

METHODS: ANALYSES**BIO 6020 (Course Ref. No. 12540, Section 001)****SYLLABUS, FALL, 2017****Credits:** 4**Time and Place:** M 2:30 pm - 4:20 pm Biological Sciences, Room 1169
W 1:00 pm - 6:50 pm Shapero Hall, Room 0405**Instructor:** Dr. Markus Friedrich
Biological Sciences Building, Room 3117
Phone: 313 577 9612

Goals: Introduction to essential principles in design, execution and analysis of experiments in molecular biology. Topics that will be covered includes laboratory safety, scientific documentation, database searching, development of experimental protocols, error analysis, solutions and buffers, isolation of nucleic acids, protein isolation, electrophoretic separation of proteins and nucleic acids, immunohistochemistry, bioimaging, and scientific ethics.

Limited to 20 students.

Prereq: BIO 5330 or BIO 6330 or consent of instructor.

Material fee: \$50.00

Format: Lectures and lab practicals accessible at:

<https://drive.google.com/drive/folders/0B6RXcc7dd6CObGVOTEI4eGhycE0?usp=sharing>

Lab safety requirement: Lab coat

Contact and communication after lecture or via email: mf@biology.biosci.wayne.edu

Office hours: After lecture or by appointment

Textbook:

Current Protocols: Essential Laboratory Techniques, Wiley

Supplementary Textbook:

Kathy Barker: At the Bench: A Laboratory Navigator (Spiral-bound)
Safety Sense: A Laboratory Guide, Second Edition by Cold Spring Harbor Lab

TOPICS COVERED

1. Laboratory safety rules
2. Lab notebook management
3. Stock solutions
4. Nucleic acid isolation
5. PCR
6. Restriction digest
7. DNA sequencing
8. Computational sequence analysis
9. Immunohistochemistry
10. Epifluorescence microscopy
11. Laser scanning confocal microscopy

LEARNING OBJECTIVES/OUTCOMES

As a result of mastering the materials in this course, you will be able to:

1. Conduct laboratory research under supervision
2. Generate proper documentation of experimental results for academic and industrial settings keeping a digital lab notebook
3. Perform basic DNA and RNA analysis experiments
4. Analyze sequencing data
5. Perform basic immunohistochemistry experiments
6. Discuss and analyze experimental results
7. Archive sequence and image data

Exams: Class performance will in part be measured in form of one quiz per week. The lowest scoring quiz (this includes missed quizzes) can be dropped. There will be **NO** makeup exams or bonus points.

Grading: 50% of the final grade will be based on the average score determined for the weekly quiz results. The second 50% of the final grade will be based on accuracy and organization of the laboratory notebook in which you will document your experimental work during the lab sessions. The laboratory notebook will be submitted for grading after each lab class and returned during lecture each following Monday.

Cheating policy: A student found to be cheating during an exam (using a “cheat sheet”, looking at another’s paper, or allowing another to look at yours) will receive a zero for that test or report with no opportunity to drop or replace that score. A second episode of cheating will result in a grade of E for the course and may also result in initiation of university disciplinary action.

Add/Drop policy: Add forms will not be signed after the second week of class (except for the purpose of changing lab sections when and if appropriate). Drop forms must be signed before the end of “study day”, which is the day after the last day of classes. Note that **“incomplete”** grades will not be issued to students in poor standing who are seeking an alternative to late drop.

Students with disabilities: If you have a documented 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 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Credit requirement policy: Note that prerequisite requirements will be strictly enforced except for cases of extreme urgency, which will be decided on at the instructor’s discretion.

TENTATIVE lecture and lab schedule:

Wed Aug 30	1:00pm – 6:30pm	⊕ BIO 6020: Introduction, Pipette check and assignment, Pouring Ampicillin agar plates ✎
Mon Sep 4	2:30pm – 4:20pm	⊕ BIO 6020: Lab notebook management ✎
Wed Sep 6	1:00pm – 6:30pm	⊕ BIO 6020: Lab safety ✎
Mon Sep 11	2:30pm – 4:20pm	⊕ BIO 6020: Making buffers ✎
Wed Sep 13	1:00pm – 6:30pm	⊕ BIO 6020: Preparation of stock solution ✎
Mon Sep 18	2:30pm – 4:20pm	⊕ BIO 6020: Nucleic acid purification ✎
Wed Sep 20	1:00pm – 6:30pm	⊕ BIO 6020: Genomic DNA extraction ✎
Mon Sep 25	2:30pm – 4:20pm	⊕ BIO 6020: Polymerase chain reaction ✎
Wed Sep 27	1:00pm – 6:30pm	⊕ BIO 6020: Genomic PCR ✎
Mon Oct 2	2:30pm – 4:20pm	⊕ BIO 6020: PCR applications ✎
Wed Oct 4	1:00pm – 6:30pm	⊕ BIO 6020: RNA extraction ✎
Mon Oct 9	2:30pm – 4:20pm	⊕ BIO 6020: Gene expression analysis ✎
Wed Oct 11	1:00pm – 6:30pm	⊕ BIO 6020: cDNA synthesis and first round RT-PCR ✎
Mon Oct 16	2:30pm – 4:20pm	⊕ BIO 6020: DNA cloning ✎
Wed Oct 18	1:00pm – 6:30pm	⊕ BIO 6020: RT-PCR II and product analysis ✎
Mon Oct 23	2:30pm – 4:20pm	⊕ BIO 6020: Plasmids as DNA vectors ✎
Wed Oct 25	1:00pm – 6:30pm	⊕ BIO 6020: Ligation and DNA transformation with white blue screening ✎
Mon Oct 30	2:30pm – 4:20pm	⊕ BIO 6020: Restriction enzymes ✎



Wed Nov 1	1:00pm – 6:30pm	☒ BIO 6020: Mini-column plasmid prep and restriction digest ☒
Mon Nov 6	2:30pm – 4:20pm	☒ BIO 6020: Sanger sequencing and Next generation sequencing methods ☒
Wed Nov 8	1:00pm – 6:30pm	☒ BIO 6020: Field trip to WSU Applied Genomics Technology Center ☒
Mon Nov 13	2:30pm – 4:20pm	☒ BIO 6020: Computational sequence analysis ☒
Wed Nov 15	1:00pm – 6:30pm	☒ BIO 6020: Sequence analysis computer lab ☒
Mon Nov 20	2:30pm – 4:20pm	☒ BIO 6020: Antibodies ☒
Mon Nov 27	2:30pm – 4:20pm	☒ BIO 6020: Immunohistochemistry ☒
Wed Nov 29	1:00pm – 6:30pm	☒ BIO 6020: Bio-labeling of tissue culture cells ☒
Mon Dec 4	2:30pm – 4:20pm	☒ BIO 6020: Microscopy ☒
Wed Dec 6	1:00pm – 6:30pm	☒ BIO 6020: : Bio-labeling of whole mount tissue ☒
Mon Dec 11	2:30pm – 4:20pm	☒ BIO 6020: Microscopy lab ☒