HOS 6932: ROOT AND RHIZOSPHERE ECOLOGY
3 CREDITS

Instructor: Dr. Lorenzo Rossi
Webpage: https://ufl.instructure.com/courses/357898

Contact Information:
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- Phone: 772-577-7341.
- Office hours: online conferencing via canvas/zoom every Friday 11am-12pm (or by request)

Lectures: 100% Online course. Each week there is a block of content available with specific due dates.

Course Description: The aim of this course is to provide a complete view of the rhizosphere and its unique functioning that implies numerous, strong and complex interactions between plant roots, soil constituents and microorganisms. Furthermore, the course not only aims at addressing current knowledge and achievements but also at outlining the future challenges that stand in front of rhizosphere sciences. Topics incorporate how roots and the rhizosphere respond to different environments including multiple interactions between soils, plant roots, microbes, mycorrhizas, and fauna, soil heterogeneity, biogeochemical cycles, abiotic stresses, and emerging contaminants.

Course prerequisites: BOT 2010 or BSC 2010

Knowledge prerequisites: This is an advanced course which examines the interactions between plant root apparatus and the environment. To be successful, students should have a general knowledge of biology, botany, microbiology, and soil chemistry.

Course objectives:
- To provide a review of recent research literature on root and rhizosphere biology and ecology.
- To develop an understanding of unique biochemical processes in roots and in the rhizosphere.
- 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.
- To raise awareness about environmental concerns (e.g., interaction between plant roots and heavy metals, engineered nanoparticles, BTEX, etc.).
LEARNING OBJECTIVES

After successful completion of this course, students will be able to:

- Identify the role of plant roots in the global context of soil development and atmosphere composition.
- Classified and recognized root derived products.
- Compare different Root System Architectures.
- Describe root response to biotic and abiotic stresses.
- Explain key root-rhizosphere interactions, from beneficial microorganisms to detrimental nematodes.
- Recommend modern research techniques for field and lab studies on plant roots.

COURSE MATERIALS

Recommended textbooks


Required readings

**EVALUATION OF LEARNING**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>% of grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) 15 Quizzes/Discussions due every week</td>
<td>70</td>
<td>1500</td>
</tr>
<tr>
<td>2) First Exam</td>
<td>10</td>
<td>250</td>
</tr>
<tr>
<td>3) Mid-Term Exam</td>
<td>10</td>
<td>250</td>
</tr>
<tr>
<td>4) Final Exam</td>
<td>10</td>
<td>250</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>2250</td>
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**Quizzes**

At the end of each module a specific quiz will assess the students learning. 10 questions related to module will be available. Students will have 2 possible attempts. 5 points will be available for each question, for a total of 50 points per quiz.

**Discussions**

At the end of each week and discussion board with a specific prompt will be ready for the students. Students will not be able to read posts made by other students until after they have already completed and submitted their own post. Each submitted post should consist of 500 words or less and must address all parts of the prompt. Each student will also be expected to post a reply to at least two other students’ posts in order to receive credits. Please note that points will not be assigned separately for discussion comments and discussion posts. Students will either receive all potential points for making an original post and posting two comments, or they will receive nothing for either skipping any part of the assignment. Poor quality submissions will receive partial credit.

The grading procedures of the discussion will follow this rubric.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Ratings</th>
<th>Pts</th>
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</thead>
<tbody>
<tr>
<td>Original Response to Prompt</td>
<td>25.0 to &gt;10.0 pts: Response addresses all parts of the prompt in a convincing and clear manner, and consists of 500 words or less.</td>
<td>25.0 pts</td>
</tr>
<tr>
<td></td>
<td>10.0 to &gt;0.0 pts: Response only addresses some parts of the prompt and/or is significantly more than 500 words</td>
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<tr>
<td></td>
<td>0.0 pts: Response not submitted; or all expectations of discussion thread not met</td>
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<tr>
<td>Ready to Peers</td>
<td>25.0 pts: Student responds to at least 2 peers with substantive comments that further the conversation</td>
<td>25.0 pts</td>
</tr>
<tr>
<td></td>
<td>0.0 pts: Student does not respond to at least 2 peers with substantive comments that further the conversation; or all expectations of discussion thread not met</td>
<td></td>
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</tbody>
</table>

