

**APPLIED BIOLOGY 342/FORESTRY 310**  
**Soil Biology**  
**2015/2016 Term 2**

Instructor

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Lectures

Tuesday & Thursday - 11:00 am  
FSC 1002

Office Hours

Monday-Friday  
9:00 am-5:00 pm **e-mail for appointment**

Laboratory

Tuesday - 2:00 pm  
Location – MCML 342

Instructional Objectives of APBI 342/FRST 310

Upon completion of this course, students will be able to (i) describe members of the five kingdoms of organisms commonly found in the soil and techniques used to study them, (ii) relate the activity of these (micro)organisms to nutrient transformations and cycling in the soil, (iii) differentiate the kind and activity of (micro)organisms that commonly inhabit the rhizosphere, and (iv) integrate (i)-(iii) so that an understanding of soil ecosystem complexity is achieved.

**Grading**

Midterm	25%
Final	45%
Term Paper <b>or</b> presentation	15%
Laboratory Write-ups <sup>1</sup>	15%
<b>Total</b>	<b>100%</b>

<sup>1</sup> **Note:** 5% for each lab write-up \*\*  
Write-ups are due **2 weeks** after completing the lab series

**Reference Materials:**

Due to the widely varying subject material in this course, there is no single, required text. Some useful references are:

Van Elsas, J.D., Jansson, J.K. and Trevors, J.T. (Editors) (2007) *Modern Soil Microbiology*. CRC Press/Taylor and Francis, Boca Raton, FL. 646p.

Van Elsas, J.D., Trevors, J.T. and Wellington, E.M.H. (Editors) (1997) *Modern Soil Microbiology*. Marcel Dekker, Inc., New York. 683p.

Sylvia, D.M., Fuhrmann, J.J., Hartel, P.G. and Zuberer, D.A. (2005) *Principles and Applications of Soil Microbiology*. 2<sup>nd</sup> edition. Prentice-Hall, Inc. Upper Saddle River, New Jersey. 640p.

Sylvia, D.M., Fuhrmann, J.J., Hartel, P.G. and Zuberer, D.A. (1998) *Principles and Applications of Soil Microbiology*. Prentice-Hall, Inc. Upper Saddle River, New Jersey. 550p.

Margulis, L. and Schwartz, K.V. (1998) *Five Kingdoms, An Illustrated Guide to the Phyla of Life on Earth*. 3<sup>rd</sup> Edition. W.H. Freeman and Co., New York. 520p.

Paul, E.A. and Clark, F.E. (1996) *Soil Microbiology and Biochemistry*. 2<sup>nd</sup> Edition. Academic Press, San Diego. 340p.

Paul, E.A. and Clark, F.E. (1989) *Soil Microbiology and Biochemistry*. Academic Press, San Diego. 273p.

**Note:** An introductory Microbiology or Biology Text may be a useful reference as well, e.g.,

Madigan, M.T. (2012) *Brock Biology of Microorganisms*. (13<sup>th</sup> Edition). Benjamin Cummings, San Francisco. 1043p.

Campbell, N.A. (2008) *Biology*. 8<sup>th</sup> Edition. Benjamin-Cummings. San Francisco. 1393p.

**Tentative Lecture/Lab Schedule**

Date	Lecture	Laboratory Exercise/Lecture
01-05 01-07	Introduction/Course Overview Biodiversity and Classification of Organisms – A Review	No lecture or lab
01-12 01-14	Biodiversity: Extremeophiles rRNA and Phylogeny: Classifying Prokaryotes	Biodiversity Extremeophiles (lecture)
01-19 01-21	Carbon & Oxygen Nutrition Reactive Oxygen, Free Radicals & Antioxidants	Phylogeny (lecture)
01-26 01-28	Archaeobacteria Structure & Function Archeobacteria (cont.)	Isolation of soil bacteria and fungi (lab)
02-02 02-04	Eubacteria - Gram Negative Bacteria & Activity: Biological Nitrogen Fixation Eubacteria - Gram Negative Bacteria & Activity: Biological N <sub>2</sub> Fixation (cont.)	Evaluation of soil bacteria& fungi (lab)**
02-09 02-11	Eubacteria – Gram Negative Bacteria & Activity: Agrobacterium, pseudomonads, Nitrifying bacteria, fruiting bacteria, <i>etc.</i> <b>MID-TERM EXAM</b>	Root nodule lab assignment**
02-16 02-18	No class - Study break No class - Study break	No lab
02-23	Cyanobacteria and photosynthetic bacteria	Photosynthetic bacteria (cont.)
02-25	Gram Positive Bacteria & Activity: Endospore formers, Actinobacteria <i>etc.</i>	
03-01 03-03	Gram Positive Bacteria (cont.) Mycorrhizae	Soil Fungi (lecture)
03-08 03-10	Soil Protists Decomposition (cont.)	Carbon Cycle & Decomposition (lecture)
03-15 03-17	Soil Fauna Soil Organism Interactions	Soil Fauna setup (lab)
03-22 03-24	Rhizosphere Soil as a Habitat for Microorganisms	Soil Fauna Evaluation (lab)**
03-29 04-31	Microbial Biomass Measurement Nitrogen Cycle	Presentations
04-05 04-08	Sulfur and Potassium Cycles Catch-up and Review	Presentations