

**HORT 601: CURRENT TOPICS IN ROOT AND RHIZOSPHERE BIOLOGY  
Spring 2011**

**Monday 1-1.50 PM; 108 NATRS  
Wednesday 1-1.50 PM; 204 Shepardson**

**Credits:** 2 hrs

**Term(s) to be offered:** Spring 2010; and then every other spring

**Prerequisites:** Plant Physiology and Biochemistry

**Course Description:**

This course is designed to provide an in-depth overview of the biology, biochemistry and chemical ecology of roots and the rhizospheric processes related to roots. Special emphasis will be placed in understanding the role of root exudates in the underground communication of plants, microbes, and other soil organisms.

The topics for discussion will center on recent articles published in peer-reviewed journals such as Science, Nature, PNAS, Ecology, Plant Cell, Plant Physiology, etc., as well as occasional reviews to provide background information. Each session will consist of an overview of the assigned topic given by the instructor, followed by an in-depth discussion among the students with faculty participation. Active class participation will be encouraged and in fact will be essential to the success and effectiveness of this course.

**Instructor:** Dr. Jorge Vivanco, 217 Shepardson  
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Office hours: Anytime by previous appointment.

**Course Objectives:**

- 1) To provide a review of recent research literature on root and rhizosphere biology.
- 2) To develop an understanding of unique biochemical processes in roots and in the rhizosphere.
- 3) To promote integration of different disciplines such as plant physiology, biochemistry, natural product chemistry, molecular biology, genomics and chemical ecology to study roots and rhizosphere processes.
- 4) To provide graduate students with the tools to read, dissect and understand current research papers, particularly papers produced by multidisciplinary collaboration.

## Course Topics:

- Root growth and development
- Nutrient uptake by roots
- Root exudation processes
- Rhizosphere community and interactions
- Root-microbe interactions
- Root-root interactions
- Aluminum toxicity in roots
- Roots as biochemical factories

Instructional Methodology: The class will meet as a single group two hours per week for lectures and discussions.

**Mode of Delivery:** Classroom instruction. The instructor will summarize the main topic of the day and then will set up the stage for discussion among the students. The instructor will monitor the discussion and provide points of interest to guide the comprehensive analysis of the research articles.

## Method of Evaluation:

This course will be based on active discussion of scientific articles; thus I will expect active participation of the students. Furthermore, the course will be limited to no more than 10 students to promote active discussion and participation. Student participation will be a major determinant in the final grade. Each student will also be expected to turn in a critical evaluation of an article. The evaluation should include a specific proposal for future work. This grant proposal report will be due in class on the last scheduled lecture/discussion.

Mid-term exam	25%
Grant proposal	25%
Second exam	25%
Class Participation	25%

## COURSE SCHEDULE

<b>January 24</b>	Introduction, open discussion about the course format and syllabus distribution
<b>January 26</b>	Root-microbe interactions
<b>January 31</b>	Root-pathogen interactions
<b>February 2</b>	Root-rhizobium interactions
<b>February 7</b>	Root-rhizobium interactions
<b>February 9</b>	Root-rhizobium interactions/Root-microbe interactions related to plant stress adaptation
<b>February 14</b>	Effect of roots on microbial diversity

<b>February 16</b>	Effect of roots on microbial diversity
<b>February 21</b>	Effect of roots on microbial diversity/symbionts in insect pests and their effect on plant physiology
<b>February 23</b>	Effect of roots on microbial diversity/Root exudation processes
<b>February 28</b>	Root exudation processes
<b>March 2</b>	Root exudation processes
<b>March 7</b>	Review
<b>March 9</b>	First Exam
<b>March 21</b>	Root growth and development
<b>March 23</b>	Root growth and development
<b>March 28</b>	Root growth and development
<b>March 30</b>	How diversity influences soil community development
<b>April 4</b>	A new method to identify active members of a community
<b>April 6</b>	Microbial communities in the soil 1
<b>April 11</b>	Microbial communities in the soil 2
<b>April 13</b>	Root-root interactions 1
<b>April 18</b>	Root-root-interactions 2
<b>April 20</b>	Grant proposal presentations
<b>April 25</b>	Grant proposal presentations
<b>April 27</b>	Grant proposal presentations
<b>May 2</b>	Grant proposal presentations
<b>May 6</b>	Review
<b>May 9</b>	Final