Course description template
The first level / first semester
Principles of air conditioning

Course description

Introducing the student to the basic principles of the air conditioning process, related procedures, calculations, and applications on the air properties chart.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Principles of Air Conditioning/PMTR136
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the principles of air conditioning course is:

- Providing the student with basic information about the principles of air conditioning
- Introducing the student to the calculations of air conditioning operations
- Introducing the student to the applications of air conditioning operations
- The student applies the air conditioning process to the air properties diagram
- Meeting the needs of multiple sectors in the field of air conditioning with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

- Make the student able to know and understand the principles of air conditioning.
- Make the student able to know and understand air conditioning processes through the use of air properties diagram.
- Enable students to obtain knowledge and understanding of scientific laws and practical applications in the field of air conditioning.

B. The skills objectives of the course.

- Sound scientific research skills, constructive scientific discussions, and expressing opinions.
- Use and development skills.
- Thinking skills that enable the student to understand and solve scientific problems related to air conditioning operations.
- The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.
• Applying theoretical topics practically in various educational laboratories
• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of air conditioning.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First + second	4	Principles of thermodynamics, Property, State, Temperature (dry and wet), Absolute temperature, Thermometers, Pressure (atmospheric, gauge, absolute), Pressure gauges, Heat (sensible and latent)	Principles of thermodynamics, Property, State, Temperature (dry and wet), Absolute temperature, Thermometers, Pressure (atmospheric, gauge, absolute), Pressure gauges, Heat (sensible and latent)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Third	4	Air properties, Specific volume, Specific humidity, Relative humidity, Dew point, Enthalpy, Air Conditioning	Air properties, Specific volume, Specific humidity, Relative humidity, Dew point, Enthalpy, Air Conditioning	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourth + fifth	4	Dalton's law, Psychrometric properties calculation (Specific humidity, Relative humidity, Enthalpy, Pressure and Temperature)	Dalton's law, Psychrometric properties calculation (Specific humidity, Relative humidity, Enthalpy, Pressure and Temperature)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
VI	4	Psychrometric chart	Psychrometric chart	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Seventh + eighth	4	Psychrometric chart using for (Air mixing process, Sensible cooling, Sensible heating)	Psychrometric chart using for (Air mixing process, Sensible cooling, Sensible heating)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Ninth + tenth	4	Cooling and dehumidification, Sensible heat factor, By-pass factor, Contact factor	Cooling and dehumidification, Sensible heat factor, By-pass factor, Contact factor	Theoretical and practical	Class and homework assignments, weekly and monthly

					exams
Eleventh + twelfth	4	Humidification, Cooling and humidification, Heating and humidification, Steam injection, Humidification efficiency	Humidification, Cooling and humidification, Heating and humidification, Steam injection, Humidification efficiency	Theoretical and practical	Class and homework assignments, weekly and monthly exams
thirteenth + fourteenth	4	Actual air conditioning processes, Air-mixing and cooling with dehumidification and with reheat or without reheat, preheating of air and Humidification with reheat	Actual air conditioning processes, Air-mixing and cooling with dehumidification and with reheat or without reheat, preheating of air and Humidification with reheat	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fifteenth	4	Thermal comfort requirements in space, Comfort charts, Inside and outside design condition	Thermal comfort requirements in space, Comfort charts, Inside and outside design condition	Theoretical and practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	**1.** Air conditioning Engineering by W.P. Jones **2.** Refrigeration and Air Conditioning by W. F. Stoecker, J. W. Jones **3.** Refrigeration and Air Conditioning by C. P. Arora **4.** Refrigeration and Air Conditioning by G. F. Hundy, A. R. Trott, T. C. Welch **5.** مبادئ التبريد والتكييف، عدنان ريكان موسى، حيان عبد الغني عبد الزهرة **6.** مبادئ هندسة تكييف الهواء والتثليج، د. خالد احمد الجودي
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to air conditioning • The presence of a laboratory specializing in air conditioning principles
(Scientific journals, reports, ...)	Websites concerned with air conditioning fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
The first level / first semester
Fluid mechanics

Course description

Introducing the student to concepts and definitions. Fluid statics. Conservation of mass, momentum and energy. Bernoulli equation. Viscous flow, pipe flow, pipe losses.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Fluid mechanics/PMTR140
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the fluid mechanics course is:

• Providing the student with basic information about fluid mechanics
• Introducing the student to the laws of conservation of mass, momentum and energy
• Introducing the student to calculations of viscous flow, pipe flow, and losses in pipes
• Meeting the needs of multiple sectors in the field of fluid mechanics with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

• Make the student able to know and understand fluid mechanics
• Make the student able to know and understand the processes of fluid mechanics through the use of the law of conservation of mass, momentum and energy.
• Enable students to obtain knowledge and understanding of scientific laws and practical applications in the field of fluid statics.

B. The skills objectives of the course.

• Sound scientific research skills, constructive scientific discussions, and expressing opinions.
• Use and development skills.
• Thinking skills that enable the student to understand and solve scientific problems related to the laws of fluid mechanics.
• The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.

• Applying theoretical topics practically in various educational laboratories
• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of fluid mechanics.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First	4	Introduction to Fluid Mechanics (Definition, Properties of fluid, steady flow)	Introduction to Fluid Mechanics (Definition, Properties of fluid, steady flow)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Second	4	Fluid static, Pressure of a certain depth	Fluid static, Pressure of a certain depth	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Third	4	Specific gravity, Viscosity (Newton's law of Viscosity, Types of fluids), effect of temperature on viscosity, effect of pressure on viscosity	Specific gravity, Viscosity (Newton's law of Viscosity, Types of fluids), effect of temperature on viscosity, effect of pressure on viscosity	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourth	4	Pressure Measurement (Boarder gage, Piezometer, manometer, Pitot)	Pressure Measurement (Boarder gage, Piezometer, manometer, Pitot)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fifth	4	Floating and submerged calculation	Floating and submerged calculation	Theoretical and practical	Class and homework assignments, weekly and monthly exams
VI + Seventh	4	Continuity equation with application	Continuity equation with application	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Eighth + Ninth	4	Bernoulli's equation with application	Bernoulli's equation with application	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Tenth + Eleventh	4	Energy equation with application	Energy equation with application	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Twelfth + Thirteenth	4	Momentum equation with application	Momentum equation with application	Theoretical and practical	Class and homework assignments, weekly and monthly exams

Fourteenth + Fifteenth	4	Flow in pipes (parallel and series losses in pipes), Friction losses in pipes, Pumps connection	Flow in pipes (parallel and series losses in pipes), Friction losses in pipes, Pumps connection	Theoretical and practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	**1.** Fluid Mechanics, Frank M. White, McGraw-Hill, 2011 **2.** Fundamentals of Fluid Mechanics by B.R. Munson, D.F. Young and T. H. Okiishi **3.** Schaum's Outline of Fluid Mechanics by Potter, Merle and Wiggert
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to fluid mechanics • The presence of a laboratory specializing in fluid mechanics
(Scientific journals, reports, ...)	Websites concerned with fluid mechanics fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
The first level / first semester
Principles of thermodynamics

Course description

Introducing the student to information about the basic principles of thermodynamics, the first law, and the second law of thermodynamics.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Principles of thermodynamics/PMTR137
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Thermodynamics course is:

• Providing the student with basic information about the principles of thermodynamics
• Introducing the student to the laws of thermodynamics
• Introducing the student to the calculations of the first and second laws of thermodynamics
• Meeting the needs of multiple sectors in the field of thermodynamics with highly qualified personnel

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

• Make the student able to know and understand the principles of thermodynamics.
• Make the student able to know and understand the processes of thermodynamics through the use of the first and second laws.
• Enable students to obtain knowledge and understanding of scientific laws and practical applications in the field of thermodynamics.

B. The skills objectives of the course.

• Sound scientific research skills, constructive scientific discussions, and expressing opinions.
• Use and development skills.
• Thinking skills that enable the student to understand and solve scientific problems related to the laws of thermodynamics.
• The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.
• Applying theoretical topics practically in various educational laboratories
• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of thermodynamics.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First + second + Third	4	Thermodynamic term-measuring devices-properties- state – process- cycles – density and specific volume – the pressure (gage, vacuum, and absolute)- temperature relations (Celsius, Kelvin and ranking scale)	Thermodynamic term-measuring devices-properties- state – process- cycles – density and specific volume – the pressure (gage, vacuum, and absolute)- temperature relations (Celsius, Kelvin and ranking scale)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourth + Fifth + VI	4	Energy- renewable energy-resources (solar energy, wind energy, energy of water falling, tidal energy)- hydrocarbons source (oil & gas)-form of energy used in thermodynamic-potential energy-kinetic energy-heat-work. Internal energy-flow work.	Energy- renewable energy-resources (solar energy, wind energy, energy of water falling, tidal energy)- hydrocarbons source (oil & gas)-form of energy used in thermodynamic-potential energy-kinetic energy-heat-work. Internal energy-flow work.	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Seventh + eighth	4	First law of thermodynamics-flow system, non- flow system –steady –un steady –open –closed. examples.	First law of thermodynamics-flow system, non- flow system –steady –un steady –open –closed. examples.	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Ninth + Tenth + Eleventh	4	Applications of the first law on nozzle, diffuser, condenser, evaporator, compressor, heat exchanger (surface, open), turbine, boiler. examples.	Applications of the first law on nozzle, diffuser, condenser, evaporator, compressor, heat exchanger (surface, open), turbine, boiler. examples.	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Twelfth + thirteenth	4	Thermodynamic process undergoing at constant (pressure, volume, temperature, enthalpy)- polytrophic	Thermodynamic process undergoing at constant (pressure, volume, temperature, enthalpy)- polytrophic	Theoretical and practical	Class and homework assignments, weekly and monthly

		process- with representation on a(P-V), (T-S) &(P-H) diagram.	process- with representation on a(P-V), (T-S) &(P-H) diagram.		exams
Fourteenth + Fifteenth	4	The second law of thermodynamics, statement of the second law, heat engine, heat pump, Entropy, Isentropic efficiency	The second law of thermodynamics, statement of the second law, heat engine, heat pump, Entropy, Isentropic efficiency	Theoretical and practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	**1. "Fundamentals of Thermodynamics", Sonntag, Borgnakke and Van Wylen.** **2. "Thermodynamics: An Engineering Approach" by Cengel, Y. A., and Boles, M. A.** **3. " Engineering thermodynamics" by G. Boxer**
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to thermodynamics • The presence of a laboratory specializing in thermodynamics principles
(Scientific journals, reports, ...)	Websites concerned with thermodynamics fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
The first level / first semester
Principles of electrical technology

Course description

The course aims to provide the student with the scientific and practical foundations of electrical and machinery techniques, which the student will later use when practicing his specialty.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Principles of electrical technology /PMTR142
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Electrical Technology course is:

• Providing the student with the scientific and practical foundations of electrical technologies
• Introducing the student to the electrical machines used
• Providing the student with the necessary skills that he will use later when practicing his specialty
• Meeting the needs of multiple sectors in the field of electricity technology with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

• Make the student able to know and understand electrical technology
• Make the student able to know and understand the operations of the scientific and practical foundations of electrical technology.
• Enable students to obtain skills and understanding of scientific laws and practical applications in the field of electrical technologies

B. The skills objectives of the course.

• Sound scientific research skills, constructive scientific discussions, and expressing opinions.
• Use and development skills.
• Thinking skills that enable the student to understand and solve scientific problems related to the laws of electrical machines.
• The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.
• Applying theoretical topics practically in various educational laboratories
• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of electrical technologies.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First	4	Electrical units, symbols, and various measuring devices	Electrical units, symbols, and various measuring devices	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Second	4	Potential difference - Ohm's law - connecting series, parallel and mixed resistors	Potential difference - Ohm's law - connecting series, parallel and mixed resistors	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Third	4	Practical examples of solving electrical circuits	Practical examples of solving electrical circuits	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourth	4	Ways to obtain alternating current - types of electrical power plants	Ways to obtain alternating current - types of electrical power plants	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fifth	4	Sine wave – the waveform of a current over time	Sine wave – the waveform of a current over time	Theoretical and practical	Class and homework assignments, weekly and monthly exams
VI	4	Electromagnetism - field properties - magnetic materials and their types	Electromagnetism - field properties - magnetic materials and their types	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Seventh +	4	Magnetic hysteresis, its harms, and ways to reduce it	Magnetic hysteresis, its harms, and ways to reduce it	Theoretical and practical	Class and homework assignments, weekly and

					monthly exams
Eighth	4	Single-phase AC motors	Single-phase AC motors	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Ninth	4	Three-phase alternating current - a method for distinguishing phases and types of connection	Three-phase alternating current - a method for distinguishing phases and types of connection	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Tenth	4	Star connection - triangle connection - plate current - line current - face voltage - line voltage and power	Star connection - triangle connection - plate current - line current - face voltage - line voltage and power	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Eleventh	4	Examples of star and triangle connections	Examples of star and triangle connections	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Twelfth	4	Electrical transformers - theory of operation and components - laws of transformation - cross-sectional drawing - types	Electrical transformers - theory of operation and components - laws of transformation - cross-sectional drawing - types	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Thirteenth	4	Three-phase alternating current motors, their advantages and disadvantages - their types - their uses	Three-phase alternating current motors, their advantages and disadvantages - their types - their uses	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourteenth	4	The working principle of three-phase motors and methods of starting the movement	The working principle of three-phase motors and methods of starting the movement	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fifteenth	4	Methods for	Methods for	Theoretical	Class and

		controlling engine speed changes - methods used to identify engine malfunctions and maintain them	controlling engine speed changes - methods used to identify engine malfunctions and maintain them	and practical	homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	**1. Electrical Technology, by Theraga** **2. Electrical Technology, by Hughes** **3. Electrical Technology, by Erick** **4. Electrical installation work, by Francis**
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to electrical techniques • The presence of a laboratory specializing in electrical techniques principles
(Scientific journals, reports, ...)	Websites concerned with electrical techniques fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
The first level / first semester
Principles of engineering drawing

Course description

Preparing the student to be able to deal with the drawing language, understand engineering plans and implement them.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Principles of engineering drawing /PMTR143
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(3 practical) per week * 15 weeks = 45 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Engineering Drawing course is:

- Providing the student with basic information about engineering drawing
- Introducing the student to drawing lines and their types
- Providing the student with the necessary skills to understand and implement engineering plans
- Meeting the needs of multiple sectors in the field of engineering drawing with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

- Make the student able to know and understand the principles of engineering drawing.
- Make the student able to know and understand fonts and their types.
- Enable students to obtain the skills necessary to understand engineering drawings.

B. The skills objectives of the course.

- Sound scientific research skills, constructive scientific discussions, and expressing opinions.
- Use and development skills.
- Thinking skills that enable the student to understand engineering drawings.
- The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

- Theoretical lectures and practical training in laboratories.
- Applying theoretical topics practically in various educational laboratories
- Summer training

• Graduation research
• Scientific visits to various engineering projects related to the field of engineering drawings.

