Wrexham glyndŵr UNIVERSITY

MODULE SPECIFICATION

Module Title:	Structure and Synthesis	**Level**:	6	**Credit Value**:	20

Module code:	SCI620	New ✓ Existing ☐	**Code of module being replaced**:	SCI517

Cost Centre:	GAFS	**JACS3 code**:	F170

Trimester(s) in which to be offered:	1	**With effect from:**	September 16

School:	Applied Science, Computing & Engineering	**Module Leader:**	Dr Jixin Yang

Scheduled learning and teaching hours	50 hrs including 15 laboratory 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	✓	☐
BSc Chemistry with Green Nanotechnology	✓	☐

Office use only
Initial approva July 2016
APSC approval of modification July 2016 Version 1
Have any derogations received SQC approval? Yes ☐ No ✓

Module Aims
This module aims to expand students' knowledge in chemistry and develop an understanding of various aspects of organic stereochemistry and organic chemical reactions. The module also introduces students to the topic of organometallic chemistry, covering both main group and transition metal organometallic species.

Intended Learning Outcomes

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

1. Demonstrate an extensive working knowledge of the manifestation of stereochemistry in organic molecules, including nomenclature systems.
2. Apply knowledge of stereochemical principles to interpret selected stereoselective and stereospecific reactions.
3. Suggest feasible synthetic strategies for target molecules through knowledge of key organic reactions.
4. Predict the rate and position of electrophilic and nucleophilic substitutions in organic chemistry. (KS3)
5. Suggest synthetic routes to, and chemical properties of main group and transition metal alkyl, aryl and organometallic compounds based upon comprehensive knowledge of their structure and bonding.

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	
1	Demonstrate an extensive working knowledge of the manifestation of stereochemistry in organic molecules, including nomenclature systems.	KS3	KS6
2	Apply knowledge of stereochemical principles to interpret selected stereoselective and stereospecific reactions.	KS3	
3	Suggest feasible synthetic strategies for target molecules through knowledge of key organic reactions.	KS3	

4	Predict the rate and position of electrophilic and nucleophilic substitutions in organic chemistry.	KS3	
5	Suggest synthetic routes to, and chemical properties of main group and transition metal alkyl, aryl and organometallic compounds based upon comprehensive knowledge of their structure and bonding.	KS3	KS10

Derogations
None

Assessment: Please give details of indicative assessment tasks below.

Assessment 1: A report comprising a critical analysis of given stereospecific / stereoselective reactions demonstrating broad knowledge of stereochemical principles (40%)

Assessment 2: Exam to access the knowledge in synthetic strategies for organic molecules, electrophilic and nucleophilic substitutions in organic chemistry and main group and transition metal alkyl, aryl and organometallic compounds (2 hours) (60%)

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	1-2	Report	40%		1,500
2	3-5	Examination	60%	2 hours	

Learning and Teaching Strategies:

Methods of delivery:

Students will attend formal timetabled lectures and practical sessions throughout the trimester.

Seminar, workshop and VLE will be used to support students' learning.

Students will research case studies and carry out guided self-study.

Syllabus outline:

- Organometallic chemistry and its industrial applications
- Ligands and coordination chemistry
- The bioinorganic chemistry of transition metals
- Introduction to organic stereochemistry
- Important types of organic reactions – substitution, elimination and addition
- Ionic substitution reactions – nucleophiles, electrophiles and leaving groups
- Laboratory workshops on synthetic chemistry

Bibliography:
Essential reading
McMurry, J. (2012) *Organic Chemistry 8th ed.*, New York: Brooks Cole. Crabtree, R. H. (2014), *The Organometallic Chemistry of the Transition Metals*. 6th ed. New Jersey: John Wiley & Sons.
Other indicative reading
Frausto Da Silva, J. J. R. and Williams, R. J. P. (2001), The Biological Chemistry of the Elements: The Organic Chemistry of Life. 2nd ed. Oxford: Oxford University Press. Eames, J. and Peach, J. (2003), *Stereochemistry at a Glance*. Malden, Mass: Blackwell Science.