

# CH/BI 308 – Biochemistry

Birmingham –Southern College

Fall 2020

## COURSE DESCRIPTION AND OBJECTIVES

CH308/BI308 is a one semester introductory to biochemistry course for biology and chemistry majors. This course aims to provide an overview of a variety of biochemical principles such as metabolism, enzyme kinetics, biosynthesis of macromolecules, structure and function of macromolecules, and energetics; as well as prepare students to think critically and apply these topics to modern day problems. This course also aims to explore the physiological pathways within the cell and how they become dysfunctional in disease states. After completion of this course students should be able to:

- Apply knowledge of biological systems and their interactions to explain how the human body functions in health and disease,
- Apply knowledge of the atomic and molecular characteristics of biological molecules to predict normal and pathological molecular function,
- Explain how the regulation of major metabolic pathways function to maintain health and identify major forms of dysregulation in disease,
- Apply major principles of physics and chemistry to explain normal biology, pathology and significant diseases,
- Explain the mechanism of action of major technologies used in the prevention, diagnosis and treatment of disease.

## COURSE INFORMATION

**Meeting Room:** Harbert 227 on Mon, [Join Microsoft Teams Meeting](#) to join remotely Wed and Fri.

**Instructor:** Kate Hayden, SSC 342

**Email:** [khayden@bsc.edu](mailto:khayden@bsc.edu)

**Phone:** 205-223-4872 (I recommend calling me via Teams though)

### Virtual Office Hours:

Wednesdays and Fridays 8-11am, 12-5pm

[Book an appointment with me](#)

### Required Materials:

*Fundamentals of Biochemistry* 5<sup>th</sup> ed. By Donald Voet, Judith Voet, and Charlotte Pratt.

*Foundations of Biochemistry* 4<sup>rd</sup> ed. By Jenny Loertscher and Vicky Minderhout

## 1 COURSE WORK AND EVALUATION

Letter grades, as defined in the BSC Catalog, will be assigned at the end of the course based on the number of possible points that you can earn, where 93-100% = A, 90-92% = A-, 87-89% = B+, 83-86% = B, 80-82% = B-, 77-79% = C+, 73-76% = C, 70-72% = C-, 67-69% = D+, 60-66% = D, and <60% = F.

Item	Possible Points
Exam I	200
Exam II	200
Exam III	200
Literature Review Paper	200
Sapling Online Pre-class Assignments/Review	100
In Class Assignments	100
Total Possible	1000

## 2 PRE-CLASS PREPARATION

To ensure an optimal learning experience, each student must prepare for class ahead of time by reading the assigned chapter from the text, watching the lecture videos, and completing the pre-class review activities on Sapling. Lecture videos will be posted to the course Moodle page when available. After reading and watching the video, students are also encouraged to post comments, questions, or concerns about the material in the course page discussion board for that chapter. Students are encouraged to read and respond to each other's posts in the string. These responses can even include comments, questions and concerns regarding the material. For classes involving POGIL activities, each activity has a pre-activity assignment that should be completed prior to the start of class. Proper preparation before class will help ensure students' success in group activities, discussions and POGIL workshops during class

## 3 SAPLING ONLINE PRE-CLASS ASSIGNMENTS

To ensure students have thoroughly reviewed the necessary background materials essential to the next class activity, I have created short, online assignments that will need to be completed prior to the start of class. Assignments will need to be completed by 10 AM prior to the start of each class. **These assignments will be graded for correctness, and students will have two attempts for each question. No late submissions will be accepted, but I will drop the two lowest no zero scores at the end of the term.**

1. Go to [www.saplinglearning.com/login](http://www.saplinglearning.com/login) to create an account. If you already have a Macmillan Learning account you can log in with your existing credentials and skip to step 3.
  - o Create your password and set all three security questions.
  - o Start typing in your institution to select from the options that appear in the Primary Institution or School name field. If your institution does not appear you can add it by typing in the full name: the course name is [Birmingham Southern College – CHEM 308 – Fall 2020](#)
  - o Accept the terms of use and click "Sign Up".
  - o Check your email for the confirmation link to complete your registration and return to the login page.

