

Syllabus - Advanced Genetics - PCB 5065 - Fall 2013
Section 2191; 4 credits; 2318 Fifield Hall; MTWR 5th Period
www.hos.ufl.edu/courses/PCB5065

Genetic analysis is explored with a team of instructors who use genetic approaches in their research programs. The objective of PCB 5065 is to strengthen students' comprehension of genetic concepts, so that they can read and interpret classical and current literature in the field of genetics and apply genetic analysis to their own research problems. PCB 5065 is designed to establish a strong foundation for advanced specialty courses in genetics and to complement advanced courses in molecular biology.

Prerequisite: Undergraduate general genetics. We assume students are familiar with basic Mendelian genetics and that they understand the nature and functions of DNA, RNA and proteins.

Reading: There is no required text for the course. No one book covers everything we will discuss in class.

Optional books that students might find helpful for the beginning sections of the course:

Title: ADVANCED GENETIC ANALYSIS: GENES, GENOMES AND NETWORKS IN EUKARYOTES

Author: Philip Meneely

ISBN: 0199219826

Publisher: Oxford University Press, USA

Cover: paperback book

or

Title: ADVANCED GENETIC ANALYSIS: FINDING MEANING IN A GENOME

Author: R Scott Hawley and Michelle Y Walker ISBN: 1405103361

Publisher: John Wiley & Sons

Cover: paperback book Edition: 1

Optional books that students might find helpful for the final section of the course:

Title: PRINCIPLES OF POPULATION GENETICS

Author: Daniel L Hartl, Andrew G Clark

ISBN: 0878933085

Publisher: Sinauer Associates, Inc

Cover: hardback book Edition: 4

or

Title: INTRODUCTION TO QUANTITATIVE GENETICS

Author: David S Falconer and Trudy Mackay ISBN: 0582243025

Publisher: Prentice Hall

Cover: paperback book Edition: 4

While there is no required text, there will be lots of required reading in the form of review and research articles from the primary literature. These will be provided in electronic format. Each section of the course concludes with either a discussion paper from the current literature or a computer exercise. Discussion papers, along with questions for class discussion, will be provided one week prior to the scheduled discussion. Students are expected to read the paper and discussion questions in advance and to actively participate in the class discussions.

Exams: The course is divided into five sections with an exam following the completion of each section (see schedule). Exams are scheduled for evening periods 11 and E1 (6:15-8:10 PM) to allow adequate time for solution of problem-based questions. **Exams are closed book and closed notes - a change in policy from prior years.** If a student has another exam scheduled for the time of a PCB 5065 exam, or if a PCB 5065 exam falls on a religious holiday that a student traditionally observes, an alternate time will be arranged for that student's exam. ***Please notify the instructor of these conflicts in advance of the exam! Students who cannot take a scheduled exam due to illness or last-minute emergencies should contact the instructor prior to the exam if at all possible!***

Grades: Final grades will be based upon the sum of exam scores: <325 points = C+ or lower; 325-374 = B; 375-424 = B+; 425-500 = A. Class attendance and participation will be considered in assigning grades to students with exam averages falling near a cut-off point.

Information on current UF grading policies for undergraduate and graduate students can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>
<http://gradcatalog.ufl.edu/content.php?catoid=2&navoid=762#grades>

Absences and Make-Up Work: Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Academic Honesty: As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>

Software Use: All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Instructors: Contact information for all course instructors is provided below; Instructors are available to assist students on an individual basis by appointment.

Dr. Christine Chase (Course Coordinator), Professor - Horticultural Sciences, Graduate Program in Plant Molecular and Cellular Biology (PMCB Program), Graduate Program in Genetics and Genomics Ph.D. in Biology/Genetics, University of Virginia

Office: 2215 Fifield Hall

Tel: 352-273-4862

e-mail: cdchase@ufl.edu

<http://hos.ufl.edu/faculty/cdchase>

Research interests: Plant mitochondrial biogenesis and function; development and application of molecular markers

Dr. Dean Gabriel, Professor - Plant Pathology & PMCB Program
Ph.D. in Genetics/Botany/Plant Pathology, Michigan State University

