

## **Advanced Developmental Plant Biology (PLNT 7120) –Winter 2011**

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Office hours: You can drop to my office any time. However, for your convenience, it is better to arrange an appointment by e-mail or telephone.

**OBJECTIVES:** The course focuses on the mechanisms regulating morphogenesis and plant growth and development. Emphasis will be on experimental approaches used to investigate pattern formation at subcellular, cellular, tissue, and organ levels. The course will be taught on Tuesday and Thursday (11:30-12:45) and will be held with the undergraduate course Developmental Plant Biology (PLNT 4550). Graduate students taking this course will be required to do some extra work in the form of biweekly assignments. There is no lab component in this course.

### **LECTURE OUTLINE**

- The plant cell
  - A. Regulation of cell division and differentiation
  - B. Acquisition of polarity
  - C. Cell-cell communication
  
- An introduction to plant development
  - A. Morphogenesis: shaping the organism
  - B. Experimental approaches to study plant development
    - Microsurgery
    - In vitro studies: a brief history of tissue culture
    - Mutant analysis
  
- Embryogenesis: beginning of development
  - A. Patterns of embryo development
  - B. Factors affecting embryo growth: the physical environment
  - C. Analytical and experimental studies of embryo development
  
- Primary growth and organogenesis
  - A. Patterns of shoot apical meristem development
    - Experimental investigations on the shoot apex (apical autonomy, cellular integration in the shoot)
  - B. Organogenesis in the shoot
    - Leaf morphogenesis and position (analysis of leaf development and determination of phyllotaxy)
    - Determination of leaves (dorsoventrality, branching)

- Later stages of leaf development
- C. Patterns of root apical development
  - Experimental investigation of root development (microsurgery and laser ablation studies)
- Secondary growth
  - A. Formation of the vascular cambium
  - B. Experimental studies on the cambium
    - cambial initiation
    - cambium culture
    - physical environment and cambium activity
- Extreme examples of cell differentiation: programmed cell death (PCD)
  - A. The phloem sieve elements
  - B. Tracheary element differentiation
  - C. Experimental approaches to study PCD (in vitro transdifferentiation)

## **EVALUATION**

Discussion and participation	20%
Oral presentations	40%
Biweekly assignments	40%

Plagiarism, cheating and impersonation of others in examinations are serious offences and will be handled according to Policies and Guidelines of the University of Manitoba, Section 2: Student Discipline Bylaw (see the 2010-2011 University of Manitoba Undergraduate Calendar).