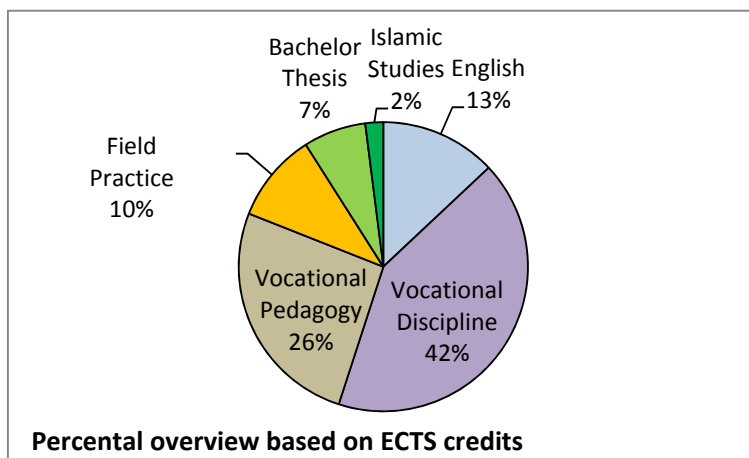


Bachelor of Engineering Technology – Electrical Power

Program Description

This course provides students with knowledge, skills and competencies within the field of Electrical Power. In the first three semesters the TTC provides a number of common training units like analog and digital circuits, electrical drawing, electrical machines or applied mathematics and physical principles. Within the specialization the students will learn fundamental electric power engineering concepts and develop technical expertise about the transmission of electricity and installation of power systems (from the power station to the consumer). Other major topics are the field of Automatic Control and PLC.



Detailed Program Overview

	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
English	General, Technical and Pedagogical English 1	General, Technical and Pedagogical English 2	General, Technical and Pedagogical English 3	General, Technical and Pedagogical English 4	General, Technical and Pedagogical English 5	General, Technical and Pedagogical English 6
Vocational Pedagogy	Introduction to Vocational Pedagogy	Basics of Learning and Teaching	Lesson Planning and Teaching Techniques	Didactics of the Vocational Discipline	Instructional Technology	Differentiation / Individualization / Dealing with Disturbances
		Organization of TVET	Didactics	Assessment, Self Evaluation and Management of VET Process	Developing a Teaching Plan / Curriculum Process	Managing Complex Learning Arrangements / Preparation Bachelor
			Teaching Practice / Micro Teaching	5 TRTS Sessions at VTC / CoT, Twin Teaching Peer Counseling	5 TRTS Sessions at VTC / CoT, Twin Teaching Peer Counseling	
Vocational Discipline	Electrical Circuits	Electrical Drawing	Electronic Circuit Analysis	Automatic Control	PLC II	Power System Protection
		Instrumentation		Power System Technology	Power System Maintenance	Advanced Lab Design
		Analog Electronics	Electrical Machines	Electrical and Industrial Installation	Electrical Control	Power System Control and Stability
			PLC I		Islamic Studies	
		Mathematics Analysis				
			Islamic Studies		Company Field Practice	Vocational Field Practice
Field Practice		Company Field Practice		Vocational Field Practice		
BA Thesis						BA Thesis

Course Descriptions

Semester 1

General, Technical and Pedagogical English 1

The trainees continue to develop their ability to interact and communicate through English, using reading, writing, listening and speaking skills. Instruction will aim to broaden and deepen their knowledge of vocabulary, grammar and structure of English in a communicative context related to their vocational discipline and also to their role as trainers. They should move from a more passive understanding of English to active use in written texts and oral presentations. The goal will be to raise the general level of ability to between B1 and B2 on the Common European Framework scale.

Electrical Circuits

The trainees will be able to perform direct and indirect measurement in analogue version and digital; set up basic circuits (buttons plus sensors) and multiple component load circuits (with contactors and relays) in sequential arrangements and interlocks; read circuit diagram and install power circuit for three-phase squirrel cage ventilator/pump motor in an air-con system/water supply with storage tank, level control; assemble, operate, troubleshoot and maintain of power circuits of various ACR equipment, such as motors; determine power efficiency of common ACR- circuits; and install complete electric supply circuit for ACR systems.

Physical Principles of Electrical Engineering

This module focuses on the development of an understanding of physical principles and their application to the solution of a range of engineering problems. The fundamental laws provide a flexible knowledge that is the tool which serves as a bridge between theory and experiment - basis of the development of technological applications. The aim of the module is to introduce basic principles of electromagnetism and how they relate to electrical and electromechanical engineering. The trainee is able to describe the fundamentals of electro-physics and can express theories in the language of mathematics. The trainee can transform basic knowledge and understanding about fundamental concepts of electro physics into the world of electro technique such as selection of material; explaining the principle of current, voltage and power or other electrical phenomena. The trainee can present and explain data in a graphical way.

