CHM441
Biochemistry Laboratory
Spring 2015; T 2-5pm*
Cox Science & Language 209#

See schedule page for special notes (*,')

Professor: Dr. Nicholas A. Pullen
Office Hours: **MW** (9-11:30am), **R** (2-5pm), and by appointment
Office Location: Cox Science & Language 205
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WWU Mission: An independent voice in higher education, William Woods University distinguishes itself as a student-centered and professions-oriented university committed to the values of ethics, self-liberation, and lifelong education of students in the world community.

Course Description: The laboratory extension of the CHM 440 course. Students will gain practical competencies in modern experimental biochemistry dealing with the major classes of biomolecules; emphasis will be placed upon protein. Additionally, substantial, independent immersion in primary literature research is a key feature of this course. Participants will design, execute, and analyze a relevant and novel biochemical experiment producing data that could potentially be published. Concurrent enrollment in CHM 440 required.
2015-2016 Academic Catalog: https://www.williamwoods.edu/catalogs/1516/undergraduate/index.aspx

Course Requisites: Current enrollment in CHM440.

Required Text: None

Other Resources (not required): Boyer, R. *Biochemistry Laboratory (2nd ed.)* 2001 Prentice Hall.
The Journal of Biology Chemistry (http://www.jbc.org/)
PubMed (http://www.ncbi.nlm.nih.gov/pubmed)

Technology Use Expectations: Messages via WWU email are official communication; students are responsible for regularly checking their WWU email accounts. Students are expected to become familiar with basic literature searches using internet databases. Course documents, and grades will be available on the relevant Owlnet page(s). Technology issues should be directed to UIT (ext. 4224; helpdesk@williamwoods.edu).

Course Objectives:
With satisfactory completion of CHM441, students will:

1. Gain knowledge of the major classes of biomolecules.
2. Demonstrate competencies in standard biochemical techniques (*e.g.* chromatography, blotting, etc.).
3. Design, execute, and analyze the results of their own creative biochemical experiment(s).
4. Develop comfort and skill with oral and written scientific communication.
5. Learn to find, dissect, and critically evaluate primary biochemical literature.

Biology Program Objectives:

1. Demonstrate knowledge of cell ultra-structure and basic cellular processes and develop an understanding of the requisites of life.
2. Converse with the basic tenets of transmission, molecular, developmental and population genetics.
3. *Contributes to an overview of the major organ systems of the human body and the normal and pathological functioning of those organ systems.*
4. *Demonstrate knowledge of the diversity and taxonomy of organisms, and the significance of variation in morphology, behavior, and life history.*

5. Explain the role that natural selection, genetic drift, and other phenomena have had on the production of biological diversity and the role evolution has in integrating explanations of both the unity and diversity of life.
6. Demonstrate knowledge of scientific methodologies and usage of current scientific equipment and technologies.

This course does not directly address Biology Program Objectives 3 & 4.

Assessment Procedures and Course Assignment Details: Grades are earned through the completion of alternative methods and topic searches, two unit lab practical exams, a final comprehensive practical exam, and submission of a final data analysis on a student-conducted experiment.

Information addressing the above objectives is presented through assigned text & case readings, literature research, PowerPoint presentations, videos, seminar-style discussions, and hands-on practical laboratory experiences. Formative assessment of student achievement in all objectives is performed via class discussions, methods & topic searches, and experimental successes. Summative assessment is performed with practical exams, a comprehensive final activity, and a results submission. *Data pertaining to Biology Program Objective 6 are used for B.A. and B.S. annual Biology Assessment Plans.*

Practical Exams: Two lab exams will be given consisting of identification, scientific skill assessment, problem solving, short responses, and long essays relevant to preceding lab activities.

