



The mission of Concord University is to provide quality, liberal arts based education, to foster scholarly and creative activities and to serve the regional community (<http://www.concord.edu/academics/>).

**Course Prefix, Number and Title:** CHEM 341 Biochemistry  
**Course CRN # and Section:** 20246 01  
**Semester Taught:** Spring 2019  
**Credit Hours:** 3  
**Prerequisites:** CHEM 331 with a grade of C or better  
**Co-requisite:** Concurrent enrollment in CHEM 347 recommended  
**Course Time:** MWF 11:00 AM - 11:50 AM  
**Inclement Weather Time:** 12:15 PM – 12:55 PM  
**Building and Room Number:** Science 300

**Professor:** Dr. Kimberly Chambers, Assistant Professor of Chemistry & Biochemistry  
**Office Location:** Science Hall Rm. 401D  
**Office Hours:** M 12-1; W 9:30-10:30; R 1-2; F 9:30-10:30 & 12-1 Also by appointment  
**Email:** [kchambers@concord.edu](mailto:kchambers@concord.edu)  
**Phone:** 304-384-6281 or x6281 (on campus)  
**Office Fax:** 304-384-6225  
**College/Department Website:** <http://www.concord.edu/physci/node/2>

**Course Description/Rationale:**

Study of the structure and function of proteins, carbohydrates and lipids, as well as eukaryotic metabolic pathways.

**Course Management System:** Moodle <https://moodle.concord.edu/login/index.php>  
Course info: Chemistry 341 - Biochemistry  
Moodle Privacy Policy: <https://moodle.org/admin/tool/policy/view.php?policyid=1>  
Moodle Accessibility Statement: <https://docs.moodle.org/34/en/Accessibility>

**Online Homework System:**

Sapling Learning <https://www.saplinglearning.com/ibiscms/login/>  
Course info: Concord University – CHEM 341 – Spring19 - CHAMBERS  
Sapling Learning Privacy Policy: <https://store.macmillanlearning.com/us/privacy-notice>  
Sapling Learning Accessibility Statement: <http://www.saplinglearning.com/ibiscms/help.php?file=accessibility.html>

**Student Response System:**

iClicker

Course info:

CHEM 341 – Chambers – Spring 2019

iClicker Privacy Policy:

<https://store.macmillanlearning.com/us/privacy-notice>

iClicker Accessibility Statement:

<https://www.iclicker.com/accessibility>**Hardware/Software Needed:**

Microsoft PowerPoint &amp; a PDF reader

**Text requirement:**SaplingPlus for *Lehninger Principles of Biochemistry* (6-month access)

Sapling Learning Online Homework with eBook (Nelson, D.L.; Cox, M.M. 2017. *Lehninger Principles of Biochemistry*. 7<sup>th</sup> edition. W.H. Freeman. ISBN 9781319108236)

Other required materials:

Molecule Model Set: Gen &amp; Org Chem. Prentice Hall. ISBN No. 9780139554445

iClicker2 (ISBN: 9781429280471) or iClicker Reef Student App (ISBN: 9781319140175) on mobile device or laptop

Calculator capable of doing logarithms (Note: Calculators that are part of a cell phone are **NOT** acceptable.)**Concord University Educational Goals:**

The mission, educational goals, and objectives of the chemistry program are aligned with the Concord University Mission and Education Goals. This course addresses components of CU Educational Goals (<http://catalog.concord.edu/index.php>) pertinent to Skills #2 & 4 and components of the Chemistry Program Goal (<https://www.concord.edu/phyci/node/11>) #1.1.

