# وزارة_البحث_والتعليم_العالي

*Ministry of Higher Education and Scientific Research*

*Scientific Supervision and Evaluation Authority*

*Quality Assurance and Academic Accreditation Department*

*International Accreditation Department*

**2025**

Academic Program and Course Description Guide

**Introduction**

The academic program is a coordinated and organized package of courses that include procedures and experiences organized in the form of study vocabulary, the main purpose of which is to build and refine the skills of graduates, which makes them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs, such as the external examiner program. The academic program description provides a brief summary of the main features of the program and its courses, indicating the skills that students are working to acquire based on the objectives of the academic program. The importance of this description is evident in that it represents the cornerstone in obtaining program accreditation and participates in writing the teaching materials under the supervision of the scientific committees in the scientific departments. This guide, in its second version, includes a description of the academic programs after updating the vocabulary and paragraphs of the previous guide in light of the developments and changes in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, semester) system, in addition to adopting the description of the academic program circulated under the letter of the Department of Studies No. 2906/3 dated 5/3/2023 regarding the program for its work. In this field, we seek to emphasize the importance of writing a description of the academic program and courses to ensure the smooth running of the educational process.

**Concepts and Terms**

1. Academic Program Description: The academic program description provides a comprehensive overview of the program’s vision, mission, objectives, and educational outcomes. This description serves as a strategic reference for achieving academic development, and accurately identifies how the program will be implemented to effectively achieve its objectives.

2. Course Description: Provides a brief and accurate description of each course, including its objectives and expected outcomes. The description should include clear details on how to make the most of the offered course material, and whether the student has acquired the required skills and knowledge.

3. Program Vision: The vision expresses the program’s future aspirations. The program seeks to be a pioneer and distinguished locally and internationally, with a focus on innovation and quality in education, and achieving sustainability in providing educational programs that are in line with the needs of society and the labor market.

4. Program Mission: The mission clarifies the general objectives that the program seeks to achieve through education and learning. The mission includes an outline of how to develop students’ capabilities and prepare them for the labor market in innovative and modern ways that are in line with technological and cognitive changes.

5. Program Objectives: A set of specific objectives that the program seeks to achieve over a specific period of time. These objectives include developing the student's knowledge and skills in measurable and evaluable ways, which contributes to improving the quality of the educational process and achieving distinguished educational outcomes.

6. Curriculum: The curriculum includes all the courses offered by the program, whether theoretical or practical. The plan is integrated with the educational strategies used, and takes into account the number of study hours for each course to ensure a balance between theoretical and applied content.

7. Learning Outcomes: Learning outcomes represent a set of skills and knowledge that the student must acquire by the end of the academic program successfully. These outcomes are determined based on the program objectives, and are an important tool for evaluating the effectiveness of education and ensuring the achievement of high-quality educational outcomes.

8. Teaching and Learning Strategies: These are the strategies used by the faculty to ensure the achievement of the educational objectives of the program. These strategies include the use of various methods in education such as interactive learning, e-learning, in addition to classroom and extracurricular activities that contribute to enhancing a deep understanding of the educational content and achieving the required learning outcomes.

Conclusion By preparing this comprehensive academic description, we hope that the program will be able to meet the highest standards of academic quality, and will contribute effectively to improving educational outcomes and developing student skills in line with the requirements of the modern labor market. Through this guide, we aspire to raise the level of academic education and contribute to enhancing the university’s position locally and internationally.

