Module Descriptor

Title	Electrical Circuit Theory and Principles		
Session	2026/27	**Status**	
Code	ENGG07031	**SCQF Level**	7
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Mohamed Abdulali		

This module introduces students to the fundamental principles of electrical and electronic engineering, focusing on the analysis and behaviour of direct current (DC) and alternating current (AC) circuits used in engineering systems. The module develops foundational knowledge of electrical quantities, circuit components, electrical measurements, and circuit analysis techniques that underpin modern engineering and industrial technologies.

The first part of the module focuses on DC circuit theory and electrical fundamentals. Students are introduced to electrical quantities including voltage, current, resistance, power, and energy, together with the behaviour of basic circuit components such as resistors, capacitors, and inductors. Fundamental laws and analysis methods including Ohm's Law, Kirchhoff's Voltage and Current Laws, series and parallel circuits, voltage division, current division, and basic network analysis techniques are explored through engineering examples and practical activities.

The second part of the module introduces AC circuit principles and waveform analysis. Students examine sinusoidal waveforms, frequency, phase relationships, impedance, reactance, and power in AC systems. The module introduces single-phase AC circuits involving resistive, inductive, and capacitive loads, together with the use of phasor diagrams and basic AC circuit calculations.

The module also introduces electrical measurement techniques and safe laboratory practice associated with electrical engineering systems. Students will use laboratory equipment such as multimeters, oscilloscopes, and power supplies to construct, test, and analyse electrical circuits. Practical activities support understanding of theoretical concepts through experimentation, measurement, simulation, and troubleshooting exercises.

During the course of this module students will develop their UWS Graduate Attributes (https://www.uws.ac.uk/current-students/your-graduate-attributes/). Universal: Academic attributes - critical thinking and analytical & inquiring mind; Work-Ready: Academic attributes– knowledgeable, problem-solving; Successful: autonomous, driven, and innovative.

The module reflects the University's Curriculum Framework principles through practical laboratory activities, engineering problem-solving exercises, and assessments aligned with real-world engineering practice. The module also contributes to relevant PSRB AHEP-4 learning outcomes associated with electrical and multidisciplinary engineering systems.

Module Delivery	**On-Campus[1]**	**Hybrid[2]**	**Online[3]**	**Work -Based**

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials,

Method	☒		☐		☐	**Learning**[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries		☐ Lanarkshire ☐ London ☒ Paisley		☐ Online / Distance Learning ☒ Other (West College Scotland)	
Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Explain the fundamental principles of DC and AC electrical circuits and the operation of common electrical components.
L2	Analyse simple electrical circuits using appropriate electrical laws, circuit theory principles, and engineering calculations.
L3	Describe the behaviour of AC waveforms, impedance, phase relationships, and power within single-phase electrical systems.
L4	Demonstrate introductory use of electrical laboratory equipment in the investigation of basic electrical circuits.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**
Knowledge and Understanding (K and U)	**SCQF 7** Students will develop knowledge of electrical quantities, DC and AC circuit theory, electrical components, waveform analysis, circuit behaviour, and electrical measurement principles.
Practice: Applied Knowledge and Understanding	**SCQF 7** Students will apply electrical circuit principles through laboratory experiments, circuit construction, measurement activities, and engineering problem-solving exercises.
Generic Cognitive skills	**SCQF 7** Students will develop analytical and problem-solving skills through electrical circuit analysis, interpretation of measurement data, and troubleshooting activities.
Communication, ICT and	**SCQF 7** Students will develop communication, ICT, and numeracy skills

resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Numeracy Skills	through technical calculations, laboratory reporting, and interpretation of electrical engineering data.
Autonomy, Accountability and Working with Others	**SCQF 7** Students will develop independent learning, teamwork, laboratory safety awareness, and professional responsibility through collaborative practical activities and engineering tasks.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching

In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.

The learning and teaching for this module will comprise lectures, and tutorials (laboratory sessions). Lectures will introduce the theoretical foundations of electrical engineering principles and circuit analysis. Tutorials (laboratories) will support the practical application of electrical measurements, circuit construction, waveform analysis, and engineering calculations.

The module adopts a learner-centred and practice-based approach that encourages active participation through engineering problem-solving exercises, laboratory experimentation, and collaborative learning activities.

Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture / Core Content Delivery	24
Tutorial / Synchronous Support Activity	6
Laboratory / Practical Demonstration / Workshop	6
Independent Study	**164**
n/a	0
n/a	0
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

- Hughes, E. (2016) Hughes Electrical and Electronic Technology. 12th edn. Pearson.
- Bird, J. (2021) *Bird's Electrical Circuit Theory and Technology*. 7th edn. Routledge.
- Hambley, A.R. (2019) *Electrical Engineering: Principles and Applications*. 7th edn. Pearson.
- Nilsson, J.W. & Riedel, S.A. (2023) *Electric Circuits*. 12th edn. Pearson.
- Floyd, T.L. & Buchla, D.M. (2020) *Principles of Electric Circuits: Conventional*

Current Version. 10th edn. Pearson.
(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements
In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time. **For the purposes of this module, academic engagement equates to the following:** The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. Students will scan their attendance, via the attendance scanners, each time they are on-campus, they will have their attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled session, due to illness or other circumstance, should notify their Programme Leader. Across the School an 80% attendance threshold is set. Students who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code. In line with the University's commitment to equality, diversity, and inclusive learning, this module aims to provide equitable learning opportunities for students with diverse backgrounds and learning requirements. Module materials will be made available electronically through the Virtual Learning Environment (VLE) in accessible formats that support flexible access and engagement with learning content. The module complies with University policies and guidance relating to inclusive learning and teaching practices. As this module includes laboratory-based teaching activities, students who may require specialist assistive equipment, additional support, or reasonable adjustments to assessment are encouraged to discuss their requirements with the Module Co-ordinator in accordance with University policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☒**Yes** ☐**No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	**Engineering**
Moderator	**Qaisar Abbas**
External Examiner	TBC
Accreditation Details	N/A
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**

Changes / Version Number	

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Workbook (70%) Electrical Circuit Calculations and Practical Workbook
Assessment 2
Practical Skills Assessment (30%) Electrical Laboratory Competency Exercise
Assessment 3
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Workbook	☒	☒	☒	☐	☐	70%	0

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Practical Skills Assessment	☐	☒	☒	☒	☐	30%	0

Change Control

What	**When**	**Who**