Office: 2559 Fifield Hall

Tel: 352-392-7239

e-mail: dgabr@ufl.edu

<http://plantpath.ifas.ufl.edu/faculty/Gabriel/faculty-Gabriel.shtml>

Research interests: The genetics of host/parasite interactions

Dr. Curt Hannah, Professor - Horticultural Sciences, PMCB Program
Ph.D. in Genetics, University of Wisconsin

Office: Building 710 (Plant Physiology building -- east of Fifield Hall across the parking lot)

Tel: 352-392-6957, personal cell 352-219-5943

e-mail: hannah@ifas.ufl.edu

<http://hos.ufl.edu/faculty/lchannah>

Research interests: The molecular-genetics of starch biosynthesis in higher plants; the effects of introns and transposons on gene expression

Dr. Brian Harfe, Associate Professor, Department of Molecular Genetics & Microbiology, Graduate Program in Genetics & Genomics

Ph.D., University of Glasgow

Office: 425G Cancer Genetics Research Complex

Tel: 273-8078

e-mail: bharfe@mgm.ufl.edu

<http://mgm.ufl.edu/faculty/faculty-home-pages/harfe-brian/>

Research interests: The formation and patterning of the intervertebral disks and the patterning of developing digits in the mouse model system

Dr. Matias Kirst, Associate Professor, Forest Resources & Conservation, PMCB Program, Graduate Program in Genetics & Genomics

Ph.D. in Genetics and Functional Genomics, North Carolina State University

Office: 367 Newins-Ziegler Hall

Tel: 352- 846-0900

e-mail: mkirst@ufl.edu

<http://sfrc.ufl.edu/people/faculty/kirst/>

Research interests: Fundamental and applied genomic research; Technology and genomic tool development

Dr. Don McCarty, Professor - Horticultural Sciences, PMCB Program, Graduate Program in Genetics & Genomics

Ph.D. in Biochemistry, University of Wisconsin

Office: 2237 Fifield Hall

Tel: 392-273-4846

e-mail: drm@ufl.edu

<http://hos.ufl.edu/faculty/drmccarty>

Research interests: Physiological and molecular aspects of development in seeds

Dr. Jim Olmstead, Assistant Professor - Horticultural Sciences

Ph.D. (2006) Plant Breeding and Genetics, Michigan State University, East Lansing, MI

Office: 2211 Fifield Hall

Tel: 352-273-4837

e-mail: jwolmstead@ufl.edu

<http://hos.ufl.edu/faculty/jwolmstead>

Research interests: Vaccinium (blueberry) breeding and genetics; increasing breeding efficiency through application of molecular technologies

Campus Helping Resources: Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

University Counseling and Wellness Center, 3190 Radio Road, 352-392-1575,

www.counseling.ufl.edu/cwc/

The center offers counseling services, groups and workshops, outreach and consultation, a self help library, training programs, and a community provider database.

Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/

Services for Students with Disabilities, 0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Schedule – Advanced Genetics, PCB 5065, Fall 2013
Section 2191, MTWR 5th Period, 2318 Fifield Hall