*Republic of Iraq*

*Ministry of Higher Education & Scientific Research*

*Supervision and Scientific Evaluation Directorate*

*Quality Assurance and Academic Accreditation*

*International Accreditation Dept.*

**Academic Program Specification Form for The Academic Year 2024-2025**

*University: Northern Technical University*

*College: Hawija Technical Institute*

*Dept.: Power Mechanics Techniques*

*Date of Form Completion :16-2-2024*

*Department Head Name/ Qusay Kamil Jasim*

*Date: 22/6/2025*

Signature

*Department Head Name: Dr. Mohammed Jyad*

*Date: 22 / 2 /2025*

***Signature :***

***Department Head Name: A.M.D. Modaffer Ahmed Hussein***

***Date: / /2021***

***Signature :***

***Department Head Name: A.M.D. Modaffer Ahmed Hussein***

***Date: / /2021***

Signature

Quality Assurance And University Performance Manager

Data: 22 / 6 /2025

***Signature :***

***Department Head Name: A.M.D. Modaffer Ahmed Hussein***

***Date: / /2021***

***Signature :***

***Department Head Name: A.M.D. Modaffer Ahmed Hussein***

***Date: / /2021***

Signature



 *Dean's approval*

**PROGRAMME SPECIFICATION**

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| This academic program description provides a concise summary of the main features of the program and the learning outcomes expected of the student to achieve, proving whether he has made maximum use of the available opportunities. It is accompanied by a description of each course within the program |

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| 1. Teaching Institution | Northern Technical University/ Hawija Technical Institute |
| 2.University Department/Centre | Power Mechanics techniques |
| 3.Program Title | Technical Sciences |
| 4.Title of Final Award | Technical Diploma |
| 5. The school system:Annual / Courses / Other Annual | Courses system |
| 6. Accreditation | **ABET Academic Accreditation Program for Engineering and Technology** |
| 7. Other external influences |  |
| 8. Date of production/revision of this specification | *22-6-2025* |
| 9. Aims of the Program |  |
|  The power generation branch aims to prepare the technical staff that will be the link between the specialist and the skilled worker. The scientific branch prepares the graduate and provides him with theoretical, applied and practical information to be able to carry out the work assigned to him. Besides that; Work in power plants of various types (steam, gas, hydroelectric, diesel ... etc.) with the operation of components and their units; Carry out emergency and periodic maintenance work for the components and units of the various stations, along with their measuring devices; Working in pumping stations, operating and maintaining their various components. |
| **Automobile Techniques Branch:** aims to prepare the technical staff that will be a link between the specialist and the skilled worker. The department prepares and prepares the graduate and provides him with theoretical, applied and practical information to be able to carry out the work entrusted to him. Besides that, the ability to identify mechanical and electrical faults in cars; Carrying out regular maintenance for gasoline and diesel cars; The ability to manage and operate service and maintenance stations. |

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| **1. Learning Outcomes, Teaching, Learning and Assessment Methods** |
| 1. **Knowledge and Understanding**

A1- Knowing how parts and components work in cars, both types: diesel and gasoline.A2- Knowing how to diagnose faults in carsA3- Knowing the diagnosis of faults in electrical power production stationsA4- Knowing how to perform periodic maintenance of devices, systems and equipment at work sites.A5- Transfer the above-mentioned theoretical information to the skilled worker. |
| 1. **Subject-specific skills**

B1 - The ability to maintain and repair parts and components for cars (diesel and gasoline).B2 - The ability to maintain and repair parts and components of electrical power production plants and systems.B3 - The ability to operate electric power stations and water pumping stations. |
| **Teaching and Learning Methods** |
| Lectures, workshops, laboratories, methodological training, summer training, as well as scientific visits to various electric power plants. |
| **Assessment methods** |
| Oral exams, written exams, quarterly exams, final exams, daily assessment, practical exams in laboratories, and weekly reports. |
| 1. **Thinking Skills (Emotional and Value Objectives):**

