

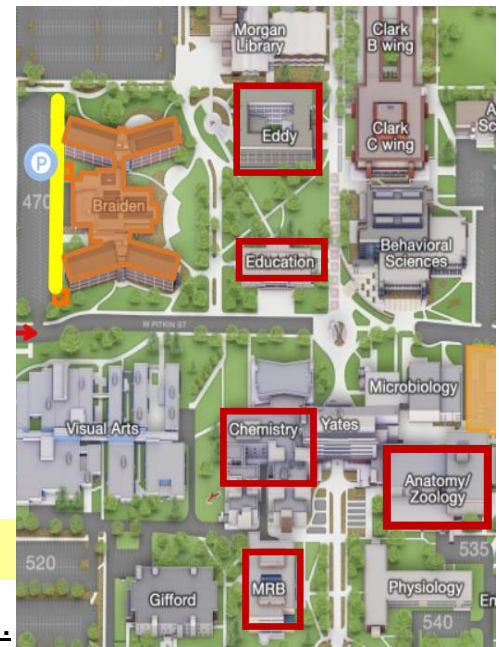
# BC 351 Principles of Biochemistry Fall 2019 - Section 1

MTRF 8:00 to 8:50 AM, EDDY 212

Instructor: Narasimha Sreerama (**Sree**)  
Office: **Anatomy & Zoology E206 (206F) – E-wing**  
Location: **See Map**  
Phone: 970-377-1609  
E-mail: [Narasimha.Sreerama@Colostate.edu](mailto:Narasimha.Sreerama@Colostate.edu) (**preferred**)  
Office Hours: **MTRF Before class (~7:20 AM); TR After class (~9:30)**  
**and By Appointment**

**Text (Optional):** Lehninger Principles of Biochemistry, 6<sup>th</sup> or 7<sup>th</sup> Edition, by Nelson and Cox, (2013 or 2017), W.H.Freeman and Company, New York

**You may use any Biochemistry text as reference (you have to find the relevant sections). I will be referencing specific pages from the text listed above.**



Exam Schedule			Q&A session
Exam I	Monday, <b>Sept 23</b>	Block of 14 lectures	<b>Sunday, Sept 22</b>
Exam II	Monday, <b>Oct 21</b>	Block of 14 lectures	<b>Sunday, Oct 20</b>
Exam III	Monday, <b>Nov 18</b>	Block of 14 lectures	<b>Sunday, Nov 17</b>
Final Exam	<u>Thursday, Dec 19</u> (8:00-9:30 AM)	~50% Lect. 43-52 ~50% Lect. 1-42	<b>Sunday, Dec 15</b>

**Exams:** Three in-term exams (**Weeks 5, 9, 13**) and a final exam (**Finals Week**). Exams will be **objective questions (multiple choice)**. Final grade will be decided as an **average of all exams**.

Exams I to III will have approx. 50 – 60 questions (each for 1, 2, 3, 4, or 5 points – total of 100 points) from a specified block of lectures.

**Final Exam** will have 80 – 90 questions (each for 1, 2, 3, 4, or 5 points – total of 160 points);

It is **cumulative** and about **half of the questions** will be from the topics covered in the **first three exams**.

**Quizzes (on Canvas)** 10 points each – **End of week 3, 7, 11, and 14 (Friday Noon – Monday Noon)**

**Extra credit Quizzes (on Canvas)** 5 points each – **before exam (Friday Noon – Sunday Noon)**

**Watch for Announcements in class and on Canvas**

**Reviews:** There will be an **in-class brief-review** (lecture may include some new material) for each exam.  
**Open Q&A sessions** are planned – Sunday before the Exam

**Grades:** Assigned from total points from all exams and quizzes. Max: **500** (100 × 3 + 160 + 40)

The letter grades will follow the table below, but may be relaxed (the averages required for a specific grade may be reduced, e.g., A – 85 – 100%) to compensate a low class average.

Grade	Final Average
A	90 – 100 %
B	80 – 89 %
C	70 – 79 %
D	60 – 69 %
F	Below 60 %

Some factual information required for the exam-questions will be provided (See sample exams).

A **partial credit may be given** if a proper explanation for a wrong answer is provided (*need to see me in my office!*) – goes toward your understanding of the subject and critical thinking.

For the final exam a **cheat-sheet** (*one-page, A4, written on one side, DO NOT cut and paste questions from other exams – Exams 1-4 or sample exams*) may be allowed. **Details will be discussed in the class at appropriate time.**

**Lecture Slides, Supplemental Material, Sample Exams, and Problem Sets will be posted on Canvas Periodically**

**Tentative Lecture Schedule** (52 Lectures; May change depending on the circumstances)

(A) If there are errors (typing or otherwise) please let me know.

(B) Slides used will be placed as **PDF files on Canvas**. It is your responsibility to print a copy for taking notes.(C) Quizzes will be **online** (on Canvas). It is your responsibility to take them on time.They open on at **NOON** and close at **NOON****(Quiz 1, 2, etc – Friday - Monday)** and **(Quiz 1A, 2A, etc, Friday - Sunday)**. Notifications on Canvas.

(D) Exams will be in class.