**Exams**

<table>
<thead>
<tr>
<th>Content covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) First Exam</td>
</tr>
<tr>
<td>2) Mid-Term Exam</td>
</tr>
<tr>
<td>3) Final Exam</td>
</tr>
</tbody>
</table>

All the three exams will have 5 questions. 50 points will be available for each question, for a total of 250 points. Students will have 7 days to start the exam and, once they started, they will have 24 hrs to complete it.
Assignment breakdown | Points x Number of assignments = Total Points
--- | ---
15 Quizzes | 50 X 15 = 750
15 Discussions | 50 X 15 = 750
3 Exams | 250 X 3 = 1500
Total | 2250

Critical dates
- First Exam: 9/27/2019 (Modules 1-5)
- Mid Term Exam: 11/4/2019 (Modules 6-10)
- Final Exam: 12/11/2019 (Modules 11-15)

GRADING SCALE
- A = 94 - 100%
- A- = < 94 - 90%
- B+ = < 90 - 87%
- B = < 87 - 84%
- B- = < 84 - 80%
- C+ = < 80 - 77%
- C = < 77 - 74%
- C- = < 74 - 70%
- D+ = < 70 - 67%
- D = < 67 - 64%
- D- = < 64 - 61%
- E = < 61%

Passing Grade Points
- A = 4.0
- A- = 3.67
- B+ = 3.33
- B = 3.0
- B- = 2.67
- C+ = 2.33
- C = 2.0
- C- = 1.67
- D+ = 1.33
- D = 1.0
- D- = 0.67
- S = 0

Additional information on current UF grading policies for assigning grade points can be found here:
- Grading policy, [www.catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx](http://www.catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx)
Course organization
The module material of a given week will be made available the Friday of the week before. A first batch the assignments will be due on the Tuesday and the rest on the Friday of a given module week.

Module 0: Introduction to the course
Module 1: Definition of the rhizosphere and origin of roots
Module 2: Root structure, functions and modifications
Module 3: Regulation of root growth
Module 4: Classification and function of root derived products
Module 5: Root exudates and mineral nutrition
Module 6: Root system architecture and nutrient acquisition
Module 7: Legume-Rhizobia symbiosis
Module 8: Mycorrhizal fungi and nutrient acquisition
Module 9: Plant growth promoting rhizobacteria
Module 10: Drought and salt stress
Module 11: Heat and flooding stress
Module 12: Trace metals and emerging contaminants stress
Module 13: Stresses caused by pathogens
Module 14: Modern research techniques for field experiments
Module 15: Modern research techniques for laboratory experiments

