DEPARTMENT OF BIOCHEMISTRY

BCHM 32200 – Analytical Biochemistry

Syllabus
Spring, 2021

INSTRUCTOR: Dr. Mark Hall
office: BCHM 214
phone: 494-0714
e-mail: mchall@purdue.edu

Office hours: By appointment; Zoom will be used for all help sessions; requests for help outside lab time should be submitted by email.

LAB TA: Kedric Milholland
office: BCHM 214
e-mail: kmiholl@purdue.edu

Assistant TA: Benjamin Waddey
office: BCHM 214
email: bwaddey@purdue.edu

Office hours: By appointment; Zoom will be used for all help sessions; requests for help outside lab time should be submitted by email.

FORMAT, TIME, AND LOCATION

Instructional Modality: Face-to-Face. Because of the focus on hands-on lab experimentation, we are planning a normal in-person format for this course. The section size has been limited to accommodate everyone in BCHM 112 while strictly adhering to Purdue’s Covid safety procedures for laboratory instruction (see more information on Covid-related safety requirements below). Contingency plans have been created for instances where individuals are unable to attend the in-person lab sessions for Covid-related reasons.

Schedule:

Lab Prep:
Section 32200-004: Thursday 10:30-11:20 AM
Section 32200-005: Friday 11:30 AM-12:20 PM

Lab:
Section 32200-002: Thursday 1:30-4:20 PM
Section 32200-003: Friday 1:30-4:20 PM

Location: Both Lab Prep and Lab sections will meet in BCHM 112
Course Credit Hours: 2 credits  
Pre-requisites: BCHM 22100

Course Description: Modern biochemical techniques for the purification and characterization of proteins. This is a project-oriented course where students begin by purifying a recombinant enzyme by affinity chromatography and then characterize various biochemical properties of the enzyme throughout the semester. Emphasis will be placed on quantitative analyses, including measurements of enzyme activity and inhibition, molecular interactions, and oligomeric state. Students will learn basic principles of designing assays to measure biochemical phenomena. Use of bioinformatics and computational modeling tools for protein structure analysis will be integrated. The course will culminate with preparation of a manuscript-style report describing the enzyme characterization.

Course Objectives:
1. Give students practical experience with the process of isolating and characterizing biochemical properties of proteins and enzymes.

2. Expose students to classical and modern methods employed in protein characterization, including computational tools used to augment wet lab experiments. Methods include site-directed mutagenesis, recombinant protein expression, affinity and size exclusion chromatography, electrophoresis, centrifugation, immunoblotting, spectrophotometry, enzyme activity assays, mass spectrometry, bioinformatics, and protein structural modeling.

3. Introduce students to the early stages of the drug discovery process, including target identification and validation.

4. Provide students opportunities to develop hypotheses based on existing knowledge, and design appropriately controlled experiments to specifically test those hypotheses.

5. Give students practice effectively communicating scientific research results in writing.

Learning Outcomes:
1. Students will be able to apply the scientific method to a specific research problem. This will include the design of hypotheses based on finding and evaluating information available in primary literature, design of experiments to test hypotheses, and analysis of experimental data to determine if hypotheses are supported.  
   Methods of assessment: Weekly lab data submissions, weekly lab question sets, final report

2. Students will demonstrate proficiency in the application of modern biochemical and molecular techniques for the purification and characterization of proteins.  
   Methods of assessment: Weekly lab instruction quizzes, weekly lab data submissions, weekly lab question sets, mid-term and end-of-semester exams

3. Students will be able to explain the theoretical principles behind modern research methods for protein purification and characterization
Methods of assessment: Weekly lecture quizzes, mid-term and end-of-semester exams

4. Students will understand the contributions of the course methods to society, especially to the fields of drug discovery and agricultural biotechnology.