Mathematics Algebra

This module introduces and then consolidates basic mathematical principles and promotes awareness of mathematical concepts for students needing a broad base for further vocational studies. Theory is introduced in each chapter by a brief outline of essential theory, definitions, formulae, laws and procedures. However, these are kept to a minimum, for problem solving is extensively used to establish and exemplify the theory. It is intended that readers will gain real understanding through seeing problems solved and then solving similar problems themselves. The trainee can use methods of algebra for solving engineering technology and physical problems. The trainee can develop mathematical descriptions for technical processes. The trainee can transform data into diagrams and vice versa. The trainee shows logical thinking in problem solving.

Semester 2

General, Technical and Pedagogical English 2

The trainees continue to develop their ability to interact and communicate through English, using reading, writing, listening and speaking skills. Instruction will aim to broaden and deepen their knowledge of vocabulary, grammar and structure of English in a communicative context related to their vocational discipline and also to their role as trainers. They should move from a more passive understanding of English

to active use in written texts and oral presentations. The goal will be to raise the general level of ability to between B1 and B2 on the Common European Framework scale.

Electrical Drawing

The trainee can use the basics in technical communication. The trainee can read and draw technical documents and drawings. The trainee can prepare handmade as well as computerized drawings and diagrams e.g. of electrical circuits, electrical machines, power distribution systems or electrical installations. The trainee can document technical processes to develop the practical aspects of the theory knowledge. The trainee can transfer ideas into technical drawings in order to communicate in adequate ways. He is able to explain the technical content in the classroom.

Instrumentation

This module deals with instruments used to read and observe the general electrical quantities like current, voltage, power, energy, frequency, resistance etc and their wave shapes. Therefore it introduces measurement and instrumentation systems and summarizes important concepts by building on the foundation provided in other modules (e.g. BVF 1; BVF 6), starting from the physical sensors and proceeding through wiring and grounding to signal conditioning and analogue-to-digital conversion. The trainee knows the functional principles of different types of measuring equipment and can use them. The trainee can choose the right equipment for different measuring scenarios. The trainee knows about the source of failures, their compensation and can calculate the expected measurement failures. The trainee can design and use of an electrical system to collect and process physically meaningful data.

Analog Electronics

This module introduces trainees to the use of a variety of analogue electronic components and semiconductor-based electronic devices, and in so doing; it provides a transition between the fundamentals of electrical circuit analysis and the study of electronic circuits. Moreover this module extends trainees knowledge of the theory and applications of electrical circuits and introduces trainees to the concepts and use of feedback and feedback (amplifier) design. The trainee learns to analyze, calculate, design, tune and operate different basic analogue circuits. The trainee can discuss different parameters necessary for mathematical models. The trainee can choose the right setup of components for given problems. The trainee knows the technical principles of basic components and can explain them. This serves to continue to develop and practice oral and written communications skills specifically directed to the later occupation as a technical trainer.

Digital System Design

This module introduces and then consolidates an intermediate understanding of digital circuits and analyzing these circuits. The knowledge gained shall be effectively used for designing and building digital circuits. The trainee can develop digital circuits, combinational and sequential circuits. The trainee can use mathematical methods to solve logical problems. The trainee can set up and optimize different digital solutions in a closed context using the basic technologies for designing and testing digital circuits. Moreover troubleshooting procedures and problem solving are covered. Hands-on equipment and practical application design are emphasized.

Special Purpose Machines and Drives

The objective of this chapter is to introduce the operating principles and performance characteristics of a number of special-purpose electric machines that find widespread engineering application in a variety of fields, ranging from robotics to vehicle propulsion, aerospace, and automotive control. The trainee develops a basic understanding of small machines and drives which are employed mainly in domestic and commercial appliances etc... The trainee is able to explain construction principles of the machines. The trainee can calculate real world problems concerning small machines. The trainee can plan projects using small machines with special emphasis to the surrounding factors. The trainee can operate small machines using simulation as well as real world examples.

Semester 3

General, Technical and Pedagogical English 3

The trainees continue to develop their ability to interact and communicate through English, using reading, writing, listening and speaking skills. Instruction will aim to broaden and deepen their knowledge of vocabulary, grammar and structure of English in a communicative context related to their vocational discipline and also to their role as trainers. They should move from a more passive understanding of English to active use in written texts and oral presentations. The goal will be to raise the general level of ability to between B1 and B2 on the Common European Framework scale.

Electronic Circuit Analysis

This module covers the basic and higher circuit analysis methods, including the solving of simultaneous equations of 3rd order. The trainee can explain the physical and mathematical foundations of electro technology and gets familiar with basic circuit elements. The trainee can measure electrical values and judge them in comparison with calculations. The trainee can setup experiments in order to analyze and explain complicated resistive networks. He writes numerical equations for currents and voltages and is able to graph the response of networks. The trainee reactivates the basic knowledge and adapts it to the new teacher role.

