

Molecular Techniques in Microbial Ecology – (Bio-5319/7360G) (3) - Fall 2005

Instructor: Dr. Dittmar Hahn, Dept. Biology, Texas State University

Office: SCI 316, office hours: M-Th 8:15 - 9:15am, phone (512) 245-3372, fax (512) 245-8713, email dh49@txstate.edu

Prerequisite: Bio 2400/3440, courses in biochemistry and/or ecology would be helpful

Text: none

Other reference materials: Lectures will be driven from scientific journals including: Applied and Environmental Microbiology, Advances in Microbial Ecology, Environmental Microbiology, FEMS Microbiology Ecology, Microbial Ecology, Microbiology and Molecular Biology Reviews, Annual Review of Microbiology

Catalog Description: This course will illustrate the wide variety of molecular tools used to quantitatively analyze bacteria in nature, i.e., in pristine and contaminated, terrestrial and aquatic habitats. The course includes a student's presentation on the *pros* and *cons* of selected typing protocols and a semester-long laboratory focussing on the potentials and drawbacks of selected *in situ* and *ex situ* techniques such as *in situ* hybridization, PCR, DGGE and sequence analysis after nucleic acid extraction in aquatic or terrestrial environments.

Course grading:

Attendance	25 %
Oral Presentation	25 %
Laboratory	50 %

Subjects Covered in Lectures:

- Introduction, historical background
- Systematics, classification
- Quantitative ecology (Cytochemical methods)
- Quantitative ecology (Molecular methods)
- Total DNA as target
 - DNA reassociation
 - G+C DNA content analysis
- Specific genes as target (e.g., rRNA, *nifH*, etc.)
 - Hybridization (filter-, *in situ* hybridization)
 - PCR
 - Sequence analysis (incl. cloning)

- PCR-based typing procedures (presented by students): ARDRA, DGGE, REP-PCR, etc.
- Additional analysis/typing procedures (presented by students): FAME, BIOLOG, etc.

Subjects Covered in Laboratory:

- *in situ* hybridization (soil, water, root surfaces)
- DNA extraction from soil/water, incl. gel electrophoresis
- PCR
- DGGE
- Filter hybridization
- Cloning
- Sequence analysis