

Chemistry 160 – INTRODUCTORY BIOCHEMISTRY - Fall 2022

Course Information:

Class days: Tuesday and Thursday

Class times: 2:00-3:15 pm

Class location: (Storm Hall) SH 101

Mode of delivery: Lecture/discussion

3 credits, Section 01, (or Zoom if

conditions and policy change)

Class Schedule # 20855

Instructor: Dr.K. (David Kretchmar, PhD.)

Phone: 217.622.1901 (cell)

Email: dkretchmar@sdsu.edu

Office: Love Library Room 328 (MSLC – 3rd floor Love Library)

Office hours: Tues/Thurs 3:20 pm - 5:00 pm,

or **by appointment**

Prerequisite: Chem 130 Organic Chemistry or equivalent

Course Objective: This course is intended primarily for majors in nutrition and related fields. Not applicable for admission to the School of Nursing. Biochemistry is an attempt to describe the complex traits of biological systems in terms of the molecules that make up living things. The goal of this course is to provide students with an interest in nutrition and the life sciences with a working vocabulary and a structural and functional understanding of the molecules and processes in living systems. In addition, students are provided with the tools to succeed in upper division courses that require an understanding of biomolecules. The topics will include thermodynamics; properties of biomolecules (carbohydrates, lipids, nucleic acids, and proteins); the biochemical composition of foods and cells; principles of enzyme and receptor chemistry; membrane transport; cell signaling; general metabolic concepts; and bioenergetics.

Course content: This is an introductory biochemistry class aimed at students interested in nutritional sciences and related fields. The major topics of the course are as follows:

1. Chemical composition, properties of cells and biomolecules: carbohydrates, lipids, nucleic acids, & proteins
2. Origin and evolution of life
3. History of biochemical science issues and inequalities in the field
4. Aqueous chemistry and buffers
5. The Central Dogma: genes to RNA to proteins (most of the time)
6. Protein structure and function
7. Basic principles of enzymes
8. Membrane structure, membrane transport and cell signaling
9. Introduction to metabolism and bioenergetic
10. How biochemistry as a science relates to the human condition.

Course materials:

- Simple Scientific Calculator with log/antilog (non-graphing)
- Computer with videoconference compatibility (Zoom or Conferences thru canvas)
- We will use handouts and PowerPoint lectures that will be posted on Canvas.

Textbook: Essential Biochemistry (5th ed., Pratt & Cornely) with WileyPLUS

Access will be through Immediate Access. The Bookstore has a FAQ to explain Immediate Access here:

www.shopaztecs.com/t-immediateaccess-faq.aspx

Print ISBN 9781119713203, 111971320X

eText ISBN 9781119712855, 1119712858

Important Dates: https://registrar.sdsu.edu/calendars/academic_calendars/fall-2022

- First Day of Classes.** Faculty can begin to add seats from class section wait lists. If a seat becomes available, students on the wait list will be added automatically. Faculty can select the number of students to be added to each course section through the class rosters available in the SDSU WebPortal.
- Aug. 22
- Aug. 28 Last day of [wait list](#) auto-enrollment. After this date, enrollment in open seats is not automatic or guaranteed. Faculty must enroll students from their wait list.
- Aug 29 - Sept. 2 On the sixth instructional day through the Schedule Adjustment deadline, enrollment in open seats is not automatic or guaranteed. Faculty must monitor their class rosters and determine if students may be added to the wait list to meet the enrollment needs for the class.
- Aug. 31 Last day for faculty to drop students from classes (11:59 p.m. deadline).
- Sept. 2 [Schedule Adjustment Deadline](#). Last day to add, drop, or change grading basis (7:59 p.m. deadline).
- Sept. 2 Last day to [officially withdraw](#) from the university without penalty fee for fall semester 2022. Withdrawal requests after September 2 are accepted by petition only.
- Sept. 2 Last day to apply for December 2022 graduation with a bachelor's degree or advanced degree. For more information visit the [Apply to Graduate](#) web page.
- Sept. 2 Last day to file petition for concurrent graduate credit for fall semester 2022.

