

Chemistry 564 - Receptor Biochemistry and Protein Modifications

SDSU Spring Semester 2021

Course Information:

Class days: Monday and Wednesday
Class times: 10:00-10:50 am
Class location: Virtual
Mode of delivery: Lecture/discussion
2 credits, Section 01,
Class Schedule # 20804

Instructor: Dr.K. (David Kretchmar, PhD.)
Phone: 217.622.1901
Email: dkretchmar@sdsu.edu
Office location: Internet (call, text or zoom)
Office hours: M & W ≈ 9 - 10am & 11am - Noon
or by appointment

Learning objectives:

- Describe various types of lipids and membrane proteins.
- Describe how proteins, lipids and carbohydrates are involved in signal transduction.
- Discuss and describe the importance of signal transduction, the need for communication between cells in multi-cellular organisms, sensing the environment, and role of receptors in sensing and communication.
- Discuss and describe the biochemical mechanisms of taste, touch, smell, sight, sound, temperature, etc.
- Detail the signal transduction cascades of various membrane and cytosolic receptors.
- Discuss receptor-mediated endocytosis.
- Discuss regulated intramembrane proteolysis.

Prerequisites: Chem 560:

Amino acids	structures and basic chemical properties
Nucleotides	structures, names and chemical properties
Proteins	primary, secondary and tertiary structure; forces involved in protein folding, basic understanding of enzyme-mediated catalysis
Lipids	structure and function of common lipids
Membranes	function and physical properties, types of membrane proteins, synthesis of type 1 integral membrane proteins
Cell biology	basic organization and compartmentalization of the cell

Course materials:

- Simple Scientific Calculator (non-graphing)
- Computer with videoconference compatibility (Zoom or Conferences thru canvas)
- We will use handouts and PowerPoint lectures that will be posted on Canvas. (Handouts are copies of articles from the scientific literature).
- You may find useful information in Principles of Biochemistry (Lehninger), the 6th edition is sufficient (and available as a free PDF on line). Signal transduction (Gomperts, Kramer and Tatham) is a book completely devoted to signal transduction.

Important Dates: Wed. Jan. 20, 1st day of class;

Fri. Jan. 29 Last day for faculty to drop students from classes. (11:59 p.m. deadline);

Tues. Feb. 2 - Last day to officially withdraw without penalty fee. Last day for students to add, drop, or change grading basis (7:59 p.m. deadline). Last day for faculty to add from their wait list.

Grading Policy and Scale:

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

<u>Activity</u>	<u>Points</u>	<u>% of Total</u>
Exams (2 @ 150 + Final @ 200)	500	50.0
Term paper	180	18.0
Quizzes (8 total)	160	16.0
Homework/other	140	14.0
Participation	<u>20</u>	<u>2.0</u>
Total	1000	100.0

The following grading scale will be applied to all work:

<u>Letter Grade</u>	<u>Points</u>	<u>Percentages (%)</u>
A	930 – 1000	93.0 – 100.0
A-	900 – 929	90.0 – 92.9
B+	870 – 899	87.0 – 89.9
B	830 – 869	83.0 – 86.9
B-	800 – 829	80.0 – 82.9
C+	770 – 799	77.0 – 79.9
C	730 – 769	73.0 – 76.9
C-	700 – 729	70.0 – 72.9
D+	670 – 699	67.0 – 69.9
D	630 – 669	63.0 – 66.9
D-	600 – 629	60.0 – 62.9
F	< 60.0	0 – 59.9

Exams: There will be two (2) unit tests given approximately the 6th, and 10th 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 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 (**some will be unannounced**). Quizzes will be given on-line or during class 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.

Term papers/projects: There will be two project assignments during the course. This first project is a presentation based on a case study of a crime scene that involves the use of a chemical forensic technique (70 points). The second project will be term paper on an environmental forensic topic that must be approved in advance by the instructor (100 points).

The **minimum requirements to pass this course** are: **Your average exam score must be at least 60% for the two (2) hourly exams and the final exam**, If you do not meet the minimum requirements, you will receive a grade of F regardless of your total points.

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

University policies:

Accommodations: 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. 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.

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.

Religious observances: According to the University Policy File, students should notify the instructors of affected courses of planned absences for religious observances by the end of the second week of classes.

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.

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.

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.

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](#).

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.

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.

Tentative Class Schedule (Emphasis on the word “tentative”)

Week	Date	Lecture	Topic(s)
1	1/20	1	Introduction...receptors???
2	1/25	2	Lipids, Carbohydrates, Proteins and Membranes...
	1/27	3	Integral and lipid-linked membrane proteins and domains
3	2/1	4	Endorphin and Opioid receptors...what a rush!!!
	2/3	5	Secretory pathways...how fast can you think, literally?
4	2/8	6	Auditory receptors...can you hear me?
	2/10	7	Photoreceptors...what do you see?
5	2/15	8	Olfactory receptors...something smells bad!
	2/17	9	Taste and Chemotactile receptors...are you going to eat that?
6	2/22	10	Touch and Thermoreceptor...chilling to the touch!
	2/24	11	Ligand binding Receptors...don't let go!
7	3/1	12	G-protein coupled receptors...part of the pathway.
	3/3	13	GPCR activation, Cyclic AMP a second messenger
8	3/8	14	Inositol triphosphate pathway
	3/10	15	Phosphate receptors
9	3/15	16	Ryanodine Receptors: Structure, Expression, Molecular Details, and Function in Calcium Release
	3/17	17	Calmodulin
10	3/22	18	Human Cell receptors and Covid19...WTF (wow that's fantastic)!!!
	3/24	19	Analyzing protein-protein interactions
11			Spring break
12	4/5	20	Glut-1 and Glut-2 receptors
	4/7	21	Insulin receptor pathway
13	4/12	22	Glucagon receptor pathway and amplification signals
	4/14	23	Glucagon and amplification signals
14	4/19	24	Chylomicrons and cholesterol transport and binding
	4/21	25	LDL, IDL, HDL receptors
15	4/26	26	Receptor-mediated endocytosis
	4/28	27	Regulated intramembrane proteolysis
16	5/3	28	RIPping and regulation of gene transcription
	5/5	29	CSF-1 receptor ripping

Fold and cut on the dotted line and turn in the contract listed below: (scan or picture) email to dkretchmar@sdsu.edu

I have read this syllabus (CHEM564 - Spring 2021) and understand the content.

Printed Name: _____ **Date:** _____

Signature: _____ **Section 01, Schedule # 20804**