Methods of assessment: Weekly lecture quizzes, Final report

5. Students will be able to effectively document and communicate research results and their meaning in writing.

Methods of assessment: Final report (including submissions of individual sections throughout semester)

Format Notes.
- Students will engage in a continuous research project throughout the semester. The project assignment will be described in week 1 and will culminate with a final written report describing the project and results obtained in week 15.
- Each week will have a specific lab objective to complete with instructions provided. Most weeks will have an associated lecture that teaches principles and theory of the primary method being used in the lab. **We will not have in-person lectures this semester. Instead, there will be a recorded lecture each week posted on Brightspace. Students will be required to view the lecture on their own time each week before the scheduled Lab Prep period, and to pass a short online quiz based on the lecture content.**
- Each week a set of follow-up questions will be assigned after the lab period that will focus on the lab experiments and on data analysis. These questions will be due the following week.
LEARNING RESOURCES, TECHNOLOGY & TEXTS

Textbook: We do not use a textbook for this course. Reading material from various sources will be provided in electronic format via the Brightspace course page.

Brightspace: All required files will be posted on the course Brightspace page. This includes the lab instructions for each week, the course syllabus, the lecture video links, grading keys, and accessory readings. **NOTE: It is each student’s responsibility to print the lab instructions and bring them to lab each week. The instructions are needed to conduct the experiments properly.** We are not allowed to print handouts for courses now.

Computer software: All software needed for conducting experiments and analyzing data will be pre-installed on Surface Pro tablets in the teaching lab room. Students do not need to bring their own computer to lab. We use computational modeling software from Chemical Computing Group called Molecular Operating Environment (MOE). Chemical Computing Group has very generously provided teaching licenses for MOE free of charge for our use in this course.

See the Student Services widget on the campus homepage for resources such as Technology Help, Academic Help, Campus Resources, and Protect Purdue.
ATTENDANCE POLICY DURING COVID-19:

This is a laboratory course that focuses on development of practical research skills. Maximizing the educational value of the course therefore requires students to be present in lab, actively engaged in the activities. For this reason, we are doing everything possible to have a normal in-person BCHM 32200 experience this semester. Student survey data from Fall 2020 emphasized students’ views of in-person course opportunities as critical to their learning, engagement with faculty/TAs, and ability to interact with peers. The instructor and TA are committed to making this happen and will need the full cooperation of the students.

In a typical semester, lab attendance is mandatory every week. This semester, students are still expected to attend all lab prep and lab sessions in-person unless they are ill or otherwise have an excused reason to miss lab. If a student feels ill, has any symptoms associated with COVID-19, or suspects they have been exposed to the virus, they are required to stay home, notify the TA and instructor, AND contact the Protect Purdue Health Center (496-INFO).

Because of the likelihood that students will be quarantined during the semester due to COVID-19, in-person attendance will not be a factor in the final grades. However, even if unable to attend lab sessions in person, all students will still be responsible for completing all weekly assignments and quizzes and should communicate with their research group to obtain the data collected in the lab periods so that they can answer the weekly question sets. Students must keep in mind that it is not practical to have make-up lab sessions. It is imperative that students communicate with the TA and/or instructor to keep them aware of any COVID-19-related absences. It may be necessary to shuffle or combine research groups during the semester to deal with illness and quarantine situations.

In general, students need to inform the instructor immediately of any anticipated or actual conflicts that will affect the timely submission of an assignment or the ability to take an exam. In cases of bereavement, quarantine, or isolation, the student or the student’s representative should contact the Office of the Dean of Students via email or phone at 765-494-1747. Brightspace includes a link to the Dean of Students under ‘Campus Resources’.

ACADEMIC GUIDANCE IN THE EVENT A STUDENT IS QUARANTINED/ISOLATED

If you must quarantine or isolate at any point in time during the semester, please reach out to the instructor via email so that we can communicate about issues related to successfully completing your course assignments. Work with the Protect Purdue Health Center (PPHC) to get documentation and support, including access to an Academic Case Manager who can provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Your Academic Case Manager can be reached at acmq@purdue.edu. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify the course instructor via email or Brightspace. We will make suitable arrangements based on your particular situation. We are committed to making this course a meaningful educational experience for you.

