COURSE INFORMATION

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MEETING TIMES

Lecture: Mon/Wed/Fri 1030am-1135am
Room: GV 120

Lab*: Tue 100pm-500pm or Fri 115pm-515pm
Room: BROH 329

We will often meet in the computer lab (BROH 314) for the start of lab. The start of lab will be reserved only as time to introduce concepts and procedures. Often lab partners will self-schedule a time to work on the lab.

TEXTS

Biochemistry, by Voet and Voet
Writing Research Papers Across the Curriculum, by Susan M. Hubbuch
Write like a chemist [electronic resource]: a guide and resource by Marin S. Robinson

- ACS Style Guide
  - Quick ACS Style Guides
    - PSU
    - Williams

SUPPLEMENTAL READING

Biochemistry, Berg, Tymoczko, Stryer 5th ed. (online at PubMed books)
Proteins: Structure and Function, Whitford
Crystallography Made Crystal Clear, Rhodes (eText)
Research and Review articles

Prerequisite

C- or better in Bio/Chem135 (or equivalent)
C- or better in Engl-005

CLASS FORMAT

The regular daily format will consist of (1) a pre-class assignment (online), (2) an in class activity, and (3) the homework assignments. The pre-assignment will vary in format but may require you to produce a reading log (notes), take an online quiz, and/or solve selected problems. It will be graded. The pre-assignments and online quizzes will be available from the course website. The in-class activity will be either student-led group problems or a student-led discussion of research articles. For discussion of research articles each group will elect or be assigned a group leader who will lead the discussion of the article. Groups will be randomized at various times in the semester. You will be evaluated on your participation in class. Homework will be assigned on a daily basis. Please check the Calendar Page for daily assignments of homework problems from the textbook. In addition, some materials, resources, and activities are only available through the website. I reserve the right to collect homework without prior notice.
PRESENTATIONS

Presentations will be connected to the lab project. Each student is required to give one formal presentation (~10-min.) scheduled during normal class time or lab in the last week of classes. Individual presentation dates will be determined by lottery. The focus of the presentations will be on the end of semester research project selected by the student and approved by the instructor. Although the presentations focus should be the experimental results and analysis, you are still responsible for doing the appropriate background research to assist in your understanding of the experiment, and to help you to answer questions at the end of the talk. You may use the WEB, Powerpoint, handouts or other formats to aid your presentation.

Additional guidelines ------- Peer Review sheets

TESTING

There will be 2 one-hour long exams during the semester and a quiz every other week. Exams may include a take-home component.

Exam Dates

Exam #1 Mid-March
Exam #2 End of April
Final Exam (See final exam schedule on SMC website)

Alternate exam arrangements will be considered only for excused absences with prior notification.

WRITING ASSIGNMENTS

Research Review article: The paper will be written in the form of a review article in a biochemistry journal (examples will be distributed in class) and will derive from prior research. Primary research studies can include experimental research published in journal articles and patents. Books, reference handbooks, review articles and textbooks be used to develop a basic understanding, and to discover the primary research studies.

The purpose of this assignment is to investigate, understand and communicate about a specific drug – drug target interaction by reading and compiling into a coherent summary at least ten primary research studies. Possible areas to explore include the structure of the target, the structure of the drug, a comparison of the drug and native substrate, the nature of the drug-target interaction, the mechanism of action, the metabolic process and/or chemical reaction that is interrupted, and the technique and process by which the drug was discovered, such as combinatorial, natural product research, and structure-based drug design. RUBRIC

Schedule (for more details see the course calendar):

Mandatory Library Workshops
Prior to Week 4: Explore the resources in the assignment and your textbook and identify at least 1-3 drug-drug target interactions as possible topics to research.
Prior to Week 7: Complete Research Study File reports for at least 5 primary resources.

Understanding Scientific Writing
Prior to Week 7: Read Section 1, Module1 from How to Write Like a Chemist
Prior to Week 11: Read Section 2 Graphics, References, and Final Stages of Writing

Drafts
Prior to Week 10: First draft of paper due
(1) Meet with professor to discuss first draft and the writing rubric
(2) Each student will read two peer papers (names removed) and evaluate it using the rubric.
Prior to Finals Week: Final Draft of paper due

Lab Notebook: Your lab notebook pages will be collected and graded in two parts. Part one: Purification of hen egg white lysozyme. Part two: Physical characterization of an enzyme.

You must obtain a bound notebook (no spiral notebooks). Your laboratory notebook will build on skills you have developed in general chemistry and organic chemistry; lab notebooks will be assessed using the following rubric. Please review each area of the rubric (Clarity/Organization, Procedure, Results, Goals, Discussion) to help you writing your notebook. Your notebook should provide a complete record of everything you have done in the lab. It is not permissible to record data outside your notebook and then transfer to your notebook later. Instead, all of your rough notes, recording of data, and calculations should be included in your notebook and then rewritten clarity if necessary. While the notebook is considered informal writing you are still expected to use appropriate biochemical diction.

