BIOLOGY 203-3 MICROBIOLOGY - WINTER 2006
College of Science & Management, UNBC

INSTRUCTORS:	**Dr. Keith Egger (Sections I & II)**	**Dr. Nabla Kennedy (Section III)**
Office:	Bentley Lab Building Room 8-341	Bentley Lab Building Room 8-311
Office Phone:	960-5860	960-5308
E-mail:	egger@unbc.ca	kenned2@unbc.ca
OFFICE HOURS:	Mon 1:00-2:00pm and Thu 12:30-1:30pm; or by arrangement.	Mon 1:00-2:00pm and Thu 2:30-3:30pm; or by arrangement.

LOCATION:

Lecture: Room 8-166: Monday & Wednesday: 11:30-12:20
Lab: Room 8-321 (Bentley Laboratory Building): Tuesday: **Section 1**: 8:00-10:50am; **Section 2:** 3:00-5:50pm; **Section 3:** 6:30 - 9:20pm.

PREREQUISITE: (BIOL 101-4 and102-4) or BIOL 100-4.

RECOMMENDED: BIOL 210-3 Genetics and at least one of CHEM 201-3, 204-3, or 220-3 (may be taken concurrently)

COURSE CALENDAR DESCRIPTION:

This course introduces students to the classification and biology of prokaryotic and eukaryotic micro-organisms and applications to forestry, agriculture, environmental science, medicine and industry. In the laboratory, students will learn techniques for culturing and characterizing micro-organisms.

COURSE OBJECTIVES:

The objective of this course is to introduce you to the diversity of prokaryotic and eukaryotic micro-organisms, with particular emphasis on bacteria and fungi. The course will incorporate sections on microbial diversity, aspects of microbial metabolism and genetics, the role of microorganisms in the environment, and applications in forestry, agriculture, medicine and industry. The lab will introduce you to diverse techniques for culturing and manipulating micro-organisms, observing micro-organisms, and testing their biochemical activities. There will also be opportunities to isolate and identify microorganisms from the environment.

REQUIRED TEXTS (available in the Bookstore):

Microbiology (6th Edition) by LM Prescott, JP Harley and DA Klein. 2005. This is the primary source for the course; figures used in the lectures will be drawn from this source.

BIOL 203 Microbiology Laboratory Exercises (2006 Edition) by Susan Robertson and Keith Egger, UNBC. All laboratory exercises will be drawn from this source.

EVALUATION:

Midterm Exam (Monday, Feb 6th)	15%
Final Exam (Scheduled by the Registrar's Office)	25%
MFM "My Favourite Microbe" and peer evaluations	20%
Laboratory Exercises*	40%

***NOTE: Labs attendance is mandatory; you must obtain a passing grade in the lab component to pass the course.**

COURSE SCHEDULE – WINTER 2006

Section I: MICROBIAL METABOLISM & GENETICS [K. Egger]

		Text
Wed 4 Jan	History and Scope of Microbiology	Ch 1
Mon 9 Jan	Procaryotic and Eucaryotic Cell Structure & Function	Ch 3 & 4
Wed 11 Jan	Microbial Nutrition and Growth	Ch 5 & 6
Mon 16 Jan	Metabolism: Energy, Enzymes and Regulation	Ch 8
Wed 18 Jan	Metabolism: Energy Release and Conservation	Ch 9
Mon 23 Jan	Introduction to Genes: Structure, Replication & Mutation	Ch 11
Wed 25 Jan	Microbial Gene Expression & Regulation	Ch 12
Mon 30 Jan	Microbial Recombination & Plasmids	Ch 13
Wed 1 Feb	***Seminar**: *Dr. William McGill*: Microbes, metabolism and electrons.	

