Northern Technical University
الجامعة التقنية الشمالية

Bachelor of Science (B.Sc.) – Electronics and Control Techniques

البكالوريوس التقني - تقنيات هندسة الالكترونيك والسيطرة

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1. Mission & Vision Statement

Vision Statement

The Department of Electronics and Control Engineering strives to achieve excellence in the field of electronics and control engineering at the local, regional, and global levels, guided by

intellectual and professional distinction. It aims to serve the community, contribute to scientific advancement, and participate in the development of technical engineering personnel in the specialized field, in alignment with scientific and economic advancements in the job market.

Mission Statement

Providing high-quality academic programs that align with scientific and technological advancements at the local, regional, and global levels, and actively participating in the development of engineering technologies and continuous improvement of the educational and research system in the college through continuous collaboration with relevant entities in various engineering and technical disciplines.

2. Program Specification

Programme code:	BSc-ECE	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

The Department of Electronics and Control Engineering was established in 1999 under the name of Electronics and Control Engineering Technologies. It is one of the important departments in the college. The department adopted curriculum materials from prestigious international universities and equipped its laboratories with the latest devices, aiming to train technicians capable of designing various electronic and electrical circuits and dealing with them.

The department approved the commencement of studies in the same year of its establishment and admitted students for the first course. Their curricula were determined based on the needs of industrial facilities. The department takes pride in opening this study program as directed by the Ministry of Higher Education and Scientific Research, in response to enhancing the scientific level by providing advanced technical personnel. The department considers the importance of its study program to be derived from its close connection to the industry's development in various fields. Therefore, one of the department's objectives is to nurture and follow the scientific and educational trends, develop them to achieve harmony and integration with the scientific and technical activities worldwide, expand and strengthen cooperation with scientific institutions worldwide, encourage scientific missions and promote academic leaves based on the current and future needs of various industrial and research facilities specializing in the field of electronics and control engineering.

The department also aims to introduce information systems in the field of electronics and control engineering to enhance the development of curricula and research methods to meet international standards, stay updated with research and technology advancements worldwide, and continuously supply teaching staff to newly established universities and colleges, especially those with relevant specialization. This is to support faculty members and researchers in those institutions and conduct scientific research aimed at expanding cooperation between universities, serving reconstruction plans, and investing in industrial sectors. Additionally, the department provides direct scientific and technical consultations in specialized centers and advisory offices.

Level 1 exposes students to the fundamentals of electronics, suitable for progression to all programs within the electronics and control program group. Program-specific core topics are covered at Level 2 preparing for specialist modules at Levels 3 and 4. A Leeds electronics graduate is therefore trained to appreciate how research informs teaching, according to the University and College Mission statements.

The research ethos is developed and fostered from the start via practical and lab methods, which are either embedded in lecture modules or taught in dedicated lab modules and tutorials.

Academic tutorials are held at Levels 1 and 2 and 3 with the same tutor, who is also the personal tutor, providing continuity and progressive guidance. Level 1 and 2 tutorials include a number of workshops to teach skills, e.g. library use and presentation skills, followed by assessed exercises, e.g. essays and talks, as opportunities to practice these skills in a subject-specific context.

International years and Industrial placements are also offered and individual needs are discussed with the appropriate tutor and accommodated wherever possible.

3. Program Goals

The Department of Electronics and Control Engineering aims to:

1. Provide students with the fundamental scientific and engineering concepts in the field of specialization, equipping graduates with the scientific and technical capabilities and

competencies necessary for engaging in engineering and technical work and keeping up with the rapid advancements in electronics and control engineering.

2) Foster collaborative research between departments of local, regional, and international universities, strengthening the department's scientific identity.
3) Encourage creativity, innovation, and excellence, and deliver impactful services in various fields.
4) Establish scientific partnerships with similar departments outside of Iraq to stay abreast of contemporary advancements in the educational process, particularly in the engineering and technical fields, benefiting both students and faculty members.
5) Make continuous efforts to improve the performance and quality of the teaching and technical staff in the department.
6) Strive for national accreditation according to the national standards set by the Ministry of Higher Education (General Standards for Technical Diploma and Technical Engineering Programs) and international standards based on ABET's global standards.
7) Develop and accredit laboratories according to good laboratory practice standards.
8) Implement digital transformation in all administrative and scientific processes within the department among its members, as well as with the administrative units in the college.

4. Student Learning Outcomes

Electronics and Control Techniques is the study of the principles and applications of electronic systems and control theory. Graduates obtain knowledge in various aspects of electronics and control and apply this knowledge to solve complex engineering problems. The department offers a Bachelor of Science in Electronics and Control Techniques with concentrations in areas such as Analog Electronics, Digital Electronics, Control Systems, and Communication Systems. Additionally, the department offers courses to students from other disciplines and supports pre-professional programs. The curriculum and experiences in Electronics and Control Techniques are designed to prepare students for careers in industries such as automation, robotics, telecommunications, power systems, and manufacturing, as well as for graduate studies and technical careers.