PROTECT PURDUE CLASSROOM GUIDANCE

“The Protect Purdue Plan, which includes the Protect Purdue Pledge, is campus policy and as such all members of the Purdue community must comply with the required health and safety guidelines. Required behaviors in this class include: staying home and contacting the Protect
Purdue Health Center (496-INFO) if you feel ill or know you have been exposed to the virus, properly wearing a mask in classrooms and campus building, at all times (e.g., mask covers nose and mouth, no eating/drinking in the classroom), disinfecting desk/workspace before and after use, maintaining appropriate social distancing with peers and instructors (including when entering/exiting classrooms), refraining from moving furniture, avoiding shared use of personal items, maintaining robust hygiene (e.g., handwashing, disposal of tissues) prior to, during and after class, and following all safety directions from the instructor.

Students who are not engaging in these behaviors (e.g., wearing a mask) will be offered the opportunity to comply. If non-compliance continues, possible results include instructors asking the student to leave class and instructors dismissing the whole class. Students who do not comply with the required health behaviors are violating the University Code of Conduct and will be reported to the Dean of Students Office with sanctions ranging from educational requirements to dismissal from the university.

Any student who has substantial reason to believe that another person in a campus room (e.g., classroom) is threatening the safety of others by not complying (e.g., not properly wearing a mask) may leave the room without consequence. The student is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights.”
ASSIGNMENTS AND ASSESSMENTS

Grading for BCHM 32200 will be determined from the following assignments and assessments. The relative contribution of each is defined in the table at the end.

**Weekly Lecture Quizzes.** There will be a brief online quiz associated with the lecture video posted each week. This quiz, which assesses lecture topic comprehension, must be completed each week for students to be eligible to participate in that week’s lab.

**Weekly Lab Instruction Quizzes.** There will be a brief online quiz assessing each week’s lab instructions. This is primarily to ensure students have read the instructions ahead of time in preparation for the week’s lab activities. Prior preparation is essential to completing the labs on time and to avoid unnecessary mistakes. The quiz must be completed each week for students to be eligible for lab participation.

**Weekly Lab Data Submission.** At the end of each lab period, students will need to submit their dataset, as directed at the end of the lab instructions. The basis for evaluation of the data will be defined at the end of the instructions as well. All data must be submitted before leaving the lab. Data is submitted as a group and everyone in the group will receive the same grade for the data submission.

**NOTE ON ONLINE ONLY STUDENTS:** On any given week, students not able or willing to participate in person will have the lab data submission grade replaced with an additional online assignment focused on the lab experiments that week. All other assessments will remain identical for online only students each week.

**Weekly Lab Question Sets.** A set of data interpretation questions will be assigned each week. These questions must be answered individually by each student, not as a group, but are based on the group’s lab data. Answers to the lab question set are due before the subsequent week’s lab prep period begins.

**Exams.** There will be 2 exams, the first roughly at mid-term, the second the last week of lab. The exams focus primarily on the theory from the lectures and background information from the lab instruction files. However, they also include a data analysis section based on the lab activities. The second exam is not cumulative.

**Final Report.** Instead of a final exam, you will be required to write a manuscript-style lab report in the format of a biochemistry journal article (Abstract, Introduction, Results, Discussion, Methods) that describes the purification, identification, and characterization of your enzyme, including appropriate figures and tables to present your experimental results from throughout the semester. Detailed instructions will be provided at the beginning of the semester and opportunities to turn in rough drafts of individual sections for feedback will be provided throughout the semester.