You are 100% responsible for all assignments that are due and for keeping up with the work!!!
If conditions warrant...all class activity will be taught on-line via zoom (Please have available a computer with videoconference compatibility at the ready)

Grading Policy and Scale:

Grades will be based on exams, quizzes, term paper, homework and participation as follows:

<u>Activity</u>	<u>Points</u>	<u>% of Total</u>
Exams (3 @ 100 pts + Final @ 150 pts)	450	56.25
Abstract + Term paper (20 + 80)	100	12.50
Quizzes (best 10 @ 20 pts each)	200	25.00
Homework/other	40	5.00
Participation	10	1.25
Totals →	800	100.00

The following grading scale will be applied to all work:

<u>Letter Grade</u>	<u>Points</u>
A	744.0 – 800.0
A-	720.0 – 744.0
B+	696.0 – 720.0
B	664.0 – 696.0
B-	640.0 – 664.0
C+	616.0 – 640.0
C	584.0 – 616.0
C-	560.0 – 584.0
D+	536.0 – 560.0
D	480.0 – 536.0
F	< 480.0

Exams: There will be three (3) unit tests given approximately the 4th, 8th and 12th week of the semester, and a comprehensive final. Exams may include multiple choice, short answer, matching, true/false, calculations and **essay questions**. The tests will be given in class or on-line. Any changes to the projected test dates will be announced in class. You are expected to be present when a test is given, **No make-up exams will be given without prior arrangement**. A comprehensive final exam will cover the entire semester and will be given during finals week. **This test must be taken on the date scheduled. NO EXCEPTIONS.** Everyone must take the final. **Exams and Conflicts:** If you have an exam conflict, you must inform the instructor **at least ONE WEEK** in advance to arrange an alternate exam. No late exams will be given.

Quizzes; may be given at least once per week during the semester. Quizzes will be given on-line and will have a time limit during a given time window.

Missed Quizzes: No make-up quizzes will be allowed without prior arrangement with the instructor.

Abstract and Term paper: An Abstract and a **long** term paper project for the semester (6 to 10 pages), involving a topic of your choosing involving biochemical pathways and mechanisms.

Abstract is due Thursday September 8th by 11:59 pm. (topic must be approved by instructor)
Email assignments as pdf or doc or docx file (**all Mac users be aware of this**) to dkretchmar@sdsu.edu

Term papers will be due October 30th through November 20th.

A random number 1 thru 4 will be assigned to your name by the middle of September.

All assigned #1 will be due Sunday October 30th by 11:59 pm

All assigned #2 will be due Sunday November 6th by 11:59 pm

All assigned #3 will be due Sunday November 13th by 11:59 pm

All assigned #4 will be due Sunday November 20th by 11:59 pm

You can always turn your term paper in early.

Does anyone want to volunteer for week #1? (... you cannot volunteer for weeks 2 thru 4).

If so please E-mail Dr. K. (dkretchmar@sdsu.edu)

Term papers should be 6 to 10 pages in length, and double spaced, 12 point Arial or Helvetica font. (Abstract and Bibliography pages do not count!)

Flow charts, tables and pictures are encouraged (and they take up space) ...

(I.E... when you read an article, what helps you understand what you are reading? You have all heard the old adage "A picture is worth a 1000 words"...in this case it depends on the size of the picture, table or flow chart...but all pictures and no description is a sure way the get a poor grade)

The **minimum requirements to pass this course are: Your average Exam and Quiz score must be at least 60% for the three exams, final exam and 10 quizzes**. If you do not meet the minimum requirements, you will receive a grade of F regardless of your total points.

Missed or Late Assignments: All homework that is to be turned in will receive a deduction of 20% for each business day that it is late. Any homework assignment not turned in will be deducted from your final grade. Your lowest quiz score(s) above 10 total quizzes will be absolved from your record before final course grades are calculated.

Any graded homework assignment not turned in will be deducted from your final grade!!!

Canvas: Our course Canvas site will contain (1) the PowerPoint lecture slides for each lecture; (2) any handout from lecture (homework, in-class assignments, syllabus, etc.); (3) announcements and other information. Check your Canvas and SWCCD e-mail daily.

