CHEM 4332 Intermediary Metabolism Syllabus
Spring 2018
MWF 10-10:50, Cav 215

Instructor: Edith Osborne, Ph.D.
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325-486-6629
CAV 204A

Office Hours: MWF 11:00-12:00, R 10:50-11:50, or by appointment


Online Homework: The class will use online homework from Sapling Learning.

Calculator: Bring a nonprogrammable scientific calculator to class every day and to all exams. You may not use a graphing calculator or cell phone on any quiz or exam.

Blackboard: This course will use Blackboard. Be sure to check Blackboard for postings.

Course Description: Coordinated examination of enzymatic processes in the living cell.

Prerequisite: CHEM 4331 Biochemistry

**CHEM 4332 is an ASU Designated Community Engaged Class** This class will have an additional focus on social responsibility. This will include the opportunity to develop the concept of your civic responsibility as a scientist and facilitate your engagement with the San Angelo community. As part of the CONNECT! Program, you will be required to participate in one co-curricular event, the JAMP Health Fair on Tuesday, March 6 in the UC spine from 10 am-2 pm. Class members will sign up for a time to present their projects.

Course Objectives:
- Gaining factual knowledge (terminology, classifications, methods, trends)
- Learning fundamental principles, generalizations, or theories
- Learning to apply course materials (to improve rational thinking, problem solving and decisions)

Student Learning Outcomes:
After completion of this course students will be able to:
- analyze complex chemical problems and draw logical conclusions.
- understand and apply scientific reasoning in the chemical sciences.
- demonstrate technical and analytical skills in chemistry and biochemistry.
- demonstrate an increased awareness of the concept of social responsibility by reflecting on their experience of communicating science to the public at the JAMP Health Fair.

Evaluation of Student Learning Outcomes:
Student learning outcomes will be evaluated by test questions. The social responsibility objective will be evaluated through a reflective essay.

Exams: There will be three 100 point regular exams during the semester and a comprehensive final exam of 150 points during the final exam period. Exam questions may be multiple choice, short answer, matching, and may require application of the covered material. Due to the cumulative nature of the course, some concepts from previous chapters may be necessary to solve problems in later chapters. Exams will not be curved. During exams, all items except your nonprogrammable calculator and pencil will be placed at the front of the room. You may not wear hats during the exam.
When I give you the exam back, I will briefly review important points regarding the test and answer any questions regarding the test. I will also discuss the distribution of grades. During this discussion time, you will need to decide if you would like a regrade of any test question.

**Make-up exams**: No make-up exams will be given except for university-sponsored events. If you miss an exam for an accepted excuse, i.e. a death in your family or personal illness, the final exam score will be used to replace the missed exam. Only one exam can be replaced in this fashion. If you miss two exams, you will not pass the course. If you miss the final, you will not pass the course. If you have taken the three hour exams, you may use the final exam percentage score to replace your lowest exam score. Example: your exams are 60 pts, 70 pts, and 80 pts and your final is 100 pts. The final exam is worth 150 points, so 100 points is $\frac{100}{150 \times 100} = 67\%$, so you can replace the 40 pt exam with 67 pts.

**Quizzes**: Quizzes on selected pathways and chapter material will be given throughout the semester. On the pathway quizzes, you will draw out the selected pathway in its entirety. This will allow more time for fair evaluation of other important course materials on the exams. No reference materials (notes, worked problems or text) may be used on paper quizzes. There will be twelve quizzes during the course of the semester. The lowest two quiz scores will be dropped. No makeup quizzes will be given except for university-sponsored events. Quizzes missed for university-sponsored events must be made up within one week of the missed quiz.

**Homework and in-class activities**: Online homework from Sapling Learning will be assigned. There will also be some in-class activities. Preparation material for in-class activities will be announced in class or on Blackboard. No credit will be given for late homework or in class assignments missed for any reason, including tardiness. In calculating your grade, I will drop 10% of this category of points and normalize to 50 points for the category.

**Paper and presentation**: Information from reputable websites (MedlinePlus, Protein Databank, NIH, pharmaceutical manufacturers), texts, and peer-reviewed journal articles will be used to write a paper and prepare a presentation to describe a biochemical topic. The paper should be written for a biochemistry student audience. The presentation will be made to the general public and will be presented at the JAMP Health Fair on March 6 from 10 am-2 pm in the University Center. The paper should be a minimum of 1500 words, Arial font, font size 11, 1.5 spacing. Students will turn in on Blackboard an electronic copy of their paper. Students will also give a 7 +/- 2 minute Powerpoint presentation on the topic to the class. Deadlines for topic approval, outline, first submission, and final submission are given below. Please note that the first submission is not a rough draft. You should view this as submitting a paper to a journal. You want your best work presented and to have very little alterations before the final document. Direct copying of information from websites or other published sources is considered plagiarism and will result in an F on the assignment. Papers should be cited using superscript numbers. For example, References should be numbered in order of appearance. A numbered list of references should be included in a reference section at the end of the paper. Follow the citation rules listed for the CSE Scientific Style and Format found at http://www.scientificstyleandformat.org/Tools/SSF-Citation-Quick-Guide.html. Citations should be given next to or on the same slide as any copied figures. Wikipedia and answers.com are often helpful starting points, but they are NOT peer reviewed sources, and thus are not always accurate. You will be given an F on the assignment if you chose to cite these websites and websites like them as sources.

