**Ministry Of Higher Education and Scientific Research**

**Supervision And Scientific Office**

**Quality Assurance and Academic Department**

# Academic Description Form for Collages and Institutes

Name Of University: North Technical University

Collage/institute: Kirkuk technical institutes

Department: Electrical Techniques

File filled date:13/9/2023

Name Hade of Department:

File filled date:13/9/2023

Scientific Assistance Name:

File filled date:13/9/2023

File has been checked by Department

of Quality Assurance and Academic Department

Name:

Date:

Deans approval:

| | |
|---|---|
| Name of Final certificate | Technical Diploma / Study period is two calendar years equivalent to three academic years |
| Study system | Yearly |
| Accredited Academic Program | ABET |
| Other external influences | 1-There Is A Close Relationship Between The Department's Output And The Labor Market, And A Market Opinion Is Taken To Create Curriculum Study .<br>2-Continuous Follow-Up Of The Curricula Of Industry Prep For The Purpose Of Matching Its Outputs To Fit The Continuity Of The Vocabulary Of The Section |
| Description creation date | 30/5/2021 |

| 9- Academic Program Objectives: |
|---|
| 1- Preparing technical staff with high skills in the field of electricity capable of dealing with variables |
| 2- Enhancing the values of job affiliation and loyalty in the organization |
| 3- make a Bridge between traditional and modern scientific and training curricula to serve the current reality |
| 4- Enhancing the concepts of qualitative and quantitative excellence in order to achieve quality standards and scientific efficiency |
| 5- Create a scientific, research and applied environment that serves business organizations and find solutions to their problems |
| 6- Evaluating and developing the effectiveness of the annual educational and training programs to achieve better development |
| 7- Taking care of students and putting them on the right path that expresses their personal and professional aims and aspirations |
| 10- Required program outcomes and methods of teaching, learning and assessment |
| A- Cognitive aims<br>A1- Electrical circuits and measurements<br>A2- Computer applications and programmable logic control<br>A3- Electronics and digital electronics<br>A4- Machines and electrical networks<br>A5- Electrical installations and electrical drawings<br>A6- Power Electronics |
| b- The skill objectives of the program |
| The topic aims to graduate qualified cadres to work in the operation, maintenance and construction:<br>B1 - Various high- and low-voltage electrical circuits, and how to check and maintain them.<br>B 2 - The electrical stations and the various measuring devices.<br>B3 - Electrical network systems and installations.<br>B4 - electrical control systems. |

B5 - electric motors and transformers.

11-Teaching and learning methods

The following methods are followed

1. Theoretical lecture (with a variety of explanations)
2. The practical lecture (with a variety of illustrations)
3. Workshops (with a variety of illustrations)
4. Showing scientific films, seminars for students
5. Student research, scientific reports, scientific visits
6. Summer training.

Evaluation methods

The work of the year, which includes:

1. The work of the year, which includes: (the exam at the beginning of the lecture using Google Forms and includes the topic of the previous lecture, oral exams during the lecture with the same topic of the lecture, scientific reports, student seminars, student research)
2. The first semester exam (integrated) on online and attendance method
3. The second semester exam (integrated) on online and attendance methods
4. The final exam periodically (integrated) on online and attendance methods

C- Emotional and value aims

C1- Dissemination of scientific and technical knowledge in the field of electrical engineering sciences.

C2- Graduating national cadres at a level of education

C3- Training the student to use electrical laboratory equipment for different measurements that he can practice in his working life.

C4- Absorbing modern technologies and supporting the process of scientific and technical development to keep pace with global developments

A5 - The student acquires the skill in the field of electrical appliance maintenance and fault diagnosis, through:Teaching the student on the methods used in maintenance and the importance of the components, then training the student with practical experiences on malfunctions of various electrical devices.

d- Transferred general and rehabilitative skills (other skills related to employability and personal development)

D1- Welding

D 2- Plumbing

D 3- Turning

D 4- The refrigerator

D 5- Search on the Internet

Teaching and learning methods

Lecture style, workshop, computer simulation, summer training

Evaluation methods

1. The work of the year, which includes: (the exam at the beginning of the lecture using Google Forms and includes the topic of the previous lecture, oral exams during the lecture with the same topic of the lecture, scientific reports, student seminars, student research),
2. the first semester exam (built-in) via the Internet And my attendance,
3. The second semester exam (combined),
4. The final exam is also integrated.