C1- Increasing the awareness of the student during education.C2 - The student's participation in class activities and the delivery of the assignment on time.C 3- Adherence to the rules of occupational safety while working in laboratories.C4-Attention control and attention test (selective attention). C5- Increasing the students' self-confidence.C6- Managing time and not wasting it.C7- Increasing the spirit of competition and enthusiasm among students. |
| **Teaching and Learning Methods** |
| 1- Listen carefully to the teacher’s explanation.2- Knowing the role of science and scientists in life.3- Encourage and motivate the student to contribute to the explanation and discussion and increase his interaction in the class.4- The student's interest in the calm and cleanliness of the class. |
| **Assessment methods** |
| 1- Observe the student through his posts.2- Interviewing the student for practical tests.3- The student's cumulative record through educational committees located in the department.4- Giving the student homework and asking to solve certain problems. |
| **D- General and transferable skills (other skills relevant to employability and personal development).**D1- Using the computer and the Internet to understand the working mechanism of some complex parts of the specialty.D2 - Using the computer in engineering and industrial drawingD3 - Using modern measurement and control equipment to conduct laboratory experiments.D4 - Using modern inspection techniques in diagnosing malfunctions of devices and equipment and determining ways to fix them. |
| **Teaching and Learning Methods** |
| 1- Explanation and clarification in the lectures.2- Practical lessons in workshops and laboratories.3- Reports.4- Graduation projects for students.5- Summer training.6- Systematic training.7- Discussion seminars.8- Guidance seminars |
| **Assessment methods** |
| 1- Theoretical tests (oral and written).2- Practical tests.3- Semester and final exams.4- Daily evaluation.5- Reports. |

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| **11. programme structure** |

Courses for the two branches:

1. Automobile techniques/ first year

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Seq | Subject | Theoretical(hours) | Practical(hours) | Total | Units | Notes |
| 1 | Human Rights and Democracy | **2** | **0** | **2** | **2** | Public |
| 2 | English Language 1 | **2** | **0** | **2** | **2** | Public |
| 3 | Principles of Computer 1 | **1** | **1** | **2** | **2** | Assistant |
| 4 | Arabic Language | **2** | **0** | **2** | **2** | Public |
| 5 | Mathematic 1 | **2** | **0** | **2** | **2** | Assistant |
| 6 | Mathematic 2 | **2** | **0** | **2** | **2** | Assistant |
| 7 | Mechanical Workshops | **0** | **3** | **3** | **3** | Specialized |
| 8 | Workshops | **0** | **3** | **3** | **3** | Specialized |
| 9 | Automotive Engines Maintenance1 | **2** | **4** | **6** | **6** | Specialized |
| 2 | Automotive Engines Maintenance2 | **2** | **4** | **6** | **6** | Specialized |
| 11 | Automotive Electrics and Electronics1 | **2** | **2** | **4** | **4** | Specialized |
| 12 | Automotive Electrics and Electronics 2 | **2** | **2** | **4** | **4** | Specialized |
| 13 | Thermodynamics | **2** | **2** | **4** | **4** | Specialized |
| 14 | Heat Transfer and Fluid | **1** | **2** | **3** | **3** | Specialized |
| 15 | Engineering Mechanics | **2** | **1** | **3** | **3** | Specialized |
| 16 | Engineering Drawing1  | **0** | **3** | **3** | **3** | Assistant |
| 2025 | Engineering Drawing2  | **0** | **3** | **3** | **3** | Assistant |
|  | Total Hours | **24** | **30** | **54** | **54** |  |

Automobile Techniques/ Second Year

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Seq** | **Subject** | **Hours** | **Units** | **Type** |
| **Theo.** | **practical** | **Total** |
| **1** | **English Language 2** | **2** | **0** | **2** | **2** | Public |
| **2** | **Ethics of the Profession** | **2** | **0** | **2** | **2** | Public |
| **3** | **The crimes of the Baath regime in Iraq** | **2** | **0** | **2** | **2** | Public |
| **4** | **Arabic language** | **2** | **0** | **2** | **2** | Public |
| **5** | **Maintenance of automotive mechanical power transmission systems1** | **2** | **4** | **6** | **6** | Specialized |
| **6** | **Automotive electronic control systems1** | **2** | **2** | **4** | **4** | Specialized |
| **7** |  **Internal Composition Engine1** | **2** | **2** | **4** | **4** | Specialized |
| **8** | **computer aided Engineering drawing for automotive parts** | **0** | **6** | **6** | **6** | Assistant |
| **9** | **Automotive Bodywork1** | **1** | **2** | **3** | **3** | Specialized |
| **2** | **Automotive Electrical and electronics1** | **1** | **2** | **3** | **3** | Specialized |
| **11** | **Maintenance brake, suspension and steering systems in the Automotive2** | **2** | **4** | **6** | **6** | Specialized |
| **12** |  **Automotive electronic control systems2** | **2** | **2** | **4** | **4** | Specialized |
| **13** |  **Internal Composition Engine2** | **2** | **2** | **4** | **4** | Specialized |
| **14** | **Automotive mechanics** | **4** | **0** | **4** | **4** | Specialized |
| **15** |  **Automotive Bodywork2** | **1** | **2** | **3** | **3** | Specialized |
| **16** | **Automotive Electrical and electronics2** | **1** | **2** | **3** | **3** | Specialized |
| **2025** | **Project**  | **0** | **3** | **3** | **3** | Specialized |
|  |  |  |  |  |  |  |
|  | **Total hours** | **28** | **33** | **61** | **61** |  |

