

Microbiology –Biology 3500
Syllabus Spring 2008
Professor John J Lee
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(Laboratory MR 704)

COURSE LEARNING OUTCOMES

1. What are microbes? How do they differ from each other?
2. Evolution of life in a microbial world. How are microbes related to other living organisms?
3. What would the world be like without microbes?
4. How do microbes affect us in our personal lives?
5. How do Microbes interact with each other and other living beings?
6. Comparative microbial metabolism and genetics.
7. How do we exploit microbes for the benefit of humankind?
8. Tools and techniques needed to study microorganisms.

COURSE ASSESSMENT TOOLS

1. Brief questions, responses and discussions every week on design and results of laboratory exercises (5%).
2. 2 laboratory practicums (10%)
3. 3 laboratory quizzes (35%)
4. 3 Lecture tests (35%)
5. Written paper on self examination and identification of bacteria on each student's own nose, throat, gums, or face. Interpretation of results. (15%)

Text: Madigan & M. T., Martinko, J. M. J. 2006

BIOLOGY OF MICROORGANISMS, 11th edition Prentice Hall

Additional resources: Lecture schedule, Power Point® slides and study guides on CUNY Bio 35000 Blackboard site.

Lecture topics

What are microbes?

Evolution of the earth and earliest life forms

Origin and evolution of modern eukaryotes

Microbial diversity and classification

Special problems presented by microbial and protist taxonomy

Microbe hunters

Enumeration of microbes in natural populations

Cell and population growth, batch & continuous culture

Tools of microbiologists

Optical microscopes

Electron microscopes

Prokaryotic and eukaryotic cell structure:

surface structures and coats, cell walls, membranes,

Flagella

ribosomes,

photosynthetic apparatus,

DNA organization and function.

Culture of microorganisms

Types of culture media,

Gnotobiotic concepts

Sterilization and aseptic techniques

Disinfectants and antiseptics

Effects of environmental factors on growth

Extremophiles

Tools of microbiologists

Optical microscopes

Electron microscopes

Nutrition, metabolism & biosynthesis;

Metabolic diversity, metabolic regulation,

energy sources

Chemolithotrophs

Chemoorganotrophs

photolithotrophs,

chemoorganotrophs

Metabolic Pathways

Glycolytic or E-M pathway

Hexose monophosphate shunt

E-D pathway

TCA or Krebs cycle

Cytochrome system-aerobic respiration

fermentation,

Anaerobic respiration

Viruses,

virus structure,

quantification,

Replication,

lysogeny

Microbial genetics,

mutations & mutagens,

Recombination, Merozygote formation

Transformation,

Transduction,

Conjugation

plasmids, transposons
and insertion sequences,
eukaryotic microbial genetics
 Typical eucaryotic genetics—*Chlamydomonas*
 Aneuploidy—*Aspergillus*
 Heterokaryosis – Ciliates and some Foramonifera
Traditional microbial technology,
 bread, alcoholic and other beverages, cheese,
yogurt, vinegar, pickles antibiotics, enzymes
Biotechnology
Medical applications
 Diagnosis of diseases.
Gene therapy
Vaccines
Hormones manufactured by transgenic microbes.
PCR--→RFLP finger printing.
Environmental cleanup
 Extraction of heavy metals—Cu, Pb, Ni
 Degrade chlorinated hydrocarbons—oil spills

Biogeochemical mineral cycling,
 detritus,
wastewater microbiology,
composting

microbial interactions and symbioses with higher & forms
(gnotobiotics) examples: mycorrhiza, insects, ruminants, lichens, legumes, corals, foraminifera

Host-Parasite relationships/medical microbiology
Normal flora of the human body,
non-specific host defenses,
Koch's postulates,
portals of entry,
mechanisms of pathogenesis,
major microbial diseases
immunogens & antigens,
antigen/antibody reactions,
compliment and related topics
Biological Warfare/Bioterrorism

Academic Integrity

The CUNY Policy on plagiarism says the following about plagiarism (the CUNY Policy can be found in Appendix B.3 of the CCNY Undergraduate Bulletin 2007 -2009):

“Plagiarism is the act of presenting another person’s ideas, research or writings as your own. The following are some examples of plagiarism, but by no means is it an exhaustive list:

1. Copying another person’s actual words without the use of quotation marks and footnotes attributing the words to their source.
2. Presenting another person’s ideas or theories in your own words without acknowledging the source.
3. Using information that is not common knowledge without acknowledging the source.
4. Failing to acknowledge collaborators on homework and laboratory assignments.
5. Internet plagiarism includes submitting downloaded term papers or parts of term papers, paraphrasing or copying information from the internet without citing the source, and “cutting and pasting” from various sources without proper attribution.

The City College Faculty Senate has approved a procedure for addressing violations of academic integrity, which can also be found in Appendix B.3 of the CCNY Undergraduate Bulletin.”

Be aware that if we suspect plagiarism **we will follow this procedure, no exceptions made**; i.e. we will report you to the Academic Integrity Official. Disciplinary sanctions range from failing the class to expulsion from the college

Attendance: If you miss 2 or more lectures and labs, you will have missed a substantial portion of the course. If you anticipate personal problems that will affect your ability to complete an assignment on time, be present in a lab or an exam, let me know in advance. If you are absent on the exam without my permission, you will get a zero.

Lab report format (Four to five pages, Times NewRoman, 12 pt, double space. It is best to use the past tense except for the discussion): Your lab report should include, Introduction (purpose, background), Methods (enough detail so that anyone not involved in the course can understand what you did(stains-diagnostic tests), Results (what you found-results of diagnostic tests, procedures for identification), and Discussion (Some information about the organism you found. Can it be a disease causing organism? If So, under what circumstances? If there was some question about identification what further tests would need to be done? References should be written out as in a traditional scientific journal format).