**BCHM 32200 Grading Breakdown:**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>20%</td>
</tr>
<tr>
<td>Lecture quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Pre-lab quizzes</td>
<td>5%</td>
</tr>
<tr>
<td>Lab data</td>
<td>15%</td>
</tr>
<tr>
<td>Lab question sets</td>
<td>15%</td>
</tr>
<tr>
<td>Final lab report</td>
<td>20%</td>
</tr>
</tbody>
</table>
The cutoff values for letter grades are as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>92-100%</td>
</tr>
<tr>
<td>A-</td>
<td>90-91%</td>
</tr>
<tr>
<td>B+</td>
<td>88-89%</td>
</tr>
<tr>
<td>B</td>
<td>82-87%</td>
</tr>
<tr>
<td>B-</td>
<td>80-81%</td>
</tr>
<tr>
<td>C+</td>
<td>78-79%</td>
</tr>
<tr>
<td>C</td>
<td>72-77%</td>
</tr>
<tr>
<td>C-</td>
<td>70-71%</td>
</tr>
<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>Below 60%</td>
</tr>
</tbody>
</table>

Missing an exam or failure to turn in the final report or lab question sheets on time will result in a grade of 0 being recorded unless documented justification is presented. Any request to be excused from an exam must include official documentation (doctor's note, request from academic advisor, etc) explaining why the exam was or will be missed. Makeup tests will be scheduled in consultation with the instructor.

Questions about grades. If you have any disagreements with the way any of your exams, quizzes, or assignments have been graded, please consult the grading key, if available, and then discuss them with the TA. In the event this does not resolve your concerns, please take them up with the instructor.

Requests for re-grades must be submitted no later than the end of the next lab period after the graded exam, quiz or assignment has been returned.

Extra credit. There are no official opportunities for extra credit in this course.

Obtaining extra help. The instructor will be available to answer questions immediately after class, during lab, or by appointment (arranged in class or by e-mail). Alternatively, you can submit questions by e-mail. The lab TA will not hold office hours but will provide extra help by appointment or e-mail.

Review sessions are generally schedule a couple days prior to the two exams.

Incomplete grades. A grade of incomplete (I) will be given only in unusual circumstances. To receive an ‘I’ grade, a written request must be submitted prior to May 1 and approved by the instructor. The request must describe the circumstances, along with a proposed timeline for completing the course work. Submitting a request does not ensure that an incomplete grade will be granted. If granted, you will be required to fill out and sign an “Incomplete Contract” form that will be turned in with the course grades. Any requests made after the course is completed will not be considered for an incomplete grade.
LAB SAFETY, INCLUDING SPECIAL COVID-19 LAB SAFETY MEASURES
- Safety goggles, lab gloves, dust masks, and lab coats will be provided. These must be worn while working in the teaching labs. You are welcome to bring your own lab coat and/or goggles if you have them, as we cannot guarantee that the items we have in the lab will fit comfortably. We will only occasionally be working with dangerous chemicals or procedures and these rare cases will be pointed out by the TA or instructor ahead of time.
- Acceptable Lab Attire: Do not wear open-toe shoes (e.g. sandals) or shorts to the lecture and lab sessions. Everyone must wear long pants.
- Food and drinks are not permitted in the teaching labs at any time.
- Bags must be hung on the provided wall hooks, so they do not take up space on the benches or create safety hazards on the floor.

Special Covid-19 safety measures:
- To comply with Protect Purdue policy for instructional lab spaces every student MUST be wearing a mask at all times while in the lab. In addition, plastic face shields will be provided each week and must be worn at any time when lab teams are working in close proximity (less than 6 feet apart), when students are facing each other at the benches, or when any student needs to move around the lab (e.g. to use common equipment).
- Students will be required to use provided hand sanitizer immediately upon entering the lab each week. In addition, students will be required to wear lab gloves whenever working or using equipment in the lab.
- Work surfaces will be sanitized before lab sessions begin by the TA and/or instructor. Students will be required to sanitize their work areas prior to leaving at the end of the lab session.
- The BCHM 112 teaching lab has been approved for 10 student occupants, TA, and instructor. We have limited the two sections of BCHM 32200 to 10 students this semester to allow everyone to be in lab each week. Bench seats have been marked to indicate which may be used and which may not to maintain required social distancing while seated.
- Additional procedural details will be provided as needed based on the lab activities. In general, for use of common equipment, only one student at a time may be present at the instrument. Protocols for keeping surfaces of common equipment decontaminated will be provided by the instructor and must be strictly followed.
ACADEMIC MISCONDUCT

Remember Purdue’s Honor Pledge: “As a boilemaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue.” All BCHM 32200 students are expected to adhere to the spirit of the Honor Pledge.