Power Generation techniques/ first year

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Seq | Subject | Theoretical(hours) | Practical(Hours) | Total(Hours) | Units | Notes |
| 1 | Human Rights and Democracy | **2** | **0** | **2** | **2** | Public |
| 2 | English Language 1 | **2** | **0** | **2** | **2** | Public |
| 3 | Principles of Computer 1 | **1** | **1** | **2** | **2** | Assistant |
| 4 | Arabic Language | **2** | **0** | **2** | **2** | Public |
| 5 | Mathematic 1 | **2** | **0** | **2** | **2** | Assistant |
| 6 | Mathematic 2 | **2** | **0** | **2** | **2** | Assistant |
| 7 | Mechanical Workshops1 | **0** | **3** | **3** | **3** | Specialized |
| 8 | Mechanical Workshops 2 | **0** | **3** | **3** | **3** | Specialized |
| 9 | Thermodynamics | **2** | **2** | **4** | **4** | Specialized |
| 2 | Electrical technology1  | **2** | **2** | **4** | **4** | Specialized |
| 11 | Fluid | **2** | **2** | **4** | **4** | Specialized |
| 12 | Engineering Mechanics1 | **2** | **2** | **4** | **4** | Specialized |
| 13 | Engineering Drawing1  | **0** | **3** | **3** | **3** | Assistant |
| 14 | Heat Transfer  | **2** | **2** | **4** | **4** | Specialized |
| 15 |  Engineering Drawing  | **0** | **3** | **3** | **3** | Assistant |
| 16 | Hydraulic Machines | **2** | **2** | **4** | **4** | Specialized |
| 2025 | Electrical technology  | **2** | **2** | **4** | **4** | Specialized |
| 18 | Engineering Mechanics | **2** | **2** | **4** | **4** | Specialized |
|  | Total Hours | **27** | **29** | **56** | **56** |  |

Power Generation techniques/ Second year

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Seq** | **Subject** | **Hours** | **Units** | **Notes** |
| **Theo.** | **Prac.** | **T** |
| **1** | **English Language 2** | **2** | **0** | **2** | **2** | Public |
|  **2**  | **Ethics of the Profession** | **2** | **0** | **2** | **2** | Public |
| **3** | **The crimes of the Baath regime in Iraq** | **2** | **0** | **2** | **2** | Public |
| **4** | **Arabic language** | **2** | **0** | **2** | **2** | Public |
| **5** |  **Measurement Instruments1** | **2** | **2** | **4** | **4** | Specialized |
| **6** | **Hydraulic & Pneumatic Systems1** | **2** | **2** | **4** | **4** | Specialized |
| **7** | **Gas Turbine and Diesel Power Plant Technology1** | **2** | **3** | **5** | **5** | Specialized |
| **8** | **Steam Power Plant Technology1** | **2** | **3** | **5** | **5** | Specialized |
| **9** | **Electrical Technology1** | **2** | **2** | **4** | **4** | Specialized |
| **2** | **Industrial Drawing** | **0** | **3** | **3** | **3** | Assistant |
| **11** |  **Measurement Instruments2** | **2** | **2** | **4** | **4** | Specialized |
| **12** | **Hydraulic & Pneumatic Systems2** | **2** | **2** | **4** | **4** | Specialized |
| **13** |  **Gas Turbine and Diesel Power Plant Technology2** | **2** | **3** | **5** | **5** | Specialized |
| **14** | **Steam Power Plant Technology2** | **2** | **3** | **5** | **5** | Specialized |
| **15** | **Electrical technology**  | **2** | **2** | **4** | **4** | Specialized |
| **16** | **Project**  | **0** | **3** | **3** | **3** | **Specialized** |
|  | **Total** | **28** | **30** | **58** | **58** |  |

