

General Virology (MBIO 250)

Course number and code	Course title	Meeting Times and Locations	Instructor & contact way	Laboratory	Credit hours
MBIO 250	General Virology (BS. Microbiology)	lectures, tutorial groups, seminars, group assignments, demonstrations presentation and laboratory	Dr. Maaweya E. Hamed E-mail: mhamed1@ksu.edu.sa Phone: 0548107134 Building 5 second floor Office: 2A82	2A72	3 (2+1)

Course Description:

General characteristics of Viruses- cultivation and purification of viruses -Physical and chemical structure of human and animal viruses -Methods of classification -Families and replication cycle of human and animal viruses - Detection method of vaccine and antiviral drugs (antiviral therapy and vaccination)

What is the main purpose for this course?

The course offers deeper knowledge of viruses as an important cause of infection to humans and animals. It describes the basic historical events of virology. The details of the basic characteristics and structural of viruses, families and replication cycle, mutation, evolution and emerging and re-emerging viruses will be discussed. The course also will highlight the methods and strategies of virus classification, as well as the pathogenesis and viral transmission. Besides, detection method and vaccine and antiviral drugs (antiviral therapy and vaccination) also will be highlighted and discussed. All these topics will help students become familiar with the terms used in virology and provide an understanding and hands-on experience of techniques used in virology together with experimental design and data analysis.

Timetable and lecture schedule

The course contact time involves two lectures per week of the second semester. There are one laboratory classes per week.

Weeks	Topic
1	Historical background and terminology
2	Introduction to Virology: definition, properties and origin of viruses
3	Virus architecture, nomenclature (virus classification) and genomes and genetics
4	Student group 1 presentation (Mutation)+ Midterm exam 1
5	Virus replication cycle
6	Viral DNA replication
7	Viral RNA replication
8	Student group 2 presentation (Virus Survival in nature)+ Midterm exam 2
9	Viruses and cancer: oncoviruses, transformation and oncolytic viruses
10	Vaccines and antiviral chemotherapy
11	Evolution and emerging and re-emerging viruses
12	Student group 3 presentation (Virus Pathogenesis)
13	Viral epidemiology and introduction to the human virome
14	Final Review of All Topics

Practical classes

Required Materials:

Lab Manual: Virology Laboratory Manual- Lab Notebook

Weeks	Class topic
1	Laboratory detection of virus (collection and transport of samples).
2+3	Basic cell culture techniques and virus cultivation in cell culture
4+5	Direct demonstration of virus infections I (virus isolation and identification).
6+7	Direct demonstration of virus infections II (detection of viral antigens and viral nucleic acid).
8	Virus-induced cytopathic effects
9	Titration of viruses
10	Direct detection of viral infections using molecular methods I. (virus nucleic acid purification)
11	Direct detection of viral infections using molecular methods II. (polymerase chain reaction)
12	Direct detection of viral infections using molecular methods II. (agarose gel electrophoresis)
13+14	Virus isolation from diagnostic samples (inoculation of embryonated eggs)

Teaching and Learning methods

The learning and teaching strategy is designed to: Develop active learning, peer-to-peer, independent thinking, learning and analytical skills.

In this course, lectures, tutorial groups, seminars, group assignments, demonstrations and laboratory work are used. During this course, the specific objectives within each lecture or practical session will be provided to the students. Each topic focused on one virology theme and the students undertake guided learning activities that are designed to encourage active learning, peer-to-peer learning and conceptual themes in a more constructivist method. The

students will take two written midterm exam (40 minute) consisting of mixed MCQ/SAQ after lecture 1-3 and 5-7. These will assess the learning of lecture 1-3 and 5-7 learning outcomes.

Practical work

Practical work will complement some of the subjects learned in the classes. Besides the mere learning of how to work in a virology laboratory, experimental design, the experimental results and their interpretation will be discussed to promote the understanding of the whole practical content. The practical main aims are to engage the students with the main of virus detection, diagnosis and laboratory methods that are used in a wide range of microbiology and biomedical research settings. The practicals are also designed to offer an alternative learning situation for the ideas that underlie both the virus detection and the techniques.