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace table of contents, under University Policies.

Academic misconduct of any kind will not be tolerated in any course offered by the Department of Biochemistry. Information on Purdue’s policies with regard to academic misconduct, including the Purdue University Bill of Student Rights, can be found at http://www.purdue.edu/studentregulations/student_conduct/regulations.html

Any incidence of academic misconduct will be reported to the Office of the Dean of Students. Academic misconduct may result in disciplinary sanctions including expulsion, suspension, probated suspension, disciplinary probation, and/or educational sanctions. In addition, such misconduct will result in punitive grading such as:
• receiving a lower or failing grade on the assignment, or
• assessing a lower or failing grade for the course

Punitive grading decisions will be made after consultation with the Office of the Dean of Students. Please note reported incidences of academic misconduct go on record for reference by other instructors. Further, a record of academic misconduct is likely to influence how current/future situations are handled.

To provide you with an unambiguous definition of academic misconduct, the following text has been excerpted from "Academic Integrity: A Guide for Students”, written by Stephen Akers, Ph.D., Executive Associate Dean of Students (1995, Revised 1999, 2003), and published by the Office of the Dean of Students in cooperation with Purdue Student Government, Schleman Hall of Student Services, Room 207, 475 Stadium Mall Drive West Lafayette, IN 47907-2050.

“Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty." [Part 5, Section III-B-2-a, Student Regulations] Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” [University Senate Document 72-18, December 15, 1972]

More specifically, the following are a few examples of academic dishonesty which have been discovered at Purdue University and that will result in one or more of the disciplinary sanctions described above:

substituting on an exam for another student; substituting in a course for another student; paying someone else to write a paper and submitting it as one’s own work; giving or receiving answers by use of signals during an exam; copying with or without the other person’s knowledge during an exam; doing class assignments for someone else;
plagiarizing published material, class assignments, or lab reports; turning in a paper that has been purchased from a commercial research firm or obtained from the internet; padding items of a bibliography; obtaining an unauthorized copy of a test in advance of its scheduled administration; using unauthorized notes during an exam; collaborating with other students on assignments when it is not allowed; obtaining a test from the exam site, completing and submitting it later; altering answers on a scored test and submitting it for a regrade; accessing and altering grade records; stealing class assignments from other students and submitting them as one's own; fabricating data; destroying or stealing the work of other students

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment
- submitting a document written by someone else but representing it as one's own

Important Note on Course Materials: All materials used in this course, including lecture videos, lab instructions, assignments, exams, quizzes, and answer keys are subject to copyright protection. Distribution of any course material to any persons or entity other than registered course participants is strictly prohibited without written permission from the instructor.
NON-DISCRIMINATION POLICY

Purdue University’s non-discrimination policy will be upheld in this course. Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue’s full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

ANTI-HARASSMENT POLICY

Purdue University is committed to maintaining an environment that recognizes the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding and mutual respect; and encourages its members to strive to reach their potential. The most effective way to work toward preventing Harassment is through education that emphasizes respect for every individual.

Harassment in the workplace or the educational environment is unacceptable conduct and will not be tolerated. Purdue University is committed to maintaining an educational and work climate for faculty, staff and students that is positive and free from all forms of Harassment. This policy addresses Harassment in all forms, including Harassment toward individuals with legally protected status for reasons of race, gender, religion, color, age, national origin or ancestry, genetic information or disability and Harassment toward individuals for other reasons such as sexual orientation, gender identity, gender expression, marital status or parental status. Full details of Purdue’s anti-harassment policy can be found here: http://www.purdue.edu/policies/ethics/iiic1.html

MENTAL HEALTH

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765)494-6995 or http://www.purdue.edu/caps/ after hours, on weekends and holidays, or by going to the CAPS office of the second floor of the Purdue University Student Health Center (PUSH) during business hours.