Mon 6 Feb	**MIDTERM EXAM** (will cover material from Part I)

Section II: DIVERSITY OF THE MICROBIAL WORLD [K. Egger]

Wed 8 Feb	Viruses	Ch 16
Mon 13 Feb	**WINTER BREAK - University Closed**	
Wed 15 Feb	**WINTER BREAK - University Closed**	
Mon 20 Feb	Microbial Taxonomy	Ch 19
Wed 22 Feb	The Archaea	Ch 20
Mon 27 Feb	The Gram-Negative Bacteria	Ch 21 & 22
Wed 1 Mar	The Gram-Positive Bacteria	Ch 23 & 24
Mon 6 Mar	Fungi	Ch 25
Wed 8 Mar	Slime Molds, Water Molds, and other Protists	Ch 25 & 27
Mon 13 Mar	***Seminar:** *Dr. Keith Egger*: Climate change and biodiversity. ***Deadline for confirmation of My Favourite Microbe selection***	

Section III: ENVIRONMENTAL & INDUSTRIAL MICROBIOLOGY [N. Kennedy]

Wed 15 Mar	The Carbon Cycle, Microbes & Climate Change	Ch 28
Mon 20 Mar	Microbes and Other Biogeochemical Cycles	Ch 28
Wed 22 Mar	Microbial Ecology ***"My Favourite Microbe" Reports DUE***	Ch 28, 29 & 30
Mon 27 Mar	Microbial Ecology (continued)	
Wed 29 Mar	Emerging (and re-emerging) Diseases	Ch 37
Mon 3 Apr	Industrial Microbiology & Biotechnology	Ch 41 & 42
Wed 5 Apr	***Seminar**: *Dr. Michael Rutherford*: Bioremediation of oil and gas waste.	

TBA	**FINAL EXAM** (will **emphasize** material from Section II & III but will ask questions that require you to synthesize material from across all three sections)

***NOTE**: Seminars are considered examinable, and PDF files will **not** be posted (i.e. skip at your peril).

Laboratory Table of Contents – Winter 2006

Week	Date	Lab Exercises	Assignments Due
1	10-Jan	Lab 1	-
2	17-Jan	Lab 2	-
3	24-Jan	Lab 3	-
4	31-Jan	Lab 4	-
5	7-Feb	Lab 5	-
6	14-Feb	Winter Break	-
7	21-Feb	Lab 6	Identification of Soil Bacteria
8	28-Feb	Lab 7	-
9	7-Mar	Lab 8	Bacterial Community Function in Soil
10	14-Mar	Lab 9	-
11	21-Mar	Review	-
12	28-Mar	Lab Exam	Lab Exam

Grading (the laboratory component is worth 40% of your final grade)

Soil Bacterial ID Report (due Feb. 21)	7.5%
Bacterial Community Function Report (due March 7)	7.5%
Lab Technique	10%
Lab Exam (March 28)	15%

Note: You must pass the laboratory component to pass the course.

MFM "MY FAVORITE MICROBE" ASSIGNMENT

The objective of this assignment is for you to research a microbe of your choice, provide basic information on the organism, and a brief synopsis of a few interesting points about the microbe, and provide a synopsis of one scientific paper about the microbe. The choice of microbe is up to you, as long as it belongs to one the following microbial groups: Viruses, Archaea, Bacteria, Fungi, or Protozoa (I do not include Algae because I do not cover them in this course, however, I will entertain compelling requests for algae on a case-by-case basis) **and** it was not the subject of a report last year (see page 6). The main body of the report can be on any aspect of biology you find interesting: e.g. biochemistry, genetics, ecology, cell biology, immunology, medical pathology, etc.

The rules for selecting a microbe for your report are:

- The report should focus on the **microorganism**, not just the **disease** it causes (reports that only discuss the disease will be marked down accordingly).
- You must **confirm your selected organism** with me first (check the list of organisms that have already been selected on the BIOL 203 WebCT site, then email me your requested choice). Multiple students may not report on the same organism so, make your selection early.
- All students must have their **organism selected and confirmed by Monday, March 13th**.
- You may not select an organism that was done last year (Winter 2005) (see excluded list on p. 6).

