

COURSE CHANGE FORM

Signature Routing Log




General Information:

Course Prefix and Number: BIO 304
 Proposal Contact Person Name: Ruth E. Beattie Phone: 257-7647 Email: rebeat1@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Biology Faculty	04/10/09	Dr. Vincent Cassone - Chair / 257-6766 / vincent.cassone@uky.edu	
		/ /	
		/ /	
AAS EPC	10/5/10	ganpathy Murthy 17-47319 ganpathy. murthy@ uky.edu	
AAS Dean	10/5/10	Anna Bosch 17-6689 bosch@ uky.edu	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁸
Undergraduate Council			
Graduate Council	11/09/2010		
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

⁸ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

COURSE CHANGE FORM

Complete 1a – 1f & 2a – 2c. Fill out the remainder of the form as applicable for items being changed.

1. General Information.

- a. Submitted by the College of: Arts and Sciences Today's Date: August 19, 2010
- b. Department/Division: Biology
- c. Is there a change in "ownership" of the course? YES NO
If YES, what college/department will offer the course instead? _____
- d. What type of change is being proposed? Major Minor¹ (place cursor here for minor change definition)
- e. Contact Person Name: Ruth Beattie Email: rebeat1@uky.edu Phone: 257-7647
- f. Requested Effective Date: Semester Following Approval OR Specific Term²: Spring 2011

2. Designation and Description of Proposed Course.

- a. Current Prefix and Number: BIO 304 Proposed Prefix & Number: same
- b. Full Title: Principles of Genetics Proposed Title: Principles of Genetics
- c. Current Transcript Title (if full title is more than 40 characters): _____
Proposed Transcript Title (if full title is more than 40 characters): _____
- d. Current Cross-listing: N/A OR Currently³ Cross-listed with (Prefix & Number): _____
Proposed – ADD³ Cross-listing (Prefix & Number): _____
Proposed – REMOVE^{3,4} Cross-listing (Prefix & Number): _____
- e. Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours⁵ for each meeting pattern type.
- | | | | | | |
|-----------|------------------|-------------------------------|-------------------------------------|------------------|--------------------|
| Current: | <u>3</u> Lecture | _____ Laboratory ⁵ | <u>2</u> Recitation | _____ Discussion | _____ Indep. Study |
| | _____ Clinical | _____ Colloquium | _____ Practicum | _____ Research | _____ Residency |
| | _____ Seminar | _____ Studio | _____ Other – Please explain: _____ | | |
| Proposed: | <u>3</u> Lecture | <u>3</u> Laboratory | _____ Recitation | _____ Discussion | _____ Indep. Study |
| | _____ Clinical | _____ Colloquium | _____ Practicum | _____ Research | _____ Residency |
| | _____ Seminar | _____ Studio | _____ Other – Please explain: _____ | | |
- f. Current Grading System: Letter (A, B, C, etc.) Pass/Fail
Proposed Grading System: Letter (A, B, C, etc.) Pass/Fail
- g. Current number of credit hours: 4 Proposed number of credit hours: same
- h. Currently, is this course repeatable for additional credit? YES NO

¹ See comment description regarding minor course change. *Minor changes are sent directly from dean's office to Senate Council Chair.* If Chair deems the change as "not minor," the form will be sent to appropriate academic Council for normal processing and contact person is informed.

² Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

³ Signature of the chair of the cross-listing department is required on the Signature Routing Log.

⁴ Removing a cross-listing does not drop the other course – it merely unlinks the two courses.

⁵ Generally, undergrad courses are developed such that one semester hr of credit represents 1 hr of classroom meeting per wk for a semester, exclusive of any lab meeting. Lab meeting generally represents at least two hrs per wk for a semester for 1 credit hour. (See SR 5.2.1.)

COURSE CHANGE FORM

Proposed to be repeatable for additional credit?

YES NO

If YES: Maximum number of credit hours: _____

If YES: Will this course allow multiple registrations during the same semester?

YES NO

- i. **Current Course Description for Bulletin:** A study of the physical and chemical aspects of the genetic material and their relationship to the expression and inheritance of the phenotype. Lecture, three hours; recitation, two hours per week. Prereq: BIO 150, BIO 152, and BIO 315.

Proposed Course Description for Bulletin: A study of the physical and chemical aspects of the genetic material and their relationship to the expression and inheritance of the phenotype. Lecture, three hours; laboratory three hours per week. Prereq: BIO 148, BIO 152, BIO 155, CHE 107, CHE 113.

