Molecular Biology 3Y03
Plant Responses to the environment
COURSE OUTLINE FOR TERM 2, 2015-16

Professor:
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Lectures: Monday, Wednesday, Thursday at 5:30 to 6:20 pm in MDCL 1010
Materials: There is no required text, primary literature and lecture notes will be posted to Avenue.

Course Description: How plants’ sense and respond at the genetic, molecular, biochemical and phenotypic levels to environmental stress, such as drought, salinity, cold and disease will be discussed. The application of this basic scientific information in biotechnological strategies for improving crop yields and crop disease resistance will also be addressed.
Pre-requisites: Bio 2B03, 2C03, 2D03

Course Objectives

• Students obtain an understanding of how pathogens successfully invade and grow in plants
• Students obtain an understanding of how plants resist and destroy attacking pathogens
• Students obtain an understanding of how plants respond to abiotic stress
• Students obtain an understanding of techniques (molecular, genetic, biochemical and physiological), their pros and cons and uses in answering biological questions.
• Students obtain skills in primary literature reading, scientific writing, oral presentation, team work
Course Information

- Participation (5%) - marks will be given for attending PBL sessions, in-class tutorials and for participation in discussions in-class and during tutorials and PBL presentations.

- Writing Assignment (20%) – A detailed Abstract of a paper chosen by each student will be prepared. The 1st Draft is due Feb. 8th, it is worth 5%. The 2nd Draft is due Feb. 22nd, at which time you will exchange with students in the class and edit each others drafts during class. At the end of class, students will hand in the edited drafts to be marked (5%). The final Draft is due on the last day of class, April 7th and is worth 10%.

- PBL Group Work Evaluation (25%)
  Self-Evaluation and Within-group Evaluation: 5% - evaluation of the quality of your own participation and your assessment of each member of your group. The quality of your assessment will contribute towards this mark. Presentation Evaluation: 5% - based on class members rating of the quality of your presentation. Instructor’s Evaluation: 15% - instructor and teaching assistant evaluation of the PBL presentation (science and presentation quality).

- Grading Issues - If you have questions regarding grading of assignments, tests or exams, please discuss them with the TA and if required, make an appointment via email with Dr Cameron. If you have ideas for how to improve the course, make an appointment via email with Dr Cameron.

- Avenue will be used in this course. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

**GRADING SCHEME**

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Date</th>
<th>% of final grade</th>
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</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>February 1st in class</td>
<td>10</td>
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<tr>
<td>Test 2</td>
<td>March 3rd in class</td>
<td>10</td>
</tr>
<tr>
<td>Problem-Based Learning</td>
<td>Presentations, March 14,16,17</td>
<td>20</td>
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<tr>
<td>Project</td>
<td>Self &amp; within group evaluations, due March 10th</td>
<td>5</td>
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<tr>
<td>Writing Assignment</td>
<td>1st Draft, due Feb. 8th</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>2nd Draft, due Feb. 22nd</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Final Draft, due April 7th</td>
<td>10</td>
</tr>
<tr>
<td>Participation</td>
<td>During class, tutorials, PBLs</td>
<td>5</td>
</tr>
<tr>
<td>Final Exam</td>
<td>2 hours during exam period</td>
<td>25</td>
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Policy on missed work, extensions, late penalties and missed exams:

Requests for Relief for Missed Academic Term Work

For absences from classes lasting up to 3 days:
Undergraduate students may report absences lasting up to 3 days by using the McMaster Student Absence Form (MSAF) on-line, self-reporting tool, in order to request relief for missed academic work. The submission of medical or other types of supporting documentation is normally not required. Students may use this tool to submit one request for relief of missed academic work per term. It is the prerogative of the course instructor to determine the appropriate relief for missed term work in his/her course.

Immediately after using the online tool, students MUST contact their course instructor regarding the nature of the relief. Failure to do so may negate the opportunity for relief.

For absences from classes lasting more than three days:
Students who are absent more than three days MUST report to the Associate Dean’s Office (BSB 129) to discuss their situation and may be required to provide appropriate supporting documentation.

For the reporting of more than one request for relief per term:
Students who wish to submit more than two requests for relief of missed academic work per term MUST report to their Faculty Office to discuss their situation and may be required to provide appropriate supporting documentation.

The MSAF on-line, self-reporting tool cannot be used for any final examination or its equivalent.

Late Writing Assignment drafts and final version
If the drafts or final version is submitted after the due date, a 0.5% penalty mark will be deducted from the grade for each day the paper is late.

Academic Integrity:
You are expected to exhibit honesty and use ethical behavior in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behavior can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with at notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/ or suspension or expulsion form the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity. The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
2. Improper collaboration during group work.
3. Copying or using unauthorized aids in tests and examinations.

**Schedule of Topics:** At certain points in the course it may make sense to modify the schedule outlined below. The instructor reserves the right to modify elements of the course and will notify students accordingly (in class and post any changes to the course website).

<table>
<thead>
<tr>
<th>3Y03 Topics</th>
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| **Section I - Introduction**  
Introduction to the course and marking scheme, abiotic & biotic stress  
Plant molecular techniques in the age of genomics |
| **Section II – Plant-Microbe Interactions**  
Review of disease and resistance in plants to pathogens  
Pathogen infection strategies  
Biotrophs live with and manipulate host plants  
i) *Pseudomonas*/Plant Interactions - leaf spot and speck, virulence factors, avirulence genes, role in HR and disease, where do they act? The Hrp pilus and effector proteins it delivers into plant cells.  
ii) *Agrobacterium*, an almost perfect pathogen, important tool in plant research and biotechnology.  
Necrotrophs kill plant cells - *Erwinia*/Plant Interactions - Overview of soft rots, role of pectic enzymes in virulence and elicitation of plant defense, regulation of pectic enzyme production including quorum sensing.  
Role of the phytohormones, SA and JA in defense to microbes and insects  
Age-Related Resistance, a developmentally regulated defense, map-based cloning to identify an ARR gene.  
Gene Silencing in Plants - a novel defense mechanism against foreign nucleic acids  
Mutually beneficial *Rhizobium*/Legume interaction - Introduction to symbiosis, exchange of signals & beneficial compounds, Nod factors, nodule development, nitrogen fixation. |
| **Section III – Plant Responses to Abiotic Stress**  
Responses to light and seasons  
Responses to cold, drought, salinity & freezing |
| **Section IV – Agriculture**  
Sustainable Agriculture  
Integrated Pest Management  
Current and Future GM crops |