University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Complex Analysis			
Code: MATH09009	**SCQF Level: 9 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Dr Alan Walker		

Summary of Module
This module extends the material on complex numbers encountered in prior study to discuss complex functions, and their use in geometry and calculus.
Complex functions will be discussed, including power, trigonometric, exponential, logarithmic, and the Gamma and Beta functions. Rational complex functions will be used to motivate a discussion of Mobius transformations.
Mappings, branches, branch cuts and points and branch planes will be introduced as well as their application to boundary value problems in physics and engineering.
The idea of limits and differentiability, including reference to the Cauchy-Riemann equations, will be introduced, as will the idea of analyticity. Taylor and Laurent series will also be discussed.
Integrals of complex functions will be introduced, and will extend to cover contour integrals and the residue theorem, for which a discussion of poles will be necessary.
Some important results in complex analysis will also be covered, such as the Poisson Integral formula, Rouché's Theorem, and the Schwarz-Christoffel transformation.
The Graduate Attributes relevant to this module are given below:
- Academic: Critical thinker; Analytical; Inquiring; Knowledgeable; Problem-solver; Autonomous.   - Personal: Motivated; Resilient   - Professional: Ambitious; Driven.

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
See Guidance Note for details.					

Campus(es) for Module Delivery

The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)

Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

Term(s) for Module Delivery

(Provided viable student numbers permit).

Term 1	☒	Term 2	☐	Term 3	☐

Learning Outcomes: (maximum of 5 statements)
These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.
At the end of this module the student will be able to:

L1	Demonstrate a detailed knowledge and understanding of complex functions.
L2	Use a range of differentiation techniques for complex functions, and their applications.
L3	Use a range of integration techniques for complex functions, and their applications.
L4	Use complex variables in the analysis of improper real integrals.

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 Level **9** Demonstrating a detailed knowledge and understanding of important techniques necessary in the use of complex functions. Demonstrating critical awareness of established techniques of enquiry in common applications of complex functions.
Practice: Applied Knowledge and Understanding	SCQF Level **9** Using a range of standard techniques to solve problems at an advanced level, sometimes in non-routine contexts. Carrying out defined investigative problems within a mathematically based subject.

Generic Cognitive skills	SCQF Level **9**
	Conceptualising and analysing problems informed by professional and research issues.
Communication, ICT and Numeracy Skills	SCQF Level **9**
	Formally presenting standard topics in the field of complex analysis to a range of audiences.
Autonomy, Accountability and Working with others	SCQF Level **9**
	Exercising independence and initiative in carrying out a range of activities.
	Identifying learning needs through reflection based on self, tutor and peer evaluation of work.

Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: MATH08008	**Module Title:** Multivariable Calculus
	Other:	Or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

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.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Independent Study	164
	Hours Total 200
**Indicative Resources: (eg. Core text, journals, internet access)	

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

"Complex Analysis" class notes as published on the University VLE.

"Complex Analysis", IN Stewart and DO Tall, 1983, Cambridge University Press.

"Complex Variables", M Spiegel, 1980, McGraw-Hill Education.

Please ensure the list is kept short and current. Essential resources should be included, broader resources should be kept for module handbooks / Aula VLE.

Resources should be listed in Right Harvard referencing style or agreed professional body deviation and in alphabetical order.

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.

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.]()

Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics..

(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 and Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Computing, Engineering and Physical Sciences
Moderator	Dr Kenneth Nisbet

External Examiner	C. Guiver
Accreditation Details	e.g. ACCA Click or tap here to enter text.
Changes/Version Number	1.07 Module Coordinator changed. Assessment component 1 (70%) changed to Class Test Assessment component 2 (30%) changed to Coursework

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 - Class Test (Unseen, closed book) (70%)
Assessment 2 – A series of coursework assignments (30%)
(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.)

Assessment Outcome Grids (**See Guidance Note**)

Component 1							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Class Test (unseen, closed book)	✓	✓	✓	✓		70	2

Component 2							
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Learning Outcome (4)	Learning Outcome (5)	Weighting (%) of Assessment Element	Timetabled Contact Hours
Coursework	✓	✓	✓			30	0

	Combined Total for All Components	100%	2 hours