through lectures and lab work, students will learn how to design and implement Industry 4.0 solutions in various industries. By the end of the course, students will have a strong foundation in Industry 4.0 concepts and technologies, enabling them to apply Industry 4.0 principles in real-world settings and contribute to the ongoing transformation of various industries.

Prerequisites: 00103351, 00103367

00102523: Health, Safety, and Environment, 1 Cr (1,0)

The course aims to qualify the student for international certification in health and safety and environmental awareness at work. Topics covered include: Fundamentals of health and safety, the responsibility for health and safety, risk assessment and control, work equipment, transport safety, working with electricity, fire safety, manual handling, repetitive activity, hazardous substances, practical risk assessment planning activity, environmental awareness, pollution impact assessment, dealing with emergencies.

Prerequisites: 00102321

00103595: Capstone Project for Electrical Engineers, 1 Cr (0,3)

An applied research project required from each student to implement the knowledge gained from the research project course. The students will practice proper project documentation, results presentation and defending their project outcomes in front of a specialized committee.

Prerequisites: 00103490

00103596: Capstone Project for Electrical Engineers, 2 Cr (0,6)

An applied research project required from each student to implement the knowledge gained from the capstone project course. The students will practice proper project documentation, results presentation and defending their project outcomes in front of a specialized committee.

Prerequisites: 00103595

00103536: Advanced Electrical Machines, 3 Cr (3,0)

This course builds on the electrical machines course by discussing advanced topics in conventional motors (induction and synchronous AC machines). It also describes the theory behind special electrical machines and their applications, such as brushless DC, stepper and servo motors.

Prerequisites: 00103333

00103537: Special Topics in Power Systems, 3 Cr (3,0)

This course provides a focused review of certain chosen topics in power systems engineering. Topics are chosen to keep the students up-to-date with the current technologies and advancements in electrical power systems engineering.

Prerequisites: 00103534

00103538: Electrical Drive Systems, 3 Cr (3,0)

This course introduces the concept of drive systems for controlling the speed and the torque of electrical motors. It summarizes different types of electrical drive systems, a detailed review of their control circuits and their corresponding applications.

Prerequisites: 00103333, 00103341

00103554: Mobile Robotics, 3 Cr (2,3).

This course provides the students with comprehensive material for designing and building simple Unmanned Aerial Vehicles (UAV) and Unmanned Ground Vehicles (UGV) prototypes. The course covers the fundamentals of mobile robots, including their locomotion, perception, and control. The course integrates theory, simulation, and practical work into four focused modules: System modeling; Sensors and actuators; Control systems; and Unmanned vehicles. The course will include an introduction to robot navigation and autonomous systems. By the end of the course, students will have a strong foundation in mobile robotics, enabling them to build and program mobile robotic solutions in real-world settings.

Prerequisites: 00103250

00103555: Industrial Robotics, 3 Cr (2,3).

The aim of this course is for students to investigate the range, operations, and benefits of industrial robots within manufacturing applications. The course covers the fundamentals of robot systems, including their kinematics, dynamics, and control. Among the topics included are industrial robot selection, programming and safety protocols that anticipate future developments in industrial robot technology. Students will learn the different robot structures with emphasis on six-degree of freedom manipulators. Students will understand the electrical, mechanical, hydraulic and pneumatic operation of common industrial robots. Students will learn how to program an industrial robot for automated process applications and will understand the communication protocols. Through lectures, lab experiments, and hands-on projects, students will learn how to design and program industrial robots for various applications. By the end of the course, students will have a strong foundation in industrial robots and automation systems, enabling them to develop and implement robotic solutions in real-world settings.

Prerequisites: 00103250

00102544: Green Buildings, 3 Cr (2,3)

This course introduces sustainability concepts in new and existing buildings and prepares the student for international certification in green buildings. Topics covered include: Green buildings rating systems, LEED concepts and categories, site sustainability strategies, water efficiency and wastewater technologies, energy performance, building simulation, renewable energy in buildings, fundamental and enhanced commissioning, sustainable building materials, indoor air quality, lighting and thermal comfort, innovative design case studies.

Prerequisites: 00102111

00103543: Nano-Electronics and Information Technology, 3 Cr (3,0)

This course presents the current status of the state-of-the-art Silicon industry and its evolution, starting from the well-established micro-fabrication techniques to the proposed novel nano-fabrication trends. It focuses on the MOSFET as the main building component of the integrated circuits and the motivation behind the emergence of nanotechnology. It also presents some revolutionary applications of the novel nano-electronic devices in various areas, such as: memory and storage devices, displays, data transmission and communications and imaging systems.

Prerequisites: 00103260, 00103542

00103544: Optical Electronics and Applications, 3 Cr (3,0)

This course summarizes the physics of semiconductor laser diodes and their applications in various fields such as illumination, communications, biomedical and industrial applications. It also reviews the recent trends in integrating electrical and optical devices into single electronic chips, or electro-optical integrated circuits.

Prerequisites: 00103362, 00103341

00103545: Special Topics in Clinical Engineering, 3 Cr (3,0)

This course reviews the biomedical engineering technologies and managerial skills used in healthcare applications. It focuses on the design and application of electronic medical devices, in addition to healthcare environment design and development. Topics include lifecycle management, patient-safety regulations, risk assessment and management, interoperability and cybersecurity.