Schedule (for more details see the course calendar):

Prior to Week 4: Meet with your professor to discuss your lab notebook and address questions about the rubric
Prior to Week 8 (Spr Break): Lab notebooks on purification of hen egg white lysozyme due
Prior to Finals Week: Three lab experiments on physical characterization of an enzyme and the lab pages on final independent project are due

GRADING

Your grade will be based on your performance on

• two exams (125 points each) and one final exam (175 points) [Note: Exams will be a combination of multiple choice, matching, and short answer (ie 2-7 sentences).]
least 50-70% of the points on the exams will be short answer]
• review article writing assignment (150 pts)
• pre-class assignments (3 points each, ~25 meetings)
• quizzes (100 points)
• Lab will be worth 250 points (approximately 25% of your total grade). Lab grades will be calculated based on notebook pages (75%) and the end of semester presentation (25%).

1000 total points (~60% evaluation of written work)

Final letter grades will be assigned according to the percentage of points that you accumulate during the semester. The approximate ranges for letter grades will be:

A = 100-85%  B = 84-70%  C = 69-55%  D = 54-40%

Your exact letter grade will be determined by a number of factors, including your performance on the final exam, the consistency of your performance during the term, your formal and lab notebook writing, and class participation.

OUTCOMES

Biochemical Concepts

Students should be able to comprehend and discuss the following topics in depth using the principles biology and chemistry:

• protein structure and function
• enzyme kinetics, mechanism, and inhibition
• carbohydrate structure and function
• lipid structure and function
• organization and operation of cell membranes
• biochemical signal transduction
• metabolic pathways and their regulation

Students will understand the basic theory of and application of the following tools towards enzyme structure determination and mechanistic investigations

• X-ray crystallography
• Molecular modeling and bioinformatics
• UV-vis, fluorescence, and circular dichroism spectroscopy

Lab Skills

Students will develop an increased ability to

• generate, analyze, and interpret experimental evidence
• design experiments and understand the limitations of experimental approaches
• use appropriate techniques for handling and manipulating protein samples
• apply quantitative skills—the ability to accurately and reproducibly prepare reagents and measure various quantities with high precision
• use and understanding the operation of modern instruments, including pH meters, UV-vis and fluorescence spectrometers, UV-vis plate readers, and HPLC
• work safely in the laboratory
• conduct experimental work in an organized and observant manner and developing excellent record-keeping practices
• analyze results using statistical, graphical, and other methods
• assess the reliability and significance of results and designing appropriate follow-up experiments
• interpret laboratory data, drawing reasonable and appropriate conclusions
• converse and collaborate with scientific peers in the appropriate “language” by using oral, written, and visual presentations
• access, read, comprehend, and extract relevant information and ideas from the primary and secondary literature
• work collaboratively with peers (on laboratory experiments)

Written and Oral Communication (these will build off of what you learned in English 5)

Students will be able to:

• recognize and write about biochemical topics in clear, well-constructed sentences and logical paragraphs using appropriate scientific language (exams, review article, notebook)
• understand and effectively communicate scientific information for peer scientists in the format of research and review articles and laboratory notebooks
• analyze data and construct evidence so as to provide clear support of a hypothesis or exploratory question (applies to the lab notebook and formal writing assignment)
• use the process of writing (formulation of a hypotheses, discussion and representation of data, drawing conclusions, brainstorming, collaborating, outlining, research, drafting, revising, and reflecting) to enhance understanding of the biochemical concepts (this particularly applies to the lab notebook and formal writing assignment).

Information Evaluation and Research Practices (these will build off of what you learned in English 5 and Chem Lit)

Students will be able to:

• explore a topic and search for relevant material in handbooks and journal articles using the library biochemistry subject guide, databases and search engines (Web of Science, PubMed, Patent Database)
• understand different types of resources (Primary Research Article*, Patent*, Review Article, Handbook and evaluate the references for a incorporation in a scientific p
• integrate and cite evidence using the ACS style guidelines
• understand the concept of intellectual property and practice academic honesty
FREE WRITING ADVISING AT THE CENTER FOR WRITING ACROSS THE CURRICULUM

Reasonable and appropriate accommodations, that take into account the context of the course and its essential elements, for individuals with qualifying disabilities, are extended through the office of Student Disability Services. Students with disabilities are encouraged to contact the Student Disability Services Coordinator at (925) 631-4164 to set up a confidential appointment to discuss accommodation guidelines and available services. Additional information regarding the services available may be found on the Saint Mary's website.

Ask a librarian!

Need library sources but don’t know where to start? Searching for a book, article, or data to support your argument? Not sure how to cite a source in your bibliography? Ask a librarian! Research help is available in person at the Reference Desk, by phone at 925-631-4624, and during reference hours you can even text a librarian at 925-235-4762 or chat with us live via the Library’s website. Check the Library’s Ask Us page for details. (http://www.stmarys-ca.edu/library/ask-us)

Extended assistance by appointment is also available with Linda Wobbe

Library Subject page: Biochemistry

DISABILITY SERVICES

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Academic Honesty Students are expected to do their own work on all exams and quizzes. Violations of this policy will be vigorously prosecuted according to SMC Academic Honesty Procedures.

Tips for Success Keep up with the work! Assignments will be updated on a weekly basis. Check our website after each lecture for the assignments due before the next class.

Most reading material will be distributed via email. Additional handouts will be given out in lecture or be available in the box outside my office. I cannot emphasize enough the importance of keeping up with the assignments. The material builds upon itself as the semester proceeds, so you must learn the early concepts to understand the later material.

Also, you are here at SMC to get the best possible education. Take advantage of the small class size and individual attention that a small liberal arts school can provide. Work together on assignments, and see me in my office as often as possible.