- j. **Current Prerequisites, if any:** BIO 150, BIO 152, and BIO 315.

Proposed Prerequisites, if any: BIO 148, BIO 152, BIO 155, CHE 107, CHE 113

- k. **Current Distance Learning (DL) Status:** N/A Already approved for DL* Please Add⁶ Please Drop

*If already approved for DL, the Distance Learning Form must also be submitted unless the department affirms (by checking this box) that the proposed changes do not affect DL delivery.

- l. **Current Supplementary Teaching Component, if any:** Community-Based Experience Service Learning Both

Proposed Supplementary Teaching Component: Community-Based Experience Service Learning Both

3. **Currently, is this course taught off campus?** YES NO

Proposed to be taught off campus? YES NO

4. **Are significant changes in content/teaching objectives of the course being proposed?** YES NO

If YES, explain and offer brief rationale:

The course will include an embedded laboratory experience. This replaces an embedded recitation experience. This revision was made as a result of a comprehensive review and revision of the current biology undergraduate program and also in response to feedback on the most recent Departmental review. The inclusion of the laboratory component will enhance the current course. Students will develop practical laboratory skills and will apply those skills to knowledge learned in the classroom to address a biological problem.

The new format course is being piloted in fall 2010 under the A&S 300 prefix.

5. **Course Relationship to Program(s).**

- a. **Are there other depts and/or pgms that could be affected by the proposed change?** YES NO

If YES, identify the depts. and/or pgms: BIO 304 is a required course in the BS and BA in Biology programs. This course change does not change any of the degree requirements for either program

This course is an option in the BS in Agricultural Biotechnology program, BS in Animal Sciences and in the BS in Secondary Education (science option.). All programs have been informed of the change in this course. Feedback indicates that this change in course format does not impact these programs.

⁶ You must also submit the Distance Learning Form in order for the course to be considered for DL delivery.

COURSE CHANGE FORM

b. Will modifying this course result in a new requirement⁷ for ANY program?

YES NO

If YES⁷, list the program(s) here: _____

6. Information to be Placed on Syllabus.

- a. Check box if changed to 400G or 500. If changed to 400G- or 500-level course you must send in a syllabus and *you must include the differentiation* between undergraduate and graduate students by: (i) requiring additional assignments by the graduate students; and/or (ii) establishing different grading criteria in the course for graduate students. (See SR 3.1.4.)

⁷ In order to change a program, a program change form must also be submitted.

University Senate Syllabi Guidelines

B10304

General Course Information

- Full and accurate title of the course.
- Departmental and college prefix.
- Course prefix, number and section number.
- Scheduled meeting day(s), time and place.

Instructor Contact Information (if specific details are unknown, "TBA" is acceptable for one or more fields)

- Instructor name.
- Contact information for teaching/graduate assistant, etc.
- Preferred method for reaching instructor.
- Office phone number.
- Office address.
- UK email address.
- Times of regularly scheduled office hours and if prior appointment is required.

Course Description

- Reasonably detailed overview of the course.
- Student learning outcomes.
- Course goals/objectives.
- Required materials (textbook, lab materials, etc.).
- Outline of the content, which must conform to the Bulletin description.
- Summary description of the components that contribute to the determination of course grade.
- Tentative course schedule that clarifies topics, specifies assignment due dates, examination date(s).
- Final examination information: date, time, duration and location.
- For 100-, 200-, 300-, 400-, 400G- and 500-level courses, numerical grading scale and relationship to letter grades for *undergraduate* students.
- For 400G-, 500-, 600- and 700-level courses, numerical grading scale and relationship to letter grades for *graduate* students. (Graduate students cannot receive a "D" grade.)
- Relative value given to each activity in the calculation of course grades (Midterm=30%; Term Project=20%, etc.).
- Note that undergraduate students will be provided with a Midterm Evaluation (by the midterm date) of course performance based on criteria in syllabus.
- Policy on academic accommodations due to disability. Standard language is below:
If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Course Policies

- Attendance.
- Excused absences.
- Make-up opportunities.
- Verification of absences.
- Submission of assignments.
- Academic integrity, cheating & plagiarism.
- Classroom behavior, decorum and civility.
- Professional preparations. *NH*
- Group work & student collaboration. *NH*

Syllabus

BIO 304 – 001 Principles of Genetics Spring Semester 2010

Instructor

Pete Mirabito, PhD

Associate Professor

Department of Biology

College of Arts and Sciences

Room 319 T.H. Morgan Bldg

Phone: 257-7642

Preferred method of Contact - Email: pmmira00@uky.edu

Office hours: Thursday by appointment

Teaching Assistants

Marie Forbes-Osborne and Lakshmi Pillai

Maforb2@uky.edu & Lakshmi.pillai@uky.edu

Prerequisites: BIO 148, BIO152, BIO 155, CHE 107, CHE 115.