YOUR REPORT MUST INCLUDE THE FOLLOWING COMPONENTS:

***1. Background Information*:**

Non-viral:

Scientific Name: e.g. *Genusus speciesii*
Common Name (if any):
Classification: e.g. Phylum, Order, Family [see Text Appendix III]
Mode of Nutrition: i.e. auto/hetero; photo/chemo; litho/organo (you may have to figure this out!)
Optimal growth conditions: i.e. where does it grow best, special requirements needed?
Habitat or Host: i.e. where does it live? e.g. thermal vents, human pathogen, etc.
Geographical distribution: e.g. is it found world-wide or is it restricted to certain geographical areas? (if known)

Viral:

Name: e.g. Smallpox virus
Classification: i.e. virus family [see Text Appendix IV]
Nucleic Acid Type: i.e. RNA or DNA (or both), single- or double-stranded
Free or integrated into the host genome: (e.g. does it have a lysogenic phase?)
Optimal growth conditions: i.e. where does it grow best, special requirements needed?
Host: e.g. human pathogen, etc.
Geographical distribution: e.g. is the organisms found world-wide or is it restricted to certain geographical areas? (if known)

***2. Synopsis of a Scientific Paper*:**

- In preparing your report, I want you to do a synopsis of **one** publication from the **primary literature**[1]; it is not sufficient to take all of your information from web sites (see also the section on **plagiarism**), although you may find electronic copies of primary literature on the web.

[1]**Primary Literature** refers to major peer-reviewed scientific journals, e.g. "Science", "Nature", "Canadian Journal of Microbiology", "Applied & Environmental Microbiology", "Microbial Ecology", or medical journals such as "Medical Microbiology & Immunology", "Mycopathologia", etc. **If in doubt, ask the instructor.**

The synopsis will contain the following:

1. The full **title** of the paper (put the full citation - with authors, journal, etc - in the References)

2. The **background** of the problem (i.e. why did the authors do this research?)
3. The **objectives** of the study (i.e. what were they trying to do?)
4. The **methods** used to achieve the objectives (i.e. how did they do it?)
5. The **main findings** (conclusions) (i.e. what did they find out?)
6. **Significance** (i.e. what does it mean to the world?)

NOTE: Your objective should be to summarize items 2-6 in one 1 sentence each! (your grade on the assignment will be maximized if you can be this concise while still capturing the essence of the paper).

3. Interesting Facts:

- This section will include interesting additional information about this organism (this additional information is not restricted to primary literature sources and can be obtained from the web).
- You may use images, but you must reference all figures and images (see section of **plagiarism**), including the URL if you obtained them from a web site.

4. References:

Citations to the literature sources as well as any supplementary literature you used in preparing the report (including primary and web sources and any images you might use!). Primary literature citations should follow standard "Canadian Journal" format (e.g. Sigler, L, de la Maza, LM, Tan, G, Egger, KN, and Sherburne, RK. 1995. Diagnostic difficulties caused by a nonclamped *Schizophyllum commune* isolate in a case of fungus ball of the lung. Journal of Clinical Microbiology 33: 1979-1983). Citations in the text can be either **Author, date** format [e.g. "interesting fact (Sigler *et al.* 1995)"] or **Number** format [e.g. "interesting fact (9)"].

LENGTH:

- In order to accommodate posting on the web site and peer review by other students, you must **keep the text for your report (including text associated with figures) to 500 words or less** (approx. one single-spaced page, not including images).
- **Your Reference List will not be included in your 500 word total**.

EVALUATION:

You must post a copy of your report in readable electronic (html) format (i.e. you must be able to read it on the computers in the student lab) on the WebCT web page for BIOL 203 (the **Centre for Teaching and Learning** will be able to help you if you are unfamiliar with posting html pages). **Reports must be posted by March 22nd.** Your web report will be available for all students to view (so check spelling and grammar!). After the final posting date **each member of the class will have 10 days to select your top 15 MFM poster on the WebCT site** (your own excluded!), and **email me** (egger@unbc.ca) **a few sentences giving a rationale for why you chose each one**.

EVALUATION SHEET	**Value**
- MFM selection confirmed by March 13th?	-1 per day late
- MFM posted on web by March 22nd due date?	-4 per day late
- text > 500 word limit	-0.05 per word
Background info	3
Synopsis (clarity and conciseness)	5
Interesting Facts (quality, presentation, interest)	4
References (cited properly, includes **all** material used)	2
Presentation (e.g. visual quality, organization, readability)	2
Online/email evaluation (participation and **rationale** for choices)	4
TOTAL:	**20%**

Excluded list from MFM 2005 (alphabetical by scientific name; viruses by common name **in bold**).

YOU CAN NOT DO YOUR MFM REPORT ON ANY OF THE ORGANISMS LISTED ON THIS PAGE.

