Module Descriptor

Title	Secondary STEM Subject Studies		
Session	2025/26	**Status**	
Code	EDUC10050	**SCQF Level**	10
Credit Points	40	**ECTS (European Credit Transfer Scheme)**	20
School	**Education and Social Sciences**		
Module Co-ordinator	J Isdale		

Summary of Module

This module will enable students to develop knowledge and understanding and skills and abilities in relation to the curriculum, pedagogy and assessment of a STEM subject (Chemistry/Mathematics/Physics) within the secondary curriculum. It will enable the contextualising within specific curricular areas of some of the broader principles explored in the Secondary School Experience module.

Curriculum

Students will explore the principles of curriculum design, contexts for learning, and the processes of change and development in the curriculum.

Pedagogy

Students will understand the methods and underlying theories for effective teaching and learning and learn how to plan appropriately in order to meet the needs of all learners, across different contexts and experiences.

Assessment

Students will develop knowledge and understanding of the principles of assessment and how to use a range of approaches for formative and summative assessment purposes, appropriate to the needs of all learners and the requirements of the curriculum and awarding and accrediting bodies, record assessments appropriately, use assessment information to review progress, inform and enhance teaching and learning, identify strengths and development needs which lead to further learning opportunities, and produce clear, informed and sensitive reports.

Professional qualities and capabilities

The module will enable students to engage in professional dialogue with peers and university staff and to work collaboratively. Students will be expected to model appropriate levels of literacy and numeracy in learning activities; to reflect on the impact of their personal communication on others and to demonstrate appropriate levels of health and wellbeing relevant to the teaching profession.

Module Delivery Method	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☒ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☐ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

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	Demonstrate knowledge that covers and integrates most of the principal areas, features, boundaries, terminology and conventions of the curriculum, pedagogy and assessment of a STEM subject within the secondary curriculum and critical understanding of the principal theories, concepts and principles.
L2	Use a wide range of the principal skills, techniques, practices and materials associated with a STEM subject area of secondary education, some of which are specialised, advanced or at the forefront of classroom practice, in a variety of settings, environments and circumstances.
L3	Adopt an enquiring approach to professional practice, demonstrating some originality and creativity in planning teaching, learning and assessment.
L4	Construct and sustain reasoned and coherent arguments about the curriculum, pedagogy and assessment of a STEM subject area of secondary education.
L5	Exercise autonomy and initiative in planning and reporting on a defined project of professional enquiry related to teaching and learning in a STEM subject area of secondary education.

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 10** Demonstrating knowledge that covers and integrates most of the principal areas, features, boundaries, terminology and conventions of the curriculum, pedagogy and assessment in a STEM subject area of secondary education.

[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, 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

	Understanding critically the principles and evolving theories of curriculum design, contexts for learning and cross-curricular links. Understanding in detail a subject area within the secondary curriculum, current educational issues and effective approaches to teaching and learning. Understanding the ways in which teaching and learning are developed, including a range of established techniques of professional enquiry. Demonstrating knowledge of how to access and apply relevant findings from educational research.
Practice: Applied Knowledge and Understanding	**SCQF 10** Designing effective, appropriate and stimulating programmes of work, in a STEM subject area within the secondary curriculum, which are suitable for children at different stages of secondary education. Using skills, practices and materials which are specialised, advanced or at the forefront of classroom practice. Planning and reporting on a defined project of professional enquiry related to teaching and learning in a chosen subject area of secondary education.
Generic Cognitive skills	**SCQF 10** Undertaking critical analysis, evaluation and synthesis of ideas, concepts, information and issues in educational contexts. Justifying a personal stance on educational issues by referring to appropriate evidence from a range of sources. Reflecting on and acting to improve the effectiveness of their own practice. Adopting an enquiring approach to professional practice, demonstrating some originality and creativity in finding solutions to professional issues. Maintaining a record of personal professional learning and development.
Communication, ICT and Numeracy Skills	**SCQF 10** Communicating effectively, using a variety of media including digital technologies, with peers and university staff. Communicating and reporting effectively, both orally and in writing. Engaging in professional dialogue with peers, university staff and school colleagues. Constructing and sustaining reasoned and coherent arguments about educational matters and professional practices.
Autonomy, Accountability and Working with Others	**SCQF 10** Exercising autonomy and initiative in professional activities. Working with others and, at times, taking a leading role in bringing about change, development and new thinking relating to curriculum, pedagogy or assessment of a subject area within the secondary curriculum.