University policies:

Accommodations: Students Ability Success Services: If you are a student with a disability and are in need of accommodations for this class, please contact Student Ability Success Center at (619) 594-6473 as soon as possible. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please know accommodations are not retroactive, and I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Ability Success Center. Your cooperation is appreciated and to your benefit.

<https://sites.google.com/sdsu.edu/sasconnect/home>

Religious Observances: The University Policy File includes the following statement on Absence for Religious Observances: By the end of the second week of classes, students should notify the instructors of affected courses of planned absences for religious observances. Therefore, if you foresee that the date of a religious observance coincides with an exam date, please see me before the end of the second week of the semester. Do not wait, no make-up exam requests will be granted within 5 business days, either before or after an exam date.

Academic Honesty: The University adheres to a strict [policy prohibiting cheating and plagiarism](#). Examples of academic dishonesty include but are not limited to:

- copying, in part or in whole, from another's test or other examination;
- obtaining copies of a test, an examination, or other course material without the permission of the instructor;
- collaborating with another or others in work to be presented without the permission of the instructor;
- falsifying records, laboratory work, or other course data;
- submitting work previously presented in another course, if contrary to the rules of the course;
- altering or interfering with grading procedures;
- assisting another student in any of the above;
- using sources verbatim or paraphrasing without giving proper attribution (this can include phrases, sentences, paragraphs and/or pages of work);
- copying and pasting work from an online or offline source directly and calling it your own;
- using information you find from an online or offline source without giving the author credit;
- replacing words or phrases from another source and inserting your own words or phrases.

The California State University system requires instructors to report all instances of academic misconduct to the Center for Student Rights and Responsibilities. Academic dishonesty will result in disciplinary review by the University and may lead to probation, suspension, or expulsion. Instructors may also, at their discretion, penalize student grades on any assignment or assessment discovered to have been produced in an academically dishonest manner. Students will receive a zero on the assignment in question, in accordance with the SDSU academic integrity policy. A second instance of academic dishonesty will result in failure of the course and possible expulsion from the university.

Campus Safety: To be prepared for emergencies, each student is responsible for becoming familiar with the evacuation plan specific to each classroom. The evacuation plan is posted within each classroom and should be examined on the first day of class. Campus police can be reached by dialing (619) 594-1991 or call 911 in the event of an emergency.

Student Privacy and Intellectual Property: The [Family Educational Rights and Privacy Act](#) (FERPA) mandates the protection of student information, including contact information, grades, and graded assignments. Canvas and SDSU e-mail will be used to communicate with you. Students will be notified at the time of an assignment if copies of student work will be retained beyond the end of the semester or used as examples for future students or the wider public. Students maintain intellectual property rights to work products they create as part of this course unless they are formally notified otherwise.

Classroom Conduct Standards: SDSU students are expected to abide by the terms of the Student Conduct Code in classrooms and other instructional settings. Prohibited conduct includes:

- Willful, material and substantial disruption or obstruction of a university-related activity, or any on-campus activity.
- Participating in an activity that substantially and materially disrupts the normal operations of the University or infringes on the rights of members of the University community.
- Unauthorized recording, dissemination, or publication (including on websites or social media) of lectures or other course materials.
- Conduct that threatens or endangers the health or safety of any person within or related to the University community, including
 1. physical abuse, threats, intimidation, or harassment.
 2. sexual misconduct.

Violation of these standards will result in referral to appropriate campus authorities.

Resources for students: A complete list of all academic support services--including [Writing Center](#) and [Math Learning Center](#)--is available on the Student Affairs' [Academic Success](#) website. [Counseling and Psychological Services](#) (619-594-5220) offers confidential counseling services by licensed therapists; you can Live Chat with a counselor at http://go.sdsu.edu/student_affairs/cps/therapist-consultation.aspx between 4:00pm and 10:00pm, or call San Diego Access and Crisis 24-hour Hotline at (888) 724-7240.

