# Plant Genetics (BIOL 310)

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| **Professor:** Devinder Sandhu, Ph.D. |
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| **Section:** 1 |
| **Lecture :** T, R, F 12.00noon - 12.50p TNR271 |
| **Office Hours :** T, R 1.00p – 2.30p or by appointment |

**COURSE DESCRIPTION :**

Plants play main role in human endurance. Plant performances and characteristics are controlled by genetic components. In this course, students will explore the structure, expression, and manipulation of plant genomes using the principles and theory of classical and contemporary genetics. This course is designed to build a solid foundation in plant genetics and to stimulate further, more specialized, study.

**COURSE OBJECTIVES:** By the end of this course you should have basic understanding of

- History of Plant Genetics
- Role of various marker system in understanding Plant Genomes
- Various gene cloning strategies in plants
- Effect of Genetic manipulations in plants on a common man
- Genetics of plant-pathogen interactions

**TEXTBOOK** We will use sections from different books and research articles.

To help to revise concepts you learnt in Biol 210 (Principles of Genetics) I would recommend

*Genetics: Analysis and Principles* by Robert J. Brooker, 3rd edition. Required; rental from bookstore

**METHODS OF EVALUTION:**

Your final grade will be based on the total number of points that you receive out of a possible 600 points. There will be two exams (100 points each) and a final exam (200 points). Final exam will be comprehensive with more emphasis on material not covered in previous exams.

There will be unannounced pop quizzes at the **beginning** of classes, consisting of 2 points each. This will be considered as an extra credit towards your final grade. There is no makeup for these quizzes. If you are late in class you will miss the quiz.

In this course we are going to cover some recent papers published in selected topics. Every alternate Friday we will discuss a paper related to material covered in recent classes. Each student is expected to come to class prepared to participate in discussion. Your participation in discussion will be

graded in each paper discussion. If you are absent in class you will not get credit for paper discussion. Paper discussions will constitute 100 points towards your final grade. There will be 5 paper discussions, consisting of 20 points each (see detailed schedule for the dates).

There will be 100 points for the home exercises (assignments).

Break down of points needed for a Letter Grade:

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| First Lecture Examination | = 100 points |
| Second Lecture Examination | = 100 points |
| Assignments | = 100 points |
| Paper discussions | = 100 points |
| Final Lecture Examination | = 200 points |

Plus there will be opportunity to score extra points in pop quizzes.

**Grading Scale** for the course is

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|---|---|---|
| 555 – 600 | 92.5 – 100% | A |
| 540 – 554 | 90 - 92.4% | A- |
| 525 – 539 | 87.5 – 89.9% | B+ |
| 495 – 524 | 82.5 – 87.4% | B |
| 480 – 494 | 80 – 82.4% | B- |
| 450 – 479 | 75 – 79.9% | C+ |
| 420 – 449 | 70 – 74.9% | C |
| 390 – 419 | 65 – 69.9% | C- |
| 360 – 389 | 60 – 64.9% | D+ |
| 330 – 359 | 55 – 59.9% | D |
| < 330 | < 55% | F |

**ATTENDANCE:**

I expect you to attend each class meeting. Consistent attendance will improve your final grade more than any other investment of time that you can make. I urge you to arrive punctually, attend each lecture, take detailed notes, and to complete all assigned work

**MAKE-UP EXAMS**

I do not expect any make-up exams in this course. Make-up exams will be permitted at Instructor's discretion only for unavoidable emergencies. If you know that you will be unable to attend a scheduled exam, it is your responsibility to inform me in advance. In case of unplanned emergency, you must notify me of your absence within 48 hrs of exam and the reason for that absence. If you fail to follow this rule, I am within my rights to refuse to give you a replacement exam.

**ACADEMIC INTEGRITY**

Academic dishonesty in any form will result in disciplinary action in accordance with UW System Administrative Code.

Here is the link to the document that explains your rights and responsibilities as a member of the UWSP community.

http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf

| **Bio 310** | | **Tentative Class Schedule** |
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| **Date** | **Day** | **Topic** |
| Sept. 4 | T | Syllabus/ Experiments in Plant Hybridization |
| Sept. 6 | R | Experiments in Plant Hybridization |
| Sept. 7 | F | Experiments in Plant Hybridization |
| Sept. 11 | T | Controversies about Mendel's work |
| Sept. 13 | R | Meiosis and Recombination |
| Sept. 14 | F | Linkage analysis |
| Sept. 18 | T | Linkage analysis |
| Sept. 20 | R | Genetic Linkage mapping |
| Sept. 21 | F | *Paper discussion 1* |
| Sept. 25 | T | Molecular Markers - RFLPs |
| Sept. 27 | R | RFLPs |
| Sept. 28 | F | PCR – PCR based markers, AFLPs |
| Oct. 2 | T | SSRs |
| Oct. 4 | R | RAPDs |
| Oct. 5 | F | *Paper discussion 2* |
| Oct. 9 | T | **Review, Exam 1 (5.00p to 7.00p)** |
| Oct. 11 | R | Quantitative Trait Loci, Bulked Segregant Analysis |
| Oct. 12 | F | Map based cloning of Plant Genes |
| Oct. 16 | T | Map based cloning of Plant Genes |
| Oct. 18 | R | Map based cloning of Plant Genes |
| Oct. 19 | F | *Paper discussion 3* |
| Oct. 23 | T | Plant Transformation |
| Oct. 25 | R | Plant Transformation |
| Oct. 26 | F | Plant Transformation |
| Oct. 30 | T | Plant Transformation |
| Nov. 1 | R | Genetically Modified Plants |
| Nov. 2 | F | *Paper discussion 4* |
| Nov. 6 | T | Genetically Modified Plants |
| Nov. 8 | R | Nitrogen Fixation |
| Nov. 9 | F | Nitrogen Fixation |
| Nov. 13 | T | **Review, Exam 2 (5.00p to 7.00p)** |
| Nov. 15 | R | Plant Genome Structure and Organization |
| Nov. 16 | F | *Paper discussion 5* |
| Nov. 20 | T | Plant Genome Structure and Organization |
| Nov. 22 | R | **Thanksgiving Break** |
| Nov. 23 | F | **Thanksgiving Break** |
| Nov. 27 | T | Plant Genome Structure and Organization |
| Nov. 29 | R | Gene Expression |
| Nov. 30 | F | Gene Expression- Guest lecture by Dr. R. Sekhon, UW- Madison |
| Nov. 30 | F | At **5.00p.** Gene Expression- Guest lecture by Dr. R. Sekhon, UW- Madison |
| Dec. 4 | T | No class |
| Dec. 6 | R | Gene Expression |
| Dec. 7 | F | Genetics of Disease Resistance |
| Dec. 11 | T | Genetics of Disease Resistance |
| Dec. 13 | R | Genetics of Disease Resistance |
| Dec. 14 | F | Review |
| Dec. 19 | W | **Final Exam (10:15p-12:15p)** |