Prerequisites	**Module Code**	**Module Title**
	Other	

Co-requisites	**Module Code** EDUC10049	**Module Title** Secondary School Experience

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 teaching and learning strategies within this module will take different forms depending on subject. For example, Chemistry and Physics with Education students will experience teaching sessions in the form of lectures, workshops and specialist laboratory experiments that focus students towards issues faced by STEM educators in the classroom. Mathematics with Education students will experience lectures and specialist workshops focused on issues faced by Mathematics Educators while on teaching practice.

Tutorials, workshops and use of the VLE, employing a range of learning and teaching methodologies including group work, problem-based learning, concept visualisation (eg using drawing and collage), walking, student presentations, online tutor/student-led discussions, and resources such as subject-specific equipment, interactive whiteboards, laptops and the outdoors, will be used, as appropriate, to develop student learning.

Chemistry/Physics:

For the eighteen weeks of timetabled classes, there will be four hours each week of General Science, which will include classes on the pedagogy, including practical activity, of Biology, Chemistry and Physics, as appropriate to the Broad General Education phase of Curriculum for Excellence. The three subjects are timetabled to ensure equal coverage. Twelve additional hours, split across the three main teaching blocks, will focus on the pedagogy, including practical activity, appropriate to the subject area (ie Chemistry or Physics) at Senior Phase, in order to prepare students to deliver National Qualification courses.

A breakdown of these activities and the numbers of hours attributed to them are as follows... The on-campus teaching sessions are broken down as follows.

Lectures: 24 hours

Workshops: 48 hours

Labs: 12 hours

Independent Study: 200 hours Maths:

For the eighteen weeks of timetabled classes, there will be four hours each week of Mathematics inputs, which will include classes on the pedagogy across all levels of the subject.

Lectures: 24 hours

Workshops: 48 hours Independent Study: 212 hours

Teaching placements, which also forms part of School experience module, hence the number of combined hours exceeding 400 hours) will involve 18 weeks of teaching practice which related to approximately 600 hour in school which will consist of the following activities.

Teaching Practice (including planning and prep): 396 hours

Practical Experiment practice: 36 hours (Chemistry and Physics only)

Independent study (Including STEM Dissertation prep): 168 hours (Chemistry and Physics) 204 hours (Maths)

Student handbooks and other material made available to students will give more detailed information on the particular learning and teaching methodologies, and combinations of these methodologies, to be used for timetabled student sessions. This will clarify for students both their expectations for timetabled sessions, and their expectations for the overall balance of learning and teaching methodologies to be used during the module.

At an early stage of the module, students will undertake a two-week observation placement in order to establish links between theory and practice.

A breakdown of these activities and the numbers of hours attributed to them are as follows... The on-campus teaching sessions are broken down as follows.

Lectures: 24 hours

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	72
Laboratory / Practical Demonstration / Workshop	12
Work-based Learning	70
Asynchronous Class Activity	48
Independent Study	198
Please select	
TOTAL	400

Indicative Resources

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

Curriculum for Excellence documentation, including the Building the Curriculum series, and support materials at www.education.gov.scot and National Qualifications documentation and support materials at www.sqa.gov.uk

Furtak, E M (2009) Formative assessment for secondary science teachers. Thousand Oaks, CA: Corwin Press.

Keeley, P (2016) Science formative assessment: 75 strategies for linking assessment, instruction and learning (2nd ed). Thousand Oaks, CA: Corwin Press.

*Kyriacou, C (2018) Essential Teaching Skills (Fifth Edition). Oxford: Oxford University Press

*Ross, K, Lakin, L and McKechnie, J and Baker, J (2015) Teaching secondary science: constructing meaning and developing understanding (4th ed). Abingdon: Routledge. Taber, K (2012) Teaching secondary chemistry (2nd ed). Abingdon: Hodder Education Sang, D (2011) Teaching secondary physics (2nd ed). Abingdon: Hodder Education.