Evaluation methods
• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practic

C. Emotional and value-based goals
• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods
• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods
• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).
• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods
• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods
• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First	3	The importance of engineering drawing - tools used - measuring drawing boards - zooming in and out - data table - types of lines in engineering drawing	The importance of engineering drawing - tools used - measuring drawing boards - zooming in and out - data table - types of lines in engineering drawing	Practical	Class and homework assignments, weekly and monthly exams
Second	3	Writing letters and numbers in Arabic and English	Writing letters and numbers in Arabic and English	Practical	Class and homework assignments, weekly and monthly exams
Third	3	Geometric operations include: - Drawing a perpendicular straight line and bisector of another straight line, dividing a straight line into several equal sections, finding the center of a known arc or a known circle, drawing an arc with a known radius that touches two known circles from the outside, drawing an arc with a known radius that touches two known circles from the inside (drawing Two paintings) - drawing an arc with a known radius that touches a known circle and a straight line, drawing an arc with a known radius that touches two circles from the inside, drawing a straight line	Geometric operations include: - Drawing a perpendicular straight line and bisector of another straight line, dividing a straight line into several equal sections, finding the center of a known arc or a known circle, drawing an arc with a known radius that touches two known circles from the outside, drawing an arc with a known radius that touches two known circles from the inside (drawing Two paintings) - drawing an arc with a known radius that touches a known circle and a straight line, drawing an arc with a known radius that touches two circles from the inside, drawing a straight line	Practical	Class and homework assignments, weekly and monthly exams

		that touches two circles from the outside (drawing a painting)	that touches two circles from the outside (drawing a painting)		
Fourth	3	Drawing regular polygons, drawing polygons using the general method, drawing regular pentagons (panel drawing) - applications to engineering operations	Drawing regular polygons, drawing polygons using the general method, drawing regular pentagons (panel drawing) - applications to engineering operations	Practical	Class and homework assignments, weekly and monthly exams
Fifth	3	Individuals of simple geometric surfaces (cylinder, cone, pyramid) Individuals of truncated surfaces (drawing three panels) - Methods of drawing simple perspective, drawing a panel that includes two simple perspectives, one at a 30 degree angle and the other at a 45 degree angle	Individuals of simple geometric surfaces (cylinder, cone, pyramid) Individuals of truncated surfaces (drawing three panels) - Methods of drawing simple perspective, drawing a panel that includes two simple perspectives, one at a 30 degree angle and the other at a 45 degree angle	Practical	Class and homework assignments, weekly and monthly exams
VI	3	Methods of setting dimensions in an engineering manner: Drawing a painting that includes two perspectives while setting the dimensions - drawing the perspective of the circle (oval shape) at a 30-degree angle	Methods of setting dimensions in an engineering manner: Drawing a painting that includes two perspectives while setting the dimensions - drawing the perspective of the circle (oval shape) at a 30-degree angle	Practical	Class and homework assignments, weekly and monthly exams
Seventh	3	Drawing complex perspective that contains an ellipse at an angle of 30 degrees (drawing two panels) - Drawing complex perspective (illustrating methods for moving centers) (drawing two panels)	Drawing complex perspective that contains an ellipse at an angle of 30 degrees (drawing two panels) - Drawing complex perspective (illustrating methods for moving centers) (drawing two panels)	Practical	Class and homework assignments, weekly and monthly exams
Eighth	3	Explaining the theory of projection, drawing projections for a	Explaining the theory of projection, drawing projections for a	Practical	Class and homework assignments,

		simple perspective (drawing two paintings) - drawing three projections for a relatively complex perspective	simple perspective (drawing two paintings) - drawing three projections for a relatively complex perspective		weekly and monthly exams
Ninth	3	Drawing projections of complex perspectives (two panels)	Drawing projections of complex perspectives (two panels)	Practical	Class and homework assignments, weekly and monthly exams
Tenth	3	Drawing perspective from the three projections - Drawing the perspective from two projections and then deducing the third projection	Drawing perspective from the three projections - Drawing the perspective from two projections and then deducing the third projection	Practical	Class and homework assignments, weekly and monthly exams
Eleventh	3	The theory of cutting in bodies and its importance in engineering drawing, the angle of insertion, types of cutting lines, parts that are not cut (drawing a painting that includes the cut projections)	The theory of cutting in bodies and its importance in engineering drawing, the angle of insertion, types of cutting lines, parts that are not cut (drawing a painting that includes the cut projections)	Practical	Class and homework assignments, weekly and monthly exams
Twelfth	3	Drawing projections from complex perspective	Drawing projections from complex perspective	Practical	Class and homework assignments, weekly and monthly exams
Thirteenth	3	Drawing perspective after cutting in different directions	Drawing perspective after cutting in different directions	Practical	Class and homework assignments, weekly and monthly exams
Fourteenth + Fifteenth	3	Drawing a painting that includes perspective and its projections after cutting	Drawing a painting that includes perspective and its projections after cutting	Practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	1. **Engineering drawing by Cousins 1966.** 2. **Engineering drawing by A. W. Boundy.** 3. **Engineering drawing B. Dash Sharma.** 4. **Technical drawing by Blackie.**
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to engineering drawing • The presence of a laboratory specializing in engineering drawing principles
(Scientific journals, reports, ...)	Websites concerned with engineering drawing fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / First semester
Engineering mechanics

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Engineering mechanics / PMTA126
5- Available forms of attendance	Mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical +2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:

The aim of studying the principles of Engineering mechanics course is:

- Providing the student with basic information about the principles of Engineering mechanics
- Introducing the student to the use of Engineering mechanics
- in other scientific topics and increasing his ability to think logically when solving exercises.
- As well as increasing his ability and how to link data with his information to obtain a solution to the problem.
- As well as increasing his ability and how to link data with his information to obtain a solution to the problem.

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

- Introducing the student to force , resolution and resultant Moment of the force & applications , Couples , applications.
- Moment of inertial , definition , single area.
- Dynamics science definition the Newton's second law and application.
- Curvilinear motion low's & applications.

Teaching and learning methods

- Theoretical lectures and the solution of various exercises by the subject professor
- Students' daily participation in solving class exercises.
- Giving homework to students.
- Applying theoretical topics practically in various areas of life and student research.

- Theoretical lectures and practical training.
- Applying theoretical topics practically in various educational problems.
- Summer training
- Graduation research

Evaluation methods

- Daily written tests
- Submitting weekly reports on the practical experiments carried out by the student
- Monthly and theoretical tests (theory and practical)

- Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

- Learning how to deal with others and work in a team spirit.
- Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

- Adherence to theoretical and practical lecture schedules..
- Implementation of projects by students.
- E-learning.

Evaluation methods

- Follow up on attendance and absence.
- Theoretical and practical tests
- Monitoring behavior and behavior inside the classroom.
- Follow up on attendance at training sites and the extent of benefit.
- Submitting and discussing reports.
- Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

- Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
- Developing the student's ability to transfer information to practical reality after graduation.
- Developing the student's ability to find appropriate solutions.

Teaching and learning methods

- Using modern technologies in the automotive field.
- Competitive tests between groups of students for one section

Evaluation methods

- Extracurricular activities and homework.
- Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Introduction & topics of mechanics	2	1
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Definition of mechanics science & the branches basic quantities & units , Applications by using mechanics in the life	2	2
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Force , resolution and resultant	2	3
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Victors	2	4
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	analytic + applications	2	5
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Moment of the force & applications	4	6
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Couples , applications	4	7
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Equilibrium , definition & the conditions and applications	4	8
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Free body diagram , procedure of the drawing ””F.B.D	2	9
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Friction , theory and applications types of the friction , coefficient of friction , angle of friction	2	10
Classwork, homework, weekly and monthly	Theoretical	Engineering mechanics	Center of gravity & centroid applications ,	2	11

exams			lines		
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Center of gravity &centeroid , application , single area	2	12
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Moment of inertial , definition , single area	2	13
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	Moment of inertial , application	2	14
Classwork, homework, weekly and monthly exams	Theoretical	Engineering mechanics	parallel axis theory	2	15

Practical part

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	practical	Engineering mechanics	Define the laboratory and the method of writing especial report	2	1
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	The Brinel hardness test	2	2
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	The Vickers hardness test	2	3
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	The Rockwell hardness test	2	4
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Hardening metals with carbon and an ailing	2	5
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Measure Injecting with cold shaping	4	6
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	The impact test for the metals	4	7
Classwork, homework, weekly and monthly	Practical	Engineering mechanics	Practical examine to the students	4	8

exams					
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	The impact test for the plastics	2	9
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Drawing the coils	2	10
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Tension test	2	11
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Compression test	2	12
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Torsion test	2	13
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Bending test	2	14
Classwork, homework, weekly and monthly exams	Practical	Engineering mechanics	Practical examine to the students	2	15

12. Infrastructure

Required textbooks

1- Holzner, Steven (December 2005). Physics for Dummies. Wiley, John & Sons, Incorporated. p. 64. ISBN 978-0-7645-5433-9
2- Beer, F.P.; Johnston Jr, E.R.; Eisenberg (2009). Vector Mechanics for Engineers: Statics, 9th Ed. McGraw Hill. ISBN 978-0-07-352923-3.
3- -Hanaor, D.; Gan, Y.; Einav, I. (2016). "Static friction at fractal interfaces". Tribology International. 93: 229–238.
4- Meriam, J. L.; Kraige, L. G. (2002). Engineering Mechanics (fifth ed.). John Wiley & Sons. p. 328. ISBN 978-0-471-60293-4.
5- Hibbeler, R. C. (2007). Engineering Mechanics (Eleventh ed.), Pearson, Prentice Hall. p. 393. ISBN 978-0-13-127146-3.
6- Engineering mechanics Ferdinand L. Singer third edition. Harber and P. Ow. Publisher inc.

The main references (sources)	**the scientific books in the Free Education Division**
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Engineering mechanics 2. The presence of a laboratory specializing in Engineering mechanics
B - Electronic references, Internet sites...	Sites concerned with Engineering mechanics

13. Course development plane

- Keeping pace with scientific development in the field of specialization with every new development.
- Updating lectures.
- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / First semester
Principles of Mathematics

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Principles of Mathematics / **TIMO110**
5- Available forms of attendance	Mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical) per week * 15 weeks = 30 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the principles of Principles of Mathematics course is:

- Providing the student with basic information about the principles of Principles of Mathematics.
- Introducing the student to the use of mathematics in other scientific topics and increasing his ability to think logically when solving exercises.

- As well as increasing his ability and how to link data with his information to obtain a solution to the problem.
- As well as increasing his ability and how to link data with his information to obtain a solution to the problem.

10. Course outcomes and teaching, learning and evaluation methods

B- Cognitive objectives

- Introducing the student to matrices, determinants, and their properties.
- Introducing the student to solving linear equations, linear equations, Cramer's method, applications, arc analysis, vectors, methods for measuring and calculating internal combustion engine performance parameters.
- Introducing the student to space vectors, analysis of limits, types of vectors, quantities, standard vector algebra, vector arithmetic operations.
- Introducing the student to the various types of engineering functions and how to use them.
- Introducing the student to the details, the derivative, the derivative of algebraic functions, applications of the chain rule, and the implicit function.
- Introducing the student to the foundations of integration, indefinite integration, and integration of algebraic functions.

B - The skills objectives of the course.

- Applications on the derivative (slope equation, perpendicular, velocity and acceleration), increase, decrease, maximum and minimum limits, inflection points, function graph.

Teaching and learning methods

- Theoretical lectures and the solution of various exercises by the subject professor
- Students' daily participation in solving class exercises.
- Giving homework to students.
- Applying theoretical topics practically in various areas of life and student research.

- Theoretical lectures and practical training.
- Applying theoretical topics practically in various educational problems.
- Summer training
- Graduation research

Evaluation methods

- Daily written tests
- Submitting weekly reports on the practical experiments carried out by the student
- Monthly and theoretical tests (theory and practical)
- Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

- Learning how to deal with others and work in a team spirit.
- Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

- Adherence to theoretical and practical lecture schedules..
- Implementation of projects by students.
- E-learning.

Evaluation methods

- Follow up on attendance and absence.
- Theoretical and practical tests
- Monitoring behavior and behavior inside the classroom.
- Follow up on attendance at training sites and the extent of benefit.
- Submitting and discussing reports.
- Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

- Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
- Developing the student's ability to transfer information to practical reality after graduation.
- Developing the student's ability to find appropriate solutions.

Teaching and learning methods

- Using modern technologies in the automotive field.
- Competitive tests between groups of students for one section

Evaluation methods

- Extracurricular activities and homework.
- Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Applying theoretical topics practically in various areas of life and student research	2	1
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Solving linear equations Linear equations, Cramer's method, applications, arc analysis	2	2
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Vectors, analysis of limits, types of vectors, quantities, standard vectors, curve algebra, vector arithmetic operations	2	3
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Logarithm, definition of logarithm, laws of logarithm and how to use them, solving logarithmic equations	2	4
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Trigonometric ratios and the relationship between them, some laws in trigonometric ratios, the function, the meaning of the function, the independent and dependent variables, the explicit function, the implicit function	2	5
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Measurements, the purpose of trigonometric and algebraic functions	4	6
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Applications of linear speed, areas	4	7

Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Details, derivative, derivative of algebraic functions, applications of the implicit function chain rule	4	8
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Higher order derivative, derivative of the exponential function, derivative of the logarithmic function	2	9
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Derivative of trigonometric functions, derivative of circular functions	2	10
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Partial differentiation	2	11
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Applications on the derivative (slope equation, perpendicular, velocity and acceleration)	2	12
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Derivative applications (instantaneous change)	2	13
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Increasing, decreasing, maximum and minimum limits, inflection points, graphing the function	2	14
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Mathematics	Integration, indefinite integration, integration of algebraic functions	2	15

12. Infrastructure

Required textbooks

1-Panal calter “Technical Mathematics”

2- Murray R. “ Mathematical handbook”

3- Shantinarayam “ Engineering Mathematics part 1 – 1987”

4- Garlick B. “ Technical Mathematics” 1981.

The main references (sources)	**the scientific books in the Free Education Division**
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Engineering Mathematics 2. The presence of a laboratory specializing in Engineering Mathematics
B - Electronic references, Internet sites...	Sites concerned with Engineering Mathematics

13. Course development plane

- Keeping pace with scientific development in the field of specialization with every new development.
- Updating lectures.
- Using modern methods in education

Course Description Form

First Level / First Semester

Computer Principles

Course Description

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, proving whether he or she has made the most of the available learning opportunities. It must be linked to the description of the programme.

1- Educational institution	**Northern Technical University**
2- Scientific Department / Center	**Technical Institute / Mosul**
3- Name of academic or vocational program	**Department of Power Mechanics**
4- Course Name / Code	**Computer PrinciplesTIMO114**
5- Available Attendance Forms	**Mandatory**
6- Semester / Year	**Decisions**
7- Number of Credit Hours (Total)	**(1 theoretical + 1 practical) per week * 15 weeks = 30 hours**
8-The history of prearation of this description	**14 / 1 / 2024**

9. Course Objectives

Preparing the student to be prepared to abide by the basic rules of dealing with the computer and managing it to help him in completing projects, printing matters, preparing statistics and graphs, creating presentations, engineering plans designs, etc., as well as providing him with the skills of dealing with Internet networks, electronic correspondence and web pages and avoiding the damage caused by them such as viruses and malicious programs.

10.Course Outcomes and Methods of Teaching, Learning and Assessment

A- Cognitive objectives

- Work on the student's comprehension of the material.
- The ability to analyze and apply what he has learned practically to the calculator .
- The evaluation should be carried out by presenting the material among students in the laboratory and then applying it by the students.

B - Skills objectives of the course.

- Direct questions and answers about the material.
- Analyze the student's ability to absorb through exercises, homework and reports.

Teaching and learning methods

Presenting the material on Power Point in the form of charts and pictures in order to attract the student's attention and help him not to feel bored . And the application of what has been presented on the calculator and conduct daily and monthly tests .

Evaluation methods

- Periodic and quarterly theoretical exams.
- Quizzes.
- Duties.

- Short reports and researches.

C. Emotional and value goals

- Providing the student with the skill of using the computer in a manner compatible with his need for each stage.
- Directing the student how to deal with the computer in proportion and achieve maximum benefit and avoid damage.

Teaching and learning methods

- Presentation of the material in the form of educational films
- Students are asked to conduct research and reports on the importance of using computers in our lives and using means of communication among themselves and make simple movies about that as well and discuss the reports

Evaluation methods

- Daily written tests
- Evaluate the student through his use of the computer and the implementation of practical issues on the computer
- Monthly and theoretical tests (theoretical and practical)
- Classroom participation and continuous evaluation of student performance

d . General and rehabilitative skills transferred (other skills related to employability and personal development).

- Encourage the student to write reports on the main topics.
- Urging the student to make practical projects on the calculator and make seminars among students.
- Urging the student to evaluate and correct the wrong answers in a way that creates a scientific problem and tries to solve it.

11. Course Structure

Evaluation method	Method of education	Unit / Subject Name	Required Learning Outcomes	Hours	Week
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Computer cycle phases, generations and data Information + computer features, areas of use and components	2	First
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Types of computers and their classification + computer components, physical parts and input devices and directing	2	Second
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Computer box and software entity + setup systems and personal computer	2	Third
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Computer platform and factors to consider when buying a computer + main features of the PC and class questions	2	Fourth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	The ethics of the electronic world, forms of abuse, computer security + computer software licenses And types of licenses	2	V
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Intellectual property and electronic penetration + electronic penetration and types of penetration	2	Sixth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	The most common sources of penetration and security risks + malware computer viruses	2	Seventh
Classroom and home assignments and weekly and	Theoretical and practical	Computer Principles	Damage caused by viruses and recipes + viruses The most important steps necessary to protect against penetration	2	Eighth

monthly exams					
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Components and types of viruses Computer damage to health and questions of the chapter + the beginning of the second semester Introduction to the definition of the operating system, its functions and objectives	2	Ninth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Operating system classification Examples of operating systems + Windows 7 operating system	2	X
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Requirements for installing it and desktop components (using the calculator to know its contents) + Start menu and its contents (using the calculator to know its contents)	2	Eleventh
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	New features of Windows 7+ taskbar (use calculator to find out its contents)	2	Twelfth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Media area (use the calculator to know its contents) + folders, files and icons	2	Thirteenth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	(Using the calculator to know its contents) + performing operations on the windows (using the calculator to know its contents)	2	Fourteenth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Computer Principles	Desktop backgrounds and control panel + (Using Calculator to navigate between Windows windows)	2	Fifteenth

12. Infrastructure

Computer Fundamentals and Office Applications Ministry of Higher Education and Scientific Research Research and Development Department	1 Required textbooks
Yusr Al-Mustafa Series for Science"Basics of Computer and Internet Office2010-2013, Dr. Ziad Muhammad Abboud, Dar Al-Dr. for Publishing and Distribution, Baghdad	2 Main references (sources)
Use some research **1.Encryption a text using affine cipher and hiding it in the colored image by using the Quantization stage,** Nada Abdul Aziz Mustafa ,Iraq, Baghdad, University of Baghdad, College of Languages **2.** The Effect of the Smoothing Filter on an Image Encrypted It in A BMP Image By the Blowfish Algorithm Then Hiding Nada Abdul Aziz Mustafa, Iraq, Baghdad, University of Baghdad, College of Languages **3.Computer literacy BASICS 2012, LeBlanc, Brandon." A closer look at the, windows 7. 2009** **4.Computing Fundamentals, Innovative training works USA, Inc, 2006**	Recommended books and references (scientific journals , reports ,....)
. Word 2010 Digital Classroom Book **https://www.agitraining.com/books/microsoft-office-books/word-2010-digital-classroom-book**	B Electronic references, websites ....

