Applied & Industrial Microbiology 16:682:524

Fall 2017 Lecture Schedule

Tuesday, Friday 1st Period (9.15-10.35), FS109

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For notes and information see http://sakai.rutgers.edu/portal Applied & Industrial Microbiology Fall 2017

Lec	Date	Topic
1	Tu Sept 5	Introduction to course, Historical perspective
2	Fr Sept 8	Microbial Diversity and Bioprospecting: physiology & ecology and applications
3	Tu Sept 12	Identification of microorganisms, Culture collections (Ines Rauschenbach)
4	Fr Sept 15	Microbial growth and nutrition: environmental conditions
5	Tu Sept 19	Microbial growth: measurement & kinetics; Bioreactors
6	Fr Sept 22	Microbial death and control: physical/chemical methods, preservation
7	Tu Sept 26	Food spoilage
8	Fr Sept 29	Review and Exam preparation
9	Tu Oct 3	**EXAM I (Lectures 1-8)**
10	Fr Oct 6	Food borne illnesses: *Salmonella*, *E. coli* O157:H7 and others
11	Tu Oct 10	Applications of our microbiomes (Liping Zhao)
12	Fr Oct 13	Food microbiology, lactic acid fermentations
13	Tu Oct 17	Fermented milk products
14	Fr Oct 20	Yeasts & fermentation: anaerobic metabolism, alcohol
15	Tu Oct 24	Alcoholic fermentations and beverages: beer, wine
16	Fr Oct 27	Industrial microbiology: production of diverse metabolites
17	Tu Oct 31	Antibiotics
18	Fr Nov 3	Metabolic review
19	Tu Nov 7	**EXAM II (Lectures 10-18)**
20	Fr Nov 10	Enzymes
21	Tu Nov 14	Microbial biomass production, Single cell protein
22	Fr Nov 17	Sanitation, Water quality testing, Water treatment
23	We Nov 22	Microbial aerosols, air quality, sick-building syndrome
24	Tu Nov 28	Environmental biotechnology - Wastewater treatment technologies
25	Fr Dec 1	Environmental biotechnology - Bioremediation and other technologies
26	Tu Dec 3	Environmental biotechnology - Metal leaching & mining technologies
27	Fr Dec 8	Bioenergy
28	Tu Dec 12	Wrap-up & Review
	Tu Dec 19 9-11 am	**EXAM III (Lectures 20-28, and selections from Exams I & II)**

Examinations: A total of three examination will be given:
I. Covering lectures 1 through 8, **II.** Covering lectures 10 through 18,
III. Covering lectures 20 through 28 and selected questions from the first two exams.
It is expected that the exam is taken on the day it is offered.
Exceptions to this rule will be made only for very extraordinary reasons.
Grading: 75% based on Examinations and 25% Term Paper and Reading Assignments.

Applied & Industrial Microbiology Term Paper

1. Select a topic in field of applied and industrial microbiology

A good source of ideas are recent (last 5 years) research or review papers from Trends in Biotechnology, Nature Biotechnology, Trends in Food Science & Technology, Microbe (ASM News), Society for Industrial Microbiology News, or Microbiology Today (Society for General Microbiology).

Other good sources for ideas and information include Journal of Industrial Microbiology and Biotechnology, Applied and Environmental Microbiology, Applied Microbiology and Biotechnology, and Annual Reviews in Microbiology.

You need to get your general topic area approved by September 16th. In case of overlap, topics will be assigned on a first come basis. Thus, we recommend that you come and discuss your selected topic prior to this date.

2. Search and review literature

Use library resources: Search Engines, databases.

Identify the key paper(s) that you will use for your topic. Through citations you will need to demonstrate your "command" of the topic and knowledge of the field.

3. Write the Term Paper

Aim for approximately 10 pages + figures and references (Format: 12 point font Times, 1.5 line spacing)

The style and format of a "mini-review" in *Applied Microbiology & Biotechnology* should be used!

In your paper you should address the following:
Description of technology (what, how, when, where, who....)
Importance & significance of the work. What are the future projections.

Academic Integrity Policy

The term papers will be analyzed for textual similarity to other publications and sources via plagiarism detection software. Any direct duplication of large portions of text without proper citation will be considered plagiarism and would be a serious breach of ethical scientific conduct. This includes copying sentences or paragraphs verbatim, even if the original work is cited in the references. If any source materials are placed in a document verbatim, the directly quoted text should be placed in quotation marks. Students are expected to paraphrase and synthesize the scientific literature for this assignment.

All students should read and understand the Rutgers Academic Integrity Policy (http://academicintegrity.rutgers.edu).

Final Term Papers are due on or before **Tuesday, December 12th**.

The term paper and reading assignments will count for 25% of the course grade.

Course Description and Learning Goals

Description: Principles of applied microbiology and microbial technology. An overview on the utilization and application of microbes in different products and processes, and the importance of disease causing organisms as they relate to these processes and public health

Overall Learning Goals: Students are expected to gain a fundamental understanding of how microorganisms are utilized and controlled for the benefit of humankind and develop the skills needed to study and evaluate these applications.

After completion of the lecture component of the course, successful students will:

1. Understand and be able explain the roles of microbes in industrial and food processes.
2. Be able to relate their knowledge of traditional microbiological techniques to how microorganisms are utilized and controlled.
3. Be able to calculate and evaluate microbial growth and death rates.
4. Integrate a historical perspective and understanding of current research in how microbes are utilized in biotechnology.

Some Suggested Background Reading:

Waites M.J., Morgan N.L., Rockney J.S. & Highton G. 2001. Industrial Microbiology. An Introduction. Blackwell Science Publishers.

The Prokaryotes online http://www.springerlink.com

Glazer, A.N., & Nikaido H. 2007. Microbial Biotechnology, 2nd Edition. W.H. Freeman and Company, New York, NY.

Smith J.E. Biotechnology, Third Edition, Cambridge University Press, UK

Präve P., Faust U. , Sittig W. & Sukarsch D.A. (eds), 1987, Fundamentals of Biotechnology, VCH Publishers

Crueger W. & Crueger A. Biotechnology, 2nd Edition, Sinauer 1989.

Glick B.R. & Pasternak J.J.. Molecular Biotechnology. Principles and Applications of Recombinant DNA. 3rd Edition ASM Press, 2003.

Moat A.G. & Foster J.W.. Microbial Physiology, 4th Edition, Wiley-Liss 2002.

El-Mansi et al. Fermentation Microbiology and Biotechnology, 2nd Edition. 2006.

Selected chapters from Brock Biology of Microorganisms or other microbiology textbooks.

Broad Background

Postgate J. Microbes and Man, 3rd Edition, Cambridge University Press.

Postgate J. The Outer Reaches of Life, 1994, Cambridge University Press.

Dixon B., Power Unseen. How Microbes Rule the World. 1994, W.H. Feeman, NY.