McCrea, E., 2019. Making Every Maths Lesson Count: Six principles to support great maths teaching (Making Every Lesson Count series). Crown House Publishing Ltd.

*Chambers, P and Timlin, R (2019) Teaching mathematics in the secondary school (3rd ed). London: Sage.

Rock, D and Brumbaugh, D K (2013) Teaching secondary mathematics (4th ed). Abingdon: Routledge.

Johnston-Wilder, S, Johnston-Wilder, P, Pimm, D and Lee, C (2016) Learning to teach mathematics in the secondary school (4th ed). Abingdon: Routledge.

Journal of Mathematics Teacher Education

National Centre for Excellence in Teaching Mathematics at www.ncetm.org.uk Centre for Innovation in Mathematics Teaching at www.cimt.plymouth.ac.uk

(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:

Students are required to attend all scheduled classes and participate with all delivered elements of the module as part of their engagement with their programme of study. Consideration will be given to students who have protection under the appropriate equality law. Please refer to UWS Regulations, Chapter 1, 1.64 – 1.67, available at the following link: http://www.uws.ac.uk/current-students/rights-and-regulations/regulatory-framework/

In accordance with module and programme handbooks, any student whose attendance has fallen below the 80% minimum requirement for a module could be withdrawn from and given a re-attend decision for that module.

To assure placement partners that students are appropriately prepared to undertake periods of school experience, unsatisfactory attendance in academic modules or within learning blocks may prevent progress to placement, or result in withdrawal from the programme, as a student would be deemed not to have met the professional requirements of the programme as accredited by the General Teaching Council for Scotland.

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.

Aligned with the overall commitment to equality and diversity stated in the Programme Specification, the module supports equality of opportunity for students from all backgrounds and with different learning needs. Using the VLE, learning materials will be presented electronically in formats that allow flexible access and manipulation of content. The module complies with University regulations and guidance on inclusive learning and teaching practice. Specialist assistive equipment, support provision and adjustment to assessment practice will be made in accordance with UWS policy and regulations. The University's Equality, Diversity and Human Rights Policy can be accessed at the following link: http://www.uws.ac.uk/equality/

Student teachers are encouraged to reflect on their developing understanding of aspects relating to equality and diversity and to consider how this helps them to work towards meeting the Standard for Provisional Registration (GTCS, 2021), of which demonstrating commitment to social justice and inclusion is a significant part.

Through studying this module, student teachers develop knowledge and understanding of pedagogical and learning theories and draw on these appropriately to inform curriculum design and content where appropriate taking account of additional support needs. They also develop the professional skills and abilities to plan coherent, progressive and engaging teaching programmes which address the needs of learners and use a range of differentiated assessment strategies that ensures support and challenge for all learners.

A direct focus on these aspects not only advances equality in the student environment, by promoting empathy and affiliation, but also within the school settings where student teachers undertake their school experience. UWS Equality and Diversity Policy
(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	**Education**
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	Education
Moderator	
External Examiner	J Munro
Accreditation Details	General Teaching Council for Scotland
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	No Changes

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Summative assessment will be based on an essay of approximately 7,000 words in three parts: a discussion of the underlying theory focused on a STEM subject-based 'tricky to teach' concept; a report of a project of professional enquiry evaluating the impact of particular teaching and learning or assessment strategies focused on the chosen concept; and reflection on development of professional knowledge and understanding and skills and abilities as a result of completing the project of professional enquiry. Throughout the module, students will complete formative tasks for which they will receive feedback. These tasks will focus on preparing students for school experience and will relate to planning, and selecting appropriate teaching and learning methods and assessment strategies. Student handbooks, and other detailed material made available to students, will clarify the relationship between formative assessment and the specific learning outcomes for the module. This will ensure that students can relate feedback from formative assessment to their individual progress on the learning outcomes for the module. On summative assessments, students will receive detailed information indicating the ways in which summative assessments will assess individual learning outcomes for the module. As appropriate, students will also receive detailed information on how feedback will be provided for assessments.
Assessment 2
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**
Essay	☒	☒	☒	☒	☒	100	0

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

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	hours

Change Control

What	**When**	**Who**
New template, no changes	Mar 25	J Isdale