13. Course Development Plan

1- Increasing and updating the topics of the course and the progress in the field of computers and modern applications spread globally

2- Using applications that serve the student in his academic and professional life after graduation

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / First semester
English language

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	English language/First level/ntu101
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical) per week * 15 weeks = 30 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the principles of English language course is:

- Providing the student with the basic information about English grammar.
- Providing the student how to read correctly in English language.
- Introducing the student to learn English vowels.
- Enable the student to speak English fluently.

10. Course outcomes and teaching, learning and evaluation methods

Cognitive objectives:

- Enable the student to read correctly.
- Enable the student to learn the English grammar.
- Enable the student to speak correctly.

Teaching and learning methods

- Lectures.
- Apply theoretical topics practically.
- Summer training
- Graduation research.

Evaluation methods

- Daily written tests
- Submitting weekly reports on the practical experiments carried out by the student
- Monthly and theoretical tests (theory).

- Emotional and value goals

- Learning how to deal with others and work in a team spirit.
- Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

- Adherence to theoretical and practical lecture schedules.
- Working in laboratories .
- Implementation of projects by students.
- E-learning.

Evaluation methods

- Follow up on attendance and absence.
- Theoretical and practical tests
- Monitoring behavior and behavior inside the classroom.
- Follow up on attendance at training sites and the extent of benefit.
- Submitting and discussing reports.

- Transferable general and qualifying skills (other skills related to employability and personal development).

- Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
- Developing the student's ability to transfer information to practical reality after graduation.
- Developing the student's ability to find appropriate solutions.

Teaching and learning methods

Competitive tests between groups of students for one section

Evaluation methods

- Extracurricular activities and homework.
- Participation and discussion in the classroom.

11. Course Structure

NO.		Grammar	Vocabulary	Everyday English
1	Unit one Getting to know you	Tenses/; Present, past, future p6-8 Questions: Where were you born? p6-8 What do you do? Questions words: Who ... ?, Why ... ?, How much ... ? p7	Using a bilingual dictionary p9 Parts of speech: adjective, preposition p9 Words with more than one meaning	a book to read I booked a table. p9
2	Unit two The way we live	Present tenses Present Simple Most people live in the south. p14 Present Continuous What's he doing at the moment? p16 have/have got	We have a population of.. . p 15 Have you got a mobile phone? p16 Describing countries a beautiful country the coast This country exports wool. p14 Collocation Daily life listen to music talk to my friends	Making conversation Asking questions Showing that you're interested p21
3	Unit three It all went wrong	Past tenses Past Simple .He heard a noise What did you do last night? p23 Past Continuous A car was waiting. p24 Irregular verbs saw, went, told p23	Making connections breaklmend, lose/find p23 Nouns, verbs, and adjectives Suffixes to make different parts of speech discuss, discussion p28 Making negatives pack, unpack p28	Time expressions the eighth of January at six o'clock on Saturday in 1995 p29
4	Unit four	Quantity much and many	a shopkeeper, an old shop, the	Prices and shopping

	shopping Let's go	How much butter? How many eggs? p30 some and any some apples, any grapes p31 something, anyone, nobody, everywhere p32 a few, a little, a lot of p31 Articles	River Thames He sells bread. p33 Buying things milk, eggs, bread, a packet ,of crisps a can of Coke, ,shampoo, soap jumpers, ,department store antique shop, newsagent, ,trainers a tie, conditioner, first class stamps	1.99£ 160$ What's the exchange ?rate How much is a pair of jeans? p37
5	Unit five What do you Verb patterns 1	want to do? want/hope to do, enjoy/like doing p38 looking forward to doing, 'd like to do p38 Future intentions going to and will She's going to travel .the world I'll pick it up for you. p40	Hot verbs have, go, come have an accident go wrong come first p44	How do you feel? Nervous, fed up Cheer up !
6	Unit six Tell me! What's it like!	What's it like in Paris?/ Compartive& superlative adjectives big, bigger, biggest good, better, best p48	Talking about towns modern buildings, night-life p47 Money make money, inherit p50 Synonyms and antonyms lovely, beautiful, interested, bored p52	Directions farm, wood, pond opposite the car park over the bridge p53
7	Unit seven Famous couples	Present Perfect and Past Simple She has written 20 .novels He wrote 47 novels. p54 for and since	Bands and music guitar, keyboards make a record p57 Adverbs slowly, carefully, just, still, too p60	ladies and gentlemen p60 Short answers Do you like ?cooking .Yes, I do No, I don't. p61

		for three years since 1985 p56 Tense revision ?Where do you live How long have you ?lived there Why did you move? p56 Past participles lived, written p54	Word pairs this and that	
8	Unit eight Do's and don'ts have (got) to	You have to pay bills. I've got to go. p62 should You should talk to .your boss You shouldn't drink coffee at night. p64 must You must go to the dentist. p64Jobs receptionist, miner, chef p63	Travelling abroad visa, documents p64 Words that go together Verb + complement take responsibility, live abroad p68	At the doctor's a cold, the 'flu food poisoning a temperature a prescription p69
9	Unit nine Going places	Time and conditional clauses as soon as, when, while, until When we're in .Australia, we'll ? . ..What if If I pass my exams, I'll... p71	Hot verbs / take, get, do, make take a photo, get angry, do me a favour make up your mind p76	Hotels a double room, ground floor p76 In a hotel I'd like to make a .reservation Can I have a credit card number? p77
10	Unit ten Scared to death	Verb patterns 2 manage to do, used to do, go walking p78 Infinitives Purpose I went to the shops to buy some shoes. p80 what, etc. + infinitive I don't know what to say. p80 something, etc. + infinitive I need something to eat. p80	Shops post office bookshop p80 Describing feelings and situations frightening, frightened worrying, worried	Exclamations He was so !scared He's such an !Idiot I've spent so much money! p85

11	Unit eleven Things that Passives	changed the Coca- Cola is enjoyed all .over the world world It was Invented In 1886. p86-9 participles Verbs and past grown, produced p87	Verbs and nouns that go together tell a story, keep a promise p89 Notices	Keep off the grass Out of order p93
12	Unit twelve Dreams and Second conditional	reality If I were a princess, I'd live In a castle. p94 p94 might I might go to America. p96-97	Phrasal verbs go away, take off your coat The plane took .off .I gave up my job Take them off. p100 Social expressions 2	!Congratulations .Never mind I haven't a clue. pl0l
13	Unit thirteen Earning a living	Present Perfect Continuous I've been living on .the streets for a year How long have you been selling The Big ?Issue p!02 Present Perfect Simple versus Continuous .He's been running He's run five miles, p104	Jobs and the ,- alphabet game bookseller, architect Word formation death, die variety, various p105 Adverbs mainly, possibly, exactly, carefully p105	Telephoning ?Is that Mike .I'm afraid he's out Can I take a message? p109
14	Unit fourteen Love you and leave you	Past Perfect They had met only one week earlier, p110 Reported statements She told me that she .loved John She said that she'd met him six months .ago	Words in context pi 16 Saying goodbye Have a safe !journey	Thank you for a lovely evening, p117
15	unit fifteen	learning new words	Vocabulary	

12. Infrastructure

1- Required textbooks	New headway /beginner
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	
B - Electronic references, Internet sites...	Sites concerned with the English language

13. Course development plan

- Keeping pace with scientific development in the field of specialization with every new development.
- Updating lectures.
- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / First semester
Thermodynamics

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Thermodynamics/PMTA124
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the principles of thermodynamics course is:

- Providing the student with basic information about the principles of thermodynamics
- Introducing the student to the energy balance equation closed system and open system
- Introducing the student to the thermodynamics processes
- Introducing the student to the laws of thermodynamics

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

- The student's knowledge of the basic concepts for thermodynamics
- The student knows how to identify open system and closed system
- Calculate the energy equation for each system
- Knowledge of power cycles and the thermodynamics processes for each cycle

B - The skills objectives of the course.

- Measure the Celsius and absolute temperature
- Measuring pressure, using different pressure devices
- Measuring the coefficient of performance for refrigerator and heat pump
- Measure the thermal efficiency for heat engine

Teaching and learning methods

- Theoretical lectures and practical training in laboratories.
- Applying theoretical topics practically in various educational laboratories
- Summer training
- Graduation research
- Scientific visits to various engineering projects related to the field of specialization.

Evaluation methods

- Daily written tests
- Submitting weekly reports on the practical experiments carried out by the student
- Monthly and theoretical tests (theory and practical)
- Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

- Learning how to deal with others and work in a team spirit.
- Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

- Adherence to theoretical and practical lecture schedules.
- Working in laboratories and workshops.
- Implementation of projects by students.
- E-learning.

Evaluation methods

- Follow up on attendance and absence.
- Theoretical and practical tests
- Monitoring behavior and behavior inside the classroom.
- Follow up on attendance at training sites and the extent of benefit.
- Submitting and discussing reports.
- Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

- Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
- Developing the student's ability to transfer information to practical reality after graduation.
- Developing the student's ability to find appropriate solutions.

Teaching and learning methods

- Using modern technologies in the automotive field.
- Competitive tests between groups of students for one section

Evaluation methods

- Extracurricular activities and homework.
- Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	First law of thermodynamics, kinds of energy, (dynamic energy, potential mechanical energy, internal energy, heat, work), + Study of mercury, mechanical and electronic thermometers with calibration	4	1
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	work of a system represented on pressure- volume diagram +Calculation of specific heat of liquid	4	2
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Energy of flow, enthalpy, energy-conservation equation of first law of thermodynamics Classifications of systems +Calculation of specific heat of gases at constant pressure	4	3
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	application of first law of thermodynamics on closed systems, energy equation for steady flow, some application on first law for steady state open systems + Calculation of specific .heat of gases at constant volume	4	4
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Application on first law for steady state open systems, application on (nozzle, diffuser, throttle, condenser, boiler) +Boyle's law experiment	4	5
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Application on first law for steady state open systems, application on (turbine, compressor, heat exchanger, open plane) +Charles's law experiment	4	6
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	representation of work for open systems for steady flow on pressure volume diagram, examples + Calculation of specific heat ratio	4	7
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Second law of thermodynamics: Reversible process, entropy, temperature-entropy diagram, coordinates place on T-S diagram, cycles + Constant pressure process experiment	4	8
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	work of cycle, thermal efficiency of cycle, examples. State of second law for heat engine, and for heat pump +Constant volume process experiment	4	9
Classwork, homework, weekly	Theoretical and practical	Thermodynamics	Ideal Gas: Specific heat at constant volume, specific heat at constant pressure, equation of ideal gas	4	10

and monthly exams			state, gas constant, universal gas constant + Constant temperature process experiment		
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Constant volume process, constant pressure process, constant temperature process, studying of process on P-V diagram and T-S diagram, examples +Adiabatic process experiment	4	11
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Adiabatic process, isentropic process, studying of process on P.V diagram and T-S diagram, examples + polytropic process experiment	4	12
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Thermodynamic cycles (Otto cycle– representation of Otto cycle on P- V and T – S diagrams – evaluation of thermal efficiency – examples on Otto Cycle)+ An (experiment of Heat pump	4	13
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Thermodynamic cycles (Diesel Cycle – representation of Diesel cycle on P- V and T – S diagrams – evaluation of thermal efficiency examples on Diesel Cycle)	4	14
Classwork, homework, weekly and monthly exams	Theoretical and practical	Thermodynamics	Combined cycle, studying of cycle on P- V diagram and T-S diagram, finding heat changed, work efficiency parameters affecting on standard air cycle efficiency, comparison between, (Auto, diesel, dual cycles), examples	4	15

12. Infrastructure

1- Required textbooks	**1- Fogial M. " the thermodynamic problem solver" 1984** **2- G. Boxer " Engineering thermodynamic" 1987** **3- T. Roy " Applied Engineering thermodynamic" 1983** **4- Rogers "Engineering thermodynamics work & heat transfer" 1974** **5- THERMODYNAMIC PROPERTIES, PROPERTY RELATIONSHIPS, AND PROCESSES, Chapter 2,** **6- Thermodynamic ,M.M Abbott. 1972** **7- Engineering thermodynamics D.B.Spadling and E.H.Cole.** **8- Thermodynamics VIRGIL – MORING FAIRES** **9- Advanced Thermodynamics for Engineers by Kenneth, Jr. Wark ,1994.** **10- Gas turbine theory H, COHEN G.F.C.ROGERS, 7th Edition, Pearson, 2017** **11- CRC Handbook of Thermal Engineering, 2nd Edition by Raj P. chhabra. 2017** **12- الديناميك الحراريرة الكلاسيكية , تاليف : ريتشارد** **13 - تاليف , 2014 مختصر قوانيين الثرموديناميك الطبعة الثانية محمد عبد الله الحسن العلي:** **14- ملخص بالديناميكا الحرارية , تاليف :ضيف العيادي**
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with thermodynamics 2. The presence of a laboratory specializing in the principles of thermodynamics
B - Electronic references, Internet sites...	Sites concerned with thermodynamics

13. Course development plan

- Keeping pace with scientific development in the field of specialization with every new development.
- Updating lectures.
- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / Second semester
Advanced engineering drawing

Academic Program Description

Studying engineering drawing achieves a high possibility for the student or trainee to read the engineering diagram or design it according to the actual need, in addition to developing the learner's abilities to visualize complex geometric shapes and the ability to change or replace parts and change the drawing in a way that achieves the desired goal.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Advanced engineering drawing Engines/PMTA127
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(3 practical) per week * 15 weeks = 45 hours
8-Date of preparing the description	10/4/2024

9- Course objectives:
The aim of studying the principles of internal combustion engines course is:

- Enabling the student to deal with engineering programs for drawing
- Introducing the student to the tools for drawing and the possibility of modifying it
- Learn to print the engineering plan of the drawing and mark the dimensions on it

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

- Enabling the student to deal with engineering programs for drawing
- Introducing the student to the tools for drawing and the possibility of modifying it
- Learn to print the engineering plan of the drawing and mark the dimensions on it

B - The skills objectives of the course.

- Learning to use the calculator in terms of saving, retrieving, and modifying files
- Learning to use engineering drawing programs such as AutoCAD and Inventor
- Learn how to deal with engineering charts and maps and analyze their data

Teaching and learning methods

- Theoretical lectures and practical training in laboratories.
- Applying theoretical topics practically in various educational laboratories
- Summer training
- Graduation research
- Scientific visits to various engineering projects related to the field of cars.

Evaluation methods

- Daily written tests
- Submitting weekly reports on the practical experiments carried out by the student
- Monthly and theoretical tests (theory and practical)
- Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

- Learning how to deal with others and work in a team spirit.
- Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

- Adherence to theoretical and practical lecture schedules.
- Working in laboratories and workshops.
- Implementation of projects by students.
- E-learning.

Evaluation methods

- Follow up on attendance and absence.
- Theoretical and practical tests
- Monitoring behavior and behavior inside the classroom.
- Follow up on attendance at training sites and the extent of benefit.
- Submitting and discussing reports.

- Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

- Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
- Developing the student's ability to transfer information to practical reality after graduation.
- Developing the student's ability to find appropriate solutions.

Teaching and learning methods

- Using modern technologies in the automotive field.
- Competitive tests between groups of students for one section

Evaluation methods

- Extracurricular activities and homework.
- Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Explaining the theory of projection, drawing projections for a simple perspective (drawing two paintings)	3	1
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing the three projections for a relatively complex perspective	3	2
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing projections of complex perspectives (two panels)	3	3
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Perspective drawing of the three views	3	4
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing perspective from two projections and then deducing the third projection	3	5
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Conclusion of the third site	3	6
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	The theory of cutting in bodies and its importance in engineering drawing, the angle of insertion, types of cutting lines, parts that are not cut (drawing a painting that includes the cut areas)	3	7
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	The theory of cutting in bodies and its importance in engineering drawing, the angle of insertion, types of cutting lines, parts that are not cut (drawing a painting that includes the cut areas)	3	8
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	The theory of cutting in bodies and its importance in engineering drawing, the angle of insertion, types of cutting lines, parts that are not cut (drawing a painting that includes the cut areas)	3	9
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing projections from complex perspective	3	10
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing projections from complex perspective	3	11

Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing perspective after cutting in different directions	3	12
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing perspective after cutting in different directions	3	13
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing a painting that includes perspective and its projections after cutting	3	14
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced engineering drawing	Drawing a painting that includes perspective and its projections after cutting	3	15

12. Infrastructure

1- Required textbooks	1- Engineering drawing by Cousins 1966. 2- Engineering drawing by A. W. Boundy. 3- Engineering drawing B. Dash Sharma. 4- Technical drawing by Blackie.

13. Course development plan

- Keeping pace with scientific development in the field of specialization with every new development.
- Updating lectures.
- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / Second semester
Advanced car engine maintenance

Academic Program Description

The Principles of Car Engine Maintenance course represents the largest part of the student's knowledge of engines, methods of maintaining them, repairing their faults, and expressing ideas that contribute to developing their work. It is the main subject for first-level students in the automotive branch.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Advanced car engine maintenance /PMTA121
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 4 practical) per week * 15 weeks = 90 hours
8-Date of preparing the description	10/4/2024

9- Course objectives:
Introducing the student to car parts and methods of assembling them. How it works, diagnosing faults, repairing them, and maintaining car parts.

