

NORTHERN TECHNICAL UNIVERSITY

Polytechnic College / Mosul – Department of Autotronics Engineering Technology

Course Description Guide – Bologna Process | Academic Year 2025–2026

1. OVERALL LIST OF ACADEMIC PROGRAM COURSES (FIRST LEVEL)

First Semester

Code	Course Name (Arabic)	Course Name (English)	ECTS	SSWL	USSWL
NTU100	الديمقراطية وحقوق الإنسان	Democracy and Human Rights	2.00	33	17
NTU101	اللغة الإنكليزية	English Language	2.00	33	17
ATD100	رياضيات	Mathematics	4.00	63	37
ATD101	الرسم الهندسي باستخدام الحاسوب	Computer Aided Engineering Drawing	5.00	94	31
ATD102	تكنولوجيا المحركات	Engine Technology	6.00	96	54
ATD103	معامل سيارات	Automobile Workshops	6.00	64	36
ATD104	مبادئ تكنولوجيا كهرباء والإلكترونيات للسيارات	Principles of Automotive Electrical & Electronic Tech.	5.00	113	12

Second Semester

Code	Course Name (Arabic)	Course Name (English)	ECTS	SSWL	USSWL
NTU102	اللغة العربية	Arabic Language	2.00	33	17
NTU103	الحاسوب	Computer	3.00	63	12
MPE100	الورش الميكانيكية	Mechanical Workshops	6.00	48	102
ATD105	السيارات الكهربائية والهجينة	Hybrid and Electrical Automobiles	4.00	63	37
ATD106	تكنولوجيا معلومات المحركات	Engine Systems Technology	6.00	128	22
ATD107	تطبيقات تكنولوجيا كهرباء والإلكترونيات للسيارات	Automobiles Electrical & Electronics Tech. Apps	3.00	93	32
ATD108	ميكانيك هندسي	Mechanical Engineering	4.00	94	6

2. DETAILED DESCRIPTION OF FIRST SEMESTER COURSES

English Language (NTU101)

Course Leader: Muthanna Muhaidi Muhammad Salih

Week	Weekly Topics / Syllabus	Type
1	Greetings and applying basic grammar rules	Theory
2	Your world and applying correct tenses in sentences	Theory
3	All about you, understanding and using auxiliary verbs	Theory
4	Family and friends, improving writing skills	Theory
5	Way of life, writing short cohesive paragraphs	Theory
6	Everyday life, formal and informal letters	Theory
7	Favorites and vocabulary memorization	Theory
8	Where I live, delivering short oral presentations	Theory
9	Past tenses, synonyms, and antonyms	Theory
10	Having a great time, using vocabulary in context	Theory
11	I can do it, conducting simple conversations	Theory
12	Please and thank you, improving pronunciation and articulation	Theory
13	Here and now, text analysis, and inferring main ideas	Theory
14	Time to go, listening to audio clips and understanding them	Theory
15	Scientific visit and comprehensive review	Theory

Engine Technology (ATD102)

Course Leader: Rafal Khalid Jassim

Week	Weekly Topics / Syllabus	Type
1	Introduction to engine technology and engine disassembly	Theory + Prac
2	Engine control systems, ECU, sensors, and practical disassembly	Theory + Prac
3	Fuel systems, fuel injection, and basic engine inspection	Theory + Prac
4	Ignition systems and fuel system troubleshooting	Theory + Prac
5	Air and exhaust systems, servicing ignition systems	Theory + Prac
6	Engine performance, efficiency, and airflow optimization	Theory + Prac
7	Diagnostics, troubleshooting, and using OBDII diagnostic tools	Theory + Prac

Engine Technology (ATD102) - Continued

Week	Weekly Topics / Syllabus	Type
8	Engine modifications, maintenance, and tuning of carburetors	Theory + Prac
9	Classic engines maintenance and compression testing	Theory + Prac
10	Engine overhaul, rebuilding, and setting valve timing	Theory + Prac
11	Advanced engine tuning and forced induction systems (Turbo/Superchargers)	Theory + Prac
12	Emission control, environmental considerations, and performance tuning	Theory + Prac
13	Classic fuel systems and engine emissions testing	Theory + Prac
14	Practical engine tuning workshop and reassembling engine	Theory + Prac
15	Final project and applied review	Theory + Prac

Computer Aided Engineering Drawing (ATD101)

Course Leader: Lubna Ali Hussein

Week	Weekly Topics / Syllabus	Type
1	Getting started, AutoCAD interface, and general concepts	Theory + Prac
2	Selecting drawing unit types and modifying drawing limits	Practical
3	Status bar tools and drawing properties	Practical
4	Drawing commands and modification commands	Practical
5	Line types sheet in engineering drawing	Practical
6	Practical exercises on 2D drawings	Practical
7-8	Drawing applications on geometric operations	Practical
9	Drawing a sheet including 2D drawings and geometric operations	Practical
10-11	Practical exercises on 3D isometric drawings	Practical
12	Orthographic projections of simple isometric & projection theory	Practical
13	Drawing projections from isometric views & inferring third view	Practical
14	Drawing a sheet including 3D drawings	Practical
15	Drawing a sheet including isometric view and projections	Practical

Principles of Automotive Electrical and Electronic Technology (ATD104)