Final Activity: A final comprehensive activity will be conducted during finals week, wherein student groups (no more than four per group) will present their research and data in a forum such as a seminar or poster session (LEAD event if possible). Student groups will choose an experimental project to study in-depth over the semester in addition to scheduled lab activities. These projects are somewhat self-designed – within the limits of budget and feasibility within a 13-15 week period. Projects should utilize techniques and theories introduced in this course. Typically, the first month of the semester is spent doing literature research and formulating hypotheses and experimental plans, and then the labwork is done through the last week of the semester. Past examples include: levels of RuBisCo expression in different plant tissues, RuBisCo expression under varying growth conditions, Sox5 expression in distinct zebrafish tissues, trefoil factor expression in different cell types, cancer invasion and survival curves, vitamin assessments in different foods, and sequence annotations. **The presentation of these projects is currently scheduled for Tuesday, May 3 at 2pm, however this could be moved a week earlier depending on the needs of the LEAD program, thus all work needs to be finalized by Thursday, April 28.** You should approach this as something that will be placed on your resumé/CV; if the work is truly novel and superb I will recommend it for paper presentation at an official conference.

Methods/Topic Searches: Due by the beginning of assigned lab periods, students must search for an alternative method(s) other than the one used in lab and write a paragraph justification/summary of the choice. Alternatively, a relevant brief research topic may be assigned requiring an abstract-style summary (250-words expected).

Experimental Data Submission: In the Western Blotting portion of this lab course, students will be assisting an active research project; therefore the data collected must be submitted in the specified format for official documentation in case they are used for publication in the future. **This is due by 2pm, Tuesday, May.**

Tutoring Information for all Students:

- **Writing Center**: Kemper 216
  Contact Dr. Greg Smith for questions: greg.smith@williamwoods.edu

- **Math Center:** Science & Language 313
  Contact Professor Raymond Hune for questions: raymond.hune@williamwoods.edu

- **SmartThinking**
  Online assistance for English, Math, and most other academic subjects is also available 24/7 through Smarthinking, our e-tutoring service provider. Just click on the "Tutoring" tab at the top of your OWLNet main page and follow the simple directions to connect with a dedicated personal tutor!

No separate login is required. You will see a list of basic subjects, and a field to do a subject search. For most subjects there are two options, "Drop-in tutoring" and "Offline questions." Drop-in allows you to chat live with a tutor, and offline allows you to submit a question and they email you back the answers.
Please contact the Academic Advising Office at bonnie.carr@williamwoods.edu if you need additional assistance.

- **Atomic learning**
  All students at WWU have access to this online tutorial program. Atomic Learning is a digital tutorial website with more than 1,500 hours of online professional development and learning resources. This program will assist you in learning how to use different software programs.

  Atomic Learning is accessed through Owlnet. Once logged into Owlnet, the Atomic Learning link is on the far right in the grey section under courses. The log in is your email user name and password. If you have any questions or concerns you can contact the UIT helpdesk at helpdesk@williamwoods.edu.

Grading Scale:

- Percentages from lecture and lab (CHM 441) will be combined into one final grade.
- Lecture is weighted as ¾ of the final grade and lab as ¼.
- Passing final grades must be received in lecture and lab to pass both courses.

Available Lab Points:

Activity	*Category Total Point Value*
Practical Exams (x2)	70
Final Activity	50
Methods/Topic Searches (x10)	50
Experiment Data Submission	30
Semester Total	**200**

Final letter grades are based on the percentage of points earned:

Letter Grade Ranges

%Points Earned	*Letter*
<60%	F
≥60%	CR

Attendance Policy: Two unexcused absences from CHM 441 result in a non-negotiable reduction of an entire letter grade for the combined course [CHM 440/441]. More than two laboratory absences will result in a failing grade for the entire course. Make-up work for unexcused lab absences will not be offered. In the event of a foreseen, excusable absence, students should contact the professor in advance regarding missed work and/or materials.

Policy on Late Work: Late work is not accepted for this course.