11-program structure

| Educational level | Subject or course code | Name of department | Credit hours | |
|---|---|---|---|---|
| | | | theoretical | Practice |
| First stage | | Department of Electrical Techniques | 16 | 19 |
| Second stage | | | 11 | 19 |

12-Planning for personal development

Specialized courses, scientific symposium, seminars, scientific developments, research, scientific conferences

13- Acceptance standard (setting regulations related to college or institute enrollment)

1)The total degree that the student obtained after passing the general exams for the sixth grade.

2) To be a graduate of the scientific or industrial branch (specializing in electrical field).

3) The results of the medical examination that the student is healthy and fit to study in the department.

4)-Desire

14-The most important references of information about the program

- "Fundamentals of Electric Circuits", Charles K. Alexander, Matthew N. O. Sadiku, 4th ed.
- "A Textbook of Electrical Technology", B.L. Theraja and A.K. Theraja, 2005
- Robert Bolested, Louis Nashelsky " Electronic Devices and Circuit Theory".
- Jimmie J. Cathy" Electronic Device and Circuit"
- Mohammed Harunur Rashid " Power Electronics Circuits, Devices, and Applications'
- A. Chakrabarti, M. L. Soni, P. V. Gupya and U. S. Bhatnagar, "Power system Engineering"
- V. K. Mehta and Rohit Mehta "Principles of Power System".
- A textbook of electrical technology by theraja

Curriculum Skills Outline

| Please check the boxes corresponding to the individual learning outcomes from the program being evaluated | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Learning outcomes required from the program | | | | | | | | | | | | | | | | | | | |
| year | code of course | name of subject | basic or optional | cognitive aims | | | | skill aims related to the program | | | | Emotional and value goals | | | | OTHER SKILLS RELATED TO employability and personal development | | | |
| | | | | A 1 | A 2 | A 3 | A 4 | B 1 | B 2 | B 3 | B 4 | C 1 | C 2 | C 3 | C 4 | D 1 | D 2 | D 3 | D 4 |
| 2019-2020 | | electronic | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Electrical circuits and measurements | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Electrical installation 1 | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Maths | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Computer Applications 1 | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Engineering and electrical drawing 1 | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Human rights and democracy | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | occupational safety | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | digital electronics | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | parameter 1 | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | English 1 | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | power electronics | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Electrical installations 2 | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | electrical networks | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | electrical machines | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Maintenance laboratories workshops 2 | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Computer Applications 2 | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Electron drawing 2 | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | Programmable Logic Control (PLC) | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | The project | Basic | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | English 2 | unessential | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

# COURSE DESCRIPTION FORM

This course description provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve, demonstrating whether he has made maximum use of the available learning opportunities.

| | |
|---|---|
| 9. Educational Institution | Northern Technical University / Kirkuk Technical Institute |
| 10.Scientific Department / Center | Electrical technology department |
| 11.Name / subject | Power Electronics |
| 12.Forms of attendance available | Google Meet online, on the theoretical side and on the practical side, in attendance, according to the blended education. |
| 13.Semester/year | Annual (30 weeks) |
| 14.Number of hours of study (total) | hours per year (5 hours per week) ١٥٠ |
| 15.The date this description was prepared | ٢٠٢٠/٥/٣٠ |
| 16.Objectives of the course: Introduce the student to: | |
| Power Electronics | |
| electronics of electrical machines | |

10-Course outcomes and methods of teaching, learning and assessment

A- Cognitive aims

A1- Identify the main components of power electronics

A2- Understand the design of electronic control circuits

A3- Identify the basic components of special electrical machines

A4- Knowing the methods of working and controlling public and private electrical machines

b- Subject-specific skill objectives

B1- Optimum use of electronic circuits

B2- Designing schematics for electronic control circuits

B3- Maintenance and diagnosis of electrical and electronic faults

10-Teaching and learning methods

The theoretical lecture (with various means of explanation), the google classroom, the practical lecture (with various means of explanation), scientific reports. google meet. Department's YouTube.

