

<b>Module Title:</b>	Physical and Chemical Science in Agriculture
<b>Language of Instruction:</b>	English
<b>Credits:</b>	10
<b>NFQ Level:</b>	6
<b>Module Delivered In</b>	No Programmes
<b>Teaching &amp; Learning Strategies:</b>	Formal lectures will be supplemented by practical training using laboratory space at Institute of Technology Carlow. The instructor will balance the needs of the learner to acquire the necessary knowledge of the discipline with the requirement to nurture a competence to apply these concepts and ideas in day to day farming. Lectures will outline the key aspects of each topic and provide a structure for class discussion and independent study to be conducted by learners. Lecturers will actively encourage engagement of learners in the classroom and emphasise at all times the relevance of the physical sciences to practical farming.
<b>Module Aim:</b>	The aim of this module is to provide the learner with an introduction to the principles of physics and chemistry and their importance and relevance to sustainable agriculture. The module will develop practical laboratory skills in both disciplines.

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Demonstrate a theoretical knowledge and understanding of physics and chemistry as applied to sustainable agriculture.
LO2	Apply scientific procedures and problem solving to overcome some of the challenges in sustainable farming systems
LO3	Apply the appropriate safety procedures in the laboratory.
LO4	Have an appreciation of the use of physics and chemistry in food production and processing

Pre-requisite learning	
<b>Module Recommendations</b> <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
<b>Incompatible Modules</b> <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b> <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

## Module Content & Assessment

### Indicative Content

#### Chemistry

• Introduction: The scope of chemistry & brief history of its development. States of matter and observation of change. • The Periodic Table. • Atomic Theory & Electronic Structure • Bonding & Structure: Chemical Equations and Experimental Calculations • Chemical Kinetics - value. Order of reaction and rate constants. • Properties of Liquids and Solutions: • Acids, Bases and Electrolysis. • Inorganic Chemistry • Organic Chemistry: Introduction to chemistry of carbon compounds. IUPAC Nomenclature for alkanes, alkenes, alcohols, aldehydes, carboxylic acids, esters and amines. Brief introduction to the structures of proteins, fats and carbohydrates and their uses.

#### Physics

• Physical standards and units. Errors. • Mechanics: Velocity, acceleration, force. • Work, energy and power, momentum. Simple machines • Light, lenses • Electricity, Ohm's law, electrical safety. • Thermodynamics Methods of heat transfer. Specific Heat capacity, U values Material Properties Pressure • Atomic and Nuclear physics: radioisotopes, biological effects of radiation, safety levels, x-rays.

#### Practical

The practical component will • allow students to develop the required technical competencies, attitudes and behaviours • develop problem solving abilities and group skills • Acid-Base, Redox, Precipitation and Complexometric Titrations • pH measurements and buffer solutions • UV-Vis analysis and flame emission analysis of various analytes • Chromatography and other organic techniques • Mechanics (four selected practicals from the first year Physics manual IT Carlow) • Thermodynamics: three selected practicals from the first year Physics manual IT Carlow) • Light • Three- four selected practicals from the first year Physics manual IT Carlow) • Electricity (two selected practicals from the first year Physics manual IT Carlow)

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	50.00%
End of Module Formal Examination	40.00%

### Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Two continuous assessment examinations	1	10.00	n/a

No Project

### Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical log book to be completed at the end of each session	2,3,4	50.00	n/a

### End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Terminal Examination	1,4	40.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	30 Weeks per Stage	1.00
Laboratory	30 Weeks per Stage	2.00
Independent Learning	30 Weeks per Stage	3.67
Total Hours		200.00

