

*Dept. of Science & Technology
Grande Prairie Regional College*

**MI 2650
General Microbiology**

Course Outline

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Schedule: Classes - Monday and Wednesday 16:00-17:20
Labs - Friday 14:30-17:20

Description: This course covers aspects of bacterial physiology such as nutrient uptake, metabolism, extracellular proteins, chemotaxis and differentiation. Symbiotic associations and interaction of microbes with the environment 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 are designed to compliment the material included in the classes.

Text-book: Brock - Biology of Microorganisms (9th edition)
MADIGAN, MARTINKO & PARKER (2000)
Prentice-Hall Publishers

This textbook is recommended for the course - it is not compulsory. For extra help with the text, Prentice-Hall Publishers are making available a web page containing Chapter summaries, self-tests, and other information that you may find useful. The URL address for this web page is:

<http://www.prenhall.com/~bookbind/pubbooks/brock2/>

A list of relevant articles will be provided to each student, and it is strongly recommended that they be read. The recommended reading list is fairly long, therefore the most important articles will also be placed in a binder on reserve in the library.

The following books have also been placed on reserve in the GPRC Library, and students are advised to take advantage of their availability.

- ALCAMO, I.E. (1997) *Fundamentals of Microbiology* (5th Edition)
Addison-Wesley Longman Inc.
- INGRAHAM J.L. & INGRAHAM C.A. (1995) *Introduction to Microbiology*
Wadsworth Publishing Co..
- PERRY J.J. & STALEY J.T. (1997) *Microbiology - Dynamics and Diversity*
Saunders College Publishing
- TORTORA, G.J., FUNKE, B.R. & CASE C.L. (1995) *Microbiology - An Introduction*
Benjamin Cummings Publishers
- VOLK W.A. & BROWN J.C. (1997) *Basic Microbiology* (8th Edition)
Benjamin Cummings Publishers

Other Available Resources:

MI 2650 web page at GPRC:

<http://www.webct.gprc.ab.ca/>

MI 265 web page at University of Alberta:

<http://www.biology.ualberta.ca/courses.hp/micrb265/micrb265a1hp.html>

Microbiology on the web:

<http://www.suite101.com/welcome.cfm/microbiology>

Evaluation:

Lab. Reports (3% each)	12%
Quizzes (4% each)	8%
Short reports/ Data sheet.....	4%
Final Lab Exam.....	15%
Total Lab mark.....	39%
Mid-term Exam.....	20%
Mini-Presentation.....	6%
Final Exam.....	35%
TOTAL.....	100%

Requirements:

Each student should maintain a **card file** on the **significant bacteria** mentioned in class. Keep a record of: Genus and species; cell morphology; Gram stain reaction; habitat; 4 or 5 interesting facts about the organism's growth, metabolism, pathogenicity, use in industry, etc. Do not keep records of taxonomic tests. Information can be obtained from textbooks, lectures, "Bergey's Manual of Determinative Bacteriology", the Internet, or other sources. A question related to this information will appear on both the Mid-term and Final Exams.

In order to successfully complete MI 2650, students must attend ALL laboratory sessions and achieve a mean score of 50% on the Lab Reports, Lab Quizzes and Final Lab Exam. All assignments **MUST** be handed in by the time and date specified. **Late reports will not be marked!** Many of the Laboratory exercises require that students perform some of the procedures at times other than the scheduled lab period. To do this, prior arrangements must be made with **Mr. Rick Scott**, the Biology Lab Technologist (J121; phone: 593-2953).

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 Grande Prairie Regional College.

MI 2650
TOPIC OUTLINE

Number of Lectures	TOPIC
1	Introduction to the course
4	Functional Morphology of bacteria: Definitions and descriptions of microbes. Correlation of cell structure and function. Differentiation of bacteria by cell wall type and key metabolic characteristics. Structural features important in both beneficial and harmful (pathogenic) interactions. Mobility and chemotaxis.
7	Microbial diversity and environments: Growth patterns in relation to oxygen (its use and toxicity). The major nutritional types with an emphasis on energy and carbon sources. Practical examples of diverse nutritional types: methanogenesis, rumen organisms, photosynthetic microbes, extremophiles.
1	MID-TERM EXAM: during lecture period
3	Bacterial growth and control of growth: Effects of temperature, nutrient levels and growth conditions. Analysis of the exponential growth curve, using the growth equation to predict growth rate and cell yield. Control of growth using heat and chemicals (heavy metals, antibiotics). Resistance of bacteria to chemical agents (especially antibiotics).
5	Sensory systems and intercellular communication: Review of transcriptional control systems in bacteria. Role of sigma factors as transcriptional activators. Global regulation. Nitrogen cycling and regulation, symbiotic nitrogen fixation. Microbe-microbe signalling (quorum sensing) and plant-microbe interactions (eg. <i>Rhizobium</i> and <i>Agrobacterium</i> spp.)
4	Biotechnology: Recombinant DNA technology. Exploitation of the <i>Agrobacterium</i> Ti plasmid to form transgenic plants. Other current topics in microbiology and biotechnology chosen by the instructor or at the request of class.