

Biochemistry I

Instructor/TA	Room No.	Telephone No.	E-Mail	Office Hours
Robert Marsh	FO 3.310	972-UTD-2511	rmarsh@utdallas.edu	TR 1:00-2:00 PM
Vincent Cirillo	FN 3.116	972-UTD-4157	cirillo@utdallas.edu	TR 1:00-2:00 PM
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Corequisites: Concurrent registration in Biochemistry Workshop I (BIOL 3161) is required for both BIOL 3361 and CHEM 3361 students.

Workshops will meet starting Tues. Jan. 9

Prerequisites: CHEM 2323 and 2325 or equivalent.

Course description: Structures and chemical properties of amino acids; protein purification and characterization; protein structure and thermodynamics of polypeptide chain folding; catalytic mechanisms, kinetics and regulation of enzymes; energetics of biochemical reactions; generation and storage of metabolic energy associated with carbohydrates; oxidative phosphorylation and electron transport mechanisms; photosynthesis.

Objectives: This undergraduate core course is the first of a two-course sequence which provides students with a working knowledge of the macromolecules and fundamental metabolic pathways of prokaryotes and eukaryotes, with emphasis on human systems. Biochemistry I is devoted to mastering 1) the structure and function of amino acids and proteins and 2) carbohydrate structure and metabolism, as a means of understanding biological processes in general and developing problem-solving skills in biochemistry. Fundamental thermodynamic principles that drive life processes and the regulatory mechanisms that fine-tune them are stressed in order to provide the rationale and framework for students to master the necessary molecular structure and pathways. Relevance to human physiology, medicine, and genetics is used to stimulate students to begin the integration of biochemistry with other disciplines.

Outcomes: Students will be able to:

1. Explain the basic thermodynamics governing biochemical reactions and use this information to solve problems involving biochemical thermodynamics.
2. Recognize the molecular structures and describe the chemical properties of proteins, their amino acid residues, and carbohydrates; and solve related pH problems.
3. Explain enzyme catalysis and regulation, and apply enzyme kinetics in problem solving.
4. Describe the central pathways for the catabolism of glucose and complex carbohydrates, and gluconeogenesis
5. Understand the organization of electron transport chains, and the different mechanisms for ATP synthesis

Required textbooks:

Biochemistry, 3rd edition, by Garrett and Grisham (ISBN 0-534-49033-6)

Jemiolo & Theg's 3rd edition Student Manual to accompany Biochemistry by Garrett and Grisham (ISBN 0-534-49035-2) will be used in the Workshops, BIO 3161.

Click on the following for copies of assigned Problem Sets:

Problem Set 1, Problem Set 2, Problem Set 3, Problem Set 4

Check out the Garrett and Grisham Website for help with Difficult Concepts, e.g., Acid/Base Theory: http://www.brookscole.com/chemistry_d/templates/student_resources/0030223180_garrettgrisham/HardToGrasp/HardToGrasp.html

Class schedule:

Jan. 9 through Feb. 27 (Dr. Marsh) 2 exams \times 20% each + 2 problem sets \times 5% each = 50% of grade

March 1 through end of semester (Dr. Cirillo) 2 exams \times 20% each + 2 problem sets \times 5% each = 50% of grade

(Click on the highlighted topics for a set of lecture figures and notes.)

Date	Topic	Assignment
Tues. Jan. 9	Introduction; Weak interactions	Chap. 1

Thurs. Jan. 11	Water and Acid/base properties	Chap. 2
Tues. Jan. 16	Thermodynamics of Biological Systems	Handout as an alternate to Chap. 3
Thurs. Jan. 18	Review of thermodynamic principles cont.	
Tues. Jan. 23	Structures and properties of amino acids	Chap. 4
Wed. Jan. 24	Last day to drop course without a W	
Thurs. Jan. 25	Protein primary structure Review List for Exam #1, Example exam questions	Chap. 5 <i>Problem Set #1 due</i>
Tues. Jan.30	EXAM #1 on Chap. 1-5 Bring a scantron form, no. F-1712 for the exam	
Thurs. Feb. 1	Protein purification & characterization	Appendix to Chap. 5
Tues. Feb. 6	Protein secondary, tertiary, and quaternary structure	Chap. 6
Thurs. Feb. 8	Protein structure cont.	Chap. 6
Tues. Feb. 13	Enzyme kinetics	Chap. 13.1 - 13.3
Thurs. Feb. 15	Inhibition kinetics ; Bisubstrate kinetics	Chap. 13.4 - 13.7
Tues. Feb. 20	Irreversible inhibition ;Chaperones; Protein denaturants	Sec. 31.1 on pp 1023-1027
Thurs. Feb. 22	Catch-up and review for exam Review List for Exam #2, Example exam questions	<i>Problem Set #2 due</i>
Tues. Feb. 27	EXAM #2 Chap. 5 appendix, Chap. 6, 13 & Sec. 31.1 Bring a scantron form, no. F-1712 for the exam	
Thurs. March 1	Mechanisms of enzyme action	Chap. 14.1-14.6
Tues. March 6	Spring Break	
Thurs. March 8	Spring Break	

