

Plant Growth and Development

BOT 6566

Instructor: Bernard Hauser

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Office Hours: After class or Period 3 on Fridays (516 Bartram Hall)

Lectures: 2 lectures per week

Literature Discussion: 1 hour per week

Course Description: Plant development is a challenging and stimulating course that covers the mechanisms for the control of plant growth and key developmental innovations permitting plants to flourish in their native environments. Key discoveries will be explored from the literature. The topics and classic papers to be covered in this course are listed below.

| Grading: | Points |
|-------------------------------------|-----------------|
| Exam I | 100 (1/3) |
| Exam II | 100 (1/3) |
| Literature discussion | 50 (1/6) |
| <u>Literature critique and talk</u> | <u>50 (1/6)</u> |
| Total | 300 |

First exam – (100 points) will be October 30.

Second Exam (100 points)

Take home exam will be distributed December 9.

Answers due December 11.

Literature Discussion (5 pts per paper, up to 50 points)

Literature discussion will usually occur on Fridays. Each paper will be accompanied by questions to be answered about each article that is discussed. More than 10 papers will be discussed during the semester, but these points are capped at 50.

Literature Critique and a Short Talk (critique = 35 points, talk = 15 points)

Topics Assigned and Dates Chosen September 5.

Papers due in class by Monday, October 29.

Dates of the Oral Presentations will be assigned by the instructor.

Literature Critique

Choose one to three key research articles in the area you were assigned. The chosen papers should be classic papers—they do not need to be recent publication, but they should have altered the way this research area was viewed. Your critique on the assigned subject in plant development should:

1. briefly introduce the topic,
2. explain the key findings and assertions the authors of the chosen paper make,
3. determine whether the authors satisfactorily substantiate their conclusions,
4. identify defects in the paper (every paper has something wrong with it), and
5. explain what is (was) the next step.

If more than one paper is chosen please relate the findings of each of the papers. Grading the paper and will be primarily based on the substance of the paper, but points will also be given for style and grammar. The text of the paper should be 5-7 pages long (double spaced).

Classroom Presentation

The talk should provide background for this area of research and review the highlights of the papers (10-15 minutes). Plan on using Powerpoint to present this information. You may want to include handouts with references and figures. Also provide students with at least two review questions so they can be sure they learned the material.

Text: Leyser, O. and Day, S. *Mechanisms in Plant Development*

References: Davies, P.J. *Plant Hormones & Their Role in Plant Growth & Development*.
Esau, K. *Anatomy of Seed Plants*.
Stephen Howell *Molecular genetics of plant development*
Sinnott, E. W. *Plant Morphogenesis*.
Srivastava, L., *Plant Growth & Development*
Steeves, T.A., Sussex, I. M. *Pattern in Plant Development*.

University Support Services

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Resources are available on campus to help students meet academic goals and solve personal problems, which interfere with their academic performance. Resources include:

1. UF Counseling and Wellness Center, 3190 Radio Road, 352 392-1575, personal and career counseling.
2. Student Mental Health, Student Health Care Center, 392-1171.
3. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.
<https://www.crc.ufl.edu/>

Disability Notice: Students with disabilities enrolled in this course and who may need disability-related classroom accommodations are encouraged to make an appointment to see me before the end of the second week of the term. All discussions will remain confidential, although the Student Accessibility Services office may be consulted to discuss appropriate implementation of any accommodation requested.

Plant Growth & Development

Classroom Topics

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| Introduction and Concepts – plants vs. animals, terms |
| Concepts – fields, compartments, patterns, gradients |
| Chemical basis of morphogenesis |
| Discussion--Morphogenesis of cells |
| Cell wall and cytoskeleton |
| Meristems |
| Modeling plant growth |
| Hormones and auxin |
| Leaf Meristems |
| Clonal analyses of growth and meristems |
| Shoots – plastochrons, phyllotaxy |
| Shoots – apical dissection |
| Roots – growth and development |
| Roots – meristems |
| Regulation of polarity in <i>Fucus</i> and zygotes |
| Leaf polarity – differentiation and morphogenesis |
| Embryo patterning |
| Gibberellin |
| ABA |
| Ethylene |
| Cytokinin |
| Plant photoreceptors |
| Senescence |
| Stomatal patterning |
| A model for local control of global phenomena |
| Development of multicellularity—evolution of multicellular organisms |
| Colony vs multicellular organisms: volvox and <i>Dictyostelium</i> |
| Development in coenocytic organisms and parallels for endosperm |
| Floral meristem induction and initiation spacing |
| Cell/cell interactions – plasmodesmata and the super-cellular plant |
| Specialization of cells: Anabaena heterocysts |
| Volvox gonidia and inversion |
| Regulation of development by methylation |
| Regulation of development by RNAi |
| Parent of origin effects on seed development |
| Chromatin changes regulating aging and development |