

MODULE SPECIFICATION

Module Title:	Chemical Education and Skills	Level:	6	Credit Value:	20
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Module code:	SCI619	New <input checked="" type="checkbox"/> Existing <input type="checkbox"/>	Code of module being replaced:	N/A
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Cost Centre:	GAFS	JACS3 code:	F170
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Trimester(s) in which to be offered:	1	With effect from:	September 16
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School:	Applied Science, Computing & Engineering	Module Leader:	Dr Ian Ratcliffe
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Scheduled learning and teaching hours	50 hrs
Guided independent study	150 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BSc (Hons) Chemistry with Education	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Office use only

Initial approval July 16

APSC approval of modification July 16

Have any derogations received SQC approval?

Version 1

Yes No

Module Aims

This module aims to expose students to the wide variety of pedagogic approaches that exist to the design, delivery and assessment of experimental / laboratory sessions in science, with particular emphasis upon chemistry. The module will develop students' ability to reflect upon and critically analyse laboratory-based classes developed by themselves and their peers.

Intended Learning Outcomes

At the end of this module, students will be able to

1. Critically review published literature relating to pedagogic approaches to design, delivery and assessment of practical based science teaching.
2. Design laboratory-based chemistry teaching sessions and assessments, and justify their design.
3. Implement planned laboratory teaching sessions and critically reflect upon their performance in delivering and assessing the intended learning outcomes. Implement planned laboratory teaching sessions and critically reflect upon their performance in delivering and assessing the intended learning outcomes.
4. Critically evaluate practical teaching sessions delivered by peers.
5. Develop effective strategies for teaching chemistry to an appropriate age group.

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Critically review published literature relating to pedagogic approaches to design, delivery and assessment of practical based science teaching.	KS4	KS6
		KS5	KS1
2	Design laboratory-based chemistry teaching sessions and assessments, and justify their design.	KS3	KS1

3	Implement planned laboratory teaching sessions and critically reflect upon their performance in delivering and assessing the intended learning outcomes.	KS9	KS1
4	Critically evaluate practical teaching sessions delivered by peers.	KS2	
5	Develop effective strategies for teaching chemistry to an appropriate age group	KS1	KS3
		KS6	KS9

Derogations

None

Assessment: Please give details of indicative assessment tasks below.

Assessment 1. Students will compile a portfolio which will typically comprise the following components:

- (i) a literature review critically reviewing published journal articles in the design, delivery and assessment of science practical classes
- (ii) session plan for a practical class of own design and justification of approach
- (iii) critical reflection of a practical 'microteach' implementing planned session including remedial action to address shortfalls
- (iv) critical reflection of 'microteach' sessions of peers including remedial action to address shortfalls

Please indicate the type(s) of assessment (eg examination, oral, coursework, project) and the weighting of each (%). Normally, each intended learning outcome should be assessed only once.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1 - 5	Portfolio	100%		4,000

Learning and Teaching Strategies:

Methods of delivery:

Students will initially use timetabled sessions and home study to complete the literature review which will form the core knowledge needed for the module. Individual and Group tutorials will be utilised to audit progress and facilitate knowledge exchange, respectively. The remaining timetabled hours will be used for students to prepare and deliver their laboratory microteaches, and participate in sessions led by their peers. Guest lectures will be incorporated into the programme to enrich the learning experience.

Syllabus outline:
Through literature study students are expected to consider: Teaching styles in practical- and classroom-based learning: Traditional /expository, Experimental / inquiry, Divergent or discovery and Problem-based or Investigatory-based approaches Assessment types in practical-based learning: Laboratory Reports, Laboratory Notebooks/Journals, Data Retrieval Tests, Learning Journals / Logs, Groupwork tasks, Structured Observation, Mini-Practical's, Observed Structured Chemistry Examinations, Online and Computer-Assisted Assessment, Self and Peer-Assessment, Peer Learning, Mini Projects, Post-Laboratory.

Bibliography:
Essential reading
Abrahams, I. (2011) <i>Practical Work in Secondary Science: A Minds-On Approach</i> London: Continuum International Publishing Group. Eilks, I. and Hofstein, A. (eds) (2013), <i>Teaching Chemistry - A Studybook: A Practical Guide and Textbook for Student Teachers, Teacher Trainees and Teachers</i> Sense Publishers Eilks, I. and Byers, B. (eds.) (2009), <i>Innovative Methods of Teaching and Learning Chemistry in Higher Education</i> . Cambridge: Royal Society of Chemistry Publishing. pp. 85-102.
Other indicative reading
Brown, G.A., Bull, J., and Pendlebury, M. (1997), <i>Assessing Student Learning in Higher Education</i> . London: Routledge. Race, P. (2009), <i>Designing assessment to improve Physical Sciences learning</i> . LTSN <i>Physical Sciences Practice Guide</i> . Hull: LTSN The following journals are recommended: <i>Chemistry Education Research and Practice</i> . Royal Society of Chemistry – Open Access <i>Journal of Chemical Education</i> – ACS Publications <i>Biochemistry and Molecular Biology Education</i> - Wiley

Education for Chemical Engineers – Elsevier

Assessment & Evaluation in Higher Education – Taylor and Francis

Higher Education: The International Journal of Higher Education and Educational Planning – Springer

Useful websites

National curriculum in Wales

<http://learning.gov.wales/resources/improvementareas/curriculum/programmes-of-study/?lang=en>

National curriculum in England <https://www.gov.uk/government/collections/national-curriculum>