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives
1. The student's knowledge of the types of engines that are installed on cars

2. The student knows how to deal with faults related to gasoline engines and diesel engines

B - The skills objectives of the course.

1. Ability to perform complete engine maintenance
2. Being able to replace and repair faulty engine parts
3. Learning to drive a car

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of cars.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. The student learned how to maintain engines

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the automotive field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Engine auxiliary systems	6	1
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Thermostat: function and malfunctions	6	2
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	The most important chemical fluids used in the engine cooling system	6	3
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Engine lubrication system, parts of the system and the function of each part	6	4
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	The most important malfunctions of the lubrication system, methods of detecting and maintaining them	6	5
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	The normal ignition system (battery), the parts of the system and how they work	6	6
Classwork, homework, weekly and monthly	Theoretical and practical	Advanced car engine maintenance	Electronic ignition system: its types, components, and method of operation	6	7

exams					
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Methods for detecting the causes of low engine efficiency	6	8
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Methods of diagnosing and repairing engine faults	6	9
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	The process of removing carbon and deposits from the combustion chamber and valve seats(grinding process)	6	10
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	The most important fixed and variable measurements used in turning cylinders, crankshafts, and camshafts	6	11
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Methods of removing and inserting cylinder liners into the cylinder block	6	12
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Checking the pressure and temperature regulators for the electronic injection system	6	13
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	The most important causes of engine overheating	6	14
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced car engine maintenance	Identify the devices for checking and diagnosing engine faults	6	15

12. Infrastructure

1- Required textbooks
1- Automotive Mechanics 10th ed. by: William H. Crouse **2- Modern Automotive Mechanics by: James Duffy** **3- The motor vehicle by: K. Newton W. steeds T. K. Garret** **4- Automotive Technology: A Systems Approach, 6e by: Jack Erjavec, and Rob Thompson, Cengage Learning, Inc. , NY , USA, 2015.** **5- A Textbook of Automobile Engineering I,II, and III, 2ed , by: P. S. Gill, published by: Katria and Sons, New Delhi, India, 2012.**

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

Course description template
First level/second semester
Principles of cooling

Course description

Introducing the student to the basic methods of refrigeration, the types of systems used and their basic parts, and focusing on the vapor compression system, its main components and the refrigeration fluids used in it.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Principles of Cooling/PMTR138
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Refrigeration course is:

- Providing the student with basic information about the principles of refrigeration
- Introducing the student to the types of systems used and their basic parts
- Introducing the student to the vapor compression system
- Meeting the needs of multiple sectors in the field of refrigeration with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

- Make the student able to know and understand the principles of refrigeration.
- Make the student able to know and understand cooling processes through the use of types of systems.
- Enable students to obtain knowledge and understanding of scientific laws and practical applications in the field of refrigeration and cryogenic fluids.

B. The skills objectives of the course.

- Sound scientific research skills, constructive scientific discussions, and expressing opinions.
- Use and development skills.
- Thinking skills that enable the student to understand and solve scientific problems related to refrigeration operations.
- The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

- Theoretical lectures and practical training in laboratories.

• Applying theoretical topics practically in various educational laboratories
• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of cooling.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First	4	Methods of heat transfer, specific heat, critical pressure, critical temperature, Phase change	Methods of heat transfer, specific heat, critical pressure, critical temperature, Phase change	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Second	4	Refrigeration, Refrigerant, Classification of refrigerants (main and secondary), Required properties, Selection of refrigerant	Refrigeration, Refrigerant, Classification of refrigerants (main and secondary), Required properties, Selection of refrigerant	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Third	4	Ozone layer, Importance of ozone layer, Ozone hole, Ozone depleting substances, international efforts to shrink the ozone hole, Ozone layer friendly refrigerant, Time table for alimenting the bad effect of ordinary refrigerant	Ozone layer, Importance of ozone layer, Ozone hole, Ozone depleting substances, international efforts to shrink the ozone hole, Ozone layer friendly refrigerant, Time table for alimenting the bad effect of ordinary refrigerant	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourth + Fifth	4	Refrigeration methods, Natural and industrial system, Vapor-compression system, Absorption system, Steam-jet system, Thermoelectric system, Liquefaction of gases system Air system in air craft and others	Refrigeration methods, Natural and industrial system, Vapor-compression system, Absorption system, Steam-jet system, Thermoelectric system, Liquefaction of gases system Air system in air craft and others	Theoretical and practical	Class and homework assignments, weekly and monthly exams
VI	4	Pressure-enthalpy chart for common refrigerants	Pressure-enthalpy chart for common refrigerants	Theoretical and practical	Class and homework assignments, weekly and

					monthly exams
Seventh + Eighth	4	Vapor-compression system, Theoretical calculation (heat added, heat rejected, Compressor work, COP, Quantity of refrigerant)	Vapor-compression system, Theoretical calculation (heat added, heat rejected, Compressor work, COP, Quantity of refrigerant)	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Ninth + Tenth	4	Actual vapor compression system, the effect of [vapor super-heating in the suction line, Sub-cooling in the liquid line, Pressure drop (pressure losses) and heat exchanger] on COP	Actual vapor compression system, the effect of [vapor super-heating in the suction line, Sub-cooling in the liquid line, Pressure drop (pressure losses) and heat exchanger] on COP	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Eleventh + Twelfth	4	Compressors, Classification, working principles, Types (reciprocating, rotary, centrifugal, screw and other types), Construction, Refrigerants suitable for different applications of compressors, Approximate range of capacity covered by various compressor types	Compressors, Classification, working principles, Types (reciprocating, rotary, centrifugal, screw and other types), Construction, Refrigerants suitable for different applications of compressors, Approximate range of capacity covered by various compressor types	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Thirteenth	4	Condensers and cooling towers, Classification of condensers (air-cooled, water-cooled, evaporative), Classification of cooling towers.	Condensers and cooling towers, Classification of condensers (air-cooled, water-cooled, evaporative), Classification of cooling towers.	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourteenth	4	Expansion devices types (manual device, automatic valve, thermostatic	Expansion devices types (manual device, automatic valve, thermostatic	Theoretical and practical	Class and homework assignments, weekly and

		valve, electronic valve, low and high side float valve, capillary tube), the applications for each type.	valve, electronic valve, low and high side float valve, capillary tube), the applications for each type.		monthly exams
Fifteenth	4	Evaporators types (natural and forced convection, flooded and dry expansion), the applications for each type	Evaporators types (natural and forced convection, flooded and dry expansion), the applications for each type	Theoretical and practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	**7.** Air conditioning Engineering by W.P. Jones **8.** Refrigeration and Air Conditioning by W. F. Stoecker, J. W. Jones **9.** Refrigeration and Air Conditioning by C. P. Arora **10.** Refrigeration and Air Conditioning by G. F. Hundy, A. R. Trott, T. C. Welch **11.** مبادئ التبريد والتكييف، عدنان ريكان موسى، حيان عبد الغني عبد الزهرة **12.** مبادئ هندسة تكييف الهواء والتثليج، د. خالد احمد الجودي
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to cooling • The presence of a laboratory specializing in cooling principles
(Scientific journals, reports, ...)	Websites concerned with cooling fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
First level/second semester
Applied thermodynamics

Course description

Providing the student with information about vapor and liquid-vapor mixtures. Ideal gas, air cycle, study of the Carnot energy cycle and vice versa. Energy cycles

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Applied thermodynamics/PMTR139
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Thermodynamics course is:

• Providing the student with basic information about steam and gases
• Introducing the student to the ideal gas-liquid mixture
• Introducing the student to the air cycle and studying the Carnot energy cycle and vice versa
• Meeting the needs of multiple sectors in the field of thermodynamics with highly qualified personnel

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

• Make the student able to know and understand applied thermodynamics.
• Make the student able to know and understand thermodynamic processes through the use of the air cycle and the study of the Carnot energy cycle and vice versa.
• Enable students to obtain knowledge and understanding of scientific laws and practical applications in the field of thermodynamics.

B. The skills objectives of the course.

• Sound scientific research skills, constructive scientific discussions, and expressing opinions.
• Use and development skills.
• Thinking skills that enable the student to understand and solve scientific problems related to the laws of thermodynamics.
• The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.
• Applying theoretical topics practically in various educational laboratories

• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of thermodynamics.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First + second	4	Study of steam. Steam properties- using steam tables.	Study of steam. Steam properties- using steam tables.	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Third + Fourth + Fifth	4	Calculations of the properties for liquid-vapor mixture (wet steam), examples of using steam tables	Calculations of the properties for liquid-vapor mixture (wet steam), examples of using steam tables	Theoretical and practical	Class and homework assignments, weekly and monthly exams
VI + Seventh +	4	Ideal Gas: Specific heat at constant volume, specific heat at constant pressure, equation of ideal gas state, gas constant, universal gas constant	Ideal Gas: Specific heat at constant volume, specific heat at constant pressure, equation of ideal gas state, gas constant, universal gas constant	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Eighth + Ninth + Tenth + Eleventh + Twelfth + Thirteenth	4	Standard air cycles: Carnot power cycle-reversed Carnot cycle (refrigeration & heat pump applications). Examples	Standard air cycles: Carnot power cycle-reversed Carnot cycle (refrigeration & heat pump applications). Examples	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourteenth + Fifteenth	4	The Rankine cycle, processes of the cycle, examples.	The Rankine cycle, processes of the cycle, examples.	Theoretical and practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure

Required prescribed books	**1. "Fundamentals of Thermodynamics", Sonntag, Borgnakke and Van Wylen.** **2. "Thermodynamics: An Engineering Approach" by Cengel, Y. A., and Boles, M. A.** **3. " Engineering thermodynamics" by G. Boxer**
Main references (sources)	Scientific books in the Free Education Division
Recommended books and	• Books related to thermodynamics

references	• The presence of a laboratory specializing in thermodynamics
(Scientific journals, reports, ...)	Websites concerned with thermodynamics fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
The first level / second semester
Advanced electrical technology

Course description

The course aims to provide the student with the scientific and practical foundations of electrical and machinery techniques, which the student will later use when practicing his specialty.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Advanced electrical technology /PMTR146
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Electrical Technology course is:

• Providing the student with the scientific and practical foundations of electrical technologies
• Introducing the student to the electrical machines used
• Providing the student with the necessary skills that he will use later when practicing his specialty
• Meeting the needs of multiple sectors in the field of electricity technology with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

• Make the student able to know and understand electrical technology
• Make the student able to know and understand the operations of the scientific and practical foundations of electrical technology.
• Enable students to obtain skills and understanding of scientific laws and practical applications in the field of electrical technologies

B. The skills objectives of the course.

• Sound scientific research skills, constructive scientific discussions, and expressing opinions.
• Use and development skills.
• Thinking skills that enable the student to understand and solve scientific problems related to the laws of electrical machines.
• The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.
• Applying theoretical topics practically in various educational laboratories

• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of electrical technologies.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practice

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First	4	Electrical units, symbols, and various measuring devices	Electrical units, symbols, and various measuring devices	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Second	4	Potential difference - Ohm's law - connecting series, parallel and mixed resistors	Potential difference - Ohm's law - connecting series, parallel and mixed resistors	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Third	4	Practical examples of solving electrical circuits	Practical examples of solving electrical circuits	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourth	4	Ways to obtain alternating current - types of electrical power plants	Ways to obtain alternating current - types of electrical power plants	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fifth	4	Sine wave – the waveform of a current over time	Sine wave – the waveform of a current over time	Theoretical and practical	Class and homework assignments, weekly and monthly exams
VI	4	Electromagnetism - field properties - magnetic materials and their types	Electromagnetism - field properties - magnetic materials and their types	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Seventh +	4	Magnetic hysteresis, its harms, and ways to reduce it	Magnetic hysteresis, its harms, and ways to reduce it	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Eighth	4	Single-phase AC	Single-phase AC	Theoretical	Class and

		motors	motors	and practical	homework assignments, weekly and monthly exams
Ninth	4	Three-phase alternating current - a method for distinguishing phases and types of connection	Three-phase alternating current - a method for distinguishing phases and types of connection	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Tenth	4	Star connection - triangle connection - plate current - line current - face voltage - line voltage and power	Star connection - triangle connection - plate current - line current - face voltage - line voltage and power	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Eleventh	4	Examples of star and triangle connections	Examples of star and triangle connections	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Twelfth	4	Electrical transformers - theory of operation and components - laws of transformation - cross-sectional drawing - types	Electrical transformers - theory of operation and components - laws of transformation - cross-sectional drawing - types	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Thirteenth	4	Three-phase alternating current motors, their advantages and disadvantages - their types - their uses	Three-phase alternating current motors, their advantages and disadvantages - their types - their uses	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fourteenth	4	The working principle of three-phase motors and methods of starting the movement	The working principle of three-phase motors and methods of starting the movement	Theoretical and practical	Class and homework assignments, weekly and monthly exams
Fifteenth	4	Methods for controlling engine speed changes - methods used to	Methods for controlling engine speed changes - methods used to	Theoretical and practical	Class and homework assignments, weekly and

		identify engine malfunctions and maintain them	identify engine malfunctions and maintain them		monthly exams

11. Infrastructure	
Required prescribed books	**1. Electrical Technology, by Theraga** **2. Electrical Technology, by Hughes** **3. Electrical Technology, by Erick** **4. Electrical installation work, by Francis**
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to electrical techniques • The presence of a laboratory specializing in electrical techniques principles
(Scientific journals, reports, ...)	Websites concerned with electrical techniques fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

Course description template
The first level / second semester
Advanced engineering drawing

Course description

Preparing the student to be able to deal with the drawing language, understand engineering plans and implement them.

1. The educational institution	Northern Technical University - Technical Institute / Mosul
2. Scientific Department/Centre	Power Mechanics Technologies Department
3. Name/code of the course	Advanced engineering drawing /PMTR144
4. Available forms of attendance	Mandatory
5. Semester/year	Courses
6. Number of academic hours (total)	(3 practical) per week * 15 weeks = 45 hours
7. Date of preparation of this description	1/14/2024

8. Course objectives

The aim of studying the Principles of Engineering Drawing course is:
• Providing the student with basic information about engineering drawing
• Introducing the student to drawing lines and their types
• Providing the student with the necessary skills to understand and implement engineering plans
• Meeting the needs of multiple sectors in the field of engineering drawing with highly qualified staff

9. Course outcomes and teaching, learning and evaluation methods

A. Cognitive objectives

• Make the student able to know and understand the principles of engineering drawing.
• Make the student able to know and understand fonts and their types.
• Enable students to obtain the skills necessary to understand engineering drawings.

B. The skills objectives of the course.

• Sound scientific research skills, constructive scientific discussions, and expressing opinions.
• Use and development skills.
• Thinking skills that enable the student to understand engineering drawings.
• The skills and ability to apply the theoretical and practical experience gained from his studies in the areas of practical life.

Teaching and learning methods

• Theoretical lectures and practical training in laboratories.
• Applying theoretical topics practically in various educational laboratories
• Summer training
• Graduation research
• Scientific visits to various engineering projects related to the field of engineering drawings.

Evaluation methods

• Daily written tests
• Providing weekly reports on the practical experiments carried out by the student
• Monthly and theoretical tests (theoretical and practical)
• Class participation and continuous evaluation of the student's performance in practic

C. Emotional and value-based goals

• Learning how to deal with others and work in a team spirit.
• Learning and the ability to make appropriate decisions to address mistakes.
• Encouraging the development of students' scientific thinking in memorizing and guessing.

Teaching and learning methods

• Commitment to theoretical and practical lecture schedules.
• Working in laboratories and workshops.
• Implementation of projects by students.
• E-Learning.

Evaluation methods

• Follow up on attendance and absence.
• Theoretical and practical tests
• Monitor behavior and behavior inside the classroom.
• Follow up on attendance at training sites and the extent of benefit.
• Submitting and discussing reports.
• Discussing graduation projects

D. Transferable general and qualifying skills (other skills related to employability and personal development).

• Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
• Developing the student's ability to transfer information to practical reality after graduation.
• Developing the student's ability to find appropriate solutions.

Teaching and learning methods

• Using modern technologies in the field of air conditioning.
• Competitive tests between groups of students for one section

Evaluation methods

• Extracurricular activities and homework.
• Participation and discussion in the classroom.

