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| Module Title: | Molecular Biology 1: Informational macromolecules and Genetic Information |
| Language of Instruction: | English |
| Credits: | 5 |
| NFQ Level: | 6 |
| Module Delivered In | 3 programme(s) |
| Teaching & Learning Strategies: | <p>This module will be delivered via two 1 hour lectures and a 2 hours practical mode. Students may be required to access the material via the VLE Blackboard as applicable in advance of the class and practicals to encourage active learning. To consolidate lectures and practicals, students will normally be required to carryout assignments, give presentations and take formative quizzes. Group and peer learning will be facilitated during the preparation of assignments, presentations and practicals. Online demonstrations may be used to illustrate key concepts of the course and will be available through out the year. Digital Resources such as Youtube, Reusable Learning Objects (RLOs) and the National Digital Learning Repository (NDLR) will be used as practicable. The practical component is essential: • To allow students to develop the required technical competencies, attitudes and behaviours in a molecular biology laboratory. • To develop problem solving abilities and group skills. • To promote deep learning via investigation of a problem, application of prior knowledge and analysis of results thus generating new knowledge. • To promote timely submission of reports written in the standard format.</p> |
| Module Aim: | To introduce students to the fundamentals of the theory and practical aspects of Molecular Biology. |
| Learning Outcomes | |
| <i>On successful completion of this module the learner should be able to:</i> | |
| LO1 | Describe the main features of procaryotic and eucaryotic cells, genetic organisation and control. Describe and distinguish between the structures and functions of nucleic acids (DNA and RNA). |
| LO2 | Outline the molecular processes of DNA replication, transcription and translation to proteins. Describe and discuss the differences between eukaryotic and prokaryotic genetic organisation and control. |
| LO3 | Demonstrate a range of molecular biology techniques, safely and efficiently. Be able to monitor, record and analyse experimental data. Demonstrate effective group work and good communication skills. |
| Pre-requisite learning | |
| Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i> | |
| No recommendations listed | |
| Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i> | |
| No incompatible modules listed | |
| Co-requisite Modules | |
| No Co-requisite modules listed | |
| Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i> | |
| Successful completion of year 1 or equivalent. | |

Module Content & Assessment
Indicative Content
Informational Macromolecules

An introduction to organisation and cell structure in prokaryotic and eucaryotic organisms. Structural components of informational macromolecules: purines and pyrimidines; nucleosides and nucleotides; basic nucleic acid structure. Occurrence and functions of nucleic acids; primary structure of nucleic acids. Secondary structure: the Double Helix. Double-stranded RNA. Tertiary structure of DNA –the Superhelix. DNA organisation in prokaryotic and eucaryotic organisms. Physical properties of DNA with particular emphasis on thermal denaturation. Renaturation and hybridisations of DNA. Restriction and modification. A brief introduction to nucleic acid sequencing

Transfer of Genetic Information

An introduction to the Central Dogma of Molecular Biology, biological information flow: replication. transcription and translation. DNA replication in prokaryotes and eukaryotes. RNA transcription in prokaryotes and eukaryotes. Structure and function of RNA: mRNA, tRNA and their role in protein synthesis. The Genetic Code, codons, anticodons. Translation: the fundamental principles of protein synthesis. Posttranslational modification.

Practical

At the end of the practical component the student is expected to be: Competent in the manipulation and handling and disposal of recombinant organisms and molecules with due respect to cGMP and health and safety, monitor, record and analyse experimental data in molecular biology, operate the range of instrumentation specified safely and effectively in the laboratory and work effectively in a group and demonstrate good written and oral communication skills

| Assessment Breakdown | % |
|----------------------------------|--------|
| Continuous Assessment | 20.00% |
| Practical | 30.00% |
| 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 | Continuous assessment will take the form, of in class tests, specific assignments and presentations | 1,2 | 20.00 | n/a |

No Project

Practical

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|-----------------------------|--|-------------------|------------|-----------------|
| Practical/Skills Evaluation | Practical skills and competencies will be assessed via a correctly kept laboratory notebook (which will be submitted on time), observation of skills and a practical exam. | 3 | 30.00 | n/a |

End of Module Formal Examination

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

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

Module Workload

| Workload: Full Time | | |
|----------------------------|--------------------|--|
| <i>Workload Type</i> | <i>Frequency</i> | <i>Average Weekly Learner Workload</i> |
| Lecture | 12 Weeks per Stage | 2.00 |
| Laboratory | 12 Weeks per Stage | 2.00 |
| Estimated Learner Hours | 15 Weeks per Stage | 5.13 |
| | Total Hours | 125.00 |

Module Delivered In

| Programme Code | Programme | Semester | Delivery |
|----------------|---|----------|------------------|
| CW_SABTP_B | Bachelor of Science (Honours) in Biosciences with Biopharmaceuticals | 3 | Mandatory |
| CW_SABFQ_D | Bachelor of Science in Biosciences | 3 | Mandatory |
| CW_SASCI_C | Higher Certificate in Science in Applied Biology or Applied Chemistry | 3 | Group Elective 1 |