**National Standards:** Not applicable**Specific Learning Outcomes:**

As a result of taking the course, the student should be able to:

- sketch all 20 amino acids and recognize their chemical properties
- distinguish between the multiple levels of protein structure
- recognize how proteins interact with other molecules and how these interactions are related to dynamic protein structure
- indicate the properties of enzymes and the principles underlying their catalytic power
- identify some common biochemical techniques for working with biomolecules in the laboratory, construct a plan to use them for a specific task, predict the expected results, and interpret data
- recognize the major classes and chemical structure of carbohydrates and lipids, their physical properties, and structural and functional roles
- indicate the molecular composition and dynamic structure of cellular membranes and how transport is mediated across these membranes
- recognize the role of ATP in energy exchanges

- indicate the importance of oxidation-reduction reactions in living cells and the energetics of electron-transfer reactions
- identify the electron carriers that commonly act as cofactors of enzymes that catalyze electron-transfer reactions
- memorize the individual reactions of glycolysis, gluconeogenesis, the citric acid cycle, glycogen degradation, the pentose phosphate pathway, fatty acid catabolism, oxidative degradation of amino acids and the urea cycle
- recognize the mechanisms of metabolic regulation
- identify the steps and mechanisms of oxidative phosphorylation
- recall the steps involved into the biosynthesis of fatty acids and their assembly into triacylglycerols and membrane phospholipids
- recognize the steps involved in the synthesis of cholesterol

### Course Requirements:

The following assignments will be used to determine the student's grade in the class.

- **Clicker participation:** To assess student understanding throughout lecture and during in-class activities, questions will be asked on a daily basis. Students will be expected to participate by submitting their answers using either a clicker or a mobile device with the Reef application. Each class session will be worth 10 points. Students will receive 9 points for simply answering all of the questions for a class session. If the student has at least one correct answer during the class session, they will receive 10 points for that day. People that are caught with another student's clicker will be considered cheating.
- **Model assignments:** Assignments requiring you to build a biomolecule using your molecular model kit will be given throughout the semester. These biomolecule models will be collected and graded along with a short set of related questions. There will be approximately 5 of these assignments.
- **Online homework assignments:** Questions reviewing the week's material will be posted approximately every Saturday morning on the Sapling Learning site. These questions are to be answered by 11:59 PM the following Wednesday. There will be approximately 15 total assignments.
- **Metabolism poster:** You will prepare a poster that diagrams the various metabolic pathways discussed and their interconnectedness. For this project, you will use a piece of poster board (22" x 28"). These posters will be collected and graded following discussion of fatty acid degradation.
- **Exams:** To assess your overall comprehension of the course material, four lecture exams will be given throughout the semester. These exams may be a combination of multiple choice, matching, draw the structure, fill in the pathway, short answer, problem-solving and essay questions. At the end of the semester, a standardized, **CUMULATIVE** final exam will be given.

- **Extra Credit:** Approximately four times during the semester, quizzes will be given to encourage you to keep up with the material. The instructor will inform you of when the quiz will be and what topics to study. Each quiz will be worth 1 point added to your final grade assuming you receive at least the average score for that quiz. Additionally, all lecture exams will be prepared with 105 possible points and the score will be calculated on a 100-point scale, giving each exam 5 bonus points. **No other extra credit will be available, so DON'T ASK.**

**Grading:**

Clicker participation	9%
Model assignments	5%
Online homework assignments	15%
Metabolism poster	2%
4 Lecture Exams (13% each)	52%
<u>Final exam</u>	<u>17%</u>
Total of	100%

Scale A: 90-100% B: 80-89% C: 70-79% D: 60-69% F: < 60%

**Course Policies:**

- **Attendance & Make-Up:**  
Regular attendance is essential for adequate performance and is required. Although the instructor reserves the right to drop non-attending students, it is the student's responsibility to withdraw if they have decided not to complete the course. Accommodations for documented university or medical excused absences will be made on a case-by-case basis. Due to the nature of some work, there will be no make-ups for the following assignments: clicker participation, model assignments or homework assignments. For other missed work: in situations where the student is aware of the absence in advance (athletic events, field trips, etc.), arrangements for accommodations **MUST** be made prior to the absence; in situations where the student misses due to an unforeseen circumstance, they must contact the instructor (see, email or call) before the end of the missed class period to make arrangements if applicable. Individuals that wait to speak with the instructor at a later date will not be granted permission to make up missed work. Make-ups must be completed within one week of the originally scheduled date.
- **Electronic Assignment Submission:**  
On-line assignments must be completed in a timely fashion. An excuse for "technological difficulties" (internet was down, etc.) is not acceptable.
- **Late Assignments:**  
Assignments that are not submitted at the specified times will be considered late. There will be a 10% deduction for every day late.

