UNIVERSITI TEKNOLOGI MARA

BMS662: MICROBIAL PATHOGENICITY

Course Name (English)	MICROBIAL PATHOGENICITY APPROVED
Course Code	BMS662
MQF Credit	3
Course Description	This course is about how microbes cause disease. Emphasis is on medically important microorganisms. The relationship between pathogenicity and the lifestyles and structures of microbial pathogens will also be discussed. Selected model microorganisms are used to introduce the major concepts in microbial pathogenesis. Special emphasis will be on the mechanisms and strategies by which microbial pathogens attach, invade and multiply in a host; the host's response and pathogens' evasion strategies against the host immune system will also be discussed. Emphasis is also given to the molecular and genetic aspects of pathogenicity. The regulation of virulence factors and the evolution of bacterial pathogens will also be covered. Treatments for microbial infections will also be discussed.
Transferable Skills	Student should be able to understand on how microbes cause diseases and differentiate medically important microbes. In addition, they will learn the relationship between microbes and pathogenicity as well as its genetic mechanism and regulation.
Teaching Methodologies	Lectures, Blended Learning, Lab Work, Discussion
CLO	CLO1 Describe the various mechanisms of pathogenicity and virulence factors by a microorganism CLO2 Conduct laboratory experiments on microbial pathogenicity. CLO3 Elaborate on how knowledge of microbial pathogenicity can be useful in the design of better therapeutic agents.
Pre-Requisite Courses	No course recommendations

Topics
1. 1.0 Introduction 1.1) Definitions & Scope 1.2) Classification of Microorganisms of Medical importance 1.3) Infectious Diseases 1.4) Koch's Postulates 1.5) Classification of infectious disease 1.6) Development of disease 1.7) Host and microbial factors influencing susceptibility
2. 2.0 The common theme in microbial infections 2.1) 2.1 Entry 2.2) 2.2 Adherence/Attachment 2.3) 2.3 Invasion of host cells 2.4) 2.4 Colonization/Establishment 2.5) 2.5 Dissemination within host 2.6) 2.6 Damage of tissues 2.7) 2.7 Exit
3. 3.0 Virulence factors 3.1) 3.1 Factors that enhances transmission 3.2) 3.2 Attachments factors 3.3) 3.3 Colonization factors 3.4) 3.4 Invasiveness 3.5) 3.5 Toxins & Enzymes 3.6) 3.6 Selected examples of microbial pathogens and their virulence factors e.g. 3.7) a) Tuberculosis

3.8) b) Staphylococci 3.9) c) Streptococci 3.10) d) Neisseria
4. 4.0 Strategies for survival against host defence system 4.1) 4.1 Surviving colonization 4.2) 4.2 Defending against complement 4.3) 4.3 Avoiding phagocytosis 4.4) 4.4 Survival inside phagocytes 4.5) 4.5 Immune evasion 4.6) 4.6 Resistance to antibiotics
5. 5. Regulation of virulence factors 5.1) 5.1 Two-component regulatory systems 5.2) 5.2 Global regulators 5.3) 5.3 Quorum sensing 5.4) 5.4 Other regulators
6. 6.0 Evolution of bacterial pathogens 6.1) 6.1 Selective pressure 6.2) 6.2 Gene acquisition & Gene loss 6.3) 6.3 Pathogenicity Islands 6.4) 6.4 Co-evolution of pathogens & host's immune system 6.5) 6.5 Selected examples of emerging new pathogens e.g. 6.6) a) E.coli 6.7) b) Coagulase negative Staphylococci 6.8) c) Zika virus
7. 7.0 Therapeutic treatments for microbial infections 7.1) 7.1 Antibiotics therapy 7.2) 7.2 Prophylaxis-Vaccines 7.3) 7.3 Other forms of therapy

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment

Assessment Type	Assessment Description	% of Total Mark	CLO
Assignment	Students will be required to prepare a written assignment on the microbial pathogenicity topic. Marks will be given on the scientific, arguments and critical thinking contents of the report.	10%	CLO3
Test	Cumulative of one test	30%	CLO1
Written Report	Students will conduct a virtual experiment (mini project) and present the results in a lab report	10%	CLO2

Reading List

Recommended Text

- **Michael Madigan, John Martino, Kelly Bender, Daniel Buckley, David Stahl 2015, *Brock Biology of Microorganisms*, 14 Ed., Pearson Education Limited England [ISBN: 1-292-01831]**

Reference Book Resources

- **Patrick R. Murray, Ken S. Rosenthal, Michael A. Pfaller 2016, *Medical microbiology*, 8 Ed., Elsevier Philadelphia [ISBN: 9780323299]**
- **Barocchi and John L. Telford 2014, *Bacterial pili: structure, synthesis, and role in disease*, Wallingford, Oxfordshire UK [ISBN: QR342.B33 201]**

Article/Paper List

Reference Article/Paper Resources

- **Li Y, Yang L, Fu J, Yan M, Chen D, Zhang L 2017, Microbial pathogenicity and virulence mediated by integrons on Gram-positive microorganisms., *Microbial pathogenesis*, 111, 481 http://10.1016/j.micpath.2017.09.035.**

Other References

This Course does not have any other resources