BIOL 687 MICROBIAL ECOLOGY
Spring 2005

Time: MWF 12:30-1:20
Location: 105 Ackert
Instructor: Walter Dodds
Office 113 Bushnell; 532-6998; wkdodds@ksu.edu
Office Hours: M 1:30-2:30, or drop in, or make an appointment
Text: Atlas and Bartha, Microbial Ecology, 4th ed. Note, this text is not required, there will be a copy on reserve at the library; Figure packets (2) and tables (1) (**required**) from internet; course note packet (optional) on the web at http://www.ksu.edu/doddslab/

I. **Course Requirements**
Three midterms and a final, each worth 20% of the grade. Four short paper reports (described below) will be worth 12% of the grade. Written notes each class (8%).

If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as it is outlined, or which will require academic accommodations, please notify me during the first two weeks of the course.

II. **Course Goals**
To provide students with a basic appreciation for the little that is known about microorganisms in their natural environment. Some emphasis will be placed upon aquatic microorganisms.

III. **Lectures**

Day	Date		Topic	Suggested Reading, pages
W	Jan.	12	Introduction, History	2-26
F		14	Systematics	27-57
M		17	University Holiday - No Class	
W		19	"	
F		21	Functional roles	332-384
M		24	Ecosystems	281-331 (don't worry, I know it's unrelated)
W		26	Microscale Physics	
F		28	"	
M		31	Chemotaxis, Phototaxis	
W	Feb	2	Photosynthesis	
F		4	Growth	196-203
M		7	Origins of life	
W		9	Evolution of recombination	
F		11	**Exam I**	
M		14	Nutrient cycling	386-459
W		16	Nutrient cycling	**last drop date**
F		18	Nutrient cycling	

Day		Date	Topic	Reading, pages
M		21	Nutrient cycling	
W		23	Nitrogen in Kings Creek	
F		25	Aquatic grazers of microbes	60-98
M		28	"	
W	Mar	2	Microbial loop in aquatic systems	
F		4	Microbial loop in aquatic systems	
M		7	Interactions within the community	174-196; 204-217
W		9	Interactions with plants	99-140
F		11	**Exam II**	
M		14	Interactions with plants	
W		16	Interactions with animals	141-172
F		18	Nitrogen cycling on the prairie	
March 21-25		**Spring Break**		
M		28	Unusual environments	375-377
W		30	"	
F	Apr	1	Environmental issues - bioremediation	511-555
M		4	Bioremediation	556-598
W		6	"	462-510
F		8	Zooplankton behavior	
M		11	Acid precipitation	
W		13	"	
F		15	Genetic information exchange	
M		18	Release of engineered organisms	624-657
W		20	Methods, biomass and production	218-280
F		22	"	
M		25	*In situ* identification	
W		27	Microscale techniques	
F		29	**Exam III**	
M	May	2	Human Microbial Ecology	
W		4	Applications	599-623
F		6		
M	**May**	**9**	**FINAL 4:10-6:00 pm**	

Paper reports

I will assign each student four unique papers for the duration of the course. I will try to match their interests given to me at the beginning. Each student will be required to write a two paragraph critique of each paper and make a short (5 minute) presentation to the course on the paper. Students need to be prepared to synopsize the paper tell what they think the most important points and what the weaknesses are. I will do a paper that we will all read at the beginning of the course so the students will have a guide to expectations.

Course Outline

I. Introduction, History, Systematics (molecular and traditional) (3 lectures)
II. Functional roles and ecosystems (2 lectures)
    A. Environments (lakes, marine, sediments, soil)
    B. Ways to make a living
    C. Food webs, transfer efficiency
    D. Global productivity and energy
    E. Photosynthesis
    F. Fermentation and respiration
III. Microscale Physics (2 lectures)
    A. Reynolds numbers
    B. Diffusion
    C. Flow
    D. Motility
IV. Chemotaxis, Phototaxis (1 lecture)
V. Nutrient Cycling (6 lectures)
    A. Redox, oxygen and controlling factors
    B. Carbon cycle, greenhouse effect
    C. Nitrogen cycle
    D. Sulfur cycle
    E. Phosphorus cycle
    F. Iron cycle
    G. Minor nutrients
VI. Microbial Food Webs (6 lectures)
    A. Nutrient uptake, utilization, and recycling
    B. Functional response of predators, bactivory, filter feeding
    C. Microbial loop in aquatic ecosystems
VII. Interactions (6 lectures)
    A. Microorganism-microorganism interactions
    B. Interactions with plants
    C. Interactions with animals
VIII. Extreme environments (thermal, deep marine, hypersaline) (2 lectures)
IX. Environmental issues (8 lectures)
    A. Degradation of organics, bioremediation
    B. Microbes and acidification
X. Case Studies (3 lectures)
XI. Methods in microbial ecology (molecular probes, thymidine uptake, counting, microelectrodes etc.) (3 lectures)
XII. Human microbial ecology (1 lecture)