Class Meeting Times and Places (also see detailed schedule on page 5)

Lectures: Mondays, Wednesdays and Fridays 9:00AM to 9:50AM Room B01 T.H. Morgan Building.

Lab: Tuesdays, 12:00 noon to 2:50 PM, Room B01 T.H. Morgan Building.

Final Exam Friday, December 17th 8:00 AM to 9:50 AM Room B01 T.H. Morgan Building.

NOTE: We can change the final exam time and date by a unanimous vote of the class!

Textbook and other Reading

Essentials of Genetics, Klug, Cummings, Spencer and Palladino, 7th Edition

Genetics: An Integrated Approach, Sanders and Bowman, pre-prints handed out in class

Study Guides that include a list of key terms and concepts and genetics problems, on BBN course site

Course Description and Goals This is a sophomore-level course that should provide you with the knowledge and analytical skills needed to understand the principles of modern genetics and apply them to appropriate situations in your personal and professional lives. You should gain an understanding of the fundamental concepts of genetics as they pertain to the nature of genes, genomes, and chromosomes, the mechanisms of recombination and mutation, and the patterns of Mendelian and non-Mendelian inheritance. I emphasize examples from human genetics to illustrate and reinforce genetic principles, however; examples from classic laboratory genetic research organisms will also be covered.

Grading: Your final numerical grade for this course will be based on the following:

class participation (clickers)	5%	5 points possible
homework	5%	6 points possible (5 + 1 bonus point)
four tests	55%	55 points possible
lab notebook	10%	10 points possible
<u>final exam</u>	<u>25%</u>	<u>25 points possible</u>
Total:	100%	101 points possible

Final Letter Grade: Your letter grade will be **no lower than** 90 or above = A, 80 to 89 = B, 70 to 79 = C, 60 to 69 = D, and below 60 = E. I will adjust the scale to obtain a distribution of approximately 20%A, 25%B, 40%C, and 10%D. Grades will be posted on the class web site using a 4-digit PIN that you will supply to me by email.

Class Participation:

I will present several clicker questions during most lectures. You will get full credit for class participation if you give an answer to all clicker questions for a class. You do not have to answer correctly to earn credit for participation. However, if you do not answer a clicker question, or are absent, then you will not get credit for participation for that class. There are 36 lecture meetings, therefore each lecture represents $5\%/36 = 0.14\%$ of your final grade. Thus, if you come most of the time and participate fully when you are there, you will get most of the 5 points from the participation grade.

Opting-out of Participation Grading:

If, for whatever reason, you do not wish to participate in clicker questions in class, you can opt-out of this by emailing to notify me. If you choose to opt-out of clicker questions, your final exam will count for 30% of your grade instead of 25%.

Homework: For each topic, you will be required to turn in the original copy of YOUR HAND-WRITTEN definitions of key terms and concepts listed for each reading assignment.

- The definitions MUST be hand-written and must include all terms listed for that topic on the class website.
- The definitions are due on the first day of lecture on that topic (see class schedule) but can be turned in earlier. The homework will be graded Pass/Fail and returned to you by the next lecture period.
- A Pass grade will be awarded if you provide a reasonable definition for every term. The definitions themselves will not be corrected, nor will “correct” definitions be provided to you.
- A Fail grade will be awarded if you do not provide a reasonable definition for every term or if you do not turn in the homework assignment on time. **There are NO acceptable excuses for missed or late homework, including being absent from class.** If you cannot attend class on a day when homework is due, email me a scanned, PDF file of your written homework by start of class time.
- NOTE: I will forgive one Fail grade for each student. In other words, you can mess up one homework assignment and still receive full credit for homework.
- **Bonus Point:** Students who receive 13 Pass grades (all homework acceptable and turned in on time) will earn an extra percentage point towards their final course score. If you miss one homework assignment, you will not get the extra point.

Tests: Tests will include questions that focus on key terms and concepts from the homework assignments and questions that ask you to solve problems similar to those identified in the Study Guide on the web site.