Course schedule
8/21/2019  Week 1 – Module 0 – Introduction to canvas and distance education
8/23/2019  Week 1 – Module 0 – Introduction to the course, quiz #0 and discussion #0
8/26/2019  Week 2 – Module 1 – Definition of the Rhizosphere/1
8/28/2019  Week 2 – Module 1 – Definition of the Rhizosphere/1
8/30/2019  Week 2 – Module 1 – Quiz #1, Discussion #1
9/2/2019   Labor Day
9/4/2019   Week 3 – Module 2 – Root structure and development
9/6/2019   Week 3 – Module 2 – Quiz #2, Discussion #2
9/9/2019   Week 4 – Module 3 – Regulation of root growth/1
9/11/2019  Week 4 – Module 3 – Regulation of root growth/2
9/13/2019  Week 4 – Module 3 – Quiz #3, Discussion #3
9/16/2019  Week 5 – Module 4 – Classification and function of root derived products/1
9/18/2019  Week 5 – Module 4 – Classification and function of root derived products/2
9/20/2019  Week 5 – Module 4 – Quiz #4, Discussion #4
9/23/2019  Week 6 – Module 5 – Root exudates and mineral nutrition
9/25/2019  Week 6 – Module 5 – Quiz #5, Discussion #5
9/27/2019  First Exam (Modules 1-5)
9/30/2019  Week 7 – Module 6 – Root system architecture and nutrient acquisition/1
10/2/2019  Week 7 – Module 6 – Quiz #6, Discussion #6
10/4/2019  Homecoming – Go Gators!
10/7/2019  Week 8 – Module 7 – Legume-Rhizobia symbiosis/1
10/9/2019  Week 8 – Module 7 – Legume-Rhizobia symbiosis/2
10/11/2019 Week 8 – Module 7 – Quiz #7, Discussion #7
10/14/2019 Week 9 – Module 8 – Mycorrhizal fungi and nutrient acquisition/1
10/16/2019 Week 9 – Module 8 – Mycorrhizal fungi and nutrient acquisition/2
10/18/2019 Week 9 – Module 8 – Quiz #8, Discussion #8
10/21/2019 Week 10 – Module 9 – Plant growth promoting rhizobacteria/1
10/23/2019 Week 10 – Module 9 – Plant growth promoting rhizobacteria/2
10/25/2019 Week 10 – Module 9 – Quiz #9, Discussion #9
10/28/2019  Week 11 – Module 10 – Drought and salt stress/1
10/30/2019  Week 11 – Module 10 – Drought and salt stress/2
11/1/2019   Week 11 – Module 10 – Quiz #10, Discussion #10
11/4/2019   Mid-Term Exam (Modules 6-10)
11/6/2019   Week 12 – Module 11 – Heath and flooding stress
11/8/2019   Week 12 – Module 11 – Quiz #11, Discussion #11
11/11/2019  Veterans Day
11/13/2019  Week 13 – Module 12 – Metals and emerging contaminants stresses
11/15/2019  Week 13 – Module 12 – Quiz #12, Discussion #12
11/18/2019  Week 14 – Module 13 – Stresses caused by pathogens
11/20/2019  Week 15 – Module 13 – Quiz #13, Online discussion #13
11/22/2019  Week 15 – Module 14 – Modern research techniques for field experiments
11/25/2019  Week 15 – Module 14 – Quiz #14, Discussion #14
11/27/2019  Holiday break
11/29/2019  Happy Thanksgiving!
12/2/2019   Week 16 – Module 15 – Modern research techniques for laboratory experiments
12/4/2019   Week 16 – Module 15 – Quiz #15, Discussion #15
12/11/2019  Final Exam (Modules 11-15)

COURSE POLICIES

Attendance and Make-up Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

- *UF Attendance policy*, [https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx)

Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action.

- For more information regarding the Student Honor Code, please see: [http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code](http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code)
Software Use
All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken when appropriate.

Services for Students with Disabilities
Students with disabilities requesting accommodations should first register with the Disability Resource Center by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

- Disability Resource Center, 0001 Reid Hall, (352) 392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- Counseling and Wellness Center, 3190 Radio Road, 392-1575, www.counseling.ufl.edu
- Counseling Services
- Groups and Workshops
- Outreach and Consultation
- Self-Help Library
- Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu
- Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161.
- University Police Department, 392-1111 (or 9-1-1 for emergencies), www.police.ufl.edu

Additionally, if you would like orientation on choosing a major, finding an internship, or planning your career, I encourage you to use the university’s on-campus resources.

- Career Connections Center, CR-100 Reitz Union, 392-1601, https://career.ufl.edu/

Course Evaluation Process
Student assessment of instruction is an important part of the effort to improve teaching and learning. At the end of the semester, you are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at:

- Course evaluations, www.evaluations.ufl.edu
Evaluations are typically open during the last two or three weeks of the semester. You will be notified of the specific times when evaluations for this course are open. Summary results of these assessments are available to students at:

- Evaluations summary, [www.evaluations.ufl.edu/results](http://www.evaluations.ufl.edu/results)

**Student Complaints**

You can file and resolve any complaints about your experience in this course in the following site:

- Student complaints in residential courses, [https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/](https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/)
- Student complaints in online courses, [http://distance.ufl.edu/student-complaint-process/](http://distance.ufl.edu/student-complaint-process/)