- **Electronic Device Policy:** The only appropriate time during class to be using your cell phone is while participating in a clicker activity. The instructor reserves the right to make point deductions from your grade for using a cell phone inappropriately during class. During exams, all electronic devices except calculators must be inaccessible. Use of a cell phone during an exam will result in an F for the exam. Calculators that are part of a cell phone are not acceptable.

### Course Timeline (Schedule of Assignments/Assessments/Presentations):

This is a tentative schedule. The instructor reserves the right to modify this schedule as needed.

Date	Topic	Chapter	Other Assignments Due
<b>Week 1</b>			
1/14	Intro	1.1–1.2, 2.1	
1/16	pH & buffers	2.2–2.3	pH & Buffers Video & prep for pH & Buffers In-Class Activity
*1/18	Working with proteins	3.3–3.4	Working With Proteins Video – Parts 1 & 2 and prep for Protein Techniques In-Class Activity #1 – 4
<b>Week 2</b>			
1/21	<b>No Class – MLKJ Day</b>	-	
*1/23	Working with proteins	3.3–3.4	Working With Proteins Video – Parts 3 & 4 and prep for Protein Techniques In-Class Activity #5 - 7
1/25	Amino acids	3.1	Amino Acids Video & prep for Alanine Model
<b>Week 3</b>			
1/28	3-D structure of proteins	3.2, 4.1-4.4	3D Structure of Proteins Video & prep for Asp-Glu Dipeptide Model
*1/30	3-D structure of proteins	3.2, 4.1-4.4	
2/1	3-D structure of proteins	3.2, 4.1-4.4	Protein Structure Assignment
<b>Week 4</b>			
2/4	Biochemistry of Flavor Tripping	-	Flavor Tripping Video & prep for Flavor Tripping Activity
*2/6	Protein function - hemoglobin	4.3 & 5.1	Protein Function – Hemoglobin Video – Part 1 & prep for Hemoglobin In-class Activity #1 - 8
2/6	<b>Review Session – 4 PM</b>	-	
2/8	<b>Exam 1</b>	-	
<b>Week 5</b>			
2/11	Protein function – hemoglobin	5.1	Protein Function – Hemoglobin Video – Part 2 & prep for Hemoglobin In-class Activity #9 - 25
*2/13	Basic concepts of enzyme action	6.1-6.2	
2/15	Enzyme kinetics, mechanisms & inhibitors	6.3–6.4	Enzyme Kinetics, Mechanisms & Inhibitors Video – Parts 1 & 2 and prep for Enzyme Kinetics In-Class Activity

