Course Biol3019 "Microbiology II; Virology"
(Viruses and Extrachromosomal Genetic Elements)

1 Jelgavas str., Auditorim *Aeris* (702),
Wednesday, 8-30 - 12-00 a.m., fall 2015

Individual consultations: Prof. Indrikis Muiznieks (indrikis.muiznieks@lu.lv) ,
Wednesdays, 1 Jelgavas str., room 524, 7-30 – 9-00 p.m.

Course aims:

to provide the knowledge needed for academic and professional career about the diversity of viral structure, genetics, morphology, life cycle, the methods of viral research. To provide the information about the viral groups and groups of extrachromosomal genetic elements whose research has provided important insights for the development of Life Science, Medicine, society and economy; to motivate self-dependent work with the scientific literature.

Course tasks:

- develop the students knowledge in Microbiology, Molecular Biology and Immunology;
- provide the information about
  - conventional and advanced methods in the virus and extrachromosomal genetic element research;
  - on the actual problems of Virology in Latvia and in in the world;
- master the basics of general virus biology – terminology, morphology, physiology, genetics;
- acquire the knowledge about specific groups of viruses, on their pathogenic potential, basics of virus epidemiology and anti-viral theraphy;
- master the basic skills of analysis of the research publications and presentation of the results of the analysis.

Prerequisites:

mandatory courses of the Bachelors Programme in Biology, commendable also Microbiology and Immunology from the optional part of the Bachelors Programme in Biology.

After finishing the course:

The students have to know:

- the peculiarities of the Biology and the Life Cycle of the viruses, which make them different from the other objects in Biology;
- the main groups of viruses, specific features of their structure, characterization of typical representatives;
- the structure of viroids, prions, plasmids, transposons, characteristic features of the typical representatives;
- the defence mechanisms of the organism preventing intrusion of the alien genetic elements;
- the fields of employment and business in Latvia, where the knowledge of Virology is instrumental.

The students are expected to be able to:

- to explain the principles of Microbiological, Biochemical and Immunological methods used in Virus research;
- to have the basic understanding of the methods of ant-viral therapies, vaccination protocols, groups of antiviral substances;
- to provide general analysis of a research paper on a selected topic in Virology;
- to present and to explain the rationale and concept of a research paper.

The Course is provided

through lectures, seminars and tests. The lectures provide the overview on the programme topics, and indicate the literature sources, which are needed to master the course tasks. The participation in the seminars and tests is mandatory. The participation in the lectures is optional, but the students have to consider that the teacher may add 0,5 bonus points to the final marking of the Course to recognize active participation in the discussions during the lectures.

The course is evaluated according to the following criteria

„Digest": the presentation of the analysis of a Nobel's Lecture or of a breakthrough research publication on the topic addressed during the preceding lectures. The topics of the presentation are distributed during the first lectures of the course. The presentations may be prepared by the teams including 2-4 students.

The structure of the presentation:

1. the topic under analysis in the context of the development of the main concepts of Biology and Virology;
2. the progression of the author towards the research achievement;
3. the main results of the research;
4. the influence of the research upon the further development of Biology and Virology;
5. the relevance of the research to the contents of the Course.

After the presentation the authors are expected to discuss the topic with the class. The presentation is evaluated by the teacher in 1-10 marking system. The marks given for each of the presenting team members can be different, reflecting

the understanding of the topic, justification of its importance;

the versatility of the auxiliary information resources used;

the quality of the presentation, use of the time, interaction with the class, answers to the questions.

The length of the presentation should not exceed 20 minutes, including 5 minutes for the discussion.

Seminar on the topics of General Virology. The quality of the answers as well as the the ability to justify them and the activity at the discussions is evaluated in 1-10 marking system.

First part of the exam is the written test on the topics of General Virology – history and methods of Virology, structure, composition, replication and genetics of viruses, epidemiology of viral infections and their treatment. The marking of the test is calculated as percentage of the maximal number of points that can be obtained, which

is transformed into the mark in 1-10 system leaving it with one decimal sign (73%=7,3).

Journal Club: the students are expected to select a research paper on the topic relevant to their interests in Virology or in the Biology of extrachromosomal elements and prepare a report on this paper. The choice of the paper has to be agreed before the presentation with the teacher. The reports on the papers may be prepared by small groups including 2-4 students. In the group work the individual contribution of the group members has to be clearly identified.

In the report (up to 15 min including discussion)

1. the choice of the article has to be justified;
2. the background information of the described research has to be reflected;
3. critical analysis of the theoretical and applied aspects of the research, its results further perspectives.

The report is evaluated both by the teacher and by the students. The marking is the mean value of the average of the student's evaluation and the teacher's evaluation.

The following criteria are used to evaluate the reports in the Journal Club:

Criteria	Positive features	Range of marking	Negative features
Understand-ing, the theo-retical basis	Excellent, deep knowledge obtained also by the stu-dies of additional literature	3 1	Week, the basic literature sources are not studied, basic knowledge is lacking.
Analysis of the paper	Well structured report, critical and detailed analysis of the paper.	3 1	Chaotic report, inability to analyse the paper and justify the conclusions.
Quality of the presentation	Good communication with the class, time limits observed.	3 1	No contact with the class, the report is either too long or too short.
Additional criteria	Teamwork, literature list, demonstrations, English, etc.	1 0	No additional criteria

Second part of the exam is the written test on the topics of Special Virology – taxonomic groups of viruses and extrachromosomal elements. The marking of the test is calculated as percentage of the maximal number of points that can be obtained, which is transformed into the mark in 1-10 system leaving one decimal sign (73%=7,3).