| Evaluation methods |
| --- |
| The year's work, including: (the daily exam at the beginning of the meeting, .1 including the topic of the previous lecture, oral exams during the lecture with the same topic as the lecture, scientific reports<br>First term exam .2<br>The second semester exam .3<br>.Final exam .4 |
| Emotional and value aims |
| C1- Understand the working methods and installation of special machines<br>C2- Understand the beneficial methods of treating control boards<br>C3- Understand advanced power electronics and how it works<br>C4- Understand modern methods of controlling machines |
| Teaching and learning methods<br>Theoretical lecture (with various explanations) google classroom, practical lecture (with various explanations), scientific reports. googlemeet. youtube |
| Evaluation methods<br>The work of the year, which includes: (the daily written exam at the beginning (1 of the lecture, including the topic of the previous lecture, oral exams during the lecture with the same topic as the lecture, scientific reports, 2) the first semester exam, 3) the second semester exam, 4) the final exam |

11- structure of subject

| Week | Theoretical syllabus |
|---|---|
| 1st | Power electronic ,electronic compents which used in high power control(power diodes, thyristor and power transistors)pevison of single phase rectifier circuites by using diodes. |
| 2nd | Three phase rectifier circuites by using diodes, output voltage waveform, diode current waveform, output voltage equation in case of resistance lode. |
| 3rd | Using the transistor as switch, regions of operation, transistor as a switch(cut off and saturation) |
| 4th | Power transistor in (off)and (on)state, improvement of(off)and(on)time by usenig speed up capacitance, practical problems. |
| 5th | Uniplolor junction transistor , construction , theoretical operation , using the transistor as relaxation oscillator practical example |
| 6th | operatioal amplifier , discription of operational amplifier (op-amp) as asparate components , zero detector , comparator |
| 7th | The use of op-amp as astable multivibrator and a monostable multivibrator , photo conduction cells , photo diodes |
| 8th | Light – emitting diodes (LED), photo transistors , the use of optical comparator in power Electronic circuits |
| 9th | Thyristor , construction , characteristic , curves for a thyristor , thyristor conduction in forward biasing , thyristor family , thyristor representation as a double transistor circuit. |
| 10th | Thyristor conduction methods , conduction throw the gate minimum gate current causing conduction , conduction time , conduction due to high forward voltage rectifire (dv/dt) |
| 11th | DIAC , TRIAC characteristics , practical applications , thyristor ,triggering methods , triggering on DC and AC current , pluse |

| | triggering types |
|---|---|
| 12th | thyristor triggering circuit , DC and AC triggering circuits |
| 13th | Pluse current triggering circuit , relaxation oscillator ,zero detector , comparator with astable and monostable multivibrators(operational amplifiers and timer) |
| 14th | Thyristor general application introductory , AC to DC inverter DC to AC inverter , DC to DC inverter , AC to AC inverter , phase controlled halfwave rectifire with resistance and indctormce load out put current and voltage waveform , output voltage equations |
| 15th | Half controler full wave rectifire fully controlled ,resistance and inductance load , generated wave forms , out put voltage equation for free wheeling diode. |
| 16th | Regenrating fully controlled inverters , examples , DC motor speed control |
| 17th | Three face inverters , out put voltage wave form with ,triggering pulses and equations |
| 18th | Thyristor protection from the high rate change in current and voltage , protection from the transient change in source voltage , fully protection circuit from all possible faults due to current and voltage. |
| 19th | DC to AC inverters methods of forcing the thyristor to get off |
| 20th | Parallel and senies inverter , single and three phase , control methods in charging frequency and voltage , out put wave forms1 |
| 21 th | Inverter application , emergency power supply , single phase DC motor speed control |
| 22 th | Three phase motor control by using a constant ratio of variation frequency and voltage |
| 23 th | Choppers , DC to DC inverter frequency constant , line constant |
| 24 th | Types of choppers , DC motor speed control |
| 25 th | AC to AC inverter , single phase voltage requlator , three phase voltage requlator |
| 26 th | General application on single and three induction motor speed control due to the change in stat or voltage , using the closed loop feedback circuit to control the slippery rings of AC motor |
| 27 th | Cyclic inverter , AC to DC cyclic inverter , DC to DC cyclic inverter |
| 28 th | AC to AC cyclic inverter control block diagram |
| 29 th | Using amplitude modulation for speed control |
| 30 th | Using polar transistor for AC motor speed control |

| 12-Infrastructure | |
|---|---|
| ١-Required references books | Power electronics circuits, devices, and - applications by Muhammad harunurrashid |

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|---|---|
| 2- Main References (Sources) | • Power electronics: converters, applications, anddesign by nedmohan |
| A- Recommended books and references (scientific journals, reports) | 1-The virtual library of the Ministry of Higher Education and Scientific Research |
| 13- Study course development plan: The development plan is carried out through studies submitted annual scientific plan for the development of the study course | |