**Co-curricular activity**: Students are required to participate in one co-curricular activity during the semester. Students will present their presentations at the JAMP Health Fair that will be held in the UC Spine on Tuesday, March 6 from 10 am-2 pm. Students will be graded on a reflective essay about the activity that relates to a scientist's social responsibility to promote the knowledge of science to the public and also on the ability of the student to explain their activity to the professor in their own words.

**Lecture Notes**: Lecture outlines will be posted on Blackboard, but you will still need to take notes in class.
Review sessions: Help sessions will be given before the exam. As these help sessions are directed by student’s questions, what is covered in the review sessions may or may not be covered on the test.

Grading corrections: Any discussion of corrections must be made within three weekdays of the returned work.

Grades:

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<tr>
<th>Point cutoff</th>
<th>Grade</th>
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<tbody>
<tr>
<td>603</td>
<td>A</td>
</tr>
<tr>
<td>540</td>
<td>B</td>
</tr>
<tr>
<td>469</td>
<td>C</td>
</tr>
<tr>
<td>402</td>
<td>D</td>
</tr>
<tr>
<td>&lt;402</td>
<td>F</td>
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<table>
<thead>
<tr>
<th>Point Category</th>
<th>Points Possible</th>
</tr>
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<tbody>
<tr>
<td>Regular Exam (100 points each per regular exam)</td>
<td>300</td>
</tr>
<tr>
<td>Quizzes</td>
<td>100</td>
</tr>
<tr>
<td>Homework and assignments</td>
<td>50</td>
</tr>
<tr>
<td>Comprehensive final exam</td>
<td>150</td>
</tr>
<tr>
<td>Paper and presentation</td>
<td>50</td>
</tr>
<tr>
<td>Co-curricular activity</td>
<td>20</td>
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<tr>
<td>Total points</td>
<td>670</td>
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Courtesy: Please be on time, refrain from eating, do not work on or read material for other courses, and turn off cell phones (i.e. please refrain from texting). Please help create a positive, focused learning environment for yourself and your classmates. Please be respectful of your instructor and your classmates. No credit will be given for any assignment or exam that contains drawings or writings that are inappropriate or disrespectful.

Attendance: You are expected to attend all class meetings. You are expected to arrive on time and to stay until you are dismissed. In-classroom activities such as worksheets cannot be made up. You will not be automatically dropped if you stop attending class. Daily attendance will be taken at the beginning of class. If you are tardy, you will be counted absent.

Flu: If you have the flu, please stay home. Do not help spread the flu to everyone else. Please keep me informed as to your status by email or telephone.

Academic Dishonesty: The ASU policies on academic dishonesty can be found in the Academic Honor Code [http://www.angelo.edu/forms/pdf/Honor_Code.pdf](http://www.angelo.edu/forms/pdf/Honor_Code.pdf). The penalty for ANY sort of dishonesty, including cheating or plagiarism is: 1) a grade of zero on the assignment and 2) disciplinary action as warranted in accordance with university guidelines. Unless otherwise stated, any homework/bonus work assigned should be your own work. Any Excel graph made should be your own graph.

ADA statement: If you have any ADA accommodations that need to be fulfilled, please contact the Student Life Office, Room 112 University Center, in order to request such accommodations. You are encouraged to make this request early in the semester so that appropriate arrangements can be made.

Course Schedule

Week of January 15
Review of syllabus, overview of metabolism
Chapter 11 Biological Membranes and Transport

Week of January 22
Ch 12 Biosignalling
Lehninger Part II Bioenergetics and Metabolism
Deadline for Topic Submission: January 26, submit on Blackboard

January 29  Chapter 13 Bioenergetics and Biochemical Reaction Types

February 5  Chapter 14 Glycolysis, Gluconeogenesis, and the Pentose Phosphate Pathway
February 7, Exam One
Deadline for Outline of Paper: February 9, submit on Blackboard

February 12  Chapter 14 Continued

February 19  Chapter 15 Principles of Metabolic Regulation
Deadline for 1st Submission of Paper and Powerpoint: February 23, submit on Blackboard

February 26  Chapter 16 The Citric Acid Cycle
Paper presentations: February 28 and March 2

March 5  Ch 16 continued
Tuesday, March 6, JAMP Health Fair, UC Spine, 10 am-2 pm

March 12  SPRING BREAK

March 19  Chapter 17 Fatty Acid Catabolism
Deadline for Final Submission of Paper and Powerpoint: March 23, submit on Blackboard

March 26  Chapter 18 Amino Acid Oxidation and the Production of Urea
March 28, Exam Two
March 30, Spring Holiday

April 2  Chapter 18 continued
Chapter 19 Oxidative Phosphorylation
Last Day to Drop, April 2

April 9  Chapter 21 Lipid Biosynthesis

April 16  Chapter 22 Biosynthesis of Amino Acids, Nucleotides, and Related Molecules
April 20, Exam Three

April 23  Chapter 23 Hormonal Regulation and Integration of Mammalian Metabolism

April 30  Chapter 23 continued

May 7  Final exam 10:30 a.m.-12:30 p.m.