<b>Week 6</b>			
2/18	Enzyme kinetics, mechanisms & inhibitors	6.3–6.4	
<b>*2/20</b>	Enzyme regulation	6.5	
2/22	Lipids	10.1-10.2	Lipids Video & prep for Decanoic Acid Model
<b>Week 7</b>			
2/25	Lipids Membrane structure & function	10.1-10.2 11.1-11.3	
<b>*2/27</b>	Carbohydrates	7.1-7.4	Carbohydrates Video – Part 1 & prep for D-Glucose Model
3/1	Carbohydrates	7.1-7.4	Carbohydrates Video – Part 2 & prep for Disaccharide Model
<b>Week 8</b>			
3/4	Carbohydrates	7.1-7.4	
<b>*3/6</b>	TBA	-	TBA
3/6	<b>Review Session - 4 PM</b>	-	
3/8	<b>Exam 2</b>	-	
<b>3/11-15</b>	<b>Spring Break</b>	-	
<b>Week 9</b>			
3/18	Digestion Metabolism concepts	14.2, 17.1, 18.1 13.1-13.4, 15.1	
3/20	Metabolism concepts Glycolysis	13.1-13.4, 15.1 14.1-14.3, 15.3	Glycolysis Video – Parts 1 & 2 and prep for Glycolysis In-Class Activity
3/22	Glycolysis Gluconeogenesis	14.1-14.3, 15.3 14.4, 15.3	
<b>Week 10</b>			
3/25	Gluconeogenesis Preparation for citric acid cycle	14.4, 15.3 16.1	
<b>*3/27</b>	Citric acid cycle	16.2-16.3	Citric Acid Cycle Video & prep for Citric Acid Cycle In-Class Activity
3/29	Electron transport chain	19.1	
<b>Week 11</b>			
4/1	Electron transport chain Proton-motive force	19.1 19.2	
<b>*4/3</b>	Proton-motive force	19.2	
4/3	<b>Review Session – 4 PM</b>	-	
<del>4/5</del>	<b>Exam 3</b>	-	
<b>Week 12</b>			
4/8	Glycogen degradation	15.4-15.5	
4/10	Pentose phosphate pathway Fatty acid degradation	14.5 17.1-17.3	
4/12	Fatty acid degradation	17.1-17.3	Prep for Fatty Acid Catabolism In-Class Activity
<b>Week 13</b>			
4/15	Fatty acid synthesis	21.1	Metabolism Poster
<b>*4/17</b>	Lipid synthesis	21.2-21.4	
4/19	Amino acid degradation & urea cycle	18.1-18.3	

<b>Week 14</b>			
4/22	Integration of metabolism	23.2-23.3	
<b>*4/24</b>	Integration of metabolism	23.2-23.3	
4/26	Metabolism review	-	Prep for Metabolism Review In-Class Activity
<b>Week 15</b>			
4/29	TBA		TBA
<b>*5/1</b>	<b>Review Session</b>	-	
5/3	<b>Exam 4</b>	-	

**\* due dates for on-line homework assignments**

~~4/5/19~~ **last day to drop w/ "W"**

**5/6/19 Final Exam (cumulative) - 11:30 AM - 1:45 PM**

### **Accessibility/Accommodations:**

Concord University is committed to responding to the needs of students with disabilities as defined by the Americans with Disabilities Act. Please inform your instructor at the beginning of the class semester if you have a disability and are requesting accommodations. It is your responsibility to self-disclose that you are requesting accommodations. The University and instructor will provide you with a reasonable accommodation. You should register with CU's Disability Services Office, located in the Athens campus Jerry and Jean Beasley Student Center, bottom floor, across from the Campus Post Office. The Disability Services Office phone is 304-384-6086 or you can email the Director, Nancy Ellison, at nellison@concord.edu for assistance.

### **Academic Dishonesty:**

Academic dishonesty is morally unacceptable as well as destructive to the learning and teaching atmosphere. Academic dishonesty includes the giving or receiving of improper help on examinations or assignments, falsifying documents, and plagiarism (the act of stealing and using, as one's own, the ideas or the expression of the ideas of another). Such dishonesty can lead to a variety of penalties — including but not limited to failure of assignment, failure of course, loss of institutional privileges, or dismissal from the University. (See University Catalog Academic Policies and Procedures.)

### **Concord University Honor Code:**

A Concord University Honor Code was approved by students, staff, faculty, administration, and the CU Board of Governors. The Code states:

*"As a member of the Concord University Community I will act with honesty and integrity in accordance with our fundamental principles and I will respect myself and others while challenging them to do the same."*

The Honor Code is intended to unite the Concord community behind a culture of honesty, integrity, and civility.

