

Chemistry 475: Biochemistry Lab

Fall 2017

Weds 5:45-9:40

Tiernan 209

Instructor: Yong Kim, PhD

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Office Hours: Mon and Thu from 10:00-11:00AM or by appointment

Text: Biochemistry; Fundamental Laboratory Approaches for Biochemistry and Biotechnology, Second Edition, Alexander J. Ninfa, David P. Ballou and Marilee Benore, John Wiley & Sons, Hoboken, NJ, ISBN 978-0-470-08766-4

Course description: This course will offer the chemistry and related (chemical engineering, biology, bioinformatics, bioengineering) students fundamental laboratory approaches for biochemistry and biotechnology. These experiments will reinforce concepts learned in biochemistry lecture classes.

Week 1. Introduction

09/05 Basic practices and techniques in the biochemistry laboratory

Week 2. Spectrophotometry

09/12 Create a standard curve and determine concentration of unknown using spectrophotometer

Week 3. Quantification of protein concentration

09/19 Determine the concentration of a protein using the Bradford assay

Week 4. Chromatography

09/26 Separate a mixture of biomolecules based on size using gel filtration chromatography

Week 5. Gel electrophoresis of proteins

10/03 Separate a mixture of proteins using gel electrophoresis and determine the size of

Weeks 6 and 7. Protein isolation

10/10 & 17 Purify a single protein from a complex mixture of proteins

Week 8. Enzyme kinetics

10/24 Determine the kinetic parameters (K_{cat} and K_M) of an enzyme

Week 9. Midterm test

10/31

Week 10. Polymerase chain reaction technology

11/07 Amplify DNA using PCR

Week 11. Agarose gel

11/14 Determine the size of the DNA fragment

Week 12. Transformation

11/28 Insert DNA into E. coli and select positive cells

Week 13. Miniprep

11/05 Isolate and characterize a plasmid.

Week 14. Bioinformatics

12/12 Use the internet to search databases and visualize molecular structures

12/19 Final Exam

- The NJIT honor code will be upheld, and that any violations will be brought to the immediate attention of the Dean of Students.
- Students will be consulted with by the instructor and must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Grade:

If you miss 2 or more classes, your will get F letter grade unless you provide a valid excuse document.

Lab reports: 40%, Midterm: 30%, Final: 30%

Lab report

The Lab report should be written by your words with the style of scientific article. All the structures of the chemicals used in the lab should be included in the method part. Due is every Sunday 11:59PM.

Safety

Safety in the Laboratory SAFETY GLASSES MUST BE WORN AT ALL TIMES

1. Lab coat is required. You will not be permitted to work in the lab in shorts and without protection for your legs and feet.
2. Always conduct yourself in a professional manner. Have fun while working in the laboratory, but refrain from activities that might be dangerous to you or your neighbor.
3. You must learn where the safety equipment is and how to use each item during the first day in class. In the event of an emergency, you should use whatever you need to address the emergency. Again, you do not need to ask for permission to respond to an emergency. Usually, your response will be to advise your TA and instructor and then follow his/her instructions. As a general rule, and if time permits, students should not attempt to provide first aid but should concentrate on contacting a professional (x3111 for emergency) in that area.
4. No consumption of food (including gum) or beverages will be allowed.
5. You are not to perform any unassigned experiments.
6. Do not use your mouth to fill pipettes.
7. If something is spilled on you, wash it off immediately with lots and lots and lots of water, and then report to the TA. Clean up the spill later according to instructions from the TA.
8. Uncontrolled long hair or clothing (loose sleeves, ties, jewelry) that might come in contact with a flame or become entangled in mechanical equipment will not be permitted. You will not be permitted to work in the lab without protection for your feet (no sandals, for example).
9. Never heat a closed system. It may result in an explosion.
10. Never heat flammable materials with an open flame or near an ignition source.
11. Do not heat or mix anything near your face (or anyone's face).
12. Review the hazards of all reagents for an experiment before you start, so you know how to respond to an emergency. The MATERIAL SAFETY DATA SHEETS (MSDS) for each reagent we use are available on the Internet (Consult Fischer Scientific Website www.fischersci.com). You are encouraged to review any MSDS any time you have a question. You should also note that a considerable amount of safety information is on the reagent labels. Read them before you use the reagent.
13. Do not rub your eyes with your hands. Your hands are frequently contaminated.
14. 15. You cannot tell when glass and other objects are hot by looking at them. Be careful and don't get burned by trying to pick up something that is hot.
15. If the fire alarm sounds, leave the building immediately.
16. Do not store reagents near a sink or leave them near the balance where they will be in the way and get knocked over. Return all reagents to their proper location as soon as possible after you have finished with them. Be sure everything is returned to its original location before you leave and that you have left nothing in the balance room, in a fume hood or at some other location.
17. Be sure you know where the safety equipment is located so you can find and use each item in an emergency (if the power fails, and the lab is dark, for example).
18. Be sure that, in an emergency, you know how to turn off all of the utilities (gas, water, electricity) you have been using.
19. Never attempt to identify an unknown by smelling or tasting it as recommended in some (especially old) textbooks.
20. Use the appropriate safety equipment (safety shield, gloves, fume hood, shower, eye wash, etc.) and supplies as needed. Be sure any supplies you use are promptly replaced so they are available for the next emergency. It may be you again.
21. Read all chemical labels prior to use. Be sure you know what you are using.
22. Do not store chemicals near non-compatible chemicals (acids with bases or oxidizers with fuels, for example) even for short periods of time.
23. Transport and dispose of all chemicals properly. If you are not sure how to do so, ask your TA.
24. Do not use chipped or broken glassware. Broken glassware will not be accepted at the end of the course and should be replaced during check-in or as soon as it is broken.
25. Do not operate electrical equipment with wet hands.
26. Do not wear contact lens to the laboratory.
27. The EMERGENCY telephone number is x3111 for university security/safety, x3568 for the department office.