Outcome 1

A. Knowledge and Understanding

1. Knowledge of Electronics: Students will gain a solid understanding of the principles and theories of electronics, including electronic circuits, devices, and systems.
2. Control Systems: Students will learn about control theory and techniques used in various applications, such as robotics, automation, and industrial processes. They will develop skills in designing, analyzing, and implementing control systems.
3. Analog and Digital Electronics: Students will acquire knowledge and skills in both analog and digital electronics. They will learn about electronic components, circuits, and systems used in various applications.
4. Circuit Design and Analysis: Students will be able to design and analyze electronic circuits using tools and techniques such as circuit simulation software, circuit layout, and troubleshooting.
5. Microcontrollers and Embedded Systems: Students will gain an understanding of microcontrollers, their programming, and interfacing with other electronic components. They will learn how to design and develop embedded systems for various applications.
6. Signal Processing: Students will learn about the processing and analysis of signals, including techniques for filtering, modulation, demodulation, and noise reduction.
7. Communication Systems: Students will understand the principles and technologies involved in communication systems, such as wireless communication, networking protocols, and data transmission.

Outcome 2

Oral and Written Communication

Graduates will be able to formally communicate the results of biological investigations using both oral and written communication skills.

Outcome 3

Laboratory and Field Studies

Students will acquire practical skills through laboratory experiments, which involve working with electronic components, using test and measurement equipment, and troubleshooting circuits and systems.

Outcome 4

Scientific Knowledge

Graduates will be able to demonstrate a balanced concept of how scientific knowledge develops, including the historical development of foundational theories and laws and the nature of science.

Outcome 5

Problem-solving and Analytical Skills

Students will develop problem-solving and analytical skills, allowing them to identify and solve complex engineering problems in the field of electronics and control techniques.

Outcome 6

Critical Thinking

Graduates will be able to use critical-thinking and problem-solving skills to develop a research project and/or paper.

Outcome 7

Subject-specific skills

- The ability to design simple and advanced programs in different programming languages and to control them or through them on electronic and control systems.
- The ability to think and address issues according to their algorithms and methods of work.
- Writing scientific reports, reading charts and analyzing digital data.

5. Academic Staff

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6. Credits, Grading and GPA

Credits

Northern Technical University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 student workloads, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Calculation of the Grade Point Average (GPA)

1. The GPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   GPA of a 4-year B.Sc. degrees:

   GPA = [(1st module score x ECTS) + (2nd module score x ECTS) + ……] / 240

7. Curriculum/Modules

First Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
One	1	NTU100	Human rights and democracy	حقوق الانسان والديمقراطية
	2	NTU102	Computer Principles	مبادئ الحاسوب
	3	TECK101	Diffirentiation and Integration	التفاضل والتكامل
	4	ECE100	Principles of Electrical Circuits	مبادئ الدوائر الكهربائية
	5	TECK104	Engineering Drawing	الرسم الهندسي
	6	TECK105	Mechanical engineering	الميكانيك الهندسي

Second Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
Two	1	NTU101	English Language- Elementary	اللغة الانكليزية الاساسية
	2	ECE102	Electronics	الالكترونيك
	3	ECE103	Workshops	الورش
	4	TECK103	Physics	الفيزياء
	5	ECE104	AC Electrical Circuits	دوائر التيار المتناوب
	6	NTU103	Arabic Language	اللغة العربية

Third Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
One	1	ECE200	Mathematics	الرياضيات
	2	ECE201	Electronic Circuits	الدوائر الالكترونية
	3	ECE202	Digital Electronics	الالكترونيك الرقمي
	4	NTU105	Baath Crimes	جرائم البعث
	5	ECE203	Programming Language	لغة برمجة

Fourth Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
Two	1	ECE204	Electromagnetic Fields	المجالات الكهرومغناطيسية
	2	ECE205	Measurement Devices	أجهزة القياس
	3	ECE206	Operational Amplifier Circuits	دوائر مضخم العمليات
	4	ECE207	Digital Design Using VHDL	التصميم المنطقي بأستخدام لغة VHDL
	5	NTU200	English Language- intermediate	اللغة الانكليزية - المتوسطة

Fifth Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
One	1	ECE301	Engineering Analysis	التحليلات الهندسية
	2	ECE302	Electronic Control	السيطرة الالكترونية
	3	ECE303	Computer Architechure	معمارية الحاسوب
	4	ECE304	Communication Principles	مبادئ الاتصالات

Sixth Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
Two	1	ECE305	Power Electronics	الكترونيات القدرة
	2	ECE306	Numerical Analysis	التحليلات العددية
	3	ECE307	Microcontrollers	المسيطرات الدقيقة
	4	ECE308	Digital Communications	الاتصالات الرقمية
	5	ECE309	Controllers theory	نظرية المسيطرات

Seventh Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
One	1	ECE400	Digital Control	السيطرة الرقمية
	2	ECE401	Computer Networks	شبكات الحاسوب
	3	ECE402	DC drivers	مسوقات التيار المستمر
	4	ECE403	Automatic control and Robotics	السيطرة الالية والروبوت
	5	TECK400	Research Methodology	منهجية البحث

Eighth Semester

Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية
Two	1	ECE404	AC drivers	مسوقات التيار المتناوب
	2	ECE405	Digital Signal Processing	معالجة الاشارة الرقمية
	3	ECE406	Engineering Economics	الاقتصاد الهندسي
	4	ECE407	Internet of Things	انترنت الاشياء
	5	TECK401	Graduation Project	مشروع التخرج

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