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2. Set your institution by searching using your institution's full name and selecting the appropriate option from the menu that appears.
3. Under Enroll in a new course, you should see Courses at [Your College]. Click to expand this list and see courses arranged by subject. Click on a subject to see the terms that courses are available.
4. Click on the term to expand the menu further (note that Semester 1 refers to the first course in a sequence and not necessarily the first term of the school year).
5. Once the menus are fully expanded, you'll see a link to a specific course. If this is indeed the course you'd like to register for, click the link.
6. *If applicable*, to access your ebook click on the image of the cover on the right sidebar of your course site. Create an account, or log in with an existing Macmillan Learning eBook account.
7. **Need Help?** Our technical support team can be reached by phone, chat, or by email via the Student Support Community. To contact support, please open a service request by filling out the webform: <https://macmillan.force.com/macmillanlearning/s/>

The following link includes more detailed instructions on how to register for your course: <https://macmillan.force.com/macmillanlearning/s/article/Sapling-Learning-Registering-for-courses>

## 4 IN-CLASS ACTIVITIES

During class, students will participate in various group activities and discussions to apply the material studied prior to meeting. Students will work together in teams of two to three to discuss and work through activities. The solutions or results from activities will be discussed at the end of class as a class and any necessary work will be collected for participation grading. Groups will be selected by the instructor at random. During each exam, you will be asked to reflect on both your and your group's ability to work together. With COVID-19, physical group work is not allowed; instead we will work together in a virtual setting using TEAMS. Each group has their own TEAMS channel as a collaborative workspace with the ability to have discussions, start meetings, save notes and files. On Mondays, all students will attend class in person (if able, those that need to isolate can still attend remotely), and on Wednesdays and Fridays all students will attend remotely. This way all students will be able to interact with me and each other in person once a week. Remote students will "join" the class stream from the "general" channel in TEAMS at the start of class so they will still get the same announcements, pre-activity directions, and mini lectures. Then, once we are ready to begin the day's activity; students will be asked to join their breakout session in their group's channel. We will run through this on the first day of class. Finished activities will be submitted via moodle as a pdf by 8:00 PM central time that day (typically we finish the activity in class).

## 5 EXAMINATIONS

Three in-class open book examinations will be given. Students are expected to take all exams on the dates and times scheduled and must be completed in the time given. Exams will be posted on moodle at 8 AM central time and will be due by 11:59 PM the same day via moodle. I will be available in the TEAMS general channel during our normal class time to answer any questions about the exam. If an exam is missed due to extenuating circumstances, i.e., documented and Provost Office-approved medical or family emergency, the course instructor will use her discretion to determine whether the exam can be made up.

## 6 LITERATURE REVIEW PAPER

Throughout the semester students will write a literature review term paper concerning a disease, disorder, or illness and describe how it impacts the human body via disruption of various physiological pathways and discuss existing or possible treatment options. For instance, patients with cystic fibrosis suffer from a genetic mutation that causes the Na<sup>+</sup>/K<sup>+</sup> protein pumps found in various tissues to be dysfunctional. As a result, patients suffer from poor digestion and absorption of dietary triglycerides (the salt pumps are linked to the release of lipases into the small intestines), high risk of bacterial infections in the lungs (improper pumping of salts causes mucus build up and abnormal pH levels on the lining of the lung in which bacteria thrive), and male patients are unable to reproduce (the malfunctioning salt pumps prevent the release of semen). As can be seen, one mutation in one protein can cause a myriad of disturbances through a variety of physiological and biochemical processes which can greatly impact patients' quality of life. Student papers should be original and should tie in as much RELEVANT course material as possible. More detailed information on this term paper, as well as a detailed rubric will be given at a later date.

## 7 ATTENDANCE POLICY

Those who attend all classes (either in person or remotely) will receive a 10 point bonus at the end of the term. Attendance will be taken daily at the start of class. Students with excused absences will still be eligible for the bonus if they submit their work that was missed that day.

## 8 HONOR CODE

Each student is expected to follow the BSC Honor Code. If it is determined that you have violated the honor code during a pre-activity, in-class activity, pre-class assignment, quiz, or exam you will receive a zero on that component of your grade. Students may not look at POGIL activities from previous years.

