

<b>Module Title:</b>	Biochemistry
<b>Language of Instruction:</b>	English
<b>Credits:</b>	10
<b>NFQ Level:</b>	7
<b>Module Delivered In</b>	<a href="#">2 programme(s)</a>
<b>Teaching &amp; Learning Strategies:</b>	This module will be delivered via a two theory classes of one hour duration for thirty weeks and one four-hour practical every second week for twenty weeks for each group. Students may be required to access the material via Blackboard in advance of the class and practicals to encourage active learning. To consolidate lectures and practicals, students will be required to carry out assignments, take formative quizzes and multiple choice questions. Group and peer learning will be facilitated during the preparation of assignments and practicals. Any course-related issue or questions that may arise will be discussed at lectures. Students can contact lecturer outside of class hours to discuss formative feedback given on written reports and group project work. The practical component will: <ul style="list-style-type: none"> <li>• allow students to develop the required technical competencies, attitudes and behaviours.</li> <li>• develop problem solving abilities and group skills.</li> <li>• promote deep learning via investigation of a problem, application of prior knowledge and analysis of results thus generating new knowledge.</li> <li>• promote timely submission of reports written in the standard format.</li> <li>• allow individual interaction with the lecturer.</li> </ul>
<b>Module Aim:</b>	The aim of this module is to expand the knowledge of biochemical processes, systems and structures.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Describe the synthesis, structure, function and interactions of major biomolecules.
LO2	Describe and elucidate the major metabolic pathways; explain how metabolism is controlled and metabolic diseases occur.
LO3	Demonstrate the application of biochemical processes.
LO4	Carry out a range of biochemical analysis with due regard to health and safety.
LO5	Develop individual and team based biochemical analysis skills
<b>Pre-requisite learning</b>	
<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>	
Successful completion of year 2 or equivalent.	

## Module Content & Assessment

### Indicative Content

#### Theory

Biomolecules and biomolecular synthesis, structure and function. Animal, plant and bacterial polysaccharides. Glycoproteins and glycolipids in membranes, energy stores and in membranes. Specialised lipids. Major enzyme groups and modes of action. Importance of cofactors including minerals and vitamins. Enzymology: reversible and irreversible inhibition. Ki. Allosteric enzymes.

#### Metabolism and metabolic disease:

Glycolysis and Gluconeogenesis: Review of both processes; What happens during periods of low oxygen; use of sugars other than glucose. Citric acid cycle: Review of the Citric Acid pathway; how it intersects with other metabolic pathways. Electron transport and ATP synthesis: obtaining energy from glucose. The pentose phosphate pathway and glycogen metabolism: Glucose 6-phosphate: the central component of the pentose phosphate pathway, glycogen metabolism. Regulation of carbohydrate pathways; interactions between anabolic and catabolic pathways, energy storage.

#### Photobiology

Biologically important interactions with light, Photosynthesis (light and dark phases), Biochemistry of the visual process.

#### Hormones.

The structure and function of hormones and their integration and regulation in mammalian metabolism. Metabolic disease.

#### Cholesterol biosynthesis.

Control and regulation. Lipid metabolism and regulation, Ketone bodies as fuel molecules.

#### Signal Transduction.

Signal transduction: G-Proteins, Adenylyl Cyclase Signaling Pathway, Inositol-Phospholipid Signaling Pathway, Receptor Tyrosine Kinases, Integration of metabolism.

#### Practical

Students will build on biochemical skills developed to date and apply these in areas such as adsorption, thin-layer chromatography of lipids, enzyme analysis, enzyme assays, protein analysis and identification. Electrophoresis, crude protein extraction and chromatography.

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

### Special Regulation

Students must achieve a minimum grade (35%) in both the practical/CA and final examination.

### Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	Multiple choice questions and short answer questions.	1,2,3	10.00	n/a

No Project

### Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical laboratory books	4,5	40.00	Every Week

### End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	No Description	1,2,3	50.00	End-of-Semester

ITCarlow 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	2.00
Laboratory	30 Weeks per Stage	2.00
Estimated Learner Hours	30 Weeks per Stage	2.00
Total Hours		180.00

**Module Delivered In**

Programme Code	Programme	Semester	Delivery
CW_SABTP_B	<a href="#">Bachelor of Science (Honours) in Biosciences with Biopharmaceuticals</a>	3	Mandatory
CW_SABFQ_D	<a href="#">Bachelor of Science in Biosciences</a>	3	Mandatory