- Key term/concept-based questions may include the following formats; fill-in-the blank questions, definitions, and short answer
- Problem solving questions may include the following formats; solving word problems, short essay

Feedback on Your Tests and Checking Your Test Score: PDF file copies of Answer Keys will be posted on the web site and will include the correct answers to the matching questions and information to help you understand the score you received on each problem solving/short essay question. **Detailed comments WILL NOT BE INCLUDED on the test returned to you.** Compare your test to the Answer Key and, if you find mistakes or wish to argue for more points on one or more questions, **WRITE** your argument out on a separate piece of paper, staple that paper to the test, and turn it in for a re-grade. I will review your test and get it back to you as soon as I can. You will be allowed one re-grade per test. Re-grade requests can be submitted until the start of the final exam.

Final Exam: The final exam will be a two-hour cumulative exam. The format of the test and specific study guide information will be provided to you at the start of dead week.

Other Course Policies

Meet with me during office hours: I have set aside Thursdays for office hour visits, but visits are by appointment only through email. I will answer email requests for an office hour visit up until 5 PM on preceding Tuesday and will post the time and place of each Thursday's office hour on the course web site. You are welcome to come to office hours at the time posted on the site without an appointment but will not be able to make an appointment after 5 PM on Tuesdays.

Taking a make-up test for Tests 1 through 4: If you miss one of the tests because of an excused absence, contact me immediately and present me with written validation for your excused absence. There are only three acceptable excuses for missing an exam recognized by the university: 1) the death of an immediate family member (unambiguous documentation is required); 2) illness (you must have a note from a doctor confirming this); 3) participation in off-campus activities (you must have documentation from the proper department, typically the athletic department, at the beginning of the semester). If you are ill or will miss an exam for a good reason, you *must* email or call Dr. Mirabito before the end of the exam. Convincing documentation must be provided within 1 week after the exam in order to take the make-up. If you have any other emergency situation, you must discuss it with us as soon as possible before the exam. Keep in mind cars that do not start and flat tires do not count as excuses for missing exams.

You will be allowed to make-up one test during Dead Week on Friday, December 10th at 9:00 AM in room B01. Contact me by email sometime during the week of November 29th through December 3rd to confirm that you will be making up a test (or else I may not have a make up test for you to take).

If you miss more than one of the tests 1 through 4: If you miss more than one of the tests 1 through 4 you will be given an "I" letter grade for the course. You should make up one of these tests on the make-up day during Dead Week and then meet with me to make arrangements for making up the other tests sometime after the semester ends.

If you know of university sanctioned events (intercollegiate sports or other professional engagements) that will cause you to miss more than one test in BIO 304, then meet with me during the first two weeks of the semester to make special arrangements for multiple make up tests.

Making up the final exam: If you miss the final exam because of an excused absence, you will be given an "I" letter grade for the course. See me immediately with validation for your excused absence and we will make arrangements for you to make up the exam sometime after the semester has ended.

Midterm Grades: Your test and homework scores will be available online listed by your PIN at the course web site throughout the semester. Projected letter grades (based on scores from tests and homework) will be posted prior to midterm, which is October 18th. I will use the grading scale and curving strategy described above to determine your projected letter grade. You should use these projected letter grades as a reasonable assessment of your performance in the class up to that point, however; remember that your final letter grade may differ from your midterm projected letter grade.

Cheating: All tests are "closed-book", meaning that you are not permitted to use written information in the form of notes, books, or "crib-notes" during these examinations. NOTE: You may use a calculator only while working on the short answer/problem solving section of the test. Calculator use in answering the fill-in-the-blank, definition, short-answer questions is **NOT** allowed. Behavior considered cheating in this course includes the following: 1) using notes of any kind during a test or exam; 2) copying from other students during tests or exams; 3) talking to other students during tests or exams; 4) using a calculator to help you answer the fill-in-the-blank, definition, short-answer questions; 5) handing in homework that is not your own work.

Charges of an academic offense will be made against any student that cheats or commits plagiarism. Penalties for such an offense will be assessed according to University Regulations regarding Academic

Offenses. The most severe penalties include suspension or dismissal from the University. **I have a zero-tolerance policy regarding academic offenses.**

Disabilities: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address (jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Course Policy on Classroom civility and decorum:

The university, college and department has a commitment to respect the dignity of all and to value differences among members of our academic community. There exists the role of discussion and debate in academic discovery and the right of all to respectfully disagree from time-to-time. Students clearly have the right to take reasoned exception and to voice opinions contrary to those offered by the instructor and/or other students (S.R. 6.1.2). Equally, a faculty member has the right -- and the responsibility -- to ensure that all academic discourse occurs in a context characterized by respect and civility. Obviously, the accepted level of civility would not include attacks of a personal nature or statements denigrating another on the basis of race, sex, religion, sexual orientation, age, national/regional origin or other such irrelevant factors.