Medical-related absences: Students are instructed to contact their professor/instructor/coach in the event they need to miss class, etc. due to an illness, injury or emergency. All decisions about the impact of an absence, as well as any arrangements for making up work, rest with the instructors. [Student Health Services](#) (SHS) does not provide medical excuses for short-term absences due to illness or injury. When a medical-related absence persists beyond five days, SHS will work with students to provide appropriate documentation. When a student is hospitalized or has a serious, ongoing illness or injury, SHS will, at the student's request and with the student's consent, communicate with the student's instructors via the Vice President for Student Affairs and may communicate with the student's Assistant Dean and/or the [Student Ability Success Center](#).

Counseling and Psychological Services: <https://sacd.sdsu.edu/cps> offers confidential counseling services by licensed therapists. Students can talk with a therapist by calling (619) 594-5220 between 4:00pm and 4:00pm. For after-hours services, students can call the San Diego Access and Crisis Line 24-hours a day at (888) 724-7240.

SDSU Economic Crisis Response Team: If you or a friend are experiencing food or housing insecurity, or any unforeseen financial crisis, visit sdsu.edu/ecrt, email ecrt@sdsu.edu, or walk-in to Well-being & Health Promotion on the 3rd floor of Calpulli Center.

Email Policy: Per University Senate policy, students are responsible for checking their official university email once per day during the academic term. For more information, please see [Student Official Email Address Use Policy here](#). All communication regarding this course should occur through official SDSU email accounts. The course instructor will be available via email to answer questions or to schedule office hour appointments. Please allow at least 24 hours for a response, longer over weekends and holidays. To ensure a prompt response include CHEM160 in the subject line of your emails and make sure to provide your full name.

Land Acknowledgement: For millennia, the Kumeyaay people have been a part of this land. This land has nourished, healed, protected and embraced them for many generations in a relationship of balance and harmony. As members of the San Diego State University community, we acknowledge this legacy. We promote this balance and harmony. We find inspiration from this land, the land of the Kumeyaay.

Preferred Names & Pronouns: Any student who wishes to be addressed by a name other than what is presented in Canvas is encouraged to contact the instructor with the name you wish to use. Similarly, if you have preferred pronouns that you wish to be addressed by please contact the instructor.

Syllabus Policy: The instructors reserve the right to change any portion of the syllabus at any time that is deemed necessary to best serve the educational interests of the students in this class, based on the timeline of the class, feedback from students and logistical issues. Changes will not be frequent, and all changes will be announced during a lecture or on Canvas (**may only be announced once**). This means that class attendance in lecture and **checking SDSU email and Canvas** is essential to fully understand the expectations of the course.

Course Calendar/Schedule: Tentative Class Schedule (Emphasis on the word “tentative”)

Date	Day	Topic	Reading
Aug 23	Tuesday	Chemical Basis of Life	Chap 1
Aug 25	Thursday	Chemical Basis of Life	Chap 1/2
Aug 30	Tuesday	Aqueous Chemistry	Chap 2
Sep 1	Thursday	Aqueous Chemistry	Chap 2/3
Sep 6	Tuesday	Nucleic Acids	Chap 3
Sep 8	Thursday	Protein Structure	Chap 4
Sept 13	Tuesday	Protein Structure	Chap 4 & 5
Sept 15	Thursday	EXAM #1	
Sept 20	Tuesday	Protein Function	Chap 5
Sept 22	Thursday	Protein Function/Enzymes	Chap 5 & 6
Sept 27	Tuesday	Enzymes	Chap 6
Sept 29	Thursday	Kinetics and Inhibition	Chap 7
Oct 4	Tuesday	Lipids & Membranes	Chap 8 & 9
Oct 6	Thursday	Membrane Transport	Chap 8 & 9
Oct 11	Tuesday	Transport/Signaling	Chap 9 & 10
Oct 13	Thursday	EXAM #2	
Oct 18	Tuesday	Signaling	Chap 9 & 10
Oct 20	Thursday	Signaling	Chap 10 & 11
Oct 25	Tuesday	Carbohydrates	Chap 10 & 11
Oct 27	Thursday	Carbohydrates	Chap 11
Nov 1	Tuesday	Metabolism/Bioenergetics	Chap 12
Nov 3	Thursday	Metabolism/Bioenergetics	Chap 12
Nov 8	Tuesday	Glucose Metabolism	Chap 13
Nov 10	Thursday	EXAM #3	
Nov 15	Tuesday	Glucose Metabolism	Chap 13
Nov 17	Thursday	Citric Acid Cycle	Chap 14
Nov 22	Tuesday	Oxidative Phosphorylation	Chap 15
Nov 24	Thursday	Eat too much!!!	Thanksgiving Holiday
Nov 29	Tuesday	Electron transport chain	Chap 15
Dec 1	Thursday	Electron transport chain	Chap 15
Dec 6	Tuesday	Regulation of Fuel Metab.	Chap 19
Dec 8	Thursday	Regulation of Fuel Metab.	Chap 19
Dec 13?	Tuesday	REVIEW	
Dec 15	Thursday	FINAL EXAM 1 to 3 pm	

