

## PHAR S7021: Pharmaceutical Microbiology

Module Details	
Module Code:	PHAR S7021
Full Title:	Pharmaceutical Microbiology <b>APPROVED</b>
Valid From::	Semester 1 - 2018/19 ( September 2018 )
Language of Instruction:	
Duration:	1 Semester
Credits::	7.5
Module Owner::	Orla Sherlock
Departments:	Unknown
Module Description:	This practical focused module aims to equip students with the necessary skills to carry out basic analytical microbiological procedures in accordance with European pharmacopoeia practices. It introduces students to concepts of microbial growth and control, basic infection and disease and sterile manufacture in the pharmaceutical industry.

Module Learning Outcome	
On successful completion of this module the learner will be able to:	
#	Module Learning Outcome Description
MLO1	Summarise environmental factors that influence microbial growth.
MLO2	Outline the role of microbes in infection development and transmission.
MLO3	Discuss chemotherapeutics as microbial infection control agents.
MLO4	Outline the principles of pharmaceutical product contamination and preservation.
MLO5	Describe microbial control strategies as they are maintained and measured in the pharmaceutical industry.
MLO6	Analyse pharmaceutical products and the pharmaceutical manufacturing environment qualitatively and quantitatively in accordance with European pharmacopoeia guidelines.
Pre-requisite learning	
<b>Module Recommendations</b> <i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named DkIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>	
No recommendations listed	

Module Indicative Content
<b>Topic 1: Microbial Growth</b> Growth media and methods, bacterial growth cycle, environmental factors influencing microbial growth, enumeration of microbial growth via plate count and membrane filtration methods.
<b>Topic 2: Infection and Immunity</b> Human microbiota, overview of factors in the development of infection subsequent disease development and transmission of microbes, immune response to infection.
<b>Topic 3: Chemotherapeutics</b> Selection and use of antibiotics, mode of action of antibiotics, major groups of antibiotics, antibiotic resistance development, antibiotic stewardship.
<b>Topic 4: Product Contamination and Sterility Assurance</b> Pharmaceutical product contamination with emphasis on E.coli, Salmonella, Pseudomonas, and Staphylococci species. Sterile products, overview of sterilisation processes, bioburden and sterility assurance.
<b>Topic 5: Microbial Growth Control</b> Overview of physical, chemical and mechanical control strategies. Focus on biocides as antiseptics, disinfectants and preservatives. Measurement of antibacterial activity.
<b>Microbiology Practicals</b> 1. Media preparation, inoculation and aseptic techniques 2. Culture techniques and characterisation 3. Selective and differential media 4. Preliminary identification and rapid identification procedures. 5. Microbial enumeration via total viable aerobic count and membrane filtration. 6. Evaluation of biocides via suspension tests, use dilution tests, disc diffusion test and phenol coefficient tests. 7. Preparation of pharmaceutical products for microbiological analysis. 8. Detection and quantification of E.coli, Salmonella, Pseudomonas aeruginosa and Staphylococcus aureus in pharmaceutical products. 8. Microbiological assay of antibiotics
<b>Teaching and Learning Strategy</b> Lectures: Blended and flexible learning will be used throughout. This will take the form of face to face interactive lecture sessions complemented by online resources (reusable learning objects and the National Digital Learning Repository) and online interactive activities (learn smart study assignments). Students will be directed to relevant sections of appropriate text to reinforce material covered in lectures. Online demonstrations will illustrate key concepts of the course and will be available to students via the VLE throughout the year. Practical exercises are designed to enable students to develop the required technical competencies, attitudes and behaviours in microbiology.

