Grande Prairie Regional College
Dept. of Science and Technology

Mi 2650
GENERAL MICROBIOLOGY

Instructor: Phil. Johnson
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Classes: Lectures: Mon, Wed, Fri. 2.00pm - 2.50pm
Laboratory: Tues 3.00pm - 6.50pm

Description: This course covers aspects of bacterial physiology such as nutrient uptake, metabolism, extracellular proteins, chemotaxis and differentiation. The eukaryotic microbes, their ecological roles and eukaryotic cell culture will be discussed. The interactions of microbes with the environment and symbiotic relationships are major topics. Basic principles of industrial microbiology and the use of biotechnology for the production of economically and medically important substances will be covered.
Laboratory exercises deal with topics related to the lecture material.

Textbooks: 'Biology of Microorganisms' (7th. edition)
by: Brock, Madigan, Martinko and Parker (1994)
Prentice Hall publishers

Mi 2650 Laboratory Manual

Reference texts: (on reserve in G.P.R.C. Library)

'Biology of Microorganisms' (6th. edition)
by: Brock, T.D. and Madigan, M.T.

'Bergey's Manual of Determinative Bacteriology'

Requirements:

Lab. Reports	15%
Quizzes	10%
Final Lab. Exam	20%
Midterm Exam	20%
Final Exam	35%

Satisfactory completion of the laboratory portion of the course is required in order to complete the course. Specifically, each student must attend the laboratory sessions and achieve a mean score of 50% on the laboratory assignments, quizzes and final lab exam. All assignments must be handed in by the date specified. Late reports will not be marked.

Since participation in lectures, and completion of assignments are important components of this course, students will serve their best interests by regular attendance. Those who chose not to attend must assume whatever risks are involved. In this regard, your attention is directed to the Academic Guidelines of G.P.R.C.

Quizzes may be given without advance notice.

Mi 2650

LECTURE OUTLINE

Approx. n° of hours	TOPIC
1	Introduction.
4	Review of bacterial structure and function. Growth patterns in relation to oxygen. The major nutritional types with emphasis on energy and carbon sources. Other nutritional requirements Review of major metabolic pathways.
4	Transport of nutrients into the cell: active transport; group translocation; proton motive force and symport. Export of proteins from the cell. Functions of extracellular proteins. Translocation and targetting of extracellular proteins.
9	Environmental nutrient cycling: Microbiology, physiology and environmental importance of: Carbon Cycle: bioremediation: methanogenesis; syntrophic growth; growth on C1 compounds; photosynthesis. Nitrogen Cycle: N_2 fixation by free-living and symbiotic organisms; ammonification; nitrification; assimilatory and dissimilatory nitrate reduction. Sulphur Cycle: oxidative reactions; reductive reactions. Iron Cycle
1	**MID-TERM EXAM**

LECTURE OUTLINE (cont.)

Approx. n^0 of hours	TOPIC
6	Sensory systems, cell differentiation and communication: transcriptional control; Sigma factors; intercellular signalling between microbes and their plant hosts - e.g. *Rhizobium*, *Agrobacterium*, *Erwinia*.
7	Introduction to the fungi: structure and taxonomy; growth characteristics; pathogenesis; exploitation in biotechnology (esp. yeasts); Eucaryotic cell culture: animal and plant cells; transformed plant cell culture.
3	Biotechnology: primary and secondary metabolites; recombinant DNA technology;
1	**FINAL LAB. EXAM**

LAB SCHEDULE

Sept 12..... Orientation to the laboratory.
Ex. 1 - Unknowns.
Ex. 2 - Meat lab.

Sept 19.....Ex. 1 - API strips.
Ex. 2 - Confirmed identification.
Ex. 3 - Sauerkraut lab.
Ex. 4 - Methane lab.

Sept 26.....Hand in Ex. 1 (short report, 10 marks)
Quiz 1 (25 marks)
Ex. 3 - 7 day sample.
Ex. 4 - Gas chromatograph analysis.
Ex. 5 - Cellulase lab.

Oct 3.....Hand in Ex. 2 (full lab report, 50 marks)
Hand in Ex. 4 (short report, 10 marks)
Ex. 3 - 14 day sample.
Ex. 5 - enzyme assay.

Oct 10.....Hand in Ex. 3 (short report, 10 marks)
Ex. 3 - eat results.
Ex. 7 - Symbiotic N_2-fixation.

Oct 17.....MID-TERM EXAM

Oct 24.....Hand in Ex. 5 (full lab report, 50 marks)
Quiz 2 (25 marks)
Ex. 8 - Transformation.
Ex. 9 - Antibiotics lab..

Oct 31.....Ex. 7 - slide cultures.
Ex. 9 - assays.

Nov 7.....Hand in Ex. 9 (full lab report, 50 marks)
Ex. 10 - *E. coli* lab.

Nov 14.....Ex. 7 - bacteroid examination.
Ex. 6 - N_2-ase assay.
Ex. 10 - aldehyde detection.

Nov 21.....Hand in Ex. 6/7 (combined full lab report, 50 marks)
Quiz 3 (50 marks)
Ex. 10 - ethanol assay.

Nov 28.....Hand in Ex. 10 (full lab report, 50 marks)
Ex. 8

Dec 5.....FINAL LAB EXAM