ADA Guidelines:

- Students who choose to disclose a disability are responsible for notifying the University of their disability on a timely basis. Questions about disability services should be directed to the University's coordinator for disability services. Contact information is (573) 592-1194 or ada@williamwoods.edu. The office is on the first floor of the Academic Building.

Academic Integrity Policy

- William Woods University, founded on the principle of honesty, has long endeavored to maintain an atmosphere of academic integrity. In all academic work, it is important that the ideas and contributions of others be appropriately acknowledged, and that work that is presented as original is, in fact, original. Insuring the honesty

and fairness of the intellectual environment at William Woods University is a responsibility that is shared by the entire campus community. Details of the Academic Integrity Policy can be found at the following web address: https://www.williamwoods.edu/catalogs/1516/undergraduate/policy_detail.aspx?Policies_id=51

Student Outcomes Assessment Policy: 2015-2016 Academic Catalog
https://www.williamwoods.edu/catalogs/1516/undergraduate/policy_detail.aspx?Policies_id=30
Additional Academic Policies can be found at: 2015-2016 Academic Catalog:
https://www.williamwoods.edu/catalogs/1516/undergraduate/policies.aspx

Academic Credit Hour Definition: The University has adopted the following United States Department of Education definition of a credit hour:

A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally-established equivalency that reasonably approximates not less than:

(1) one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time.

Expected Outside Time Commitment: Since CHM441 is similar in time structure to a 1-credit course two of the three weekly dedicated lab hours count toward outside time over the course of the semester (for a total of 30h). However, students should expect to spend, at minimum, an additional hour per method/topic search (10h total) and time working on their semester projects, which of course varies by individual.

Add/Drop Deadlines and Other Important Dates:

- Last day to add a class – January 15, 4:30 PM.
- MLK Day (no classes) – January 18
- Last day to drop a class during refund period – February 8, 4:30 PM
- Student Performance Reviews (no classes) – February 16 & 17
- End of Midterm – March 4
- Midterm grades reported – March 8
- Daylight Saving Time begins – March 13
- Last day to drop a class or withdraw from the University – March 21, 4:30 PM
- Spring Break (no classes) – March 28-April 1
- Finals Week – May 2-6

TENTATIVE COURSE SCHEDULE

Exam dates will not change.

Topics may change and will be announced in class.

Dates	Topics
12 Jan	Introductions, Basic Lab Practices, Project ideas
19 Jan	The Internet, Research Consultation *Buffer Lab (Possible)*
26 Jan	Chromatography/Toxicology
2 Feb	Lipid Isolation and Chromatography Continued
9 Feb	**Lab Practical**; Research Consultation and Supplies
16 Feb	**NO LAB – Student Performance Reviews**
23 Feb	Vitamin C, Research Consultation and Supplies
1 March	Enzymes: Michaelis-Menten
8 March	Biomolecular fractionation - Trizol Research Consultation and Supplies
15 March	Measuring Biomolecular Concentrations, Cell Culture Introduction
22 March	**Lab Practical**
29 March	**Spring Break**
5 April	Group experiment planning, Cell Culture Treatments
12 April	Protein Sample Collection/Isolation
19 April	Western Blotting I
26 April	Western Blotting II, data analysis **Complete Semester Projects by 28 April**
3 May	Results submission **Lab Final Activity (2pm)**

***Special Note Regarding Lab Time:** Time outside the scheduled lab hours will be required to complete some experiments, especially those involving Western Blotting and Cell Culture. Equity of labor among group members is expected in completing these activities.

 # Special Note Regarding Lab Space: Due to current enrollment surpassing historical levels, and the types and locations of equipment used, this course will utilize several laboratory spaces. Room 209 will serve as a home-base; however it is necessary for some student groups to use room 201, 202, and occasionally room 211. Room 204 will also be frequented for reagent storage, and room 112 might be used for additional fume hood space. Please be patient in the face of experimental difficulties: seek advice from your peers, other resources (the internet!), and look for the professor in one of the other rooms if not with you at that time.