Week	Day	Topic	Quiz
Week 1	M	Introduction; <b>Biomolecules</b>	
	T	Building blocks; Chemical basis of life	
	R	<b>Thermodynamics</b> : $\Delta H$ , $\Delta G$ ; $\Delta G^\circ$ and $K_{eq}$	
	F	Oxidation number; Functional Groups	
Week 2	<b>M</b>	<b>LABOR DAY HOLIDAY</b>	
	T	<b>Water</b> ; Non-covalent interactions; polar/nonpolar groups	
	R	pH, pK; acid/base and ionized forms; Buffers	
	F	<b>Nucleic Acids</b> : Central Dogma;	
Week 3	M	<b>DNA &amp; RNA</b> : Sugar, Base, Nucleotides; Chargaff's rules	
	T	DNA & RNA: Secondary structures;	
	R	<b>Gene</b> ; mRNA, tRNA, rRNA	
	F	<b>Gene expression</b> : translation, Genetic Code	<i>Quiz 1</i>
Week 4	M	DNA Stability; DNA sequencing (Sanger's sequencing)	
	T	DNA sequencing cont.; PCR	
	R	Recombinant DNA; Cloning	
	F	<b>REVIEW I</b> (may include new material)	<i>Quiz 1A</i>
<b>Sept 23</b>	<b>Monday</b>	<b>Exam I</b> (Block of first 14 lectures)	
Week 5	M	EXAM I	
	T	Site-directed mutagenesis; mutations and disease	
	R	<b>Proteins</b> : classification; Levels of structure; Amino acids	
	F	<b>Amino acids</b> : classification, pK and charges	
Week 6	M	<b>pH, pK, charges</b> ; Peptide bond;	
	T	Ramachandran Plot; Secondary structures – $\alpha$ and $\beta$	
	R	Tertiary Structures - Globular Proteins	
	F	Secondary structure rules	
Week 7	M	Secondary structure rules	
	T	<b>Structural Proteins</b> : Fibrous Proteins - Keratin, Collagen	
	R	Protein Folding: principles and energetics	
	F	Protein sequencing; 2D-gel; Sanger and Edman reagents	<i>Quiz 2</i>
Week 8	M	<b>Structure/Function</b> : Myoglobin and Hemoglobin O <sub>2</sub> binding	
	T	Binding curves; Cooperative binding – Allosterism,	
	R	BPG, Bohr effect, mutations and hemoglobin function	
	F	<b>REVIEW II</b> (may include new material)	<i>Quiz 2A</i>
<b>Oct 21</b>	<b>Monday</b>	<b>Exam II</b> (Block of about 14 lectures)	

Week	Day	Topic	Quiz
<b>Week 9</b>	M	EXAM II	
	T	Sickle Cell anemia; Cytoskeletal proteins; Muscle structure;	
	R	Muscle contraction; <b>Lipids:</b> Fatty acids; Membrane and storage lipids	
	F	Fluid mosaic model, Membrane proteins	
<b>Week 10</b>	M	Membrane Permeability; Membrane transport	
	T	Active and Passive transport; Ion channels; gating	
	R	<b>Enzymes:</b> Catalysis, active site, Free Energy diagram; models	
	F	<b>Enzyme Kinetics:</b> rate constants, $K_M$ , $K_{cat}$ ; Enzyme Inhibition	
<b>Week 11</b>	M	Enzymatic reactions; Chymotrypsin; Substrate specificity	
	T	<b>Enzyme mechanism:</b> Serine proteases; Catalytic steps	
	R	Transitions state Stabilization; Regulation of Enzyme activity	
	F	<b>Biochemical reaction classes; Metabolism;</b> Fuels, ATP, NADH;	<i>Quiz 3</i>
<b>Week 12</b>	M	Metabolic flux; <b>Carbohydrates:</b> monomers, polymers, $\alpha$ and $\beta$ forms	
	T	<b>Glucose Metabolism:</b> four pathways, locations and purpose;	
	R	<b>Glycolysis</b> – phases, reactions, intermediates	
	F	<b>REVIEW III</b> (may include new material)	<i>Quiz 3A</i>
<b>Nov 18</b>	<b>M</b>	<b>Exam III (Block of about 14 lectures)</b>	
<b>Week 13</b>	M	Exam III	
	T	<b>Glycolysis</b> continued; ATP yield	
	R	<b>Gluconeogenesis</b> – unique steps; futile cycle; Regulation of glycolysis/gluconeogenesis	
	F	<b>Pentose Phosphate Pathway</b> – purpose; <b>PDH</b> reaction – acetyl-CoA	
<b>Week 14</b>	<b>Thanksgiving Break</b>		
<b>Week 15</b>	M	<b>Citric Acid cycle:</b> Energy Generation, Regulation of the cycle	
	T	<b>Oxidative Phosphorylation:</b> Electron transport chain	
	R	ATP synthase; P:O ratio	
	F	<b>Lipid Metabolism:</b> lipoproteins – HDL, LDL, etc	<i>Quiz 4</i>
<b>Week 16</b>	M	$\beta$ -oxidation, ATP yield, Ketogenesis – ketone bodies	
	T	<b>Nitrogen Metabolism</b> Nitrogen Fixation, N-Cycle, Glucogenic/ketogenic amino acids	
	R	<b>Regulation of Metabolism:</b> Insulin/Glucagon; diet and metabolic pathways	
	<b>F</b>	<b>Finals REVIEW</b>	<i>Quiz 4A</i>

#### Finals Week

**Dec 19 R Final Exam (8:00 AM – 9:30 AM)**

**Cumulative: 50% from 10 Lectures (last Block of lectures) + 50% from Earlier Lectures (Lectures 1 – 42)**

*Disclaimer: I hope to cover these topics. However, depending on the pace of the course I may have to skip certain topics.*

*Usually things get a little hectic towards the end.*

*I will however give you a fair shake of the processes. **Exams will be on what is covered in class.***