10. Course structure

Week	Hours	The required learning outcomes	Name of the unit/topic	Education method	Evaluation method
First	3	Three-dimensional drawings - preparing a three-dimensional drawing board	Three-dimensional drawings - preparing a three-dimensional drawing board	Practical	Class and homework assignments, weekly and monthly exams
Second	3	Box command, practical examples with dimensions	Box command, practical examples with dimensions	Practical	Class and homework assignments, weekly and monthly exams
Third	3	Cylinder command with applied examples and dimensioning	Cylinder command with applied examples and dimensioning	Practical	Class and homework assignments, weekly and monthly exams
Fourth	3	Wedge command with practical examples and dimensioning	Wedge command with practical examples and dimensioning	Practical	Class and homework assignments, weekly and monthly exams
Fifth	3	Cone command, Torus command, Sphere command	Cone command, Torus command, Sphere command	Practical	Class and homework assignments, weekly and monthly exams
VI	3	Assembling 3D drawings	Assembling 3D drawings	Practical	Class and homework assignments, weekly and monthly exams
Seventh	3	Modify, Solid Editing, Subtract	Modify, Solid Editing, Subtract	Practical	Class and homework assignments, weekly and monthly exams
Eighth	3	Modify, Solid Editing, Union	Modify, Solid Editing, Union	Practical	Class and homework assignments, weekly and monthly exams
Ninth	3	Modify, Solid Editing, Intersect	Modify, Solid Editing, Intersect	Practical	Class and homework assignments, weekly and monthly exams
Tenth	3	Practical examples	Practical examples	Practical	Class and homework assignments, weekly and monthly exams
Eleventh	3	Projections with	Projections with	Practical	Class and

		applied examples	applied examples		homework assignments, weekly and monthly exams
Twelfth	3	Projections with applied examples	Projections with applied examples	Practical	Class and homework assignments, weekly and monthly exams
Thirteenth	3	Projections with applied examples	Projections with applied examples	Practical	Class and homework assignments, weekly and monthly exams
Fourteenth	3	Pieces with applied examples	Pieces with applied examples	Practical	Class and homework assignments, weekly and monthly exams
Fifteenth	3	Pieces with applied examples	Pieces with applied examples	Practical	Class and homework assignments, weekly and monthly exams

11. Infrastructure	
Required prescribed books	**5. Engineering drawing by Cousins 1966.** **6. Engineering drawing by A. W. Boundy.** **7. Engineering drawing B. Dash Sharma.** **8. Technical drawing by Blackie.**
Main references (sources)	Scientific books in the Free Education Division
Recommended books and references	• Books related to engineering drawing • The presence of a laboratory specializing in engineering drawing principles
(Scientific journals, reports, ...)	Websites concerned with engineering drawing fields

12. Course Development Plan

• Keeping pace with scientific development in the field of specialization with every new development.
• Update lectures.
• Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / Second semester
Applied Mathematics

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Applied Mathematics / **TIMO111**
5- Available forms of attendance	Mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical) per week * 15 weeks = 30 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the Applied of Mathematics course is:

1. Introducing the student to using mathematics in other scientific topics and increasing his ability to think logically when solving exercises, as well as increasing his ability and how to link data with his information to obtain a solution to the problem.
2. Providing the student with information to increase the logical ideas to solve any problem.
3. Providing the student with information about the conecting of the giving data with his information

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1- Integration of exponential and logarithmic functions, as well as integration of trigonometric functions
2- Definite integral, applications (distance under the curve, distance between the curve).
3- The rotational magnitudes and arc length of the curve.
4- Integration methods, retail integration.
5- Statistical operations, frequency distributions, histograms, and frequency curve

B - The skills objectives of the course.

Introducing the student to using mathematics in other scientific topics and increasing his ability to think logically when solving exercises, as well as increasing his ability and how to link data with his information to obtain a solution to the problem.

Teaching and learning methods

A:

1- Theoretical lectures and the solution of various exercises by the subject professor.
2- Theoretical lectures and the solution of various exercises by the subject professor
3- Students participate daily in solving class exercises.
4- Giving homework to students.
5- Applying theoretical topics practically in various areas of life and student research

B:

1. Theoretical lectures and practical training.
2. Applying theoretical topics practically in various educational problems.
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of cars.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules..
2. Implementation of projects by students.
3. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the automotive field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Integration of exponential and logarithmic functions	2	1
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Integration of trigonometric functions	2	2
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Definite integral, applications (distance under the curve, distance between the curve)	2	3
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	The rotational magnitudes and arc length of the curve	2	4
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Approximation in integration (trapezoid rule, Simpson's rule)	2	5
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Integration methods, retail integration	4	6
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Integration by compensation method	4	7
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Integration by partial fraction method	4	8
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Solving differential equations of first order and first order, discrete homogeneous	2	9
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Differential equations - linear - applications	2	10
Classwork, homework, weekly and monthly	Theoretical	Applied Mathematics	Complex numbers - addition - subtraction - division - multiplication	2	11

exams					
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Applied formula: Converting the carpenteric characteristic to linear and vice versa	2	12
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Statistical operations, frequency distributions, histograms, and frequency curve	2	13
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Mean, range, standard deviation, variance	2	14
Classwork, homework, weekly and monthly exams	Theoretical	Applied Mathematics	Possibilities	2	15

12. Infrastructure

1-Panal calter “Technical Mathematics”
2- Murray R. “ Mathematical handbook”
3- Shantinarayam “ Engineering Mathematics part 1 – 1987”
4- Garlick B. “ Technical Mathematics” 1981.

2- The main references (sources)	**the scientific books in the Free Education Division**
B - Electronic references, Internet sites...	Sites concerned with Engineering Mathematics

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.
2- Updating lectures.
3- Using modern methods in education

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

First level / Second semester
Heat Transfer and Fluid

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Heat Transfer and Fluid/PMTA125
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the principles of internal combustion engines course is:

1. Providing the student with basic information about the principles of heat transfer and fluid
2. Introducing the student to the difference between methods of heat transfer
3. Introducing the student to the properties of fluids
4. Introducing the student to the different types of flow

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. The student's knowledge of heat transfer methods
2. The student knows how to find the heat transfer rate for each method
3. Methods of measuring and calculating the flow characteristics of fluids
4. Know the work of the continuity equation and Bernoulli's equation

B - The skills objectives of the course.

1. Measuring pressure, using different pressure devices
2. Measuring the static pressure using a Venturi meter
3. Measurement of thermal conductivity for material
4. Measurement of frictional losses for laminar and turbulent flow

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of specialization.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests

3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Heat transfer by conduction: Steady state heat conduction, conduction through homogenous plane wall, conduction through composite wall, thermal resistance + Using pressure measurement equipment ((piezometer & bourdon gage	4	1
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Heat conduction through homogenous cylindrical wall, heat conduction through multi layers cylindrical wall, examples. + How to use different types of manometers	4	2
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Heat transfer by conduction: fee & forced thermal resistance + Using Venturi meter to measure static pressure	4	3
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Heat transfer by radiation, definition of thermal radiation, emissivity of black25-body, Stefan-Boltzmann law for radiation, emissivity + Velocity measurement of flow in pipes	4	4
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Heat exchangers and their topes, logarithmic mean temperature difference, calculations of heat exchangers, effectiveness of heat exchangers, examples + Using Venturi meter and orifice to measure velocity of flow and compare the results	4	5
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Types of unit systems, density, specific volume, pressure, temperature (Celsius and absolute), Properties of fluids: difference between fluids and solid metals, difference between liquids and gases + Measurement of frictional losses for laminar flow	4	6
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Definition of density, relative density, specific weight, specific volume, ideal fluid, real fluid, examples + Measurement of frictional losses for turbulent flow	4	7
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Shear stress, dynamics of fluid flow, Newton's Law of viscosity, dynamics viscosity, kinematic viscosity, surface tension, Capillarity, liquid vapor pressure + Measurement of frictional losses for sudden enlargement	4	8

Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Pressure liquid, Pressure head, Pascal law of Pressure, variation of liquid pressure heat with respect to gravity, pressure at a datum for stationary liquid + Measurement of frictional losses for sudden contraction	4	9
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Absolute pressure, gage pressure, barometer, pressure gauge equipment + Using Bernoulli equation for uncompressible flow	4	10
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Bourdon gauge, piezometer, u tube manometer, comparative gauge + An experiment to calculate thermal conductivity of insulation substances	4	11
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Fluid motion, fluid flow, pressure of fluid flow, laminar flow, turbulent flow; velocity profile of flow, Reynold's number + An experiment to calculate free convection coefficient	4	12
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Flow rate, volumetric flow rate, mass flow rate, Continuity-equation, problems on continuity + An experiment to calculate forced (convection coefficient	4	13
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Bernoulli equation + An experiment to calculate (LMTD) for a heat exchanger	4	14
Classwork, homework, weekly and monthly exams	Theoretical and practical	Heat Transfer and Fluid	Applications of Bernoulli equation + An experiment to calculate effectiveness of heat exchanger	4	15

12. Infrastructure

1- Required textbooks	**1- Fogial M. " the thermodynamic problem solver" 1984** **2- G. Boxer " Engineering thermodynamic" 1987** **3- T. Roy " Applied Engineering thermodynamic" 1983** **4- Rogers "Engineering thermodynamics work & heat transfer" 1974** **5- THERMODYNAMIC PROPERTIES, PROPERTY RELATIONSHIPS, AND PROCESSES, Chapter 2,** **6- Thermodynamic ,M.M Abbott. 1972** **7- Engineering thermodynamics D.B.Spadling and E.H.Cole.** **8- Thermodynamics VIRGIL – MORING FAIRES** **9- Advanced Thermodynamics for Engineers by Kenneth, Jr. Wark ,1994.** **10- Gas turbine theory H, COHEN G.F.C.ROGERS, 7th Edition, Pearson, 2017** **11- CRC Handbook of Thermal Engineering, 2nd Edition by Raj P. chhabra. 2017** **12- الديناميك الحراريرة الكلاسيكية , تاليف : ريتشارد** **13 - مختصر قوانيين الثرموديناميك الطبعة الثانية 2014 , تاليف :محمد عبد الله الحسن العلي** **14- ملخص بالديناميكا الحرارية , تاليف :ضيف العيادي**
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Heat Transfer and Fluid 2. The presence of a laboratory specializing in the heat transfer and fluid
B - Electronic references, Internet sites...	Sites concerned with heat transfer and fluid

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / First semester
Principles of Refrigeration Systems

Academic Program Description

This academic program description provides a concise summary of the main features of the program and the expected learning outcomes for students to achieve, demonstrating whether they have maximized their benefit from the available learning opportunities. It must be linked to the program description.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Principles of Refrigeration Systems / PMTR240
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	13/4/2024

Course Objectives:

The objective of studying the Fundamentals of Refrigeration Systems course is:

1. To understand the principles of compression refrigeration systems.
2. To introduce students to refrigerants and differentiate between them.
3. To familiarize students with refrigeration stations and the pipes installed within these stations.

10- Course Outcomes and Teaching, Learning, and Assessment Methods:

A- Cognitive objectives

1. Understanding the function of each part of the compression system.
2. Familiarity with the operation principle of the compression system and its accessories.
3. Knowledge of compound systems and their practical applications.
4. Understanding the types of pipes used in refrigeration and air conditioning and their connection methods.

B - Skills Objectives:

1. Calculating compressor work, added and removed heat in the evaporator and condenser, and cycle performance coefficients.
2. Reading the chemical composition of refrigerants and numbering them.
3. Proper selection of components of the compression refrigeration system.

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of air conditioning and refrigeration.

Evaluation methods

1. Daily written tests
2. Weekly reports on practical experiments conducted by the student
3. Monthly and theoretical tests (theory and practical)
4. Classroom participation and continuous assessment of student performance practically.

C- Emotional and Ethical Objectives:

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. Teaching students how to handle each system to facilitate the maintenance process.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Attendance and absenteeism monitoring.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Monitoring attendance at training sites and level of engagement.
5. Submitting and discussing reports.
6. Discussion of graduation projects.

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Utilizing modern technologies in the field of refrigeration and air conditioning.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Principles of Refrigeration Systems	**Compression Refrigeration System (Theory and Practice)**	**8**	**2 - 1**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Principles of Refrigeration Systems	**Refrigerants**	**4**	**3**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Principles of Refrigeration Systems	**Selection of Components for the Compression System / Evaporator – Condenser – Compressor – Condensing Unit**	**8**	**5 - 4**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Principles of Refrigeration Systems	**The Balance of the Compression Group**	**4**	**6**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Principles of Refrigeration Systems	**Compound Compression System – Multiple Compressors {Presence of an Intercooler – Presence of a Flash Tank} or Multiple Evaporators**	**12**	**- 8 - 7 9**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Principles of Refrigeration Systems	**General Considerations for Designing and Extending the Pipe Network (Discharge Line – Liquid Line – Suction Line – Water Pipes)**	**4**	**- 10 - 11 12**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	**Principles of Refrigeration Systems**	**Accessories of the Compression System / Objective – Location**	**8**	**– 13 15-14**

12. Infrastructure

1- Required textbooks	**1- Modren Air – Condition practice by Harris**. **2- Principle & Refrigeration by Dossat**. **3- Refrigeration & Air – conditioning by ARORA**. **4- Handbook of air-conditioning system design by carrier air-conditioning company**. **5- Refrigeration and Air-conditioning by Stoecker**. **6- Refrigeration & Air-conditioning by Ballany**. **7- Refrigeration & Air-conditioning by Jordan & Priester**. **8-Commercial Refrigeration by Andarase**
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Refrigeration Systems 2. The presence of a laboratory specializing in the principles of Refrigeration Systems
B - Electronic references, Internet sites...	Sites concerned with Refrigeration Systems

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / First semester
Principles of Heat Transfer

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Principles of Heat Transfer/PMTR242
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:

The aim of studying the principles of heat transfer course is to introduce the student on the main general principles of the heat transfer science and its practical applications in the field of air conditioning for example; through studying this course, the student can be able to calculate the (heating/cooling) load of a building, thermal conductivity, thickness and type of the insulation used in the heat exchanger and the HVACR systems applications.

10- Outcomes of course and teaching, learning and evaluation methods

A- Cognitive objectives

1. Introduce the student by the basic principles and importance of heat transfer science in a technical field and a life in general.
2. The student gets to know how the heat is transferred by three main modes (conduction, convection and radiation).
3. The student knows how to calculate the thermal resistance and the heat flux through any thermal system at different cases depending on the shape of the system studied.
4. The student knows how the influence of substance's states (solid, liquid and gas) on heat transfer modes.
5. The student knows the different between heat transfer modes.
6. In this course mainly we focus to understand the principle of heat conduction mode and its applications in HVACR.

B - The skills objectives of the course.

1. Theoretically, in the classroom we learn the methods of calculating the heat transfer amounts and any other unknown such as temperature, thickness, thermal conductivity and heat transfer area of any simple or composite (Plane/Cylindrical) wall.
2. Practically, in the laboratory we learn how to calculate the value of thermal conductivity of any solid material by matching the theoretical information (heat conduction equation and the principle of themo-electric analogue network to draw the thermal resistances network of the thermal system) with practical parameters (T,Q,A,x,D conducted or insulated material…etc.) in order to compare the theoretical and practical results of the same case study.

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of HVACR.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. The student learned how to maintain, calibrate and design the HVACR system in order to satisfy the human comfort conditions and the world sustainable aims.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the course's syllabus.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the HVACR field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

			Theoretical & Practical Syllabus		
Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Basic principles and importance of heat transfer.	2	1
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	The three kinds of heat transfer , conduction heat transfer, convection heat transfer , radiation heat transfer, examples	2	2
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Algebra sensible heat gain and latent heat gain	2	1-2
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Conduction of heat transfer in the steady state conduction through a homogeneous plans wall	2	3
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Conduction through a composite plans wall, heat resistance. conduction through a homogeneous cylinder wall	2	4
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Experimental measurements to determine the thermal conductivity of different materials	2	3-4
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Conduction through a composite cylinder wall , influence of variable conductivity , examples	2	5
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Heat transfer by convection , Reynolds concept of similarity of the flow of fluids and the viscosity , the most important dimensionless groups, examples	2	6
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Determination heat transfer from vertical and horizontal plates by free convection	2	5-6

Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Heat transfer by free convection , heat transfer from vertical and horizontal surfaces , examples	2	7
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Heat transfer by free convection from horizontal square plates, heat transfer proportion of air at atmospheric pressure and properties of water. examples	2	8
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Determination heat transfer by free convection from horizontal cylinders	2	7-8
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Heat transfer by free convection from horizontal square plates, heat transfer proportion of air at atmospheric pressure and properties of water. examples	2	9
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Heat transfer by forced convection , the heating of fluids in turbulent flow through pipes , examples	2	10
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Determination the mixing – cup temperature (temperature of fluid flowing through a pipe)	2	9-10
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	The heating of fluids flowing normal to single wires and tubes the heating of fluids flowing normal to tube banks, examples	2	11-12
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Determination heat transfer by forced convection in turbulent flow through pipes (heating and cooling)	2	11-12
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Heat transfer by the combined effect of conduction and convection, heat transfer between two fluids through a plane wall, heat transfer between two fluids through a cylinder wall, examples	4	13

Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Determination heat transfer by forced convection for liquids of high viscosity in streamline flow through pipe	2	13
Classwork, homework, weekly and monthly exams	Theoretical	Principles of Heat Transfer	Types of heat exchangers, the log mean temperature difference, examples	2	14-15
Classwork, homework, weekly and monthly exams	Practical	Principles of Heat Transfer	Determination heat transfer by forced convection for liquids of high viscosity in streamline flow through pipe + Experimental the overall coefficient of heat transfer of different walls	2	14-15

12. Infrastructure

1- Required textbooks	1- Elements of heat transfer, obert McGrow – Hill – 1984. 2- Physical similarity and Dimensional analyses Dancan Edward Arnold – 1953. 3- Heat and mass transfer Jakob and Hawking John Wiley & Sons, Inc. 1957. 4- Heat transfer by Holman.
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Heat Transfer. 2. The presence of a laboratory specializing in the principles of Heat Transfer.
B - Electronic references, Internet sites...	Sites concerned with Heat Transfer.