Prerequisites: 00103341

00103564: Network Science, 3 Cr (2,3)

This course provides students with an introduction to modern networked technologies, such as wireless, social, and economic networks. Topics included in this course are: Analysis of networked technologies using analytical and engineering techniques, such as optimization, game/auction theory, graph analysis, and learning as applied to networked technologies; introduction to the basics of these techniques and their applications in networked systems; development of a network science for solving practical problems pertaining to various networked systems, such as smartphones, Wiki, Facebook, economic networks, or online video streaming software.

Prerequisites: 00103563

00103565: Special Topics in Communications, 3 Cr (3,0)

This course provides a focused review of certain chosen topics in communications engineering. Topics are chosen to keep the students up-to-date with the current communication technologies and advancements.

Prerequisites: 00103362

00103574: Algorithms and Optimization, 3 Cr (2,3).

This course is designed to provide Electrical Engineering students with the knowledge and skills necessary to develop and analyze algorithms for solving complex problems in their field. This will involve mathematical formulation, algorithm development, and programming. The course covers the fundamentals of algorithms and optimization, including their applications in signal processing, communication networks, control systems, and machine learning. Unconstrained and constrained optimization techniques, such as Simplex and gradient-based algorithms will be covered.

Prerequisites: 00103375, 00103213

00103571: Data Analytics, 3 Cr (3,0)

This course introduces the theoretical foundation of data analytics and a range of data analytic processes and techniques to provide hands-on experience for enhancing students' skills. Topics included in this course are: Data analytic terminologies; types of data analytics; data exploration and visualization; understanding data with descriptive, predictive and prescriptive analytics.

Prerequisites: 00103213

00103572: Artificial Intelligence and Engineering Applications, 3 Cr (3,0)

This course covers the following topics: Problem solving methods; problem spaces; search techniques; knowledge representation; programming languages for AI; games; predicate logic; knowledge-based systems; planning techniques; reactive systems; artificial neural networks; natural language understanding; computer vision; and robotics.

Prerequisites: 00103570, 00103571

00103573: Machine Learning, 3 Cr (3,0)

This course covers the following topics: Algorithms and principles involved in machine learning; fundamentals of representing uncertainty, learning from data, supervised learning, ensemble methods, unsupervised learning, structured models, learning theory and reinforcement learning; design and analysis of machine perception systems; design and implementation of a technical project applied to real datasets.

Prerequisites: 00103570, 00103571

00103581: Embedded Systems, 3 Cr (2,3)

This course concentrates on real-time programming of embedded systems. It develops the basic understanding of embedded systems structure and terminology. It also delivers the knowledge required for

embedded systems programming. Topics include micro-controller structure, I/O systems, real-time programming and debugging.

Prerequisites: 00103341

00103522: Electrical Installations for Buildings, 3 Cr (3,0)

The purpose of this course is to provide the students with the basics of buildings' electrical systems design and installations to facilitate the penetration of engineering consultancy / contracting fields career. It covers various topics related to Lighting system design, Distribution of socket outlets, Circuit breakers, Circuits protection, Wiring and final branch circuit panelboard schedules, Cables Sizing, Emergency power supply, Lighting control systems, Load Estimate, Life Safety Requirements, and electrical network distribution levels and development of single line diagrams. The course content is based on relevant international standards such as IET, IEC, and ISO.

Prerequisites: 00103232

00102552: Electric and Hybrid Vehicles, 3 Cr (2,3)

This course introduces the fundamentals, principles and design of hybrid and electric vehicles. Among the topics covered are: components and operation of hybrid and electric vehicles, sizing the drive system, energy storage devices and challenges, battery and charging technologies, energy management systems, vehicle dynamics and transmission, performance analysis.

Prerequisites: 00103333

00102551: Smart Grids, 3 Cr (2,3)

This course provides an in-depth introduction to the aspects and consideration governing the evolution of conventional electrical networks into smart grids. Topics covered include: anatomy of smart grids, smart grid infrastructure, smart grid operation, communication, cyber security, IEC 61850, power system protection applications, demand side management applications, energy storage applications, integration of electric vehicles.

Prerequisites: 00103331

00101535: Mechatronics, 3 Cr (2,3)

This course introduces a general overview of mechatronic systems in terms of user requirements, concept design, detailed design and component selection, as well as the additional issues of troubleshooting, maintenance and documentation. Specific components that are studied include: sensors/transducers, actuators and motors, controllers (physical controllers such as PLC and microcontrollers; control algorithms such as on/off controllers and PID controllers), as well as the plant that is to be controlled, especially mechanical plants.

Prerequisites: 00103230

00103497: Practical Training for Electrical Engineering (PATH), 6 Cr (0,40)

The practical training program is the bridge between academic study and industry. It is designed to transform the apprentice from a student to an employee. The main objective is to improve graduate readiness for full-time employment upon graduation. It is an 8-month work placement opportunity for a student where they apply the technical knowledge obtained during study and develop their workplace skills to match high international standards. The program is designed to allow updated monitoring of the apprentice progress and development.

Prerequisites: Department Approval, 40302231, Passed 100 CHs

00103498: Practical Training for Electrical Engineering (PATH) Continuation, 12 Cr (0,40)

The practical training continuation program is the bridge between academic study and industry. It is designed to transform the apprentice from a student to an employee. The main objective is to improve graduate readiness for full-time employment upon graduation. It is an 8-month work placement opportunity for a student where they apply the technical knowledge obtained during study and develop their workplace skills to match high international standards. The program is designed to allow updated monitoring of the apprentice progress and development.

Prerequisites: 00103497