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| **12. Personal Development Planning** |
| 1. Using modern resources, whether in the library or the Internet2. Participation in training courses inside and outside the institute.3. Technical and administrative advice.4. Preparing applied and field research.5. Preparing educational bags.6. Cooperation with departments and institutions in the governmental and private sectors in the field of training, supervision and consultancy. |
| **13. Admission criteria (setting regulations related to joining the college or institute)** |
| 1- Adoption of the average of student’s credits on the basis of central acceptance by the Ministry of Higher Education and Scientific Research2- The type of branch from which the student graduated, including: A- Scientific B- Professional (industrial).3- The interview: where a committee of the department’s lecturers is formed for the purpose of interviewing the students.4- Medical examination for students. |
| **14. The key sources of information about the programme** |
| 1. Textbooks approved by the Northern Technical University.2. The resources available in the institute's library or on the Internet. |

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| **Curriculum Skills Outline** |
| Please check the boxes corresponding to the individual learning outcomes from the program being evaluated |
|  | Learning outcomes required from the program |
| year/level | Course Name | basic or optional | Cognitive goals | Program specific objectives | Emotional and value goals | Transferred general and qualification skills (other skills related to employability and personal development) |
| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| FIRST | Engineering Thermodynamics | primary | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ |
| Automobile electricity | primary | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ |
| SECOND | Automotive Maintenance | primary | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ |
| Automobile Electricity (2) | primary | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ | ¶ |

Course description form

Course description

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| This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made the most of the available learning opportunities. It must be linked to the description of the program. |

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| 1. Teaching Institution | Northern Technical University/ Hawija Technical Institute |
| 1. University Department/Centre
 | Power Mechanics techniques |
| 3. Course name/code | Automotive maintenance |
| 4. Forms of attendance available | Weekly |
| 5. Semester/year | Courses system |
| 6. Number of hours of study (total) | 240 (8 hours per week) |
| 7. Date this description was prepared | *16 / 2 /2024* |
| 8. Aims of the course |  |
| The student understands the parts and malfunctions of the engine, gearbox, clutch, transmission, front axle, rear axle, stops, car air conditioners, steering and steering group, and how to maintain these parts and make the necessary and required repairs. |

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| 2. Course outcomes, Teaching, Learning and Assessment Methods |
| **A - knowledge and understanding.**A1- The mechanism of action of the clutch.A2-Knowing the mechanism of work of the powertrain.A3- Knowing the working mechanism of the front axle and the rear axle.A4-Knowing the mechanism of work of air conditioning devices in the car.A 5- Knowing how the engine works.A6- Knowing how the switch works. |
| **B - Subject-specific skills**B1 - Ability to maintain and repair the clutchB2 - Ability to maintain and repair the powertrainB3 - Ability to maintain and repair the front axle and rear axleB 4- The ability to maintain and repair the air-conditioning devices in the car |
| **Teaching and learning methods** |
| (Lecture, workshop, laboratory, summer training, methodological training) |
| **Evaluation methods** |
| Oral exams, written exams, semester exams, final exams, daily assessment |
| **C- thinking skills**C1- Graduation projectsC2 - Classroom and extra-curricular assignments and reports.C3 - competitions and workshops.C4- Innovations and patents. |
| Teaching and learning methods |
| 1- (Lecture, workshop, laboratory, summer training, methodological training) |
| Evaluation methods |
| Oral exams, written exams, semester exams, final exams, daily assessment |
| D - General and transferable skills (other skills related to employability and personal development).D1-Using the computer and the Internet to understand the working mechanism of some complex parts of the fieldD2 - Using the computer in engineering and industrial drawingD3 - Using modern electronic display methods to display pictures and videos related to the subject.D4 - Using modern inspection equipment to check the different parts and systems of cars. |