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

Course Description Form

Second Level / First Semester

Fundamentals of air conditioning design systems

Course Description

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, proving whether he or she has made the most of the available learning opportunities. It must be linked to the description of the programme.

1- Educational institution	**Northern Technical University**
2- Scientific Department / Center	**Technical Institute / Mosul**
3- Name of academic or vocational program	**Department of Power Mechanics**
4- Course Name / Code	**Basics of Air Conditioning Systems Design / PMTR241**
5- Available Attendance Forms	**Mandatory**
6- Semester / Year	**Decisions**
7- Number of Credit Hours (Total)	**(2 theoretical + 2 practical) per week * 15 weeks = 60 hours**
8- The history of preparation of this description	**14 / 1 / 202**

9. Course Objectives

The aim is to develop knowledge of the basics of air conditioning design systems. The course will include the following topics:-

1- Heat transfer methods, how to calculate thermal resistance by conduction and convection methods, in addition to calculating the total coefficient of heat transfer, calculating heat transferred through flat and composite walls.

2- Air conditioning and comfort, physiological reactions of cooling and heating

3- Calculations of thermal loads for both heating load and cooling load, heating and cooling systems to slap the air.

10. Course Outcomes and Methods of Teaching, Learning and Assessment

A- Cognitive objectives

Enhancing the analytical abilities of students by giving an introduction by studying the basics of air properties, as well as the sufficiency of calculating thermal resistances for connection and load, and the blindness of calculating heating and cooling loads for the space to be adapted.

B - Skills objectives of the course.

Study the basics of designing air conditioning systems.

Teaching and learning methods

Weekly lectures include

- Provide students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through speech, lecture or experiments.
- Solving a set of practical and practical examples by the academic staff.
- Through discussion, students are involved by solving some practical problems .
- The practical laboratories of the department are followed up by the

academic staff of the department.

- ❖ Asking the student to visit the library and the international information network (Internet) to obtain additional knowledge of the study materials .

Presenting a seminar by the student in front of his fellow students to enhance his confidence.

Evaluation methods

- ❖ Evaluate students individually by giving an opportunity for classroom participation by answering questions .
- ❖ Evaluating students collectively through daily exams with practical and theoretical questions .
- ❖ Evaluate students collectively by giving extracurricular assignments such as writing special reports or those related to practical experiments in laboratories .

Semester exams for the curriculum in addition to the mid-year exam and the final exams for the first and second round

C. Emotional and value goals

Analyze the results obtained by the student through conducting practical experiments and reach the extent of their truth through .

1- Observation and perception
2- Analysis and interpretation
3- Conclusion and evaluation

Teaching and learning methods

- ❖ Using modern means in presenting the scientific and theoretical side, such as Data Show devices , to attract attention and attract students in an interesting way by displaying some films related to the subject to reach the idea better to the student.
- ❖ Give students extracurricular assignments that require them to exert skills and self-explanations in experimental ways .
- ❖ Interrogate students through panel discussions by asking thinking questions (how, why, when, where, any) for specific topics .
- ❖ Using the method of brainstorming and feedback in order to activate the

accumulated experiences of students by linking what has been taken from the study materials in the previous academic stages and linking them to the new .

Providing students with practical skills by conducting practical experiments on laboratory equipment

Evaluation methods

1. Daily written tests
2. Provide weekly reports on practical experiments carried out by the student
3. Monthly and theoretical tests (theoretical and practical)
4. Classroom participation and continuous evaluation of student performance

d . General and rehabilitative skills transferred (other skills related to employability and personal development).

1- Enabling students of mechanical engineering sciences in their applied and cognitive aspects .

2- Developing the student's ability to analyze information and interpret the data obtained through practical experiments or the use of manual skills or using a computer.

3- Enabling the student to use the special and general equations of the subjects and how to benefit from them in analyzing problems and extracting results accurately.

4- Enabling the student to conduct a field survey to identify the problems that fall on the shoulders of the engineer or technician within the workshop or laboratory.

11. Course Structure

Evaluation method	Method of education	Unit / Subject Name	Required Learning Outcomes	Hours	Week
Classroom and home assignments	Theoretical and practical	Fundamentals of air conditioning design	Heat transfer - heat transfer by conduction - heat transfer coefficient, heat	4	First

and weekly and monthly exams		systems	transfer by convection + calculation of cooling coil capacity(1)		
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Heat transfer by radiation, heat transfer through walls + calculation of cooling coil capacity(2)	4	Second
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Heat transfer through composite walls, total heat transfer coefficient + calculation of heating coil capacity(1)	4	Third
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Air condition and comfort + calculation of heating coil capacity(2)	4	Fourth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Air movement, relative humidity, wet and dry temperature + calculation of the performance coefficient of the room air conditioner	4	V
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Heating load losses, heating load calculation(1) + determination of heat pump performance	4	Sixth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Calculation of heating load(2) + thermal balance in the air conditioner	4	Seventh
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Heating load calculation(3) +water coil capacity calculation	4	Eighth
Classroom and home assignments and weekly and	Theoretical and practical	Fundamentals of air conditioning design systems	Refrigeration Load Transactions and Calculations(1) +Scientific Visit	4	Ninth

monthly exams					
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Cooling load transactions and calculations(2) +Air Distribution	4	X
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Cooling load transactions and calculations(3) + Central fan performance determination (1)	4	Eleventh
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Cooling load transactions and calculations(4) + determination of central fan performance(2)	4	Twelfth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Heating and cooling systems + pressure loss channel study (1)	4	Thirteenth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Psychometric chart, perceptible and latent heat, composition of air coming out of heating and cooling + pressure loss channel study(2)	4	Fourteenth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Fundamentals of air conditioning design systems	Computer-aided cooling load calculation + pressure loss channel study(3)	4	Fifteenth

12. Infrastructure

PRINCIPLES OF HEATING VENTILATING AND AIR CONDITIONING by ASHRAE	Required textbooks 1
Principles of Air Conditioning and Refrigeration Engineering by Dr. Khaled Al-Judi	2 Main references (sources)

Related books and magazines	Recommended books and references (scientific (...., journals , reports
	B Electronic references, websites ....

13. Course Development Plan
Add hours for practical training and watch practical applications on the vocabulary of the study

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / First semester
Ethics of the Profession

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Ethics of the Profession / NTU 201
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical) per week × 15 weeks = 60 hours
8-Date of preparing the description	14 / 4 /2024

9- Course objectives:
The aim of studying the professional ethics course:
1. Knowing the basics of professional ethics and general rules.
2. Know the difference between work behaviors, profession, and craft.
3. Knowing the methods and means of consolidating the values of professional ethics and how to apply the ethics of practicing the profession.

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. Understanding, knowing and understanding the basics of work and professional ethics.
2. The student will be able to recognize how to apply it.

B - The skills objectives of the course.

1. Realizing the importance of ethics at work.
2. The learner must have the ability to apply the basics of professional ethics and how to use them.
3. Cultivate problem-solving skills in various professional situations through commitment to ethical conduct and behavior.

Teaching and learning methods

1. Theoretical lectures
2. Group discussions
3. Examples of curriculum-specific topics

Evaluation methods

1. Periodic and quarterly theoretical exams.
2. Quizzes.
3. Duties.
4. Short reports and research.

C- Emotional and value goals

1- Enhancing the student's level of understanding through modern methods.
2- Instilling the spirit of initiative in students in line with practical skills.
3- Promoting cooperative education.
4- Providing students with skills related to modern learning theories.

Teaching and learning methods

1. Discussion during the lecture.
2. Writing reports on scientific material.
3. Daily, weekly and quarterly exams.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical tests.
3. Follow up on interaction and participation within the classroom.
4. Submitting and discussing reports.

D - Transferable general and qualifying skills (other skills related to employability and personal development).

Teaching and learning methods

1. Applying the skills of modern interactive teaching methods among students.
2. Motivating scientific competition among students.
3. Assigning the preparation of reports that enhance the creation of a spirit of knowledge among students.

Evaluation methods

1. Extracurricular activities and homework.
2. Participate and discuss in the classroom and allow room for expressing opinions in order to evaluate the extent of benefit..

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1.The concept of ethics and its origins 2. The general principles of ethics**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**1**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. sources of ethics 2. Ethical values**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**2**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Importance of Ethics 2. Work, Profession, and Work Behaviors**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**3**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Standards Governing the Profession 2. Professional Ethics**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**4**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Characteristics and traits of professional ethics 2. acceptable level of professional ethics**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**5**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. values, and professional ethics 2. fostering honesty, integrity, justice, good communication, and excellence in work**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**6**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Unethical administrative behavior patterns 2. corruption and its types**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**7**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Bribery and its types 2. The difference between bribery and gifts**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**8**

Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. the main motivations behind corruption and bribery 2. the concept of cheating and cheating in the workplace**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**9**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. aspects of cheating in job performance 2. Methods for instilling professional ethics**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**10**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. means and methods for instilling professional ethics 2. formulation of the ethical code for the profession**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**11**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Enhancing ethical behavior in the workplace according to Crittenden and Kinnock 2. Work, administrative profession, and the ethical concept of administrative professional ethics**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**12**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. The importance of professional ethics for engineering disciplines 2. Types of professional ethics for engineering specializations**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**13**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1.Patterns of ethical behavior 2.Patterns of unethical behavior**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**14**
Daily assessments homework assignments , in-class participation,	**Theoretical and Group discussions**	**1. Factors influencing ethical behavior 2. Determinants of business ethics**	**Understanding the lecture and consolidating the concepts and how to apply them**	**2**	**15**

12. Infrastructure

1- Required textbooks	**The unified manual for the basics of professional ethics for students of technical institutes (Central Technical University), prepared by:** **1. Dr. Kareem Abd Sajer** **2. Dr. Raghad Hassan Hussein** **3. Dr. Kholoud Abdel Amir Maklaf** **4. Dr. Ahmed Abdel Qasim** **5. Dr. Muhammad Hassan Al-Helou**
2- The main references (sources)	Scientific books in the Free Education Division, the institute library, and the university library.
A- Recommended books and references (Scientific journals, reports,....)	1. The approved binding is based on more than fifty Arab references and eighteen foreign sources.
B - Electronic references, Internet sites...	Websites concerned with professional ethics

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

13. Course development plan
The development plan includes the planned curriculum to keep pace with scientific developments and modern information, in addition to giving the subject of ethics greater importance, especially during the summer training period, due to the student's presence in the field of work, which enables him to learn and apply what has been studied theoretically during the academic year.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / First semester
English language

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	English language/Second level/ntu200
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical) per week * 15 weeks = 30 hours
8-Date of preparing the description	10/4/2024

9- Course objectives:
The aim of studying the principles of English language course is:

1. Providing the student with the basic information about English grammar.
2. Providing the student how to read correctly in English language.
3. Introducing the student to learn English vowels.
4. Enabling the student to speak English fluently.

10. Course outcomes and teaching, learning and evaluation methods

Cognitive objectives

1. Enabling the student to read correctly.
2. Enabling the student to learn the English grammar.
3. Enabling the student to speak correctly.

Teaching and learning methods

1. Lectures.
2. Apply theoretical topics practically.
3. Doing Exercises
4. Groups Role-playing

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by students.
3. Monthly and theoretical tests (theory).

- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.

- Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure:

NO.		Grammar	Vocabulary	Everyday English
1	Unit one Getting to know you	Tenses/; Present, past, future p6-8 Questions: Where were you born? p6-8 What do you do? Questions words: Who ... ?, Why ... ?, How much ... ? p7	Using a bilingual dictionary p9 Parts of speech: adjective, preposition p9 Words with more than one meaning	a book to read I booked a table. p9
2	Unit two The way we live	Present tenses Present Simple Most people live in the south. p14 Present Continuous What's he doing at the moment? p16 have/have got	We have a population of.. . p 15 Have you got a mobile phone? p16 Describing countries a beautiful country the coast This country exports wool. p14 Collocation Daily life listen to music talk to my friends	Making conversation Asking questions Showing that you're interested p21
3	Unit three It all went wrong	Past tenses Past Simple .He heard a noise What did you do last night? p23 Past Continuous A car was waiting. p24	Making connections breaklmend, lose/find p23 Nouns, verbs, and adjectives Suffixes to make	Time expressions the eighth of January at six o'clock on Saturday in 1995 p29

		Irregular verbs saw, went, told p23	different parts of speech discuss, discussion p28 Making negatives pack, unpack p28	
4	Unit four shopping Let's go	Quantity much and many How much butter? How many eggs? p30 some and any some apples, any grapes p31 something, anyone, nobody, everywhere p32 a few, a little, a lot of p31 Articles	a shopkeeper, an old shop, the River Thames He sells bread. p33 Buying things milk, eggs, bread, a ,packet of crisps a can of Coke, ,shampoo, soap jumpers, department ,store antique shop, ,newsagent, trainers a tie, conditioner, first class stamps	Prices and shopping 1.99£ 160$ What's the exchange ?rate How much is a pair of jeans? p37
5	Unit five What do you Verb patterns 1	want to do? want/hope to do, enjoy/like doing p38 looking forward to doing, 'd like to do p38 Future intentions going to and will .She's going to travel the world I'll pick it up for you. p40	Hot verbs have, go, come have an accident go wrong come first p44	How do you feel? Nervous, fed up Cheer up !
6	Unit six Tell me! What's it like!	What's it like in Paris?/ Compartive& superlative adjectives big, bigger, biggest good, better, best p48	Talking about towns modern buildings, night-life p47 Money make money, inherit p50 Synonyms and antonyms lovely, beautiful, interested, bored p52	Directions farm, wood, pond opposite the car park over the bridge p53
7	Unit seven Famous couples	Present Perfect and Past Simple .She has written 20 novels He wrote 47 novels. p54 for and since for three years since 1985 p56 Tense revision ?Where do you live ?How long have you lived there Why did you move? p56 Past participles lived, written p54	Bands and music guitar, keyboards make a record p57 Adverbs slowly, carefully, just, still, too p60 Word pairs this and that	ladies and gentlemen p60 Short answers ?Do you like cooking .Yes, I do No, I don't. p61

8	Unit eight Do's and don'ts have (got) to	You have to pay bills. I've got to go. p62 should .You should talk to your boss You shouldn't drink coffee at night. p64 must You must go to the dentist. p64Jobs receptionist, miner, chef p63	Travelling abroad visa, documents p64 Words that go together Verb + complement take responsibility, live abroad p68	At the doctor's a cold, the 'flu food poisoning a temperature a prescription p69
9	Unit nine Going places	Time and conditional clauses as soon as, when, while, until .When we're in Australia, we'll ? . ..What if If I pass my exams, I'll... p71	Hot verbs / take, get, do, make take a photo, get angry, do me a favour make up your mind p76	Hotels a double room, ground floor p76 In a hotel I'd like to make a .reservation Can I have a credit card number? p77
10	Unit ten Scared to death	Verb patterns 2 manage to do, used to do, go walking p78 Infinitives Purpose I went to the shops to buy some shoes. p80 what, etc. + infinitive I don't know what to say. p80 something, etc. + infinitive I need something to eat. p80	Shops post office bookshop p80 Describing feelings and situations frightening, frightened worrying, worried	Exclamations !He was so scared !He's such an Idiot I've spent so much money! p85
11	Unit eleven Things that Passives	changed the Coca-Cola is .enjoyed all over the world world It was Invented In 1886. p86-9 participles Verbs and past grown, produced p87	Verbs and nouns that go together tell a story, keep a promise p89 Notices	Keep off the grass Out of order p93
12	Unit twelve Dreams and Second conditional	reality If I were a princess, I'd live In a castle. p94 p94 might I might go to America. p96-97	Phrasal verbs go away, take off your coat .The plane took off .I gave up my job Take them off. p100 Social expressions 2	!Congratulations .Never mind I haven't a clue. pl0l
13	Unit thirteen Earning a living	Present Perfect Continuous I've been living on the streets for .a year How long have you been selling	Jobs and the alphabet ,- game bookseller, architect Word formation	Telephoning ?Is that Mike .I'm afraid he's out Can I take a

		?The Big Issue p!02 Present Perfect Simple versus Continuous .He's been running He's run five miles, p104	death, die variety, various p105 Adverbs mainly, possibly, exactly, carefully p105	message? p109
14	Unit fourteen Love you and leave you	Past Perfect They had met only one week earlier, p110 Reported statements She told me that she loved .John She said that she'd met him six .months ago	Words in context pi 16 Saying goodbye !Have a safe journey	Thank you for a lovely evening, p117
15	unit fifteen	learning new words	Vocabulary	

12. Infrastructure

1- Required textbooks
New headway plus**.**

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / First semester
Principles of Internal Combustion Engines

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Principles of Internal Combustion Engines/PMTA214
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the principles of internal combustion engines course is:

1. Providing the student with basic information about the principles of internal combustion engines
2. Introducing the student to the difference between internal and external combustion engines
3. Introducing the student to the parts of internal combustion engines
4. Introducing the student to the types of four- and two-stroke internal combustion engines

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. The student's knowledge of the thermal cycles on which internal combustion engines operate
2. The student knows how to determine the efficiency of an internal combustion engine
3. Methods of measuring and calculating internal combustion engine performance parameters
4. Know the work of the internal combustion engine heat balance sheet

B - The skills objectives of the course.