Structures to know!!!

Water	Glucose (linear structure)
Alanine	Fructose (linear structure)
Asparagine	NAD / NADH
Aspartic acid	FAD / FADH ₂
Arginine	DHAP (dihydroxy acetone phosphate)
Cysteine	G-3-P or GADP (glyceraldehyde-3-phosphate)
Glutamine	PEP (phosphoenolpyruvate)
Glycine	Pyruvate
Glutamic acid	Acetate
Histidine	Ethanol
Isoleucine	Citrate
Lysine	α -Ketoglutarate
Leucine	Fumarate
Phenylalanine	Malate
Methionine	Oxaloacetate
Serine	
Proline	Acetyl-CoA (Just the acetyl group and attachment – not the CoA)
Tryptophan	Acetone
Threonine	Acetoacetate
Tyrosine	β -hydroxybutyrate
Valine	Mevalonate
Citrulline	Cholesterol
Ornithine	Glutathione
Fatty acid (basic structure)	Pentose
Triglyceride (basic structure)	Purine
Methyl group	Pyrimidine
Ethyl group	Uracil
Aldehyde	Adenine
Ketone	Guanine
Carboxyl group	Cytosine
Hydroxyl (alcohol) group	Thymine
Ether linkage	FAD
Ester linkage	NADPH
Anhydride (dicarboxylic acid)	
Amino group	DNA
Imino	RNA
Guanidino	Nucleoside
Imidazole	Nucleotide
Phosphoryl group	ATP / dATP / cAMP
Phosphoanhydride	GTP / dGTP
Mixed anhydride (Acyl phosphate or Carboxylic and Phosphoric acid)	CTP / dCTP
	TTP / dTTP
	UTP
	IMP (Inosine monophosphate)

Know the metric system, and especially, all bolded items on this page!!!

Meters.....Liters.....Grams

Prefix:	Symbol:	Magnitude:	Meaning (multiply by):
Yotta-	Y	10^{24}	1 000 000 000 000 000 000 000 000
Zetta-	Z	10^{21}	1 000 000 000 000 000 000 000
Exa-	E	10^{18}	1 000 000 000 000 000 000
Peta-	P	10^{15}	1 000 000 000 000 000
Tera-	T	10^{12}	1 000 000 000 000
Giga-	G	10^9	1 000 000 000
Mega-	M	10^6	1 000 000
myria-	my	10^4	10 000 (this is now obsolete)
kilo-	k	10^3	1000
hecto-	h	10^2	100
deka-	da	10	10
-	-	-	-
deci-	d	10^{-1}	0.1
centi-	c	10^{-2}	0.01
milli-	m	10^{-3}	0.001
micro-	μ (mu)	10^{-6}	0.000 001
nano-	n	10^{-9}	0.000 000 001
pico-	p	10^{-12}	0.000 000 000 001
femto-	f	10^{-15}	0.000 000 000 000 001
atto-	a	10^{-18}	0.000 000 000 000 000 001
zepto-	z	10^{-21}	0.000 000 000 000 000 000 001
yocto-	y	10^{-24}	0.000 000 000 000 000 000 000 001

1 inch = 2.54 cm

1 cm³ = 1 mL

Cut on dashed line and Email picture or scan to or bring to class. Email to: dkretchmar@sdsu.edu

I have read this syllabus (CHEM160 - Fall 2022) and understand the content.

Printed Name: _____ Date: _____

Signature: _____ Section 01, Schedule # 20855