Mathematics Analysis

Mathematics Analysis is the second of the two advanced mathematics courses and emphasis on important concepts, such as integration or trigonometric functions. Engineering applications are integrated at each opportunity in order to encourage the student to appreciate mathematics as a powerful tool for dealing with technical problems. The trainee can use methods of analysis for solving engineering technology and physical problems; can develop mathematical descriptions for technical processes; and can transform data into diagrams and vice versa. The trainee shows logical thinking in problem solving.

Electrical Machines

The objective of this chapter is to introduce the operating principles and performance characteristics of a number of special-purpose electric machines that find widespread engineering application in a variety of fields, ranging from robotics to vehicle propulsion, aerospace, and automotive control. The trainee knows the principles of construction and use of small machines (e.g. universal motor, stepping motor, servo motor). The trainee can choose the right machine for certain applications. The trainee understands the physical effects of various special purpose machines (small machines). The trainee can calculate mechanical and electrical parameters of small machines.

PLC I

This module will study the basic theory of operation of programmable controllers and their applications. The focus of this module will be on the technician learning to diagram, program, and trouble-shoot industrial programmable controllers. The trainee knows the relevant methods of programming and setting up PLC based controls; can develop and set up PLC applications for model type projects; uses different Interfaces for programming PLCs; can describe the way of problem solution for given settings; can choose the appropriate hardware for defined projects. The trainee develops simple programs or various applications and can test the programmed solutions to match the expectations.

Semester 4

General, Technical and Pedagogical English 4

The trainees continue to develop their ability to interact and communicate through English, using reading, writing, listening and speaking skills. Instruction will aim to broaden and deepen their knowledge of vocabulary, grammar and structure of English in a communicative context related to their vocational discipline and also to their role as trainers. They should move from a more passive understanding of English

to active use in written texts and oral presentations. The goal will be to raise the general level of ability to between B1 and B2 on the Common European Framework scale.

Automatic Control

The trainee is able to use the theory in control system terminology; knows the different mathematical methods how to solve system theoretical problems; is able to adapt mathematical models to real world questions; and can apply simulation techniques to theoretical as well to practical questions.

Power System Technology

This module introduce the students to fundamental concepts relating to the design and management of modern electrical power systems and develop an awareness of technical problems associated with operation of such systems. He becomes acquainted with necessary analytical, numerical and modelling skills for handling particular problems. This course enables the trainee to plan, apply and operate simple parts of power system technology. The course gives an overview of the different types and parts of power distribution and generation systems. The trainee is able to develop projects and plan for different approaches for delivering electrical energy to various users and communicate them in a proper way.

Electrical and Industrial Installation

The trainee learns to plan, install, operate and maintain different industrial installations; knows the different safety measures and can plan and use different safety tools; can set up complex industry standard electrical installations and document the process; can calculate loads, power consumption and interdependencies between installed systems.

Semester 5

General, Technical and Pedagogical English 5

The trainees continue to develop their ability to interact and communicate through English, using reading, writing, listening and speaking skills. Instruction will aim to broaden and deepen their knowledge of vocabulary, grammar and structure of English in a communicative context related to their vocational discipline and also to their role as trainers. They should move from a more passive understanding of English to active use in written texts and oral presentations. The goal will be to raise the general level of ability to between B1 and B2 on the Common European Framework scale.

PLC II

The trainee solves advanced problems of automation using PLC technology; develops complex solutions for interconnected problems using PLC and SCADA devices; is able to set up solutions for real time problems; creates user interfaces for interconnected and clustered PLC projects; and can layout and plan complex learning (model) settings using different PLC.

Power System Maintenance

The course helps the trainee perform the maintenance and understand of different components of power systems. Basic Circuit Breaker and Transformer construction, electrical safety, and common maintenance techniques are major components of this course. Trainees are to be able to perform tests and maintenance the different power system devices.

Semester 6

General, Technical and Pedagogical English 6

The trainees continue to develop their ability to interact and communicate through English, using reading, writing, listening and speaking skills. Instruction will aim to broaden and deepen their knowledge of vocabulary, grammar and structure of English in a communicative context related to their vocational

discipline and also to their role as trainers. They should move from a more passive understanding of English to active use in written texts and oral presentations. The goal will be to raise the general level of ability to between B1 and B2 on the Common European Framework scale.

Power System Protection

This course is designed to give the trainee principles knowledge of the power system protection such as: The trainee knows components of protection systems, protective relays and the use of circuit breakers; the trainee can develop and calculate protection schemes and applications.

Advanced Lab Design

The trainee is enabled to plan and develop his own laboratory experiments according to his specialization; learns the rules of integrating safety features; is able to plan and document laboratory surroundings; is able to maintain laboratory equipment; develops teaching material and handouts according to the curricular guidelines; is able to connect his results with other projects; and learns to introduce other users in the elaborated projects.