

Principles and Applications of Biotechnology II (Biology 6330)
Course Syllabus
Winter Semester, 2015

Instructor

Victoria Meller
2123 Biological Sciences Building (BSB)
(313)577-3451
vmeller@biology.biosci.wayne.edu

Lectures: Tuesday and Thursday 1:00-2:15, 0127 State Hall

Final Exam: Thursday April 27, **12:30-2:30**, 0127 State Hall

Office hours: By appointment

Course description and objectives

This course is an introduction to eukaryotic molecular methods. Upon successful completion of this course a student will be able to:

Describe commonly used methods for discovery of molecular interactions

Understand methods for sequence-directed cloning and mutagenesis

Understand the strategy of genetic screens

Be able to write simple, clear explanations of molecular and genetic methods

Interpret data obtained by molecular and genetic methods

Be able to design a properly controlled study that applies these methods

Textbook No text is assigned, but articles will be posted on Blackboard (BB). Some sections in *Molecular Biology of the Gene* by J. Watson *et al.*, 7th edition will be assigned. This text will be on reserve in the UGL. Equivalent reading from alternative texts may be substituted.

Prerequisites The Department of Biological Sciences is strictly enforcing course prerequisites. The prerequisite course for BIO 6330 is BIO 5330. If you have not already completed BIO 5330 with a C- or better, or transferred the equivalent course, you must drop BIO 6330. If you choose to disregard this warning, the department will be administratively dropping students at the end of the add/drop period. Any financial complications resulting of the administrative drop will be the responsibility of the student.

Course Description This course emphasizes modern molecular and genetic concepts as they apply to eukaryotic systems. Practical and theoretical aspects of methods will be considered. Exams and quizzes will focus on concepts, experimental design and strategy. Powerpoint slides will be posted on Blackboard shortly before or immediately after lectures.

Announcements will be made in class or by e-mail. Your Wayne State account will be used. If you do not routinely check your Wayne State e-mail account you risk missing updates of course information. The dates and topics given in the course schedule are approximate.

Reading assignments Review articles, book chapters, sections of technical documents and research papers will be assigned. Almost all of the reading material will be posted on the Blackboard site for BIO 6330. You will be expected to have read these carefully prior to class, and come to class prepared to discuss the topic and techniques. Unannounced quizzes will include material from recent lectures as well as from the current reading.

Exams Exams will be primarily short answer, essay and problem solving. Preliminary exams will be given during scheduled class times on **February 7, March 7 and April 11**. A mandatory, comprehensive final will be given on Thursday, **April 27** from **12:30-2:30**. No exceptions will be made for conflicts such as travel plans.

Writing Assignments You will complete short, written assignments based on seven of the papers read for class. These are marked in the schedule in bold. Assigned paper summaries should follow the form described in the guide posted on BB. While you are encouraged to discuss these articles with others, the written assignments are to be *individual efforts* that are the *original work of the person submitting them*. Written assignments are due before the class in which the paper is discussed and must be submitted through the SafeAssign link in Blackboard (under Course Tools). No credit will be given for assignments submitted late. Assignments are worth 25 points each. Grading will reflect the clarity of the writing, comprehension of the article and original thought. It is expected that you will incorporate suggestions made on these assignments into your future writing. For this reason, every effort will be made to grade and return assignments quickly. You will be allowed to skip a single assignment. If all assignments are turned in, the lowest grade will be dropped. Additional skipped assignments will be given a zero and will contribute to your grade. Detection of plagiarism by SafeAssign will result in penalties described on the following page.

Quizzes Up to 12 unannounced quizzes, each worth 10 points, will be given in class. Questions will be primarily short answer and essay, and will be drawn from recent lectures and current reading assignments. The lowest quiz, or a missed quiz, will be dropped. You will receive 0 for all missed quizzes in excess of 1.

Grading The final grade will be based on:

Three preliminary exams (100 points each)	300
Comprehensive final	150
Writing assignments	150
Up to 11 quizzes	up to 110
Total	up to 710

Students wishing to contest the grading of an exam or assignment must return the work in question accompanied by a written statement explaining why credit was improperly assigned. This must be done within one week of the return of the work to the class.

Plagiarism and Cheating All exams will be taken without notes or books, and calculators will be unnecessary. Cheating on an exam (using notes, looking at another student's paper, giving or receiving information or using any electronic device during the exam) will result in failure of the course. A letter detailing the incident will be sent to the dean of students.