Learning Goals	Learning Outcomes. Students will be able to:
Students will understand the concepts "gene" and "genome"	<ul style="list-style-type: none"> - describe classic studies that were important to the evolution of our current understanding of genes and genomes - illustrate the structure of a typical prokaryotic operon - illustrate the structure of a typical eukaryotic gene - explain the relationships between gene structure and function - explain the processes involved in gene expression - explain the processes involved in genome replication - predict the function of a gene from details of its structure - summarize the types of genetic evidence (transmission, cytological and molecular) that could be used to define a gene - propose specific genetic experiments (transmission, cytological and molecular) that could be used to define a gene - explain evolutionary arguments that could be used to identify a gene - explain how genomes are characterized and analyzed - construct a map of DNA from molecular data (sequence, restriction map, or southern blot hybridization results) - analyze genome sequences and identify potential genes - argue for and against the statement "genomics has caused us to reevaluate our criteria for what is and isn't a gene"
Students will know the principles of transmission genetics	<ul style="list-style-type: none"> - explain the principle of segregation and relate it to meiosis - explain the principle of independent assortment and relate it to meiosis - predict the proportions progeny and the probability of specific progeny types given the genotypes of parents - infer the genotype of parents or determine the probability of specific parental genotypes given the phenotypic proportions of progeny - design crosses to determine the genetic basis of a phenotype - define the term genetic linkage and relate genetic linkage to physical linkage, chromosome segregation, and recombination - construct genetic maps using data from crosses - describe the double-strand break and repair model of recombination and explain why gene conversion supports this model
Student will understand the nature of genotypic variation	<ul style="list-style-type: none"> - describe mechanisms that ensure the fidelity of DNA replication - describe mechanisms that change chromosome structure or number - predict the effects of chromosomal abnormalities on the results of matings - describe mechanisms that cause changes in DNA sequences and relate those mechanisms to current topics in environmental biology and human health - relate mutation to phenotypic variation and molecular evolution - determine the heritability of multifactorial traits using data from artificial selection experiments and twin studies - predict phenotypic distribution of quantitative traits in a population given allele frequencies and the contribution of each allele to the trait

Day	Date	Topic	HW due	Fly Lab#	Cloning Lab#	Plant Lab#	Yeast lab#	
Wednesday	8/25	Intro to Genetics						
Friday	8/27	S&B CH1	HW1					
Monday	8/30	S&B CH1						
Tuesday	8/31	Lab 1	HW2	fly lab 1				
Wednesday	9/1	S&B CH2						
Friday	9/3	S&B CH2						
Monday	9/6	labor day						
Tuesday	9/7	Lab 2		fly lab 2	cloning lab 1			
Wednesday	9/8	S&B CH2						
Friday	9/10	S&B CH3	HW3					
Monday	9/13	S&B CH3						
Tuesday	9/14	Lab 3		fly lab 3	cloning lab 2			
Wednesday	9/15	S&B CH3						
Friday	9/17	Test 1 (fly lab questions)						
Monday	9/20	S&B CH4	HW4					
Tuesday	9/21	Lab 4		fly lab 4	cloning lab 3			
Wednesday	9/22	S&B CH4						
Friday	9/24	S&B CH5	HW5					
Monday	9/27	S&B CH5						
Tuesday	9/28	Lab 5		fly lab 5	cloning lab 4			
Wednesday	9/29	S&B CH5						
Friday	10/1	S&B CH6	HW6					
Monday	10/4	S&B CH6						
Tuesday	10/5	Lab 6			cloning lab 5	plant lab 1		
Wednesday	10/6	S&B CH6						
Friday	10/8	Test 2 (fly lab questions)						
Monday	10/11	K&C CH17	HW7					
Tuesday	10/12	Lab 7			cloning lab 6			
Wednesday	10/13	K&C CH17						
Friday	10/15	K&C CH17						
Monday	10/18	K&C CH18	HW8					
Tuesday	10/19	Lab 8			cloning lab 7	Plant lab 2		
Wednesday	10/20	K&C CH18						
Friday	10/22	K&C CH18						
Monday	10/25	K&C CH19	HW9					
Tuesday	10/26	Lab 9			cloning lab 8		yeast lab 1	
Wednesday	10/27	K&C CH19						
Friday	10/29	Test 3 (cloning lab questions)						
Monday	11/1	K&C CH6	HW 10					
Tuesday	11/2	Lab 10			cloning lab 9		yeast lab 2	
Wednesday	11/3	K&C CH6						
Friday	11/5	K&C CH6						
Monday	11/8	K&C CH11	HW 11					
Tuesday	11/9	Lab 11				plant lab 3	yeast lab 3	
Wednesday	11/10	K&C CH11						
Friday	11/12	K&C CH11						
Monday	11/15	K&C CH14	HW 12					
Tuesday	11/16	Lab 12				plant lab 4	yeast lab 4	
Wednesday	11/17	K&C CH14						
Friday	11/19	K&C CH14						
Monday	11/22	Test 4 (yeast lab questions)						
Tuesday	11/23	Lab 13				plant lab 5	yeast lab 5	
Wednesday	11/24	Thanksgiving Day Vacation						
Friday	11/26	Thanksgiving Day Vacation						
Monday	11/29	K&C CH22	HW 13					
Tuesday	11/30	Lab 14					yeast lab 6	
Wednesday	12/1	K&C CH22						
Friday	12/3	K&C CH22						
Monday	12/6	TBA						
Tuesday	12/7	Lab 15			Turn in lab notebooks			
Wednesday	12/8	TBA						
Friday	12/10	Make-up Tests						
Friday	12/17	Final exam (plant lab questions)			8 AM Room B01			

