

Plant Genetics

11:776:305 (4 credits)

Fall Semester (yearly)

CONTACT INFORMATION

Instructor: Dr. Joseph Goffreda
Office Location: 386 Foran Hall, 59 Dudley Rd., New Brunswick, NJ 08901
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Office Hours: by arrangement

COURSE DESCRIPTION

Heritable variation, strategies, and consequences of sexual/asexual reproduction, inbreeding and outbreeding. Chromosome structure, behavior, and mapping. Uses of tissue culture and recombinant DNA techniques in plant genetic manipulation.

COURSE WEBSITE, RESOURCES AND MATERIALS

- Course website: Canvas
- Required textbook: Griffiths, AJF, S Wessler, SB Carroll, J Doebley. 2012. Introduction to Genetic Analysis, 10th. WH Freeman and Company, Salt Lake City

PREREQUISITES

01:119:115-116-117 General Biology OR equivalent

COURSE LEARNING GOALS (link to Plant Biology Undergraduate Program Goals:

<http://plantbiology.rutgers.edu/undergrad/plantbiology/>)

By the end of this course, the student will be able to:

1. Describe the fundamental basis of plant genetics (addresses program goal 1)
2. Explain biotechnological approaches for plant improvement (addresses program goals 1 and 2)
3. Explain genetic variance within plant populations, specifically as it relates to inheritances (addresses program goals 1 to 4)
4. Analyze inheritance as it relates to single or quantitative gene traits (addresses program goals 1 and 4)

ASSIGNMENTS/RESPONSIBILITIES AND ASSESSMENT

Grading:

- Exams (4 at 15% each) 60%
- On-line practice tests 5%

- Problem sets 20%
- Labs and other assignments 15%
- Scale: 90-100 = A; 80-89 = B; 70-79 = C; 60-69 = D

Learning goals assessment: Student attainment of the learning goals will be assessed through quizzes and exams (all learning goals), laboratory exercises, and completion of problem sets (course learning goals 3 and 4). The percentage score on these assessments will determine the level of mastery: >90% outstanding; 80-89% good; 70-70% satisfactory; <69% unsatisfactory.

PARTICIPATION GRADE AND ABSENCE POLICY

Students unable to attend may contact the instructor via e-mail prior to the missed class or may use the University absence reporting website (<https:sims.rutgers.edu/ssra/>) to indicate the date and reason for the absence. An e-mail is automatically sent to the instructor.

COURSE TOPICS

| Lecture/Lab | Topics |
|-------------|---|
| Lecture 1 | The genetics revolution in the life sciences |
| Lecture 2 | DNA: Structure and replication |
| Lecture 3 | RNA: Transcription and processing |
| Lecture 4 | Proteins and their synthesis |
| Lecture 5 | Single-gene inheritance |
| Lecture 6 | Independent assortment of genes |
| | Review for Exam I |
| | Exam I |
| Lecture 7 | Mapping eukaryote chromosomes by recombination |
| Lab 1 | Mendelian inheritance, probability, and chi square analyses of data |
| Lecture 8 | The genetics of bacteria and their viruses |
| Lecture 9 | Gene isolation and manipulation |
| Lecture 10 | Application of recombinant DNA |
| Workshop | Transmission genetics problem workshop |
| Lecture 11 | Genomics |
| | Review for Exam II |
| | Exam II |
| Lecture 12 | The dynamic genome |
| Lab 2 | Isolation of total plant DNA and its quantification |
| Lecture 13 | Mutation and repair |
| Lecture 14 | Large-scale chromosomal changes |
| Lecture 15 | Regulation of gene expression in bacteria |
| | Review for Exam III |
| | Exam III |
| Lab 3 | DNA analysis – plant DNA restrictions and fingerprinting with RAPDs |
| Lecture 16 | Regulation of eukaryotic gene expression |
| Lecture 17 | Gene interaction |
| | Thanksgiving recess |
| Lecture 18 | Population genetics |
| Lecture 19 | The inheritance of complex traits |

| Lecture/Lab | Topics |
|-------------|---|
| Workshop | Population and quantitative genetics problem workshop Review for Exam IV Exam IV (comprehensive) |

FINAL EXAM DATE AND TIME

The final exam for this class is comprehensive and is scheduled for normal class time.

ACCOMODATIONS FOR STUDENTS WITH DISABILITIES

Please follow the procedures outlined at <https://ods.rutgers.edu/students/registration-form>. Full policies and procedures are at <https://ods.rutgers.edu/>

ACADEMIC INTEGRITY

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/>

The principles of academic integrity require that a student:

- Properly acknowledge and cite all use of the ideas, results, or words of others.
- Properly acknowledge all contributors to a given piece of work.
- Make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- Obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- Treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- Uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that:

- Everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- All student work is fairly evaluated and no student has an inappropriate advantage over others.
- The academic and ethical development of all students is fostered.
- The reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

STUDENT WELLNESS SERVICES

Just In Case Web App <http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901 / www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.