Honors and Graduate Students
In addition to the work described above, you are expected to choose a human protein of your choice. You will write a paper that explains the structure and function of that protein and a discussion of the affects caused by the absence or mutation of the protein. Your paper should include an abstract, introduction, main body, discussion, figures (including crystal or NMR structure), and be fully referenced. The report should be 1800-2000 words including the abstract, introduction, main body, and discussion. Title page,
references and figure legends are not included in the word count. More information is found below. Also, a series of 4 case studies relating to the course material will be given periodically during the semester.

**Paper requirements**

<table>
<thead>
<tr>
<th>Topic submitted for approval:</th>
<th>February 9</th>
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<tbody>
<tr>
<td>Outline due:</td>
<td>March 14</td>
</tr>
<tr>
<td>Paper due date:</td>
<td>April 13</td>
</tr>
<tr>
<td>Points:</td>
<td>50 points</td>
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</table>

**Case studies**

| Points:                          | 4 @ 10 points for 40 points |

**Additional Paper Information:**

Submissions should be electronic. A final printed copy of your paper should also be submitted. The outline should provide enough information, including references, that the professor can clearly see the intended direction of your paper. Pay attention to the structures of the journal articles that you are reading. Your paper should be structured like a journal review article.

This is a biochemistry paper. Please make sure that a vast majority of your paper speaks of the biochemistry of your topic. Broader impact statements are useful for drawing in your readers, but make sure that you don’t dwell on them too long. You should reference scientific journal articles and texts. You should not reference websites like Wikipedia. Reputable websites like NIST, NIH, or manufacturers are allowable. You will end up with many references. The only sentences that you will not reference are statements that are general knowledge, such as DNA is translated to RNA. If your paper continually mentions a particular chemical/biochemical technique, you should briefly describe this technique.

The paper should be 1800-2000 words in length (not including references or title page), 1.5 inch line spacing, 1 inch margins, 12 point Arial font. Please include page numbers at the top right of each page. The references (required) and any figures are not included in the page count. Use endnotes for referencing your work. Endnotes are listed at the end of a paper, and the list of endnotes will serve as your bibliography/works cited/references. The endnotes should be inserted in the text body as superscript numbers in order of appearance. For example,¹ If you use the same reference more than once, use the number that it was first assigned. The references should be in the CSE style (http://www.scientificstyleandformat.org/Tools/SSF-Citation-Quick-Guide.html). Grammar and spelling count. You should expect that your paper will be returned to you for one chance at revising the paper. During the first read through, I will stop grading after encountering five major misspellings or typos.

**TITLE PAGE:** The title page should include the following items in a 12 point, Arial: title, author’s name, course name, institution name, and date. These items should be centered both vertically and horizontally. The title page does not count in the page total of the document. No page number is required on the title page.

**ABSTRACT:** The abstract should be a referenced paragraph of 150-200 words aimed at a general chemistry audience. Begin with a 2-3 sentence introduction, followed by a one-sentence statement of the primary conclusion. Conclude with 2-3 sentences putting the findings into context.

**INTRODUCTION:** Provide sufficient detail concerning the background of the topic. End with a few sentences stating the purpose, problem, or goal of the review article.

**MAIN BODY:** The main body should review recent research findings about the topic. Relevant themes and/or research should be referenced and discussed in depth with supporting evidence, data, and analysis. Use headers to demarcate content-specific sections.

**DISCUSSION:** The discussion section should summarize the work, state an opinion about where the work stands in the context of the broader field, and suggest future directions.
ACKNOWLEDGEMENTS: This is an optional section. Acknowledge anyone that gave you advice or critical feedback, e.g. The author would like to thank Dana Rerio for critical reading of the manuscript. Anonymous reviewers are not acknowledged.

REFERENCES AND IN-TEXT CITATIONS: Reference should be in CSE style. Direct quotations are rarely used in scientific writing. Please paraphrase sources. The Reference page contains all of the references used in the report, including five required primary literature articles. The primary literature articles should be no more than 10 years old. The primary sources should be in bold font. Sources are listed in order that they appear in the body of the report. Please single space the Reference page. You can use the citation engine found at http://citationmachine.net/.

TABLES AND FIGURES: Tables and figures should be embedded in the text of the report. Figures should be imported as .jpeg, .png, .tiff, or .gif files. Use separate numbering for tables and figures. Legends must accompany figures. Creation of your own summary figure(s) is encouraged.

ORDER OF REPORT
1. Title page
2. New page: Abstract
3. Introduction
4. Main Body with embedded tables and/or figures and legends
5. Discussion
6. Acknowledgements (optional)
7. New page: References