

Module Title:	Microbiology
Language of Instruction:	English
Credits:	10
NFQ Level:	6
Module Delivered In	No Programmes
Teaching & Learning Strategies:	This module contains the key concepts of fundamental microbiology at level 6. Learning objectives , learning activities and assessments are constructively aligned . The integration of the practical and theoretical aspects of the module will reinforce deep learning of key concepts , skills and competencies . A variety of active learning strategies will be employed to ensure that the learning objectives are met. Students are expected to engage actively with the material at lectures, in practicals and by independent learning VLE Blackboard Autonomous learning will be developed by use of scaffolded in class and independent research and enquiry activities . Research and enquiry skills will be developed in a supported manner via activities that will involve the learner finding , evaluating and organising information from credible sources, analysis and synthesis of new information and communicating new knowledge in the correct discipline appropriate convention. These learning activities will also encourage digital literacy, development of communication skills and group and peer learning. The practical component will support the theoretical aspects of the module and promote deep learning via, the formulation of simple hypotheses, structured investigation of simple problems and application of prior knowledge . In addition ,practicals will allow students to :develop the required safe technical competencies, attitudes and behaviours in Microbiology; the necessary analytical, mathematical and graphing skills; group skills; time management, report writing and presentation skills. Learning outcomes will be assessed by a variety of methods e.g. practical reports, multiple choice questions, assignments, video demonstrations , presentations . Continuous assessment will be accompanied by feedback delivered via Blackboard and face to face to drive learning. Group and peer learning will be facilitated during the preparation of assignments, presentations and practicals. Strategies for the assessment of the practical component that encourages not only the development of key practical and reporting competencies but also critical thinking, analysis and group learning will be used via digital and conventional means as appropriate.
Module Aim:	To introduce learners to the key concepts of practical and theoretical Microbiology and to allow them to develop the required competencies, attitudes and behaviours.
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Give an overview of the evolution and classification of microorganisms.
LO2	Describe the essential structure and arrangement of microorganisms .
LO3	Outline the main features of microbial metabolism and the molecular mechanisms of microbial interactions.
LO4	Describe briefly the factors that affect microbial growth and explain how microorganisms can be controlled by chemical and physical and other means.
LO5	Indicate the principles of natural microbial systems and microbial interactions with the environment and other organisms.
LO6	Give an overview of the positive impacts of microorganisms, including their role in the environment, food production and industrial; processes
LO7	Describe the negative aspects of microbial interactions including the role of microorganisms in new and emerging diseases.
LO8	Demonstrate essential aseptic and microbial techniques in a safe and competent manner with due regard to cGood Microbiological Practice and Occupational Health and Safety.
LO9	Demonstrate appropriate scientific thinking, research and enquiry, communication and team 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>	
No requirements listed	

Module Content & Assessment

Indicative Content

LO 1

Prokaryotes as the basis of all other life forms. prokaryotic and eukaryotic microorganism. Bacteria and Archaea Continuing evolution of microorganisms; their ubiquitous nature and metabolic diversity Classification of microorganisms, phylogenetic and other approaches

LO 2

Structure and arrangement of prokaryotic and eukaryotic microorganisms. Consequences of the similarities and differences between prokaryotes and eukaryotes. Role of prokaryotic specialised structures: flagella, endospores and pili. Viruses and their replication.

LO 3

Diversity and uniqueness of microbial metabolism, aerobic and anaerobic respiration, fermentation, oxygenic and anoxygenic photosynthesis. Heterotrophy and autotrophy. Molecular basis of microbial interactions and responses to changes in the environment.

LO 4

Factors that affect the growth and survival of microorganisms in different environments. Factors that influence the use of physical and chemical methods to control growth in the laboratory and in industry. The difference between sterilisation and disinfection. Principles of commonly used physical and chemical sterilisation methods. Sterilisation parameters. D value, thermal death time, F values. The validation of sterilisation and disinfection protocols. Microbial environmental monitoring in a clean environment.

LO 5

Range of ecosystems where microorganism are found. Biofilms in nature. Types of interactions between microbes and the environment. Principles of plant and animal interactions.

LO 6

Essential role of microorganisms for all life. Examples of beneficial role of microorganisms, agriculture, biogeochemical cycles. Plant and animal health. Food and industrial microbiology. Waste treatment and Bio remediation. Biotechnology and novel technologies

LO 7

Role of microorganisms in disease. Principles of transmission and the chain of infection. The compromised host, pathogens and virulence factors, reservoirs of infection, and vectors of transmission. Infections and intoxications. Gram positive and Gram negative food /water borne pathogens. Signs symptoms and control of common and emerging food borne diseases. Emerging pathogens. Public health concerns and indicator organisms.

LO 8 Practical component

Demonstrate essential aseptic and microbial techniques in a safe and competent manner with due regard to cGood Microbiological Practice and Occupational Health and Safety. Properly prepare and view specimens for examination using microscopy (bright field and, if possible, phase contrast). Prepare and use pure culture and selective techniques to enrich for and isolate microorganisms. Use appropriate methods to identify microorganisms (media-based, molecular and serological). Enumerate microorganisms in a sample (using, for example, direct count, viable plate count, and spectrophotometric methods and carry out appropriate mathematical, statistical and graphical manipulations. Use appropriate microbiological and molecular lab equipment and methods. Practice safe microbiology, using appropriate protective and emergency procedures. Analyse and interpret and contextualise results. Document and report on experimental protocols, results and conclusions

LO 9 Transferrable skills

Transferable and discipline specific skills will be developed via the active learning strategies of the practical and theoretical parts of the module. Behave ethically and with scientific integrity. Develop simple hypotheses. Be aware of the use of controls and the limitations of methodologies. Adhere to scientific conventions of communication including report writing and presenting, citing and referencing correctly. Identify and use credible sources of information. Cite and reference. Collaborate with others. Be aware of relationship between Microbiology and society.

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	Learning outcomes will be assessed by a blended approach of digital, VLE based and other methods e.g. practical reports, multiple choice questions, short questions, class room assessment techniques, guided assignments, video demonstrations, presentations. Both formative and summative continuous assessment will be accompanied by feedback delivered via Blackboard/Turnitin and face to face to drive learning. Group and peer learning will be facilitated during the preparation of assignments, presentations and practicals.	1,2,3,4,5,6,7,8,9	10.00	n/a

No Project

Practical				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Practical/Skills Evaluation	Strategies for the assessment of the practical component that encourage not only the development of key practical and reporting competencies but also the appropriate scientific thinking, research and enquiry, reflection, analysis, group learning and communication skills will be used via digital and conventional means as appropriate.	8,9	40.00	End-of-Semester

End of Module Formal Examination				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	Formal end of year examination containing MCQ, short answer and essay type questions. Recall , appropriate scientific thinking, application of key concepts and problem solving will be assessed.	1,2,3,4,5,6,7,8,9	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	30 Weeks per Stage	2.00
Laboratory	30 Weeks per Stage	2.00
Estimated Learner Hours	30 Weeks per Stage	2.67
Total Hours		200.00