Module Assessment	
Assessment Breakdown	%
Course Work	25.00%
Practical	25.00%
Final Examination	50.00%
Module Special Regulation	

## Assessments

Full Time On Campus			
Course Work			
<b>Assessment Type</b>	Class Test	<b>% of Total Mark</b>	10
<b>Marks Out Of</b>	0	<b>Pass Mark</b>	0
<b>Timing</b>	S1 Week 5	<b>Learning Outcome</b>	1,2
<b>Duration in minutes</b>	0		
<b>Assessment Description</b> The class exam will consist of a series of multiple choice, true and false, fill in the blank, short answer questions and diagram labelling.			
<b>Assessment Type</b>	Open-book Examination	<b>% of Total Mark</b>	15
<b>Marks Out Of</b>	0	<b>Pass Mark</b>	0
<b>Timing</b>	S1 Week 12	<b>Learning Outcome</b>	6
<b>Duration in minutes</b>	0		
<b>Assessment Description</b> Students will be provided with laboratory test results typically encountered in the pharmaceutical industry and asked to record the results observed, interpret the data and answer questions.			
No Project			
Practical			
<b>Assessment Type</b>	Practical/Skills Evaluation	<b>% of Total Mark</b>	25
<b>Marks Out Of</b>	0	<b>Pass Mark</b>	0
<b>Timing</b>	n/a	<b>Learning Outcome</b>	1,3,5,6
<b>Duration in minutes</b>	0		
<b>Assessment Description</b> Students will complete result report sheets during the practical class that are specifically designed to develop observation skills and to promote accurate data recording and subsequent interpretation in-line with pharmaceutical practices. Practical skills and competencies will be assessed via performance evaluation in class. Completion of interactive virtual labs will reinforce key concepts.			
Final Examination			
<b>Assessment Type</b>	Formal Exam	<b>% of Total Mark</b>	50
<b>Marks Out Of</b>	0	<b>Pass Mark</b>	0
<b>Timing</b>	End-of-Semester	<b>Learning Outcome</b>	1,2,3,4,5
<b>Duration in minutes</b>	0		
<b>Assessment Description</b> End-of-Semester Final Examination			
Reassessment Requirement			
<b>Reattendance</b> The assessment of this module is inextricably linked to the delivery. Therefore reassessment on this module will require the student to reattend (i.e. retake) the module in its entirety.			

## Module Workload

### Workload: Full Time On Campus

<i>Workload Type</i>	<i>Contact Type</i>	<i>Workload Description</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>	<i>Hours</i>
Lecture	Contact	No Description	Every Week	3.00	3
Practical	Contact	No Description	Every Week	3.00	3
Directed Reading	Non Contact	No Description	Every Week	2.00	2
Independent Study	Non Contact	No Description	Every Week	3.00	3
				Total Weekly Learner Workload	11.00
				Total Weekly Contact Hours	6.00

**This module has no Part Time On Campus workload.**

## Module Resources

### Recommended Book Resources

Hanlon, G., Hodges, N.. (2013), Essential Microbiology for Pharmaceutical Science, 1st. Wiley-Blackwell, [ISBN: 978-0470665343].  
Denyer, S.P., Hodges, N., Gorman, S.P. Gilmore, B.F.. (2011), Hugo and Russell's Pharmaceutical Microbiology, 8th. Wiley-Blackwell, [ISBN: 978-1444330632].  
Sherlock Oria. (2019), Pharmaceutical Microbiology Laboratory Manual, DkIT..

### Supplementary Book Resources

(2017), European Pharmacopoeia, 9th. Council of Europe Publishing.  
Talaro, K. P.. (2018), Foundations in Microbiology: Basic Principles, 10th. McGraw-Hill, [ISBN: 978-0071316736].  
Bauman. (2014), Microbiology with Diseases by Taxonomy, 4th. Pearson, [ISBN: 9780321819314].

*This module does not have any article/paper resources*

### Other Resources

Website, Study guide for textbook Essential Microbiology for Pharmaceutical Science,  
[http://www.wiley.com/go/hanlon/essential\\_microbiology](http://www.wiley.com/go/hanlon/essential_microbiology)  
Website, [www.microbiologyonline.org.uk](http://www.microbiologyonline.org.uk).  
Website, SGM- Society for General Microbiology. [www.sgm.ac.uk](http://www.sgm.ac.uk),  
<http://www.sgm.ac.uk>  
Website, Health Protection Agency, UK.. [www.hpa.org.uk](http://www.hpa.org.uk),  
<http://www.hpa.org.uk>  
Website, European Pharmacopoeia,  
<http://www.edqm.eu/en/european-pharmacopoeia-publications-1401.html>