Cumulative marking of the course

is obtained from the marking of its components (first part of the exam – 20%, second part of the exam - 30%), digest (15%), journal club (20%) and seminar (10%). The teacher can add bonus 5% (0,5 mark) to the final evaluation to reward the activity during the lectures and seminars. To finish the Course both exams have to be passed with minimum rating 4 and minimum 40% of the total rates in the Course have to be obtained. During the review lecture additional tasks for the students can be negotiated to improve final marking of the course.

The Plan of the Course

Lecure slides and the course materials are available on the web-page of the Faculty of Biology: **priede.bf.lu.lv/grozs/Mikrobiologijas/Virusol**

#	Topic of the Lecture	Date
1	Introduction – the structure of the course, the study materials. The subject and the history of Virology. Viruses and other self-replicating genetic elements. Virology in Latvia.	**09.09.**
2	The methods of research in Virology – Microbiology and Biochemistry. The material for analysis: Lechevalier„ Dmitri Josifovich Ivanovski.”	**16.09.**
3	The methods of research in Virology – Immunology The material for analysis: Ruska „The Development of Electron Microscope...”	**23.09.**
4	The structure and chemical composition of viruses, viral taxonomy. The material for analysis: Milstein „ From the Structure of Antibodies…”	**30.09.**
5	The viral replication cycle The material for analysis: Klug „From Macromolecules to Biological Assemblies”	**07.10.**
6	Genetics of viruses, routes of their spreading. The material for analysis: Wilkins „ The molecular configuration of nucleic acids.”	**14.10.**
7	Defence against the viral infections and their treatment. The material for analysis: Sharp: „Split Genes and RNA Splicing”	**21.10.**
8	Seminar, the first part of the exam – General Virology	**28.10.**
9	Discussion about the results of the test. Infectious agents smaller than viruses: viroids, prions. Parvoviruses. The material for analysis: Luria: „ Phage, colicins and macroregulatory phenomena”	**04.11.**
10	ds DNA containing viruses The material for analysis: Nathans: „Restriction Endonucleases, SV40 and the New Genetics”	**11.11.**
11	RNA containing viruses; plant viruses. The material for analysis: zur Hausen: „The Search for Infectious Causes of Human Cancers”	**25.11.**
12	Retroviruses and hepadnaviruses, viral hepatitis, comparative aspects The material for analysis: Enders et al. „The Cultivation of Poliomyelitis Virus ...”	**02.12.**
13	The cell cycle, viral oncogenesis and viruses in Gene Therapy. The material for analysis: Montagnier: „25 Years after HIV Discovery...”	**09.12.**
14	Transposons and Plasmids The material for analysis: Dulbecco: „From the Molecular Biology of Oncogenic DNA Viruses to Cancer”	**23.12.**
15	Journal Club, the second part of the exam – Special Virology.	**30.12.**
16	Continuation of the Journal Club, Review of the Course.	**Jan. 2016.**
17	Analysis of the Course. Marking of the students.	

Literature

at the Library of the or in the Department of Microbiology and Biotechnology.

1. Classification and Nomenclature of Viruses. Ninth Report of the International Committee on Taxonomy of Viruses. King A.M.Q. et al. eds. Elsevier Academic Press, 2012, 1259 pp. Grāmata atrodas LU BF Mikrobiologijas un biotehnoloģijas katedrā.
2. Dimmock N.J., Easton A.J., Leppard K.N. Introduction to Modern Virology (4-th ed.) Blackwell Science, 2001, 407 pp.
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4. Kalniņa V.Ī. Virusoloģijas rokasgrāmata. Rīga: Nacionālais apg., 2003. 272 lpp.
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7. Lewin B. Genes V, Oxford Univ.Press, 1997, Ch. The dynamic genome
8. Sherrat D.J. ed. Mobile genetic elements, IRL Press, 1995, 174 pp
9. Modrow S., Falke D., Tryen U. Molekulare Virologie. 2. Auflage Spektrum Akad. Verlag, 2003, 698 S.
10. Hof H., Dorries R. Medizinishe Mikrobiologie, Thieme, 2005, Teil C, S.S. 134 – 266.
11. Summers D.K. The Biology of Plasmids, Blackwell Science, 1996, 132 pp.
12. Жилевич А.В., Ринкужа Д.К., Виестур У.Э. Микроорганизмы и вирусы, Рига, Зинатне, 1992, 265 стр.
13. Trends in Microbiology, Trends in Biotechnology – Library of the Faculty of Biology http://www.sciencedirect.com/
14. Cartoon book of the viruses: http://www.virology.net/Big_Virology/BVHomePage.html
15. Topics of the Molecular Virology: http://www.mcb.uct.ac.za/tutorial/virtut2.html
16. Proc. Natnl. Acad. Sci USA: http://www.pnas.org/
17. Various journals, e.g., Virus Genes, Archives of Virology - http://www.springerlink.com/
18. Various journals, e.g., Journal of Virological Methods, Current Opinion in Virology, http://www.sciencedirect.com/
19. Journals of the American Society of Microbiologists - http://journals.asm.org/
20. Universal data base of viruses: http://www.ncbi.nlm.nih.gov/ICTVdb/