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack (https://purdue.welltrack.com/). Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students (http://www.purdue.edu/odos). Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.
If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at evans240@purdue.edu.

ACCESSIBILITY AND ACCOMMODATIONS

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

EMERGENCY PREPAREDNESS

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Relevant changes to this course will be posted onto the course Brightspace site or can be obtained by contacting the instructors or TAs via email or phone. Students are expected to read their @purdue.edu email on a frequent basis.

A link to Purdue’s Emergency Preparedness resources is located on the Brightspace shell under University Policies; this webpage includes a link to resources on COVID-19.

ON-LINE COURSE EVALUATIONS

During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor(s). You will also be asked to provide an evaluation of the TA. Near the end of the semester you will receive an official email from evaluation administrators with a link to the online evaluation site. You will have two weeks to complete this evaluation. Your participation in this evaluation is an integral part of this course. Your feedback is vital to improving education at Purdue University. You are strongly urged to participate in the evaluation system. Your feedback will help improve the course for future students.

DISCLAIMER

This syllabus is subject to change.
<table>
<thead>
<tr>
<th>Week#</th>
<th>Start Date</th>
<th>Lecture Topic</th>
<th>Lab Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 18</td>
<td>Course overview; Bioinformatics, evolutionary relationships between proteins</td>
<td>Using bioinformatics tools (homology searching, sequence alignments, etc.)</td>
</tr>
<tr>
<td>2</td>
<td>Jan 25</td>
<td>Studying enzyme structure and function</td>
<td>Site-directed mutagenesis</td>
</tr>
<tr>
<td>3</td>
<td>Feb 1</td>
<td>Recombinant protein expression</td>
<td>Recombinant protein expression</td>
</tr>
<tr>
<td>4</td>
<td>Feb 8</td>
<td>Chromatography, protein purification</td>
<td>Affinity purification of proteins</td>
</tr>
<tr>
<td>5</td>
<td>Feb 15</td>
<td>Electrophoresis and other protein separation methods</td>
<td>Protein analysis by SDS-PAGE, measuring protein concentration</td>
</tr>
<tr>
<td>6</td>
<td>Feb 22</td>
<td>Use of antibodies in biochemical research</td>
<td>Quantitative Western blotting</td>
</tr>
<tr>
<td>7</td>
<td>Mar 1</td>
<td>Analysis of proteins by mass spectrometry</td>
<td>Protein ID using mass spectrometry; Homology-based structural modeling</td>
</tr>
<tr>
<td>8</td>
<td>Mar 8</td>
<td>Intro to enzyme catalysis and regulation</td>
<td>Enzyme assays</td>
</tr>
<tr>
<td>9</td>
<td>Mar 15</td>
<td>Spectroscopic methods for protein analysis</td>
<td>NO LAB THIS WEEK DUE TO 3/18 READING DAY</td>
</tr>
<tr>
<td>10</td>
<td>Mar 22</td>
<td>Studying protein hydrodynamic properties</td>
<td>Determining protein oligomeric state by measuring hydrodynamic properties</td>
</tr>
<tr>
<td>11</td>
<td>Mar 29</td>
<td>Enzyme kinetics and inhibition</td>
<td>Michaelis-Menten enzyme kinetics</td>
</tr>
<tr>
<td>12</td>
<td>Apr 5</td>
<td>Molecular recognition/substrate specificity</td>
<td>Substrate specificity</td>
</tr>
<tr>
<td>13</td>
<td>Apr 12</td>
<td>Methods for studying protein structure</td>
<td>Enzyme inhibition</td>
</tr>
<tr>
<td>14</td>
<td>Apr 19</td>
<td>Computational modeling tools for proteins</td>
<td>Ligand docking and optimization for drug discovery</td>
</tr>
<tr>
<td>15</td>
<td>Apr 26</td>
<td>NO LECTURE THIS WEEK</td>
<td>Workshop for writing final research papers</td>
</tr>
</tbody>
</table>