Tues. March 13	Enzyme active sites; catalytic mechanisms	Chap 14.7
Thurs. March 15	Enzyme regulation; Hemoglobin	Chap. 15, 15 appendix
Tues. March 20	Carbohydrates; Metabolism - Part I	Chap. 7.1-7.3,17.1-17.3
Weds. March 21	Last day to drop course with a WP/WF	
Thurs. March 22	Glycolysis - First Phase	Chap. 18.1-18.3 <i>Problem Set #3 due</i>
Tues. March 27	EXAM #3 on Chap. 7.1-7.3, 14, 15, 15 Appendix, 17.1-17.3, 18.1-18.3 - Bring a scantron form, no. F-1712 for the exam	
Thurs. March 29	Glycolysis - Second Phase	Chap. 18.4-18.7
Tues. April 3	TCA cycle - Part I	Chap. 19.1-19.5
Thurs. April 5	TCA cycle - Part II	Chap. 19.6-19.10
Tues. April 10	Respiration; Oxidative phosphorylation	Chap. 20
Thurs. April 12	Gluconeogenesis; Glycogen metabolism	Chap. 22.1-22.5
Tues. April 17	Pentose pathway	Chap. 22.6
Thurs. April 19	Review for exam	<i>Problem Set #4 due</i>
Tues. April 24	EXAM #4 on Chap. 18.4-18.7, 19, 20, 22 - FINAL Bring a scantron form, no. F-1712 for the exam	

Workshop schedule

Session	Date	Topic
Tues., Wed.	Jan. 9, 10	Acid/Base calculations, HH equation
"	Jan. 16, 17	Acid/Base calculations, HH equation; Thermodynamics
"	Jan. 23, 24	Thermodynamics; Peptide sequencing and protein structure
"	Jan. 30, 31	Protein structure, purification and characterization
"	Feb. 6, 7	Enzyme kinetics
"	Feb. 13, 14	Enzyme kinetics; Enzyme inhibition

"	Feb. 19, 20	Irreversible inhibition; Mid-term review
"	Feb. 27, 28	Enzyme mechanisms and regulation
"	March 6, 7	Spring Break
"	March 13, 14	Metabolism overview and vitamins Carbohydrates and glycolysis
"	March 20, 21	Glycolysis and gluconeogenesis
"	March 27, 28	Control of glycogen metabolism
"	April 3, 4	TCA cycle
"	April 10, 11	Electron transport and oxidative phosphorylation
"	April 17, 18	Final review

Grading Four Exams – each will count as 20% of grade; Four Workshop Problem Sets – each will count as 5% of grade.

Workshop Problem Sets There will be four graded problem sets, which will be reviewed during the workshops. These problems are intended to be similar in structure and scope to those that appear on the exams. Answers to problems will be posted following their due date.

Grades The grade scale will be:

A+ 88-100, A 84-87, A- 80-83

B+ 76-79, B 72-75, B- 68-71

C+ 64-67, C 60-63, C- 56-59

D+ 52-55, D 48-51, D- 44-47

F ≤43

If your final mean numerical score is fractional it will be rounded off to the nearest integer value: i.e., 0.5 - 0.9 will be rounded up to the next highest whole number. In other words 85.5 would be rounded to 86 and the student would receive an A grade, but 85.4 would be rounded to 85 and the student would receive a B grade.

You will receive the same letter grade in both BIOL/CHEM 3361 and BIOL 3161

Course Policies

Make-up exams: Do not miss the exams as make-up exams will only be given in the case of a documented emergency.

Problem set due dates: Due dates are listed in the class schedule. Problem sets are due at the beginning of BIOL/CHEM 3361 lecture on the due date; late submissions will not be accepted so you may want to turn in your problem set answers early to a TA.

Cell-phone use: Cellular telephones and pagers must be turned off and put away during lectures and exams.

Hand-held calculators: Calculators may be used for exams, but if they are programmable they will subject to examination by the instructor or TA to verify that their memory is cleared.

BIOL 6352 students: If you have registered for this course under the graduate listing BIOL 6352, all of the above apply, except that you are not required to register for a workshop (you may, of course, attend if you wish). Examinations will consist of two parts: one part that is the same as that taken by undergraduate students enrolled in the class and a second part that will contain several additional problems.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part I, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's

end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of **F**.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22

PO Box 830688

Richardson, Texas 75083-0688

(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes with enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision

of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.

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