Actinomyces israelii
Attamyces bormatificus
Bacillus infernus
Bacillus odesseyi
Bacillus thuringiensis
Bartonella bacilliformus
Bdellovibrio sp.
Bordatella pertussis
Borrelia burgdorferi
Burkholderia mallei
Calothrix parietina
Campylobacter jejuni
Chicken Pox (Varicella) virus
Chlamydia pneumoniae
Chlamydia trachomatis
Clostridium difficile
Clostridium perfringens
Clostridium tetani
Coccidioides immitis
Coxiella burnetii
Coxsackie Virus
Deinococcus radiodurans
Epidermophyton floccosum
Epulopiscium fishelsoni
Escherichia coli 0157:H7
Francisella tularensis
Gymnodinium sanquineum
Haemophilus aegyptius
Hantavirus
Hemophilis influenzae Type B - HIB
Hepatitis A virus
Hepatitis B virus
Hepatitis C virus
Human papilloma virus (HPv)
Human T-cell lymphocytotropic virus (HTLV)
Ichthyophthirius multifiliis
Lactobacillus acidophilus
Lactobacillus reuteri
Lassa virus
Leishmania mexicana
Leptospira sp.

Leucoagaricus gongylophorus
Methanococcus jannaschii
Mycobacterium kansasii
Mycobacterium leprae
Mycobacterium paratuberculosis
Mycoplasma pneumoniae
Norwalk Virus (Norovirus)
Penicillium marneffei
Plasmodium falciparum
Porphyromonas gingivalis
Pseudomonas aeruginosa
Pseudomonas syringae
Pyrobaculum aerophilum
Pyrocystis fusiformis
Pyrodictium occultum
Pyrolobus fumarii
Rabies virus
Ralstonia eutropha
Rochalimaea heneselae
Rous Sarcoma Virus (RSV)
Rubeola virus (measles)
Shigella dysenteriae
Spirulina sp.
Streptococcus thermophilus
Streptococcus mitis
Streptococcus mutans
Streptococcus pneumoniae
Sulfolobus acidocaldarius
T4 Bacteriophage virus
Thermus aquaticus
Tobacco Mosiac Virus
Treponema pallidum
Trichomonas vaginalis
Trichonympha agilis
Trypanosoma cruzi
Vibrio alginolyticus
Vibrio cholerae
West Nile virus
Yellow Fever virus

STUDENTS WITH DISABILITIES?

IF THERE ARE STUDENTS IN THIS COURSE WHO, BECAUSE OF A DISABILITY, MAY HAVE A NEED FOR SPECIAL ACADEMIC ACCOMMODATIONS, PLEASE COME AND DISCUSS THIS WITH ME, OR CONTACT DISABILITY SERVICES LOCATED IN ROOM 7-103.

PLAGIARISM

Plagiarism is the very serious academic offence of using someone else's work or ideas, or excerpting text from their written or online documents, without acknowledging them.

For example, if you "cut and paste" from a web source and claim that as your own work, this is an extreme case of plagiarism. More minor cases of plagiarism include using sentences or phrases from another published work or web site without putting the direct excerpt in "quotes", or failing to cite web sources that you used in completing an assignment.

***PLAGIARISM will result in a minimum academic sanction of a zero grade on the assignment**, and **in extreme cases may result in suspension or expulsion from the university**.*

*The following is exerpted from the "**Academic Offenses**" section in the Calendar.*

> **Plagiarism:** Plagiarism is "the act of using and passing off as one's own the ideas or writings of another" (The American Heritage College Dictionary 1044). It includes submitting the work of another, and using citations which have been designed in order to mislead the reader as to the nature or authenticity of the source.
>
> Complete plagiarism involves an entire essay or form of creative work of another, from whatever source (including the World Wide Web) being copied and presented as original work. Unless prior written and signed permission is obtained, submitting the same essay, paper or other term work for credit in more than one course constitutes **self-plagiarism**, a situation similar to complete plagiarism.

*If you are still **unsure** what constitutes plagiarism, then consult with the course instructor or review the "Academic Offenses" section of the Calendar for more information on plagiarism and cheating.*

Remember, anything you can find on the web, I can find on the web.