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| 11. Course Structure |
| week | hours | Required Learning Outcomes | Unit Name/Subject Method | Teaching Method | Assessment method |
| 1 | 8 | Knowing the engine types | Basic engine nomenclature, engine classification  | Theoretical lecture + practical experience | Paper test + practical test |
| 2 | 8 | Knowing the Four – stroke cycle and spark – ignition engine | Four – stroke cycle spark – ignition engine and its components, four – stroke cycle compression ignition engine and its components  | Theoretical lecture + practical experience | Paper test + practical test |
| 3 | 8 | Knowing the Two – stroke cycle types | Two – stroke cycle spark – ignition engine, Two – stroke cycle compression – ignition engine, comparison of two stroke and four stroke engine.  | Theoretical lecture + practical experience | Paper test + practical test |
| 4,5 | 8 | Knowing the Valves timing for 4- stroke cycle & 2-stroke cycle | Valves timing for 4- stroke cycle spark – ignition engine andfour – stroke cycle compression ignition engine, variable valve timing [VVT, CVVT]. Valves timing for 2- stroke cycle spark – ignition engine and 2- stroke cycle compression – ignition engine, Scavenging systems for 2- stroke engines. | Theoretical lecture + practical experience | Paper test + practical test |
| 6-7-8 | 8 | Knowing the Engine performance and testing | Engine performance and testing , performance parameters for 4- stroke engine and 2- stroke engine, basic measurements indicators. Illustrative examples | Theoretical lecture + practical experience | Paper test + practical test |
| 9-2-11 | 8 | Calculate the performance of engines. | Performance of S. I. Engine, performance of C. I. Engine,effect of variable compression ratio on engine performance. Effect of strength mixture (Fr) on engine performance factors  | Theoretical lecture + practical experience | Paper test + practical test |
| 12 | 8 | Calculate the engine heat balance | Engine heat balance sheet. Illustrative examples  | Theoretical lecture + practical experience | Paper test + practical test |
| 13 | 8 | Study the combustion | Combustion – Combustion equations, heat of combustion - Theoretical flame temperature - chemical equilibrium and dissociation - Theories of Combustion - Pre-flame reactions - Reaction rates. Combustion in S. I. Engines, stages of combustion in S. I. Engine | Theoretical lecture + practical experience | Paper test + practical test |
| 14 | 8 | Study the effect of engine variables on combustion | Effect of engine variable on stages of combustion in S. I. Engine. Flame structure and speed, Cycle by cycle variations, Lean burn combustion, stratified charge combustion systems.  | Theoretical lecture + practical experience | Paper test + practical test |
| 15,16 | 8 | Knowing the knocking in engines | Detonation or knocking in S. I. Engine, what, why, control, & octane, effects of detonation, Control of duration, pre-ignition, effect of pre-ignition on engine. | Theoretical lecture + practical experience | Paper test + practical test |
| 2025 | 8 | Study the combustion in S.I. engines | S.I. engine combustion chamber designs | Theoretical lecture + practical experience | Paper test + practical test |
| 18,19 | 8 |  | Carburetion in S. I. Engine, Gasoline - air mixtures. Mixture requirements - Mixture formation - Carburetor, Chokes. Simple carburetor – calculation of the Air-fuel ratio for a simple carburetor, design of carburetor, venture size, fixed venturi and variable venturi and constant vacuum types, | Theoretical lecture + practical experience | Paper test + practical test |
| 20 | 8 | Study the injection system in engines | Injection fuel systems in S.I. engine, Pneumatic and Electronic Fuel Injection Systems, Ignition systems requirements, Timing Systems, breaker mechanism. Gasoline Injection – TBI, MPFI, GDI and Air-assisted Injection, Engine Management System, Mono point, Multi point, Direct injection systems and Air assisted systems – Principles and Features, Idle speed, lambda, knock and spark timing control. | Theoretical lecture + practical experience | Paper test + practical test |
