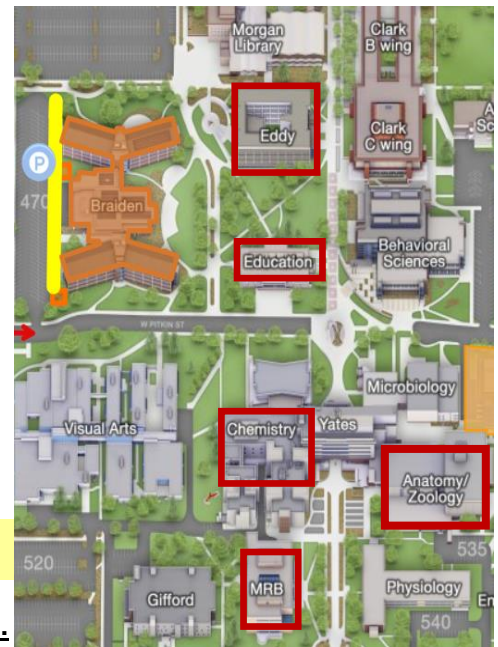


**BC 351 Principles of Biochemistry Spring 2019 - Section 3**  
**MWRF 2:00 to 2:50 PM, EDUC 7**

**Instructor:** Narasimha Sreerama (**Sree**)  
**Office:** **MRB 212** South Door (*Molecular and Radiological Biosciences*)  
*Will change to **Anatomy and Zoology Building in Feb/Mar***  
**MRB** **Corner of Lake and Center**  
**Phone:** 970-377-1609  
**E-mail:** [Narasimha.Sreerama@Colostate.edu](mailto:Narasimha.Sreerama@Colostate.edu) (**preferred**)  
**Office Hours:** **MWRF Before class (~1:00 PM) 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.**



<b>Exam Schedule</b>		<b>Q&amp;A session</b>
Exam I	Friday, <b>Feb 15</b>	Block of 13 lectures
Exam II	Friday, <b>Mar 15</b>	Block of 14 lectures
Exam III	Friday, <b>Apr 19</b>	Block of 14 lectures
Final Exam	<u>Tuesday, <b>May 14</b></u> (4:00 PM)	~50% Lect. 42-52 ~50% Lect. 1-41
		<b>Sunday, May 12</b>

**Exams:** **Three** in-term exams (**Weeks 4, 8, 12**) 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 IV 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 four 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 (Wednesday Noon – Friday 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 – We will discuss times

**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.

<b>Grade</b>	<b>Final Average</b>
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** on different days (**Quiz 1, 2, etc – Friday - Monday**) or (**Quiz 1A, 2A, etc, Wednesday - Friday**). Notifications on Canvas.

(D) Exams will be in class.

Week	Day	Topic	Quiz
<b>Week 1</b>	W	Introduction; <b>Biomolecules</b>	
	R	Building blocks; Chemical basis of life	
	F	<b>Thermodynamics</b> : $\Delta H$ , $\Delta G$ ; $\Delta G^\circ$ and $K_{eq}$	
<b>Week 2</b>	M	Oxidation number; Functional Groups	
	W	<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;	
<b>Week 3</b>	M	<b>DNA &amp; RNA</b> : Sugar, Base, Nucleotides; Chargaff's rules	
	W	DNA & RNA: Secondary structures;	
	R	<b>Gene</b> ; mRNA, tRNA, rRNA	<i>Quiz 1</i>
	F	<b>Gene expression</b> : translation, Genetic Code	
<b>Week 4</b>	M	DNA Stability; DNA sequencing (Sanger's sequencing)	
	W	DNA sequencing cont.; PCR	<i>Quiz 1A</i>
	R	<b>REVIEW I</b> (may include new material)	
<b>Feb 15</b>	<b>F</b>	<b>Exam I</b> (Block of first 13 lectures)	
<b>Week 5</b>	M	Recombinant DNA; Cloning	
	W	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	
<b>Week 6</b>	M	<b>pH, pK, charges</b> ; Peptide bond;	
	W	Ramachandran Plot; Secondary structures – $\alpha$ and $\beta$	
	R	Tertiary Structures - Globular Proteins	
	F	Secondary structure rules	
<b>Week 7</b>	M	Secondary structure rules	
	W	<b>Structural Proteins</b> : Fibrous Proteins - Keratin, Collagen	
	R	Protein Folding: principles and energetics	<i>Quiz 2</i>
	F	Protein sequencing; 2D-gel; Sanger and Edman reagents	
<b>Week 8</b>	M	<b>Structure/Function</b> : Myoglobin and Hemoglobin O <sub>2</sub> binding	
	W	Binding curves; Cooperative binding – Allostereism,	<i>Quiz 2A</i>
	R	<b>REVIEW II</b> (may include new material)	
<b>Mar 15</b>	<b>F</b>	<b>Exam II</b> (Block of about 14 lectures)	
<b>Week 9</b>		<b>Spring Break</b>	

Week	Day	Topic	Quiz
<b>Week 10</b>	M	BPG, Bohr effect, mutations and hemoglobin function	
	W	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 11</b>	M	Membrane Permeability; Membrane transport	
	W	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 12</b>	M	Enzymatic reactions; Chymotrypsin; Substrate specificity	
	W	<b>Enzyme mechanism:</b> Serine proteases; Catalytic steps	
	R	Transitions state Stabilization; Regulation of Enzyme activity	<i>Quiz 3</i>
	F	<b>Biochemical reaction classes; Metabolism;</b> Fuels, ATP, NADH;	
<b>Week 13</b>	M	Metabolic flux; <b>Carbohydrates:</b> monomers, polymers, $\alpha$ and $\beta$ forms	
	W	<b>Glucose Metabolism:</b> four pathways, locations and purpose;	<i>Quiz 3A</i>
	R	<b>REVIEW III</b> (may include new material)	
<b>Apr 19</b>	<b>F</b>	<b>Exam III</b> (Block of about 14 lectures)	
<b>Week 14</b>	M	<b>Glycolysis</b> – phases, reactions, intermediates	
	W	<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 15</b>	M	<b>Citric Acid cycle:</b> Energy Generation, Regulation of the cycle	
	W	<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	
	W	<b>Nitrogen Metabolism</b> Nitrogen Fixation, N-Cycle, Glucogenic/ketogenic amino acids	
	R	<b>Regulation of Metabolism:</b> Insulin/Glucagon; diet and metabolic pathways	
	F	<b>Finals REVIEW</b>	<i>Quiz 4A</i>

#### Finals Week

**May 14 T Final Exam (4:00 PM – 5:30 PM)**

**Cumulative:** 50% from 11 Lectures (last Block of lectures) + 50% from Earlier Lectures (Lectures 1 – 41)

*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.***