Laboratory Exercises

Fruit Fly Lab

Lab 1: Learn fruit fly life cycle, become familiar with equipment, observe phenotype of true-breeding wild type and mutant fly lines, set reciprocal crosses between wild type and mutant fly lines in vials

Lab 2: Remove parents from vials

Lab 3: Analyze progeny, determine dominance relationships, set test cross of hybrid females in vials

Lab 4: Remove parents from vials

Lab 5 Analyze progeny and determine the genetic basis for phenotypes observed

Cloning Lab

Lab 1: Become familiar with equipment (microliter pipets, pipetting, and loading samples in agarose gels)

Lab 2: Learn basic cloning procedures, perform restriction digest on chromosome and cloning vector, run samples of digests on an agarose gel and analyze results, set up ligation reaction to create recombinant clones

Lab 3: Transform bacteria with ligation, plate cells on selective medium, run samples of Lab 1 digest on an agarose gel, perform a Southern transfer of DNA from the gel to a nylon membrane

Lab 4: Identify transformants carrying recombinant clones and culture them in selective medium

Lab 5: Isolate recombinant plasmids from cultered transformants, perform a restriction digest and run samples on an agarose gel to analyze each clone

Lab 6: Synthesize DIG-labeled probe using one recombinant clone, determine efficiency of probe synthesis, pre-hybridize Southern blot

Lab 7: Probe southern blot of chromosome digest

Lab 8: Wash blot, detect location of bound probe

Lab 9: Analyze Southern blot results and use class data to generate a restriction map of the chromosome

Arabidopsis Lab

Lab 1: Learn Arabidopsis life cycle, plant F2 seeds

Lab 2: Transplant virescent F2 plants to individual containers

Lab 3: Perform PCR on leaf tissue plugs using primers to RFLP loci

Lab 4: Set up restriction digests of PCR reactions

Lab 5: Run digests on an agarose gel and analyze results, determine whether each RFLP is linked or unlinked to the virescent locus

Yeast Lab

Lab 1: Learn yeast life cycle, become familiar with equipment, patch yeast strains on YPD medium, practice streaking yeast to single colony on rich medium

Lab 2: Replica plate yeast strains from YPD medium to aminoadipate medium, observe results of your practice single-colony streaks, practice streaking yeast to single colony again

Lab 3: Identify aminoadipate-resistant mutants from each yeast strain, compare results from both yeast strains, purify mutants by streaking to single colony on aminoadipate medium

Lab 4: Patch your unknown aminoadipate-resistant mutants on YPD plates, patch known aminoadipate mutants onto YPD plates

Lab 5: Mate your unknown mutants with known mutants and perform complementation test

Lab 6: Analyze results and determine the genetic basis for aminoadiate resistance in each of your mutants