## 9 PORTABLE DEVICES

We will be using devices extensively in this class as we do our group work. I encourage you to bring a laptop or chrome book (although cell phones can work in a pinch) if you are the representative attending class that day. Your group members will remote host into the group session. The use of cell phones or other electronic devices to send or receive calls, text messages, surf the internet, etc. are not allowed in the classroom for personal use. Such devices can only be used to aid in group activities when suitable. However, these devices are NOT allowed for use during exams and should be turned off before the start of the exam so they will not ring, vibrate, or otherwise disturb you, your fellow students, or your instructor.

## 10 ACADEMIC SUPPORT SERVICES

Birmingham-Southern College complies with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Students with disabilities who seek accommodations must make their request by contacting the Office of Accessibility in-person, via email ([accessibility@bsc.edu](mailto:accessibility@bsc.edu)), or by calling 205-226-7909. The Office of Accessibility is located in the Counseling and Health Services Suite of Norton Center Room 241. Students who are registered with the Office of

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Accessibility are responsible for providing faculty with a copy of their accommodation letter and scheduling a meeting to discuss how their approved accommodations will apply to this course. Visit the Office of Accessibility website for additional information or contact Angela Smith at [awsmith@bsc.edu](mailto:awsmith@bsc.edu).

## 11 WRITING CENTER

Located in Humanities 102, the Writing Center will offer in-person tutoring Sunday-Thursday 4-8 pm beginning September 6th. The Writing Center's tutors are students from a wide variety of majors on campus and have the range to address student writing needs with discipline specificity. Supervised and assisted by Writing Center directors, our tutors provide one-on-one consultations for any student at any point in the writing process. During these consultations, tutors will not "edit" papers; instead, they will assist students in addressing any potential writing issues, including content development, grammar usage, and citation formatting. Each tutorial is about 30 minutes long, free of charge, and available on a drop-in basis. There is no limit to how many tutorials a student may attend. In light of COVID-19, the Writing Center asks that all students bring digital copies of their assignments and any other relevant materials, such as assignment sheets and rubrics, to their tutorials; we will not be using any hard copies this year. We also ask that all students abide by the BSC guidelines and wear a mask during the entirety of their tutorials in the Writing Center. If you have any additional questions, please contact Laura Tolbert ([letolber@bsc.edu](mailto:letolber@bsc.edu)) or MK Foster ([mkfoster@bsc.edu](mailto:mkfoster@bsc.edu)).

## 12 TITLE IX

Birmingham-Southern College is committed to the creation and maintenance of a safe learning environment for students and the campus community. The College forbids any type of sexual or gender-based misconduct among its students, faculty, and staff. The College encourages all members of the academic community to report suspected sexual and gender-based misconduct to the appropriate authorities so that it can be investigated, remedied, and eliminated. Such misconduct is prohibited whether the actor is a student, faculty member, staff member, contractor, visitor, or another member of the College community. BSC forbids retaliation against any person who has opposed, reported or participated in an investigation concerning sexual or gender-based misconduct.

In accordance with federal policy, all College employees are required to report information related to discrimination and harassment which includes, but is not limited to, sexual assault, relationship violence, stalking, and sexual harassment. For this reason, if you tell a faculty member about a situation of sexual harassment or sexual violence or other related misconduct, the faculty member must share that information with the Title IX coordinator. As a student, you can report allegations of sexual misconduct to officials in Student Development (Assistant Dean of Students, Dana Bekurs; Associate Dean of Students, W. David Miller; Vice President for Student Development, David Eberhardt), Campus Police, or confidential resources in Counseling Services, Health Services, and Religious Life. Please refer to the Title IX section of the BSC website for more information on filing a report and available resources.

## 13 ARC CENTER

We hope this finds you all well. I know we are all doing what we can to adapt to this new normal. We are doing everything we can to best support our students. Attached you will find our [new online tutoring schedule](#). Even though we're continuing to provide exclusively virtual services this fall, we should actually be offering more support than we can typically offer in person. After

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August 18th the updated [links to channels](#) tab should direct you to a subject-specific channel where communication and information for your subject area will be housed and where meetings will take place at their appointed time. Please share these links on your Moodle pages, virtual syllabi, or directly with your students.