In the laboratory classes, students will:

- Develop hands-on training experience on methods and techniques used in virology.
- Isolate and purify a virus, determine its growth characteristics and host range, and identify it.
- Observe and determine pathological changes occur during virus infection and replication (cytopathic effects).
- Perform cell culture techniques.
- Acquire hands-on training experience on virus identification and diagnostics
- Acquire hands-on training experience on virus isolation methods.
- Identify of unknown virus using basic virology and molecular biology techniques

Laboratory practical exam:

The preparedness and activity at the laboratory practicals is checked by a 20 question (MCQ/SAQ) exam at the end of the laboratory practical. Questions are based on the plenary practical notes, laboratory practical handout and the information discussed during the laboratory practical.

Good laboratory practices and Laboratory safety procedures and precautions

1. Each student should wear laboratory coat and appropriate personal protective equipment.
2. Do not perform activities in the lab until you are given instructions by your laboratory instruction.
3. Read all precautions in the laboratory manual and on labels and follow directions exactly.

4. No eating or drinking in the laboratory.
5. Always double-check the name of the reagent to be used and the name of the reagent you are using.
6. If you are in doubt as to the correct procedure, double-check the protocol. If doubt continues, consult your instructor. Avoid asking your neighbor for procedural help.
7. Do not pour reagents, chemicals and biological fluids down the sink. Dispose of these only in designated containers.
8. Never pipette by mouth.
9. Do not place contaminated pipettes and loops, or other contaminated tools on the bench top
10. Know the locations and operating procedures of all safety equipment such as first aid kits, and fire extinguisher.
11. **Never remove specimens, cell cultures, or equipment from the laboratory under any circumstances!!!**
12. In case of biological spill or any type of accident occurs, call the instructor immediately
 - ✓ place a paper towel over any spill and pour disinfectant over the towel
 - ✓ let the disinfectant stand for 15 minutes, then clean the spill with fresh paper towels.
13. After performing an experiment, and before leaving the laboratory, you should always wash your hands with soap and water.
14. **Don't Experiment on Yourself**

Grading and Assessment: Written examinations and/or assigned written report, quizzes, in-class assignments, presentation, midterm and final Exam

Grading point breakdown and timetable

1. Written Midterm Exam (40 minutes)
2. Written Midterm Exam 1 (10 marks) (lecture 1,2 & 3) week 4
3. Written Midterm Exam 2 (10 marks) (lecture 5,6 & 7) week 8
4. Presentation (20 + plus 10 minutes for questions)** (Power Point) (10 marks). See timetable and lecture schedule
5. Assignment, In-class assignments Quizzes (5 marks)
6. participation and student portfolio (Continuous assessment) (5 marks)
7. Laboratory practical exam (20 marks)
8. Final exam (cumulative) (40 marks) 16/10/1441 / 02/06/2020

Total: (100 marks)

Details about the both midterm exams will be announced a week before the exam (i.e., the content that would be included in the exams). The information will be announced in class, or by written or email notice, or on the course website (my university website faculty website).

Exam Format: Exams may contain a combination of questions, including (multiple-choice, true/false, and matching, filling in checklists and/or short essay questions.

**** Group presentations:** Each group of students will give an oral presentation on original research articles or any topics covered in this course. The presentations will start promptly at 1pm and 3rd August. You will have a maximum of 20 minutes for your oral presentation plus 5-10 minutes for questions from peers. All group members are expected to effectively contribute. You are encouraged to make your presentation as scientific as possible. (group assignment with individual assessment). You should give your presentation on time! Make-up presentations will be permitted **ONLY** for sick or other emergency. A physician's note will be required for illness. If you missed your presentation without a physician's note, you will lose 10 points from your final grade.

This self-learning exercise will:

- ❖ Promote independent thinking, empower critical assessment of a topic, improve oral communication skills, and develop a team work skill.
- ❖ Able to answer reasonably questions coming from the me and students.
- ❖ Consist of self-researching a particular virology subject, presenting a group presentation to the class, and writing a reports.
- **More information about the content and expectations for evaluation will be directly addressed during class. There will be no make-up exams or extra work will be assigned to improve grades, only for students who missed an exam due to illness or emergency.**

Absences:

- Attendance is very strongly encouraged and absolutely essential to understand the course materials, all students are expected to participate fully in all course related activities. **THIS DOES NOT**, however, mean that student has to come to class when he is sick or has some other emergency for which he needs to attend. Please contact me (whenever possible) to let me know you will be absent. Any absence without a sensible explanation will be considered un-excused.
- If I am late in arriving to class, you must wait a full 20 minutes after the start of lecture.
- If you missed your midterm exams, you will lose 10 points (per/exam) from your final grade.
- Students should make every effort not to miss the midterm exams. If your absence was unexpected (i.e. illness), you must provide me the medical documentation.

