Structure and Reactivity of Biomolecules, (CHEM3400) Syllabus- Summer 2020
GEORGIA STATE UNIVERISTY, Chemistry Department As on June 3, 2020… If changes are needed, changes will be made.
Instructor: Dr. Angela Maria Navarro-Eisenstein

Course Description
This course is designed for chemistry majors. Our primary goal is to convey the relationship between structure, function and the mechanistic similarities between organic compounds and biomolecules. This course comprises of two parts: In the REVIEW **Organic Chemistry of carbonyl compounds we will re-visit topics form Ogo-II.** We will review the structures and typical reactions of carbonyl compounds, their possible reactions and their applications. In the second unit, **biomolecules,** we will examine the structures of carbohydrates, lipids, amino acids, proteins and enzymes, and nucleic acids. Students will apply this background to the study of the organic chemistry of metabolism. This includes the study of three key metabolic pathways: mechanistic glycolysis, b-oxidation of fatty acids, the citric acid cycle and cellular respiration.

Course Goals and Student Learning Outcomes
After exploring features of biomolecules students will expand their curiosity for the chemistry of diets, debunk myths and misconceptions, redirecting their attention to living organisms and their own bodies. By the end of the course students will understand that the reactions of biomolecules and metabolic pathways are biochemical equivalents of organic functional group reactions taking place in a laboratory setting. This course prepares students for deeper understanding of mechanisms discussed in Biochemistry and for the MCAT.

Prerequisite: Successful completion of Chemistry 2400 and 2410
Textbook: Organic Chemistry by John McMurry 9th edition or whichever student has used in CHEM2400/2410.

Course Help: Office: 836 Langdale, **Phone**: (404)-413-5541 **Email:** anavarro@gsu.edu, (Not available this summer)

1. **Virtual Lecture Meetings:** MWF 1:00-2:30 PM for (*CHEM 3400) and* MWF 9:00-10:30 AM *(CHEM1152).*
2. **Preferred Communication** method for on line courses is iCollege email anavarro@gastate.view.usg.edu
3. In case of emergencies I created a Google number 678-369-1509
4. **Office hours by WebEx: Tuesdays and Thursdays 1:00-2:00 pm CHEM1152 and 2:30-3:30 for CHEM3400**
5. **How to get technical help** Go to https://gsutech.service-now.com/sp or Email help@gsu.edu and include a detailed description and a call back number in the request.

Grade Breakdown: Grades Tentative Cut Off for CHEM 3400:

A+*: 96 % A*: 90%; A-: 87%; B+: 84% B: 80% B-: 77%, C+: 74% C: 70% C-: 67%, D= 64-66%, F= below 64%
Letter grade percentage is = total number of points accumulated x 100
500 points

60 pts 3@20	Quizzes	June 15, July 1st, and July 15th quizzes open at 10: am and close at 1:00 pm
40 pts 2@20	HMWRK ORG	Print it, work it, scan it and upload in Icollege as a PDF file June 12, and June 20th Due by 11:30pm
90 pts	Test 1	Chemistry of carbonyl compounds, Chapts 19-23 June 22nd *opens at 9:00 am and closes by 4:00 pm*
90 pts	Test 2	Carbohydrates, AA and proteins, enzymes, lipids July 8th , *opens at 9:00 am and closes by 4:00 pm*
90 pts	Test 3	Nucleic acids and metabolism of lipids and carbs July 24th *opens at 9:00 am and closes by 4:00 pm*
120 pts	Final	Cumulative July 31st *opens at 8:00 am and closes by 8:00 pm*
10 pts	Surveys	TBD Please Be alert and follow the schedule in Icollege's calendar

*The course will require students to use **Lockdown Browser with Respondus Web Monitor** for all course Quizzes and Exams, and the Final Exam. Students will need a webcam-enabled device capable of installing Lockdown Browser. Students who require a device may request one from CETL here: https://cetl.gsu.edu/resources/resources-for-learning-remotely/internet-options/*

Tentative Assessments' Schedule and Tentative Topic and Reading Assignment Before Each Virtual Lecture

WebEx lectures are intended to clarify misconceptions. Please watch pre-recorded videos before the day/time listed below. Make a habit of the following: download and do worksheets, watch videos, re-read the chapter, practice problems from your textbook –read and read. The way our brains learn new topics is by repetition. The more your practice, the simpler will be to retrieve information stored in your memory during assessments. There is a time limit in all quizzes and exams to keep assessments' integrity and to prevent students playing around. Quick thinking will help you more than looking for the answers. We will monitor those with Web cam.

