

Applied Learning (Senior Secondary Level)

2019-21 Cohort

Learning and Teaching

Subject Title	:	Electrical and Energy Engineering
Area of Studies	:	Engineering and Production
Course Provider	:	Vocational Training Council

In Electrical and Energy Engineering, student-centred learning and teaching activities are designed to enable students to understand fundamental theories and concepts, develop their generic skills, and address their career aspirations in the electrical and energy engineering industry.

Different modes of activities are employed to provide students with a systematic understanding about the context (e.g. lectures on the overview of the electrical and energy engineering industry, basic electrical and electronic engineering principles and techniques) and eye-opening opportunities to experience the complexity of the context (e.g. industrial visits and sharing by industry practitioners).

Students acquire an understanding of the requirements, fundamental knowledge and skills essential for further learning within the area through learning-by-practising opportunities in an authentic or near-authentic environment (e.g. experiments on electrical engineering principles, and using the tools/instrument in electronic and electrical workshop practices).

Students are also encouraged to develop and apply conceptual, practical and reflective skills to demonstrate entrepreneurship and innovation (e.g. group discussion to evaluate the social and environmental impacts on the different fuel mix strategies for electricity generation). Students are given opportunities to integrate the knowledge and skills acquired and consolidate their learning (e.g. in the implementation project, students prepare a proposal on renewable energy system or smart technology and energy efficiency. They integrate and apply the knowledge and techniques acquired in the subject, transform their design ideas of utilising renewable energy, or to enhance the efficiency of an electrical system into the production of a prototype and a project report. Apart from the technical skills, students demonstrate analytical skills and critical thinking skills through completing the project. They also practise self-management and collaborative skills during the process of project management).

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Curriculum Pillars of Applied Learning in Context – Electrical and Energy Engineering

Upon completion of the subject, students should be able to:

- analyse the general profile of the electrical and energy engineering industry, and its latest development;
- apply the basic principles and techniques of electrical engineering, in particular the knowledge of energy efficiency enhancement to formulate engineering solutions;
- integrate knowledge and skills in electrical and energy engineering industry, including work ethics and social responsibilities, safety and sustainable development, as well as communication and problem-solving skills;
- interpret the latest development and achievements in the related engineering fields;
- demonstrate positive values and attitudes towards the electrical and energy engineering industry; and
- develop self-understanding for further studies and career development in the related field.

Through the specific contexts related to the subject, students have different learning opportunities, for example:

1. Career-related Competencies

- understand the importance of abiding by ethical, social and legal requirements as well as work ethics and responsibilities;
- demonstrate the knowledge and skills in electrical and energy engineering, including basic electrical and electronics principles, design and operation of sensing and control circuits for lighting and motor, and operating principles of electrical power generation, power transmission and distribution, energy efficiency, energy audit, renewable energy and sustainability;
- apply engineering knowledge and skills to plan and design solutions for practical problems in electrical and energy engineering;
- appreciate the phases of managing engineering projects;
- demonstrate the ability to work effectively in a project team and finesse the communication skills in handling tasks of renewable energy or smart technology to enhance energy efficiency; and
- explore the aptitudes and abilities required in electrical and energy engineering industry, and develop a personal roadmap to articulate to different levels of qualifications.

2. Foundation Skills

- practise communication skills through group discussions, project reports and presentations, experiments and critique;
- demonstrate information technology skills for electrical and energy engineering applications with the use of different computer tools and software (e.g. computer application for lighting design and printed circuit board design); and
- apply mathematical skills when analysing data (e.g. experimental data of electrical engineering principles).

3. Thinking Skills

- practise problem-solving skills, decision-making skills, creative thinking skills and analytical skills when planning, developing and evaluating engineering project work;
- analyse the effectiveness of different alternatives for engineering solutions (e.g. the different illumination technologies, and the various fuel mix strategies for electricity generation); and
- form regional/global perspectives on social, economic and technological changes essential to the utilisation and generation of electricity, as well as the concern about energy conservation and sustainability.

4. People Skills

- demonstrate self-reflection skills through feedback from tutors and classmates in various learning activities such as class exercises, experiments, mini-project, group discussions, presentations and critique;
- practise self-management skills during preparation for tests and presentation; and
- demonstrate interpersonal, collaborative and team building skills through interacting actively with tutors and classmates in lectures, brainstorming, group discussions, presentation, experiments and the implementation project.

5. Values and Attitudes

- demonstrate respect for others, social responsibility, law and authority through discussing electricity ordinance, professional ethics and environmental issues, especially in the planning of the implementation project;
- discuss positive attitude towards green living and the importance of low carbon emission in topics, such as energy labelling scheme, energy resources, energy saving, energy conservation and sustainability; and
- demonstrate positive attitudes (e.g. enthusiasm and motivation, and willingness to learn) through various learning activities, e.g. practical training, mini-project and group discussions.