Students are encouraged to discuss articles and to study together. However, all written assignments are expected to be individual efforts. Submitting another person's writing as your own is plagiarism and will result in disciplinary action. Students who submit material copied from any source, including the paper under discussion, as their own original writing will receive a zero for the assignment. A letter detailing the incident will be sent to the dean of students. A second episode of any type of cheating will result in a grade of F for the course and university disciplinary action.

Important Dates Add forms will not be signed after the second week of class. *Please note that "incomplete" grades will not be issued to students in poor standing who are seeking an alternative to a drop.*

Drop with tuition refund	January 23
Drop without record	February 5
Spring break	March 13-18
Last day to withdraw	March 26
Final	Thursday April 27, 12:30-2:30

Students with disabilities If you have a disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only). Once you have your accommodations in place, I will be glad to meet with you privately to discuss your needs.

University Closures If the University is officially closed on an exam day, the exam will be held on the next regularly scheduled class day. Closure of the University is announced by the following mechanisms:

1. the University Newsline (313) 577-5345 *
2. WSU Homepage (www.wayne.edu) *
3. WSU Pipeline (www.pipeline.wayne.edu) *
4. WDET-FM (Public Radio 101.9)
5. by other local radio and television stations

* Note: The information on closures and class cancellations is likely to be found at these locations before it is broadcast by local radio and television stations

Disputes Disputes that cannot be resolved following the guidelines presented in the syllabus will be resolved using the guidelines of University policy as outlined in "Student Due Process".

Tentative Lecture and Topic Schedule

Date	Topic	Reading
1-10	Introduction to the Gateway system	Assigned readings on BB
1-12	Gateway system, introduction to recombineering	Assigned reading on BB
1-17	Recombineering	Assigned reading on BB
1-19	Zinc finger nucleases, TALE proteins and TALENs	Assigned reading on BB Assignment 1
1-24	ObLiGaRe, introduction to CRISPR/Cas9	Assigned reading on BB
1-26	CRISPR/Cas9	Assigned reading on BB Watson pp. 706-11
1-31	Applications of CRISPR/Cas9	Assigned review on BB Assignment 2
2-2	Protein tagging, TAP tagging	<i>Nature Biotechnology</i> 17, 1030-1032
2-7	Exam 1, covers 1-10 through 2-2	
2-9	Organization of the proteome	Assigned reading on BB Watson pp. 180-01
2-14	Genetic analysis – pathway elucidation by modification of phenotype	<i>Science</i> STKE, 2006, Issue 322, p. tr1 <i>The Plant Cell</i> 15, 1310-19
2-16	Synthetic genome analysis (SGA) in yeast	<i>Science</i> 294, 2364-69 Assignment 3
2-21	Two hybrid screening	<i>Curr. Op. Structural Biology</i> 15; 4-14
2-23	Guest lecture by Russ Finley, WSU School of Medicine Protein/protein interaction; systems analysis	Assigned reading on BB Assignment 4
2-28	Protein-DNA interactions ChIP (chromatin immunoprecipitation)	Watson pp. 185-87 <i>Science</i> 293; 1150-55
3-2	DAM ID	Assigned reading on BB
3-7	Exam 2, covers 2-9 through 3-2	
3-9	RNAi: introduction	Watson pp. 711-26 Assigned reading on BB
3-13 to 3-18 Spring Break		

Date	Topic	Reading
3-21	Analysis of RNAi in <i>C. elegans</i>	<i>Science</i> (295) 2456-59
3-23	The binary system Clonal analysis	<i>Development</i> 130, 5065-5072
3-28	Conventional mutagenesis: hypoxia resistance in <i>C. elegans</i>	<i>Science</i> 323, 630-3 Assignment 5
3-30	SB mutagenesis in mouse (guest lecture)	Assigned reading on BB
4-4	Genome manipulation in mammals Balancer chromosomes	Watson pp. 825-29 <i>Nature Genetics</i> (22) 375-378 Assignment 6
4-6	Exam 3, covers 3/9 to 4/4	
4-11	Identification of human disease genes: positional cloning; introduction to the human Hapmap	Assigned reading on BB
4-13	Linking genetic diversity and phenotype with Hapmap technology	Assigned reading on BB Assignment 7
4-18	Stem cells, cloning by nuclear transfer, induced pluripotent stem cells	Assigned reading on BB
4-20	miRNAs and reprogramming of somatic cells	Assigned reading on BB
4-27	Comprehensive Final, 12:30-2:30, State 0127	