Date		**Tentative Topic and Reading Assignment Before Each Virtual Lecture**
Mon 6/8	*Day 1*	*Overview of carbonyl – Nu:- additions, acyl substitution, α–substitution and condensation. Aldehyde-ketones/Nu:- additions Oxidation-reduction Preparation Chapter 17.7 and 19.2) and reduction,(17.4,19.7) (19.3) Grignard, (17.5, 19.7) hydration (H+, OH-)(19.5), Aldehydes-ketones/ (19.8) Nu:- addition RNH_2 (imines), addition of R_2NH (enamines), (19.10) acetals –*
Wed 6/10	*Day 2*	*Review of Aldehyde-ketones Chapt 19.11-coenzyme NAD+/ NADH- reducing agent 19.13-(19.9) hydrazine, deoxygenation Wolff-Kishner -enolate- 1,2 vs-1,4 addition α,β-unsaturated ald-ketones-*
Fri 6/12	*Day 3*	*Homework 1 (20 points) due today by 11:30 pm Review of Chapter 20) Carboxylic acids-and derivatives-nitriles-esters amides overview*
Mon 6/15	*Day 4*	*Quiz 1 (20 points) It opens at 10:00 am and closes by 1:00 pm Review of Chapter 21 / acyl substitutions*
Wed 6/17	*Day 5*	*Review of Chapter 22 / carbonyl alpha substitutions*
Fri 6/19	*Day 6*	*Review of Chapter 23/carbonyl condensations- Aldol, Claisen, Michael Robinson annulation*
Sat 7/20		*Homework 2 (20 points) is due today by 11:30 pm*
Mon 6/22	Day 7	TEST I (90 points) carbonyl compounds It *opens at 9:00 am and closes by 4:00 pm*
Wed 6/24	Day 8	Chapter 25 carbohydrates-classification- 25-1, stereochemistry 25-2, 3, hemiacetals/ anomers- reactions-
Fri 6/26	Day 9	Chapter 25 carbohydrates disaccharides and polysaccharides
Mon 6/29	Day 10	Chapter 26 AA – structures- Ionization states- of AA pI, Handerson-Hasselbalch Peptide bond-
Wed 7/1	Day 11	Quiz 2 (20 points) It opens at 10*:00 am and closes by 1:00 pm* –Chapter 26 AA – protein structure -peptide-synthesis/ Enzymes-coenzymes - How enzymes work
Fri 7/3	Day 12	Chapter 27 Lipids/ fatty acids/waxes/ partial hydrogenation/ triacylglycerides/ saponification
Mon 7/6	Day 13	Chapter 27 Lipids/ membrane lipids glycerol and sphingophospholipids Eicosanoids, steroids
Wed 7/8	Day 14	TEST II (90 points) It *opens at 9:00 am and closes by 4:00 pm*
Fri 7/10	Day 15	Chapter 28: Nucleic acids- Structure- DNA-Replication
Mon 7/13	Day 16	Chapter 28: Nucleic acids- Nucleic acids-RNA_Transcription –Translation
Wed 7/15	Day 17	Quiz 3 (20 points) *it opens at 10:00 am and closes by 1:00 pm* _ Chapter 28: Nucleic acids – synthesis- Chapt. 29: stages of metabolism
Fri 7/17	Day 18	Chapt. 29: Org. Chem. of metabolic pathways (lipids metabolism-beta ox. fatty acids)
Mon 7/20	Day 19	- Chapt. 29: Org. Chem. of metabolic pathways- Glycolysis
Wed 7/22	Day 20	-Chapt. 29: Org. Chem. of metabolic pathways (Carbs metabolism-fates of pyruvate, CAC
Fri 7/24	Day 21	TEST III (90 points) It *opens at 9:00 am and closes by 4:00 pm*
Mon 7/27	Day 22	Chapt.29 Metabolism catch up CAC
Wed 7/ 31	Final	Final exam 120 points It *opens at 8:00 am and closes by 8:00 pm*

Course Policies:

- All prerequisites must be fulfilled before enrolling in this chemistry course

- Academic Honesty: The honor code embraced by universities expresses an ideal of character, conduct, and citizenship. This applies especially to academic honesty and integrity. Passing off someone else's work as your own represents intellectual fraud and theft, and violates the core values of academic community. You will be asked to sign up the honor code in bold as written beneath, along with your printed name on the first page of homework "**As a member of the student body taking this course, I consider myself bound, guaranteed and compelled by honor to develop and uphold high standards of honesty and behavior." GSU-Provost email states: Sharing information/cheating** via group messaging apps such as **GroupMe or Slack is a violation** of the Academic Honesty Policy. All assessments are videotaped; therefore, a video may then be appropriate evidence if a student needs to be reported for cheating. Understand that cheating brings bad reputation to student's record. If after graduation alumni consent to a background check, GSU is required to report all academic integrity violations which could interfere with plans for a promising career in a given field.