### **Class/Online Attendance Policy:**

Regular class attendance is part of a student's academic obligation at Concord. Irregular attendance may affect academic performance adversely and is detrimental to the atmosphere of a class. (See University Catalog Academic Policies and Procedures.)

### **Emergency Alert System:**

In an effort to increase safety and security on our campus, Concord University encourages everyone to register for instant text message alerts. Alerts will only be used for security and safety notices. All

students, faculty, and staff are eligible to receive text message alerts on their cell phones or email alerts. Please contact the IT Help Desk for further assistance (304-384-5291).

### **Emergency Information:**

Emergency/courtesy telephones are located at the main entrance of each residence hall and at various other locations on campus. Emergency telephones can be identified by the flashing blue light and will provide the user with a direct link to Public Safety at the press of a button. To report an on-campus emergency, call 304-384-5357 or 911. The Office of Public Safety is located on the bottom floor of the Rahall Technology Center. For further emergency information go to:

<http://www.concord.edu/administration/office-public-safety>.

### **Inclement Weather Policy:**

As a general policy, the University will remain in normal operations during adverse weather conditions. In the event of severe weather conditions, the following may occur:

#### University Closure

No students or employees are to report.

#### Classes Cancelled

Students do NOT report BUT employees are expected to report to work at their normal time.

#### Operating on an Inclement Weather Delay

Under this schedule, all 8 a.m. classes will start at 10 a.m. Students and faculty will follow the Inclement Weather Schedule. (See <http://www.concord.edu/emergency-alerts> for Athens/Beckley Inclement Weather Schedules.)

*\*Announcements invoking the late schedule or other options referenced above are aired on area radio and television stations and are sent as text and email messages to those enrolled for this service. Announcements of campus closures and schedule delays are also posted on the CU webpage. Log on to <http://www.concord.edu> → Everyday Access → Emergency Alert System.*

### **Student Conduct:**

In classrooms, online, laboratories, and during any activities that are part of course requirements, students are expected to observe reasonable rules of conduct.

### **Sexual Harassment & Assault:**

Federal law, Title IX, and Concord University policy prohibits discrimination, harassment, and violence based on sex and gender (including sexual harassment, sexual assault, domestic/dating violence, stalking, sexual exploitation, and retaliation). If you or someone you know has been harassed or assaulted, you can receive confidential counseling support through the Concord University Counseling Center (304-384-5290). Alleged Violations can be reported non-confidentially to the Concord University Title IX Coordinator at 304-384-6327 or [titleix@concord.edu](mailto:titleix@concord.edu). Reports to Campus Security can be made at (304-384-5357). As an employee at Concord University, **I am a mandatory reporter** which means I must report any sexual misconduct I am made aware of. This includes verbal or written (such as in an assignment) disclosures of sexual harassment or sexual assault.



**Technology Services:**

Contact the CU Help Desk at extension 5291 from campus or 304-384-5291 off campus. You may also e-mail [cuhelpdesk@concord.edu](mailto:cuhelpdesk@concord.edu).

**Academic Resources:**

The Academic Success Center is ready to assist any student with academic or personal concerns, tutoring, study skills, time management, and much more. The Academic Success Center is located in Suite 243 (Atrium) of the Rahall Technology Center. Students can stop by the ASC Monday through Friday, 8:00 am until 4:00 or by appointment. The ASC may be reached by calling (304) 384-6074, (304) 384-6298, or [asc@concord.edu](mailto:asc@concord.edu). Website: <http://hub.concord.edu/academicsuccess/> The drop-in tutoring schedule is posted online: <https://apps.concord.edu/tutoring/>. Smarthinking— online, and on-demand tutoring—is available on Blackboard at [elearn.concord.edu](http://elearn.concord.edu).

**Syllabus Disclaimer**

**"This syllabus is subject to change based on the needs of the class. Please check it regularly."**