Students will be able to simply join the group meeting at the designated time for help, and text, call, video-chat, screen-share, use a whiteboard, and edit live documents with tutors to get the assistance they need. If a student chooses they can reach out to tutors directly via Chat or email for one on one meetings, which the tutor will schedule in the Teams' Calendar at a time convenient for them. Feel free to join us on Teams and share resources with our tutors or upload them to your [channels](#) Files, Notes, or videos via Stream, so that we can best assist you and your students. If you have any questions or wish to collaborate do not hesitate to [contact me](#).

**Teams Tips:**

For a quick tutorial on teams: <https://bit.ly/2yatwhy>

For details on what you need to know about teams:

[Teams Tutorials on Moodle](#)

[Official Microsoft Teams Tutorial on Meetings](#)

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Date	Topic	Ch.#	In-Class Activity
8/24	Introduction		Building place and community during COVID-19
8/26	Thermodynamics	1	S22: Understanding Complex Chemical Sys
8/28	Water, Weak acids, Buffers	2	S1: Chemistry in an aqueous environment
8/31	Amino Acids	4	S2: Amino Acids and the Primary Structure
9/02	Protein Structure	6	S3: Structure of a protein $\alpha$ helix
9/04	Protein Structure	6	S4: 3-D Structure of Proteins
9/07	Protein Function – Hemoglobin	7	S8: Hemoglobin – Structure and Function Pt 1
9/09	Protein Function – Hemoglobin	7	S8: Hemoglobin – Structure and Function Pt 2
9/11	Carbohydrates	8	S13: Carbohydrates and Glycoproteins
9/14	Lipids	9	S14: Lipid Structure and Function
9/16	Biochemical Techniques	3, 5	S5: Tools of Biochemistry
9/18	Biochemical Techniques	3, 5	S6: LWBGase
9/21	<b>EXAM I (Chapters 1 through 9)</b>		
9/23	<b>Peer Review Draft Outline</b>		
9/25	Enzyme Catalysis	11	S9: Enzyme Catalysis
9/28	Enzyme Kinetics	12	S10: Enzyme Kinetics
9/30	Enzyme Inhibition and Control	12	S11: Enzyme Inhibition
10/02	Enzyme Inhibition and Control cont.	12	S12: Enzyme Problems
10/05	Introduction to Metabolism I	14	S21: Understanding rate determining stp
10/07	Introduction to Metabolism II	14	S23: Understanding Metabolically Far From
10/09	Introduction to Metabolism III	14	S24: High Energy Compounds
10/12	Glycolysis	15	S25: Enzymes in Glycolysis
10/14	Glycolysis	15	S26: Regulation of Glycolysis
10/16	Fermentation	15	S29: Glycolysis and Gluconeogenesis P.S.1
10/19	Pentose Phosphate Pathway	15	S31: Pentose Phosphate Pathway
10/21	Gluconeogenesis	16	S30: Glycolysis and Gluconeogenesis P.S.2
10/23	<b>EXAM II (Chapters 11 through 16)</b>		
10/26	<b>Peer Review Draft 1</b>		
10/28	The Citric Acid Cycle	17	S32: Exploring Pyr Dehydrogenase and CAC
10/30	The Citric Acid Cycle	17	S33: Exploring the Citric Acid Cycle
11/02	Electron Transport	18	S34: Electron Transport
11/04	Electron Transport	18	Case Study – The Effect of DNP on ETC
11/06	ATP Synthesis	18	S35: Oxidative Phosphorylation
11/09	ATP Synthesis	18	Case Study/Reflection
11/11	Lipid Metabolism	20	S36: Fatty Acid Degradation and Glucose Synthesis
11/13	Lipid Metabolism	20	S37: Understanding Fatty Acid Biosynthesis
11/16	Amino Acid Metabolism	21	S38: The Urea Cycle and the Effects of Protein Degradation
11/18	Integrated Metabolism		S39: Integrated Metabolism
11/20	<b>Exam III (Chapter 17 through 21)</b>		
11/23	<b>Virtual Peer Review Draft 2</b>		
12/04	<b>Final Literature Review Due</b>		