| 21 | 8 | Study the functions and types of sensors | Sensors for Air flow, Pressure, Temperature, Speed, Exhaust Oxygen, Knock and Position in engine management systems – Principle of operation, construction and characteristics. | Theoretical lecture + practical experience | Paper test + practical test |
| 22 | 8 | Study the Combustion in C. I engines | Combustion in C. I engines, stages of combustion in C.I. engine, variable affecting, stages of combustion  | Theoretical lecture + practical experience | Paper test + practical test |
| 23 | 8 | Know the Diesel knocking | Diesel knock methods of controlling diesel knock | Theoretical lecture + practical experience | Paper test + practical test |
| 24 | 8 | Study the design of combustion chamber | C. I. Engine combustion chamber designs, Stages of combustion, vaporization of fuel droplets and spray formation, air motion, swirl measurement,  | Theoretical lecture + practical experience | Paper test + practical test |
| 25 | 8 | Study the fuel injection in C.I. engines | Fuel injection in C. I. Engine, requirements of diesel injection system, types of injection systems, types of fuel injectors and nozzles  | Theoretical lecture + practical experience | Paper test + practical test |
| 26 | 8 | Study the fuel specifications | Fuel, specification, fuels for S. I. Engines, Octane number requirement, additives, fuels for C. I. Engine, cetane number requirement, additives, alternate fuels. Fuel – Quality standards for Automotive Engines – Lead free gasoline, low and ultra – low sulphur diesels, LPG, CNG, Alcohols, Biodiesels, FT diesels, hydrogen. | Theoretical lecture + practical experience | Paper test + practical test |
| 27 | 8 | Study the Effect of supercharging on performance of the engine | Effect of supercharging on performance of the engine supercharging tipster- and supercharging, operation of turbocharger. Intercooling, Practical considerations for SI and CI engines  | Theoretical lecture + practical experience | Paper test + practical test |
| 28 | 8 | Study the effect of additives on lubrication in engines | Engine friction and lubrication, additives  | Theoretical lecture + practical experience | Paper test + practical test |
| 29 ,30 | 8 | Study the pollution and emissions from engines | Pollutants from S. I. Engine, effect of engine maintenance on exhaust emissions, emissions control. Diesel emissions, diesel smoke and its control comparison diesel and gasoline emissions, Current trends in engine technology - Multi-valving, Tuned manifolding, camless valve gearing, EGR, Part-load charge stratification in GDI systems, Current materials and production processes for engine components, Hybrid electric vehicular piston engines and their characteristics. Noise pollution, EMISSION MEASUREMENT, EMISSION CONTROL, Engine Design modifications, fuel modification, evaporative emission control, EGR, air injection, thermal reactors, Water Injection, catalytic converters, Common rail injection system, Particulate traps, Nox converters, SCR systems. GDI and HCCI concepts.  | Theoretical lecture + practical experience | Paper test + practical test |

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| 12. Infrastructure |
| Required reading:CORE TEXTSCOURSE MATERIALS OTHERS | A systematic book on the studied subjects and any new lectures prepared by the instructor on the subject. |
| Special requirements (include for example workshops, periodicals, IT software, websites) | Books, periodicals, software and modern websites related to the subject. |
| Community-based facilities (include for example, guest Lectures, internship, field studies) | Recent research and scientific journals in the field of competence.The sites of universities, institutes and specialized research centers, engineering and technical sites, as well as the sites of major car companies in the world. |

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| 13. Course Development Plan |
| Searching for the latest scientific developments in this subject, and collecting scientific material on modern car systems, as well as finding sufficient sources about developments in car technology, and hybrid cars in order to add them to the curriculum in a way that serves its development and keeping pace with the development in automotive science. |
| Pre- requests |  |
| Minimum number of students | 60 |
| Maximum number of students | 120 |