1. Measure the engine's consumption of air, fuel and cooling water
2. Measuring the braking thermal efficiency of a four-stroke engine operating in the diesel thermal cycle and an engine operating in the Otto thermal cycle
3. Measure the calorific value of liquid fuel
4. Measure the volumetric efficiency of a gasoline engine and a diesel engine

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of specialization.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. The student learned how to maintain internal combustion engines

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the automotive field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Basic engine nomenclature + Methods of repair & write the laboratory reports	4	1
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Four – stroke cycle spark – ignition engine four – stroke cycle compression ignition engine + Study the relation between crank angle and piston displacement	4	2
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Valves timing for 4- stroke engine + Joule's experiments	4	3
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Two – stroke engine , comparison of two stroke and four stroke engine , valves timing for 2- stroke engine + Measurement air consumption , fuel consumption coolant water	4	4
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Scavenging systems for 2- stroke engines +Measurement , torque , bralce power	4	5
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Engine performance and resting +Relation between torque and power with speed for 4-stroke diesel engine constant port variable speed	4	6
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	performance parameters for 4- stroke engine and 2- stroke engine +Measurement calorific valve for liquid fuel	4	7
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	basic measurements indications +Measurement brake thermal efficiency for 4-stroke diesel engine – draw thermal with speed	4	8
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Performance of S. I. Engine performance + Measurement volumetric efficiency for petrol engine	4	9
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Performance of C. I. Engine performance + Measurement volumetric efficiency for diesel engine	4	10
Classwork, homework, weekly and monthly exams	Theoretical and	Principles of Internal Combustion	Illustrative examples +Measurement brake	4	11

	practical	Engine	thermal efficiency for 4-stroke petrol engine – draw thermal with speed		
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Engine heat balance sheet + Relation between torque and power with speed for 4-stroke petrol engine with constant throttle and variable speed	4	12
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Effect of strength mixture (Fr) on engine performance factors + Measurement friction power and indicated power for 4-stroke diesel (engine (willance method	4	13
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Combustion in S. I. Engines stages of combustion in S. I. Engine + Measurement friction power and indicated power for 4-stroke petrol engine morse test	4	14
Classwork, homework, weekly and monthly exams	Theoretical and practical	Principles of Internal Combustion Engine	Inject of engine variable on stages of combustion in S. I. Engine + Measurement friction power and indicated power for 4-stroke diesel engine motoring test	4	15

12. Infrastructure

1- Required textbooks	1- Bason & Whit “internal combustion engine” vol. 1 & vol.2 1979. 2- P. L. Ballaney “internal combustion engine” 1980 3- Chorles F. T. “the internal combustion engine in theory & practice” 1986 4- Thermodynamics & heat engines “thermal engineering” 5- A course in internal combustion engines M. L. Mathur 1984.
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with internal combustion engines 2. The presence of a laboratory specializing in the principles of internal combustion engines
B - Electronic references, Internet sites...	Sites concerned with internal combustion engines

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / Second semester
Advanced Refrigeration Systems

Academic Program Description

This academic program description provides a concise summary of the main features of the program and the expected learning outcomes for students to achieve, demonstrating whether they have maximized their benefit from the available learning opportunities. It must be linked to the program description.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Advanced Refrigeration Systems / PMTR246
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	13/4/2024

Course Objectives:

The objective of studying the Advanced Refrigeration Systems course is:

1. Introducing students to the control devices used in refrigeration systems.
2. Familiarizing students with the differences between various refrigeration systems and their operation methods.
3. Introducing students to food preservation techniques.

10- Course Outcomes and Teaching, Learning, and Assessment Methods:

A- Cognitive objectives

1. Understanding the function of each control device.
2. Understanding the operational principle of each system.
3. Familiarity with economic systems and systems that use clean energy.
4. Understanding the practical applications of each system.
5. Understanding the basic principles of constructing cold store and food preservation methods.

B - Skills Objectives:

1. Knowing the temperature and pressure values in absorption systems and other systems.
2. Selecting the appropriate refrigeration system for food preservation.
3. Overview of the heat load of food in refrigerated and frozen storage facilities.

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of air conditioning and refrigeration.

Evaluation methods

1. Daily written tests
2. Weekly reports on practical experiments conducted by the student
3. Monthly and theoretical tests (theory and practical)
4. Classroom participation and continuous assessment of student performance practically.

C- Emotional and Ethical Objectives:

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. Teaching students how to handle each system to facilitate the maintenance process.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Attendance and absenteeism monitoring.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Monitoring attendance at training sites and level of engagement.
5. Submitting and discussing reports.
6. Discussion of graduation projects.

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Utilizing modern technologies in the field of refrigeration and air conditioning.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**Control devices used in refrigeration systems + Repair methods and writing practical reports**	**8**	**1 - 2**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**Absorption refrigeration system / Operating principle - Features - Use in refrigeration and condensation / Comparison with compression system - Use of solar energy for operation**	**12**	**3 - 4 - 5**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**Steam jet Refrigeration system**	**8**	**6 - 7**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**air Vortex tube Features - Types**	**12**	**8 - 9 - 10**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**air liquefaction system Features - Types**	**8**	**11 -12**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**Thermoelectric refrigeration system**	**4**	**13**
Classwork, homework, weekly and monthly exams	Theoretical and Practical	Advanced Refrigeration Systems	**Food preservation technology - Refrigerated warehouse designs - Calculating warehouse loads - Types of warehouses**	**8**	**14 - 15**

12. Infrastructure

1- Required textbooks	**8- Modren Air – Condition practice by Harris**. **9- Principle & Refrigeration by Dossat**. **10- Refrigeration & Air – conditioning by ARORA**. **11- Handbook of air-conditioning system design by carrier air-conditioning company**. **12- Refrigeration and Air-conditioning by Stoecker**. **13- Refrigeration & Air-conditioning by Ballany**. **14- Refrigeration & Air-conditioning by Jordan & Priester**. **8-Commercial Refrigeration by Andarase**
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Refrigeration Systems 2. The presence of a laboratory specializing in the principles of Refrigeration Systems
B - Electronic references, Internet sites...	Sites concerned with Refrigeration Systems

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

Course Description Form

Second Level / Second Semester

Advanced Air Conditioning

Course Description

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, proving whether he or she has made the most of the available learning opportunities. It must be linked to the description of the programme.

1- Educational institution	**Northern Technical University**
2- Scientific Department / Center	**Technical Institute / Mosul**
3- Name of academic or vocational program	**Department of Power Mechanics**
4- Course Name / Code	**Advanced Air Conditioning / PMTR252**
5- Available Attendance Forms	**Mandatory**
6- Semester / Year	**Decisions**
7- Number of Credit Hours (Total)	**(2 theoretical + 2 practical) per week * 15 weeks = 60 hours**
8- The history of preparation of this description	**14 / 1 / 2024**

9. Course Objectives

The goal is to develop knowledge of advanced air conditioning. The course will include the following topics:-

1- Design of air ducts and their types, calculation of pressure losses, including installations, in addition to kinetic energy and air discharge in rooms, study of fans and their types, fan laws and specifications.

2- Study of vibration and its sources, pipe design and types, pump calculations, types of air conditioning systems and water and air systems.

3- Application of air conditioning systems in the building, air filtration methods, air washing, energy distribution in air conditioning systems.

10.Course Outcomes and Methods of Teaching, Learning and Assessment

A- Cognitive objectives

Enhancing the analytical abilities of students by giving an introduction by studying the methods of air distribution and the selection of air conditioning systems inside the building, as well as how to choose fans, study and calculate piping systems, choose pumps, in addition to filtration and washing of air and methods of energy distribution for air conditioning systems.

B - Skills objectives of the course.

Advanced Air Conditioning Study.

Teaching and learning methods

Weekly lectures include

- ❖ Provide students with the basics and topics related to the previous learning outcomes of skills to solve practical problems through speech, lecture or experiments.
- ❖ Solving a set of practical and practical examples by the academic staff.
- ❖ Through discussion, students are involved by solving some practical problems .
- ❖ The practical laboratories of the department are followed up by the

academic staff of the department.

- ❖ Asking the student to visit the library and the international information network (Internet) to obtain additional knowledge of the study materials .

Presenting a seminar by the student in front of his fellow students to enhance his confidence.

Evaluation methods

- ❖ Evaluate students individually by giving an opportunity for classroom participation by answering questions .
- ❖ Evaluating students collectively through daily exams with practical and theoretical questions .
- ❖ Evaluate students collectively by giving extracurricular assignments such as writing special reports or those related to practical experiments in laboratories .

Semester exams for the curriculum in addition to the mid-year exam and the final exams for the first and second round

C. Emotional and value goals

Analyze the results obtained by the student through conducting practical experiments and reach the extent of their truth through .

1- Observation and perception
2- Analysis and interpretation
3- Conclusion and evaluation

Teaching and learning methods

- ❖ Using modern means in presenting the scientific and theoretical side, such as Data Show devices , to attract attention and attract students in an interesting way by displaying some films related to the subject to reach the idea better to the student.
- ❖ Give students extracurricular assignments that require them to exert skills and self-explanations in experimental ways .
- ❖ Interrogate students through panel discussions by asking thinking questions (how, why, when, where, any) for specific topics .

- ❖ Using the method of brainstorming and feedback in order to activate the accumulated experiences of students by linking what has been taken from the study materials in the previous academic stages and linking them to the new .

Providing students with practical skills by conducting practical experiments on laboratory equipment

Evaluation methods

5. Daily written tests
6. Provide weekly reports on practical experiments carried out by the student
7. Monthly and theoretical tests (theoretical and practical)
8. Classroom participation and continuous evaluation of student performance

d . General and rehabilitative skills transferred (other skills related to employability and personal development).

1- Enabling students of mechanical engineering sciences in their applied and cognitive aspects .

2- Developing the student's ability to analyze information and interpret the data obtained through practical experiments or the use of manual skills or using a computer.

3- Enabling the student to use the special and general equations of the subjects and how to benefit from them in analyzing problems and extracting results accurately.

4- Enabling the student to conduct a field survey to identify the problems that fall on the shoulders of the engineer or technician within the workshop or laboratory.

11. Course Structure

Evaluation method	Method of education	Unit / Subject Name	Required Learning Outcomes	Hours	Week

Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Design of air ducts and their types + study of the performance and efficiency of the central heat pump	4	First
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Calculation of pressure losses in installation(1) + connecting pumps in series	4	Second
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Calculation of pressure losses in installation(2) + connecting pumps in parallel	4	Third
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Kinetic energy and air distribution in rooms + scientific film	4	Fourth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Fans and their types + performance of parallel pipe series and network	4	V
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Fan laws and specifications + equilibrium block for cooling tower	4	Sixth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Vibration and its sources + rudder balance of cooling tower	4	Seventh
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Design of pipes and their types + calculation of heat transfer coefficient in the cooling tower	4	Eighth
Classroom and	Theoretical and	Advanced Air	Pump calculations + types of air	4	Ninth

home assignments and weekly and monthly exams	practical	Conditioning	conditioning systems + pressure loss in pipes and bending(1)		
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Water & Air Systems(1) + Pressure Loss in Pipes and Bending(2)	4	X
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Water & Air Systems(2) + Pressure Loss in Pipes and Bending(3)	4	Eleventh
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Application of air conditioning systems in the building + calculation of the perceived heat in the system	4	Twelfth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Air filtration methods + inherent heat calculation in the system	4	Thirteenth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Air washing + air filtration and its types	4	Fourteenth
Classroom and home assignments and weekly and monthly exams	Theoretical and practical	Advanced Air Conditioning	Energy distribution in air conditioning systems + scientific visit	4	Fifteenth

12. Infrastructure

PRINCIPLES OF HEATING VENTILATING AND AIR CONDITIONING by ASHRAE	Required textbooks 1

Principles of Air Conditioning and Refrigeration Engineering by Dr. Khaled Al-Judi	2 Main references (sources)
Related books and magazines	Recommended books and references (scientific (...., journals , reports
	B Electronic references, websites ....

13. Course Development Plan
Add hours for practical training and watch practical applications on the vocabulary of the study

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / Second semester
Applied Heat Transfer

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Applied Heat Transfer/PMTR247
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:

The aim of studying the principles of heat transfer course is to introduce the student on the main general principles of the heat transfer science and its practical applications in the field of air conditioning for example; through studying this course, the student can be able to calculate the (heating/cooling) load of a building, thermal conductivity, thickness and type of the insulation used in the heat exchanger and the HVACR systems applications.

10- Outcomes of course and teaching, learning and evaluation methods

A- Cognitive objectives

7. Introduce the student by the heat transfer applications in the technical field and life in general.
8. How can the condensation, boiling radiation heat transfer happened?
9. What is the heat transfer by extended surfaces (fins)?
10. The student gets to know how the heat is transferred by three main modes (conduction, convection and radiation).
11. The student knows what are the types of heat exchangers, applications and calculations.
12. The student knows how the radiation heat transfer happens.

B - The skills objectives of the course.

1. Theoretically, in the classroom we learn how can we understand the influence of Grashof, Prandtol, Renolds, Nusslts numbers on fluid mechanics and heat transfer calculations by matching between the properties of (fluids and materials) and using the empirical equations of convection heat transfer.
2. Practically, in the laboratory we are learning how we can to do the convection and radiation heat transfer experiments for different case studies in order to have the heat transfer aspects parameters.

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of HVACR.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. The student learned how to maintain, calibrate and design the HVACR system in order to satisfy the human comfort conditions and the world sustainable aims.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the course's syllabus.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the HVACR field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

			Theoretical & Practical Syllabus		
Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat exchanger effectiveness ratio , examples	2	1-2
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Types of heat exchangers and drawing temperature distribution	2	
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat transfer through fins , condensation and boiling heat transfer	2	3
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Determination fouling factors	2	
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat transfer by radiation , the concept of a perfect black body	2	4
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Determination the log mean temperature difference	2	
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Stefan – boltzmann's law of total radiation , general equation for heat exchange by radiation between black surfaces , examples	2	5
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Determination the effectiveness NTV. Method	2	
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat exchange by radiation between large parallel black plane , examples	2	6-7-8
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Conduction – convection – systems) consider the one – dimensional fin exposed to a surrounding fluid and determination the fin efficiency of different fins.	2	6
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Determination the absorptivity and reflectivity and transmissivity when radiant energy strikes a material surface	2	7-8

Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat exchange by radiation between large parallel planes of different emissivity , examples	2	9-10-11
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat conduction in series with convection and radiation, examples	2	12-13
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Method of constructing a black body enclosure. And heat exchange by radiation between black equal parallel and opposite squares or discs or rectangles	2	9-10-11-12-13
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	Heat transfer through air space , examples	2	14
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Heat transfer through air spaces	2	
Classwork, homework, weekly and monthly exams	Theoretical	Applied Heat Transfer	General problems , home works	2	15
Classwork, homework, weekly and monthly exams	Practical	Applied Heat Transfer	Heat conduction in series with convection and radiation	2	

12. Infrastructure

1- Required textbooks	1- Elements of heat transfer, obert McGrow – Hill – 1984. 2- Physical similarity and Dimensional analyses Dancan Edward Arnold – 1953. 3- Heat and mass transfer Jakob and Hawking John Wiley & Sons, Inc. 1957. 4- Heat transfer by Holman.
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with Heat Transfer. 2. The presence of a laboratory specializing in the principles of Heat Transfer.
B - Electronic references, Internet sites...	Sites concerned with Heat Transfer.

13. Course development plan

- Keeping pace with scientific development in the field of specialization with every new development.
- Updating lectures.
- Using modern methods in education.

Course Description Form

Second Level / Second Semester

Arabic Language

Course Description

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, proving whether he has made the most of the available learning opportunities. It must be linked to the programme description.

Northern Technical University	1. Educational institution
Technical Institute / Mosul	2. Scientific Department / Center
Department of Power Mechanics	3. Name of academic or vocational program
Arabic NTU 203 /	4. Course Name/Code
Mandatory	5. Available Attendance Forms
Decisions	6. Semester / Year
(2 theoretical) per week × 15 weeks = 30 hours	7. Number of Credit Hours (Total)
15/ 4 / 2024	8. The history of preparation of this description

9. Course Objectives

Objective of studying the professional ethics course:

1. Providing the student with the skill of speaking Arabic in a sound eloquent language away from the colloquial and addressing common mistakes .
2. Developing the linguistic wealth of students and educating students about what the Arabic language represents as a tool of thinking, and a meansof expression between them and their society, so they accept to learn it with conviction and interest .
3. Developing the queen of sentence structure and avoiding writing words with prevailing errors and how to formulate administrative discourse .

10.Course Outcomes and Methods of Teaching, Learning and Assessment

A- Cognitive objectives

1. Motivating students to love the Arabic language.
2. Recognize the strengths of beauty in the Arabic language.
3. Introducing students to the correct words , their structures and sound methods.
4. Providing the student with a linguistic wealth that enables him to read correctly, and develop his spelling and written ability.

B - Skills objectives of the course.

1 L am a man of the same age Developing students' abilities in various branches of the Arabic language from reading, spelling and grammar .

