Module Specification

Power Systems Fundamentals

Version: 2023-24, v2.0, 15 Mar 2023

Contents

Part 1: Information

Module title: Power Systems Fundamentals

Module code: UFMFRJ-15-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: In addition to the learning outcomes the educational experience may develop through practise but not formally assess the handling of simulation software such as PSCAD, ATPDraw and MATLAB.

Outline syllabus: The syllabus includes:

History of power systems and symbols used to represent each element.

Structure of modern power systems and their respective ratings.

Per unit systems –single and three phase systems.

One-line diagram representation of power systems elements and components.

Conversion of a network impedance diagram into per unit diagram.

Model of transmission lines/cables, transformers, generators, and loads.

Part 3: Teaching and learning methods

Teaching and learning methods: Concepts and the scope of a topic will be introduced in lectures. These will be supported by tutorials, directed reading and laboratory based work.

Tutorial exercises will provide students confidence in applying the concepts and analysing a simple power network. The lab sessions will enhance understanding of realworld applications of the material delivered in the module. The students will learn through applying a variety of analysis methods and mathematical tools to the electrical networks.

Relevant ethical issues will be highlighted and students will be encouraged to consider these further through directed reading.

In addition to 36 hours of scheduled contact, students will be expected to spend (typically) 114 hours in independent study, preparation for classes, assimilation of knowledge and skills development and completion of assessments.

Scheduled learning includes lectures, tutorials and workshops.

Independent learning includes hours engaged with essential reading, assignment preparation and completion, etc. These sessions constitute an average time per level.

Contact Hours:

Scheduled contact = 36 hours

Scheduled contact will take the form of lectures, problems classes and workshops

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Demonstrate power systems history and symbols used to represent various elements

MO2 Understand global structure of power systems

MO3 Gain knowledge of power systems components and their respective ratings

MO4 Describe a network impedance diagram into per unit diagram

MO5 Implement power injection concept to networks with respect to the changes in voltage magnitude and phase angle

MO6 Design and model transmission lines (short, medium and long), cables, transformers, generators, and loads

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/index.html

Part 4: Assessment

Assessment strategy: The assessment consists of an end of module examination and an assignment.

The strategy has been chosen to ensure that fundamental engineering principles are assessed under controlled conditions, while a more open ended research based assignment is used to encourage wider engagement and reflection on this topic.

The assignment is develops understanding of the design of power systems and their applications. Starting with various design scenarios involving different applications, students are required to analyse, simulate and reflect on these designs and propose ideas for improvements. The assignment therefore develops subject knowledge as well as subject skills such as critical evaluation.

Assessment tasks:

Examination (First Sit)
Description: Examination (3 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Report (First Sit)
Description: Report
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Examination (Resit)
Description: Examination (3 hours)

Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Report (Resit)
Description: Report
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronics and Telecommunication Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2021-22

Electronics and Telecommunication Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2021-22