Special Needs:

Please inform me at the beginning of the term of any difficulties, physical or learning disabilities that you may have, to discuss what you will be need and how my course requirements and activities may influence your ability to fully participate and taking of examinations.

Classroom Behavior

- All mobile phones should be in silence mode during class. This does not, however, mean that you cannot respond your phone, if you think it is an emergency or very important call you can respond your phone call.
- Laptops/tablets can be brought to class and is permitted only for purposes related to the class.
- Behavior that interrupts the classroom atmosphere such like talking among students will be discouraged. If you need to talk, please leave the class and conduct your conversation outside.
- Your exams will include material presented by students (**Group presentations**)
- No walking in/out during the lecture (unless an emergency).

Communication

- Student can reach me through different ways: 1- E-mail 2. Phone call 3. Come to my office 4. Twitter (@DrMaaweya)
- You should frequently check your university email for any course assignments or announcements. Slides will be posted on my university website (Faculty Website)
- Students are encouraged to contact me to make arrangements for a time to discuss course-related matters.
- You are responsible for any information sent to you at university email address. It is your duty to check your email regularly.
- Please, use only official university e-mail address for all official communications.

NOTE: CHANGES: The topics of assignment/reports and the exam date may be changed or modified at any time, such changes will be made by announcement in class, or by written or email notice, or by changes on the course website (my university website faculty website).

Assessment Strategy:

Summative assessment for this module consists of:

- Two Midterm (in-class exam). Each is 40 mins long and has ~20 questions.
- Practical exam, examining practical aspects of the practical section and practical report of virus isolation.
- Presentation (20+ plus 10 minutes for questions)** (Power Point)

- Assignment, In-class assignments Quizzes
- A final exam (will be comprehensive and include all material covered from lecture No1) consisting of 40 questions).

Formative assessment and feedback

- There are summative 5-10 MCQs and 5-10 SAQs will be available on my university website (Faculty Website) after each lecture. Students will receive immediate feedback on their performance, which contains explanations for each correct answer.
- The correct and model answers for the in-class exam will be given during the first lecture following the exam, giving the students early feedback on their performance.
- Students will receive verbal feedback on their performance on a regular basis during each lecture- this is achieved by asking questions and discussions and assessing student responses. This will allow me to highlight areas of confusion or provide clarity where necessary. Individual one-to-one discussions are also possible in the lecture room and during the laboratory class.
- Students exams and quizzes answers as well as presentation, reports and in-class discussions can be used to monitor the courses areas for further exploration.
- Students receive verbal feedback on their performance and skills and results obtained immediately in the practical class. For each practical, students must complete a laboratory work during the class, and immediate group feedback will be given before the class ends.
- Written feedback as well as general feedback on the practical report is given during the first practical class following the previous one.

References (recommended textbook).

1. Principles of Virology. Vol I: Molecular Biology, Vol. II: Pathogenesis and Control (S.J. Flint et al., Third Edition, ASM Press 2015).
2. Understanding viruses. Teri Shors. 2nd ed. Burlington: Jones & Bartlett Learning.
3. Introduction to Modern Virology, N.J. Dimmock, A.J. Easton, K.N. Leppard. 7th edition-Dimmock
4. Basic Virology” Edward K. Wagner, Martínez J. Hewlett, David C. Bloom, David Camerini. 2007, 3rd edition, Wiley-Blackwell.
5. Encyclopedia of Virology, 3rd ed. 2008
6. Origin and Evolution of Viruses 1st Edition by Esteban Domingo (Editor), Robert G. Webster (Editor), John F. Holland (Editor).
7. Principles of Virology, 4th edition, Flint
8. Virology an illustrated colour text, Korsman
9. Virology Principles and Applications 2007. John Carter, Venetia Saunders.