2 . The student should acquire the ability to think systematically in terms of sequencing linguistic elements , and linking them to each other .

Teaching and learning methods

1. Analyze the material and explain it to students with examples.
2. Discussion through questions and answers.
3. Solve questions related to the topic that has been explained.

Evaluation Methods :

9. Periodic and quarterly theoretical exams.
10. Quizzes.
11. Duties.

12. Short reports and researches.

C - Emotional and value objectives:

1. Addressing some misconceptions and maintaining the integrity of the language of students.
2. Make the student an "influential" element that interacts positively with his community in a clear and eloquent language.
3. Make the student speak in a sound and understandable language.

Teaching and learning methods

1. Discussion during the lecture.
2. Writing reports for the subject.
3. Daily, weekly and quarterly exams.

Evaluation methods

1. Follow-up attendance and absence.
2. Theoretical tests.
3. Follow up the interaction and participation inside the classroom.
4. Reporting and discussion.

d. General and qualifying-transfer skills (other skills related to employability and personal development).

Teaching and learning methods

1. Apply the skills of modern interactive teaching methods among students.
2. Motivate competition among students by providing examples of linguistic errors and trying to correct them.
3. Commissioning the work of reports that enhance the creation of a spirit of knowledge among students.

Evaluation methods

1. Extra-curricular activities and homework.
2. Participation and discussion in the classroom and allow for the expression of opinions in order to assess the extent of benefit.

11. Course Structure

Week	Hours	Required Learning Outcomes	Unit / Subject Name	Method of education	Evaluation method
First	2	Identify the elements and expressions	The subject and the predicate	theoretical	Classroom and home assignments and weekly and monthly exams
Second	2	Identify the elements of the actual sentences and the expression of each element according to its location	Verb, subject and object	theoretical	Classroom and home assignments and weekly and monthly exams
Third	2	differentiate between necessary and transitive verbs and the reasons for transgression of the verb	Necessary and transitive verb	theoretical	Classroom and home assignments and weekly and monthly exams
Fourth	2	Identify the types of apparent and hidden pronouns and the impact of each of them and their syntactic state	Pronouns	theoretical	Classroom and home assignments and weekly and monthly exams
V	2	Identify the original and subsidiary parsing signs	Original and subsidiary parsing marks	theoretical	Classroom and home assignments and weekly and monthly exams
Sixth	2	Identify the five verbs, their expressions, and the signs of expression	The Five Verbs	theoretical	Classroom and home assignments and weekly and monthly exams
Seventh	2	Recognize conjunctions and their meanings	Conjunctions and their meanings	theoretical	Classroom and home assignments and weekly and monthly exams
Eighth	First monthly exam				
Ninth	2	Know the rules for writing the number and countable	Number and countable	theoretical	Classroom and home assignments and weekly and monthly exams

tenth	2	differentiate between a Connecting and cutting hamza and where to use each	Connecting and cutting hamza	theoretical	Classroom and home assignments and weekly and monthly exams
Eleventh	2	Identify excess letters in the Arabic language and the reasons for writing or deleting them	Extra characters	theoretical	Classroom and home assignments and weekly and monthly exams
Twelfth	2	Knowledge of the rules of Nun and Tanween	Noon and Tanween	theoretical	Classroom and home assignments and weekly and monthly exams
Thirteenth	2	Learn how to formulate a management letter correctly	Administrative discourse	theoretical	Classroom and home assignments and weekly and monthly exams
Fourteenth	2	Correction of common linguistic errors	Some common language errors	theoretical	Classroom and home assignments and weekly and monthly exams
Fifteenth	Second Monthly Exam				

12. Infrastructure

1- Required textbooks	**The unified binding of the Arabic language, which is taught in all departments of the Technical Institute / Mosul, which is prepared by:** **1. A.L. Susan Mustafa Hussein**
2- Main references (sources)	**Books and dictionaries in the Arabic language in the Institute and the University Library.**
Recommended books and references **(Scientific journals, reports,....)**	**All language dictionaries, books and writings of linguists and grammarians.**
B Electronic references, websites	**Sites that are interested in the Arabic language**

13. Course Development Plan

1. Adding literary topics that would endear the Arabic language in addition to consolidating the values inherited from Arab and Islamic history.
2. Include poetry and poem because of its importance in improving the student's ability to formulate and pronounce the correct words in addition to helping to accumulate the correct words in the student's mind, which helps him to express in an eloquent language free of errors and colloquial terms.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / Second semester
Advanced of Internal Combustion Engines

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Advanced of Internal Combustion Engines/PMTA215
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 2 practical) per week * 15 weeks = 60 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:
The aim of studying the Advanced of internal combustion engines course is:

1. Providing the student with basic information about advanced internal combustion engines
2. Introducing the student to the difference between the types of injection systems
3. Introducing the student to the stages of the combustion process
4. Introducing the student to the types of combustion chamber

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. The student's knowledge of the mixture strength and its effect on engine performance
2. The student knows how to determine the knock in the engine and how to reduce it
3. Methods of measuring and calculating the air – fuel ratio for a simple carburetor
4. Knowledge of the design for different combustion chamber

B - The skills objectives of the course.

1. Measurement indicated and brake mean effective pressure for 4-stroke engine
2. Measurement brake power for 4-stroke engine, draw relation between brake power, fuel consumption, mixture strength with speed
3. Measurement indicated power for engine used electronic indicator, draw indicated power curve and brake power with speed
4. Measurement heat balance for 4-stroke engine and calculation different losses engine

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of specialization.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. The student learned how to maintain internal combustion engines

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

Assessment method	Learning method	Unit name / or the subject	Required learning outcome	Hours	Week
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Detonation or knocking in S. I. Engine effects of detonation + Relation between mixture strength and speed for 4-stroke diesel engine with variable load draw power brake specific fuel consumption. Mixture strength with speed	4	1
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Control of duration , pre-ignition , effect of pre-ignition on engine + Relation between mixture strength with speed for 4-stroke petrol engine with variable load. Draw power curve brake specific fuel consumption , mixture strength with speed	4	2
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	S.I. engine combustion chamber designs + Exhaust gas analysis for 4- stroke diesel with variable load , component exhaust gas and percentage	4	3
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Carburetion in S. I. Engine + Exhaust gas analysis for 4- stroke petrol engine with variable load , component exhaust gas and percentage	4	4
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Simple carburetor – calculation of the Air-fuel nation for a simple carburetor + Measurement indicated and brake mean effective pressure for 4-stroke petrol engine	4	5
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Injection fuel systems in S.I. engine + Measurement indicated and brake mean effective pressure for 4-stroke diesel engine	4	6
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Combustion in C. I engines , stages of combustion in C.I. engine , variable affecting , stages of combustion + Measurement flash point for oil engine	4	7
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Diesel knock methods of controlling diesel knock + Measurement viscosity for internal combustion engine oil	4	8
Classwork,	Theoretical and	Advanced of Internal Combustion	C. I. Engine combustion chamber designs + Measurement brake	4	9

homework, weekly and monthly exams	practical	Engine	power for 4-stroke diesel engine , draw relation between brake power and fuel consumption . mixture strength and speak		
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Fuel injection in C. I. Engine requirements of diesel injection system , types of injection systems , types of fuel injectors and nozzles + Measurement indicated power for air compressor used mechanical indictor	4	10
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Fuel , specification , fuels for S. I. Engines , Octane number requirement , additives , fuels for C. I. Engine Octane number additives + Measurement indicated power for engine used electronic indicator , draw indicated power curve , brake power with speed	4	11
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Effect of supercharging on performance of the engine supercharging types + Study effect of compression ratio on brake power used 4- stroke diesel engine , draw brake power curve with speed for variable compression	4	12
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Engine friction and lubrication , additives + Study effect of compression ration on brake power used 4- stroke petrol engine , draw brake power curve with speed for variable compression ration	4	13
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Pollutants from S. I. Engine , effect of engine maintenance on exhaust emissions , emissions control + Measurement heat balance for 4- stroke petrol engine and calculation different losses engine	4	14
Classwork, homework, weekly and monthly exams	Theoretical and practical	Advanced of Internal Combustion Engine	Diesel emissions , diesel smoke and its control comparison diesel and gasoline emissions + Measurement heat balance for 4- stroke diesel engine and calculation different losses engine	4	15

12. Infrastructure

1- Required textbooks	1- Bason & Whit "internal combustion engine" vol. 1 & vol.2 1979. 2- P. L. Ballaney "internal combustion engine" 1980 3- Chorles F. T. "the internal combustion engine in theory & practice" 1986 4- Thermodynamics & heat engines "thermal engineering" 5- A course in internal combustion engines M. L. Mathur 1984.
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	1. Books concerned with internal combustion engines 2. The presence of a laboratory specializing in the advanced of internal combustion engines
B - Electronic references, Internet sites...	Sites concerned with internal combustion engines

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.

TEMPLATE FOR PROGRAMME SPECIFICATION

HIGHER EDUCATION PERFOMANCE REVIEW: PROGRAMME REVIEW

Second level / Second semester
Maintenance of advanced refrigeration and air-conditioning

Academic Program Description

This academic program description provides a concise summary of the most important features of the program and the learning outcomes expected of the student to achieve, demonstrating whether the student has made the most opportunities available. It is accompanied by a description of each course within the program.

1- Educational Institution	Northern Technical University
2- Scientific Department/ Center	Institute Technical /Mosul
3- Name of the academic or professional program	Department of Power Mechanics
4- Course name/code	Maintenance of advanced refrigeration and air-conditioning equipment(mandatory)/pmtr248
5- Available forms of attendance	mandatory
6- Semester/year	Courses
7- Number of study hours (total)	(2 theoretical + 4 practical) per week * 15 weeks = 90 hours
8-Date of preparing the description	10/1/2024

9- Course objectives:

Teaching the student and providing him with the necessary skills and experience to maintain and operate air conditioning and refrigeration equipment.

10. Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives

1. The student's knowledge of the thermal cycles of the air conditioning and cooling units
2. The student knows how to determine the efficiency of the compressors.
3. Methods of measuring and calculating the cooling circulation.
4. Know the work of the timetables of cooling.

B - The skills objectives of the course.

1. Measure the temperature of the cooling circulation.
2. Measuring the pressures of the cooling circulation.
3. Measure the relative and perceived humidity.
4. Measure the volumetric efficiency of compressors.

Teaching and learning methods

1. Theoretical lectures and practical training in laboratories.
2. Applying theoretical topics practically in various educational laboratories
3. Summer training
4. Graduation research
5. Scientific visits to various engineering projects related to the field of air conditioning.

Evaluation methods

1. Daily written tests
2. Submitting weekly reports on the practical experiments carried out by the student
3. Monthly and theoretical tests (theory and practical)
4. Class participation and continuous evaluation of the student's performance in practice

C- Emotional and value goals

1. Learning how to deal with others and work in a team spirit.
2. Learning and the ability to make appropriate decisions to address mistakes.
3. The student learned how to maintain the air conditioning systems.

Teaching and learning methods

1. Adherence to theoretical and practical lecture schedules.
2. Working in laboratories and workshops.
3. Implementation of projects by students.
4. E-learning.

Evaluation methods

1. Follow up on attendance and absence.
2. Theoretical and practical tests
3. Monitoring behavior and behavior inside the classroom.
4. Follow up on attendance at training sites and the extent of benefit.
5. Submitting and discussing reports.
6. Discussing graduation projects

D - Transferable general and qualifying skills (other skills related to employability and personal development).

1. Developing the student's ability to deal with modern technologies related to the curriculum's vocabulary.
2. Developing the student's ability to transfer information to practical reality after graduation.
3. Developing the student's ability to find appropriate solutions.

Teaching and learning methods

1. Using modern technologies in the air conditioning field.
2. Competitive tests between groups of students for one section

Evaluation methods

1. Extracurricular activities and homework.
2. Participation and discussion in the classroom.

11. Course Structure

الأسبوع	تفاصيل المفردات
1	صيانة مبادلات الهواء – المراوح – ملفات التسخين والتبريد – المرشحات بأنواعها.
2	صندوق خلط الهواء مع البوابات – جهاز ترطيب الهواء – المسخن الكهربائي مع صمامات السيطرة
3	صيانة وحدة الملف والمروحة (وصف النظام ، صيانة خط الملف وتنظيف الملفات والمرشح من الأوساخ التي يتركها الهواء على الشبكة)
4	مجموعة السيطرة وكيفية ربطها مع لوحة السيطرة الكهربائية
5	صيانة أجزاء جهاز تكييف مركزي – فحص زيت الضاغط مع صيانة صمامات الخدمة وغسل المكثف بالمواد الكيمياوية ، تنظيف المبخر ، تنظيم صمام التمدد ، فحص وتنظيم مسيطرات الضغط (مسيطر الضغط العالي والواطئ والزيت)
6	تبديل أجزاء الجهاز – دورة التفريغ والشحن وفحص التسرب (قائمة تحديد الأعطال)
7	صيانة برج التبريد (أنواعها) صيانة جسم البرج و الحوض ، الطوافة ، الحشوة والمروحة والمحرك ، صندوق التروس (ان وجد) ، ضبط استقامة المحاور
8	وصف الأنواع المختلفة لمضخات الماء ، صيانة المحرك والصمامات
9	ضبط استقامة محور المحرك والمضخة – أنواع مانع تسرب الماء ، الإصلاح أو الاستبدال – تبديل المضخة والأنابيب والملحقات
10	صيانة الأجزاء الكهربائية
11	صيانة المرجل – تنظيف جسم المرجل من الداخل والخارج – تفكيك المحرك وتوابعها وصيانة أجزائه المختلفة .. إعادة التركيب على جسم المرجل .
12	إعداد المرجل من حيث تجهيز الماء وفحص الكهربائيات ثم تشغيل مع إعادة فحص نظم السيطرة له.
13	صيانة اللوحات الكهربائية وقراءتها لأجهزة التكييف المركزية
14	تفكيك وتنظيف أجزاء لوحة كهرباء منظومة التكييف المركزية وخاصة بادئ الحركة ، فحص التيار المسحوب لكل محرك في المنظومة والتأكد من صحة تنظيم واقي زيادة التيار ولكل محرك
15	زيارة علمية لإحدى الأبنية التي لديها لوحات سيطرة متطورة لمنظومة تكييف مركزية

المفردات العملية	
الاسبوع	تفاصيل المفردات
1 - 2	صيانة المبادلات الحرارية – المراوح – المحركات – ملفات التسخين والتبريد ومرشحات الهواء + صناديق الخلط – البوابات – أجهزة التبخير – سخانات الكهرباء – صمامات السيطرة ومحركاتها
3	فحص وصيانة وحدات الملف والمروحة – تنظيف مصافي الهواء – التاكد من مرور الماء الى الملف – فحص محرك المروحة – فحص المنظم الحراري وصمام السيطرة
4	فحص أجزاء الدائرة الكهربائية – تنظيف نقاط التوصيل للموصلات وفحص وإعادة تنظيم المسيطرات
5	فحص كمية الشحنة (كمية الوسيط الموجود) فحص صلاحية وكمية الزيت بالضاغط – وكيفية تعويض النقص ان وجد – فحص وتبديل أجزاء الجهاز – التفريغ والشحن وتحديد الأعطال
6	غسل المكثف بالمواد الكيمياوية – غسل وتشغيل أقفال الماء المستخدمة
7	فحص أداء لوحة السيطرة الكهربائية ومتابعة أداء كل مسيطر وفحص أداء صمام التمدد
8	صيانة أبراج التبريد – التنظيف وصبغ الجسم الخارجي للبرج والحوض وتنظيف المراوح وتزييت مساندها .. صيانة الحشوات – تبديل أحزمة نقل الحركة – صيانة المحرك – تنظيف مصفى الماء – تشغيل صمامات الماء المؤدية من والى البرج
9 - 10	صيانة مضخات الماء – تفكيك المضخة – فحص الأجزاء – صيانة الأجزاء المطلوب صيانتها أو استبدالها – صيانة المحرك الكهربائي الخاص بها – صيانة بادئ الحركة – ضبط استقامة المضخة والمحرك – إعادة تركيب الأجزاء – صيانة أنابيب الماء وملحقاتها
11 - 12	صيانة المراجل – تنظيف المرجل من الخارج والداخل – صيانة الأجزاء والمنظمات – إعادة المرجل للعمل مرة أخرى – فحص الكهربائيات لجهاز السيطرة .
13	صيانة اللوحة الكهربائية – تفكيك وتنظيف الأجزاء – فحص جميع الأجزاء – إعادة ربط اللوحة
14	صيانة غاسلات الهواء – المبردات التبخيرية
15	زيارة علمية لإحدى المواقع ذات التكييف المركزي الحديثة للإطلاع على لوحات السيطرة

12. Infrastructure

1- Required textbooks	1- **-Ashrae Guide and Data Book** **2 -Modern Refrigeration and Air-condition by Althouse & Turnquist** **3 -Refrigeration & Air-condition** **4 -Refrigeration & Air-condition institute**
2- The main references (sources)	the scientific books in the Free Education Division
A- Recommended books and references (Scientific journals, reports,....)	
B - Electronic references, Internet sites...	Sites concerned with internal combustion engines

13. Course development plan

1- Keeping pace with scientific development in the field of specialization with every new development.

2- Updating lectures.

3- Using modern methods in education.