Date	Instructor	Topic
Wed Aug 21	All	Course introduction
Thurs Aug 22	Hannah	The gene in molecular terms
Mon Aug 26	Hannah	The gene pre-Mendel to Mendel
Tues Aug 27	Hannah	The gene as a unit of function
Wed Aug 28	Hannah	The gene as a unit of mutation
Thurs Aug 29	Hannah	The operon
Mon Sept 2	No Class	Labor Day Holiday
Tues Sept 3	Hannah	Allelic interactions - cistrons and operons; Genic interactions - epistasis
Wed Sept 4	Hannah	Transposable elements - molecular and genetic properties
Thurs Sept 5	Hannah	Transposable elements as tools of forward and reverse genetics
Mon Sept 9	Hannah	Further reverse genetics approaches – T-DNA, TILLING, RNAi
Tues Sept 10	Chase/Hannah	Discussion paper on genes, mutations & genetic approaches
Wed Sept 11	Gabriel	Segregation, assortment, chromosome mechanics, nondisjunction
Thurs Sept 12	Gabriel	Genes & chromosomes
Thurs Sept 12	6:15-8:10 PM	Exam 1 – genes, mutations & genetic approaches
Mon Sept 16	Gabriel	Linkage, gene order, linearity, crossing-over & recombination
Tues Sept 17	Gabriel	Tetrad analysis & sister-strand exchange
Wed Sept 18	Gabriel	Mechanisms of crossing over - gene conversion & Holiday structures
Thurs Sept 19	Gabriel	Mechanisms of crossing over - Double Strand Break Repair Model
Mon Sept 23	Gabriel	Mechanisms of crossing over – synthesis dependent strand annealing & early crossover decision models
Tues Sept 24	Gabriel	Mechanisms of crossing over – parasexuality & mitotic recombination
Wed Sept 25	Gabriel	Recombination & genetic transformation
Thurs Sept 26	Chase	Discussion paper on recombination
Mon Sept 30	Olmstead	Genome Organization
Mon Sept 30	6:15-8:10 PM	Exam 2 – recombination
Tues Oct 1	Olmstead	Molecular markers
Wed Oct 2	Olmstead	Multi-point linkage mapping I
Thurs Oct 3	Olmstead	Multi-point linkage mapping II
Mon Oct 7	Olmstead	Linkage mapping - pedigrees and LOD Scores
Tues Oct 8	Olmstead	Linkage software and exercises
Wed Oct 9	Olmstead	Physical mapping
Wed Oct 9		Note Florida Genetics Symposium Starts at 1 PM today!
Thurs Oct 10	No Class	Florida Genetics Symposium all day today
Mon Oct 14	Olmstead	Map-based cloning
Tues Oct 15	Olmstead	Chromosome structure
Wed Oct 16	Olmstead	Chromosome variation I
Thurs Oct 17	Olmstead	Chromosome variation II

Date	Instructor	Topic	
Mon	Oct 21	Chase	Non-Mendelian inheritance - organelle inheritance
Tues	Oct 22	Chase	Non-Mendelian inheritance - meiotic drive, gametophytic effects, maternal effects
Tues	Oct 22	6:15-8:10 PM	Exam 3 – Chromosomes, genomes, markers& maps
Wed	Oct 23	Chase	Non-Mendelian inheritance – epigenetics I
Thurs	Oct 24	Chase	Non-Mendelian inheritance – epigenetics II
Mon	Oct 28	Harfe	Guest lecture: The battle of model organisms
Tues	Oct 29	McCarty	Developmental genetics overview
Wed	Oct 30	McCarty	Developmental genetics – drosophila
Thurs	Oct 31	McCarty	Developmental genetics – drosophila
Mon	Nov 4	McCarty	Developmental genetics – plants
Tues	Nov 5	McCarty	Developmental genetics – plants
Wed	Nov 6	Kirst	Population genetics - Hardy-Weinberg equilibrium
Thurs	Nov 7	Kirst	Population genetics – segregation, recombination & linkage disequilibrium
Thurs	Nov 7	6:15-8:10 PM	Exam 4 – Non-Mendelian and developmental genetics
Mon	Nov 11	No Class	Veterans Day Holiday
Tues	Nov 12	Kirst	Forces that change gene frequencies: mutation
Wed	Nov 13	Kirst	Forces that change gene frequencies: migration
Thurs	Nov 14	Kirst	Forces that change gene frequencies: random genetic drift
Mon	Nov 18	Kirst	Population genetic structure & effective population size
Tues	Nov 19	Kirst	Population genetic structure & effective population size
Wed	Nov 20	Kirst	Natural and artificial selection
Thurs	Nov 21	Kirst	Short and long-term responses to selection
Mon	Nov 25	Kirst	Heritability, genetic correlation and gain from selection
Tues	Nov 26	Kirst	Molecular dissection of quantitative variation – linkage analysis
Wed	Nov 27	No Class	Thanksgiving Holiday
Thurs	Nov 28	No Class	Thanksgiving Holiday
Mon	Dec 2	Kirst	Molecular dissection of quantitative variation – association studies
Tues	Dec 3	Kirst	Population exercises - Structure
Wed	Dec 4	Kirst	Review / question-answer session
Wed	Dec 4	6:15-8:10 PM	Exam 5 – Population & quantitative genetics