Course Leader: Abdullah Basim Jassim

Week	Weekly Topics / Syllabus	Type
1	Introduction to electricity, safety, and multimeter measurements	Theory + Prac
2	DC circuits, building simple circuits, and Ohm's Law	Theory + Prac
3	Electrical components, identifying and testing components	Theory + Prac
4	Batteries, battery testing (hydrometer, load test), and charging	Theory + Prac
5	Electromagnetism and simple motor/generator experiments	Theory + Prac
6	Starting systems and operating starter motor components	Theory + Prac
7	Starting system circuit, solenoid, and tracing starter circuit	Theory + Prac
8	Charging systems and alternator components	Theory + Prac
9	Charging system circuit, voltage regulator, and schematics	Theory + Prac
10	Ignition systems and identifying spark plug types	Theory + Prac
11	Ignition system circuit and function of the ignition coil	Theory + Prac
12	Electrical systems diagnosis and multimeter techniques	Theory + Prac
13	Wiring diagrams and interpreting simple schematics	Theory + Prac
14	Case studies, troubleshooting starting issues, and diagnostics	Theory + Prac
15	Q&A session and comprehensive review of concepts	Theory + Prac

Mathematics (ATD100)

Course Leader: Sula Taha Hamid

Week	Weekly Topics / Syllabus	Type
1	Introduction to matrices and basic concepts	Theory
2	Types of matrices and algebraic operations (+, -, ×)	Theory
3	Finding determinants for various types of matrices	Theory
4	Solving linear equations using matrices	Theory
5	Cramer's Rule and applications in linear equations	Theory
6	Introduction to vectors, algebraic operations, and vector length	Theory

Mathematics (ATD100) - Continued

Week	Weekly Topics / Syllabus	Type
7	Dot product and cross product of vectors	Theory
8	Angle between vectors and perpendicular vector determination	Theory
9	Functions, types of functions, and algebraic functions	Theory
10	Trigonometric functions and their applications	Theory
11	Graphing trigonometric functions	Theory
12	Exponential functions	Theory
13	Logarithmic functions and natural logarithms	Theory
14	Graphing exponential and logarithmic functions	Theory
15	Explicit and implicit functions and their differences	Theory

3. DETAILED DESCRIPTION OF SECOND SEMESTER COURSES

Hybrid and Electrical Automobiles (ATD105)

Course Leader: Abdullah Basim Jassim

Week	Weekly Topics / Syllabus	Type
1	Introduction to hybrid & electric vehicles (HEV, PHEV, BEV)	Theory + Prac
2	Environmental impact of conventional vehicles & future transport	Theory + Prac
3	Alternative fuel vehicles, research, & history presentation	Theory + Prac
4	Batteries (lead-acid, lithium-ion), charging, & basic circuits	Theory + Prac
5	Electric motors, operating principles, & educational kits	Theory + Prac
6	Regenerative braking & field visit to car dealership	Theory + Prac
7	Hybrid vehicle architectures (series, parallel, power-split)	Theory + Prac
8	ICE in hybrid systems & group project on hybrid drivetrain	Theory + Prac
9	Energy management strategies & applied project	Theory + Prac
10	Evolution of lithium-ion technology & charging infrastructure	Theory + Prac
11	Charging methods (AC vs. DC), times, & infrastructure talk	Theory + Prac
12	"Range Anxiety" concept & debate on EV future	Theory + Prac
13	Autonomous driving integration & gasoline alternatives debate	Theory + Prac
14	Renewable energy, government policies, & EV incentives	Theory + Prac
15	Project presentations and comprehensive review	Theory + Prac

Automobiles Electrical & Electronics Applications (ATD107)

Course Leader: Abdullah Basim Jassim

Week	Weekly Topics / Syllabus	Type
1	Introduction to electrical systems & multimeter calibration	Theory + Prac
2	Common electrical components & hydrometer battery testing	Theory + Prac
3	Starting system & practical disassembly of starter motor	Theory + Prac
4	Charging system, alternator, & output testing with multimeter	Theory + Prac
5	Ignition systems, spark plug inspection, & gap adjustment	Theory + Prac
6	Testing primary & secondary circuits of ignition coil	Theory + Prac
7	Lighting systems & testing headlight/taillight circuits	Theory + Prac
8	Lighting connections & replacing bulbs and fuses	Theory + Prac
9	Auxiliary systems: repair of power windows & door locks	Theory + Prac
10	Diagnosing and repairing wiper & washer systems	Theory + Prac
11	Auxiliary systems: AC system components & troubleshooting	Theory + Prac
12-13	Dashboard cluster gauges, fuel/temp gauge operation & repair	Theory + Prac
14	Engine cooling fans operation, testing, & troubleshooting	Theory + Prac
15	General review and final project application	Theory + Prac

Mechanical Engineering (ATD108)

Course Leader: Lubna Ali Hussein

Week	Weekly Topics / Syllabus	Type
1	Newton's laws, units, scalar/vector quantities, & conversions	Theory + Tut
2	2D force vectors: force resolution, resultant, & problem solving	Theory + Tut
3	3D force vectors: unit vectors, directional cosines, dot product	Theory + Tut
4	Particle equilibrium, Free Body Diagrams, spring & cable problems	Theory + Tut
5	Moment of a force about point/axis & Varignon's Theorem	Theory + Tut
6	Couples, resultant systems, & force-moment simplification	Theory + Tut
7	2D rigid body equilibrium: supports, reactions, & FBD	Theory + Tut
8	Midterm Exam and comprehensive review	Theory + Tut
9	Structural analysis: Trusses & Method of Joints	Theory + Tut
10	Method of Sections vs. Method of Joints	Theory + Tut
11	Frames and Machines, disassembling compound structures	Theory + Tut
12	Friction: dry friction laws, tipping/slipping, inclined planes	Theory + Tut
13	Centroids: composite area calculations via integration/summation	Theory + Tut
14	Moment of Inertia: parallel axis theorem & calculating I_x/I_y	Theory + Tut
15	General review: equilibrium, friction, and centroids problems	Theory + Tut