- Electronic devices: The course will require students to use Lockdown Browser with Respondus Web Monitor for all course Quizzes and Exams, and the Final Exam. Students will need a webcam-enabled device capable of installing Lockdown Browser. Students who require a device may request one from CETL here: *https://cetl.gsu.edu/resources/resources-for-learning-remotely/internet-options/*

- Attendance: Students are expected to attend virtually all lectures via WebEx. As a courtesy to your fellow students, please arrive on time and mute your microphone and do not leave during the virtual lecture. Students are encouraged to type questions in the chat room. **If I do not discuss all questions during the session, I will make sure to do it in the announcements page**.

- Religious Holidays Observance Please email me a schedule of your holiday the first week of class via Icollege, anavarro@gastate.view.usg.edu

- Accommodation Plan, Special Needs: Students are responsible for providing a copy of that accommodation plan to instructors of all classes in which an accommodation is sought. Your need for accommodations will only be discussed in private **and never in front of classmates.** **Students who wish to request accommodation for a disability** may do so by registering with the Office of Access and Accommodations Center (AACE) https://access.gsu.edu/. Students may only be accommodated upon issuance by the AACE Office are authorized via email to Dr. Navarro-Eisenstein.

- Make-ups: There is no chance for make ups due to time constraint. Plan accordingly. Late submission could result in a 5% points deduction. In general, questions and problems on exams will be original and not copied from those found in a chapter of the textbook or old previous exams given. Don't waste time memorizing answers from old exams as the instructor modifies questions every semester. Exams are designed so that the majority of questions are of medium difficulty, some are relatively easy and very few are challenging. Students missing an exam will be expected to submit a written note explaining why the exam was missed, to provide valid evidence for that excuse, and to discuss absence by phone or WebEx in private. Dr. Navarro-Eisenstein will call contacts provided and verify the excuse. Any student presenting falsified documentation will be referred to the Chemistry Department Chair or Dean of Students for disciplinary action.

- **FERPA** In keeping with USG and university policy, this course website will make every effort to maintain the privacy and accuracy of your personal information. Specifically, unless otherwise noted, it will not actively share personal information gathered from the site with anyone except university employees whose responsibilities require access to said records. However, some information collected from the site may be subject to the Georgia Open Records Act. This means that while we do not actively share information, in some cases we may be compelled by law to release information gathered from the site. Also, the site will be managed in compliance with the Family Educational Rights and Privacy Act (FERPA), which prohibits the release of education records without student permission.

- Preparation for the course: Read the chapter to be discussed before you come to lecture or watch the videos. Work the problems within the chapter, as they bring step by step how to arrive to the answers. Work the problems at the end of the chapters. You know what you know when you answer the questions with the closed book. Previewing

solutions to problems gives a false sense of confidence about the subject matter, and typically results in poorer test scores.

- Planning ahead this is a key to success. Your performance in science is a lot better when you study daily. Do not wait until the night before the exam to begin studying. As you read the material, you should take written notes and **underline**. Use **highlighters** or color pens. That will help you throughout the semester and to study for finals. The basic ideas and principles on exams come from the book and lecture material and are designed to test a student's 1) understanding of the concepts and 2) ability to solve problems, as well as 3) knowledge of the facts. Research shows that the more **different ways** you present information to the brain the easier it is to learn. In other words, **hear it, see it, say it, write it, practice it, highlight it, quiz it,** etc.

- Withdraw- July 6 The University requires that faculty members must, on a date after the mid-point of the course to be set by the Provost (or his designee): A) **Give a WF** to all those students who are on their rolls but no longer taking the class and B) **Report the last day** the student attended or turned in an assignment.

- MORE ON "Class Preparation": The price of success is high. Anything of value requires great effort. You have to work hard, be persistent, and pay attention to details. These traits are ultimately why a college degree is valuable, plus the capacity to learn. **Believe you can succeed.** Be willing to pay the price. **Accept responsibility for learning!** Your performance depends on the time and effort you invest in this course. Chemistry is a highly structured subject in which each new topic is based on others previously discussed. Therefore, if one topic is not mastered, it becomes *increasingly* difficult to master those that follow. **Missing even one class can lead to problems that the average student cannot overcome.** Also, chemistry does not lend itself to "cramming". What you learned from the first chapter is needed for the second; what you learned from the third chapter will be needed the last day. Complex concepts build up from beginning chapters. **Attend all virtual lectures!** The quizzes and exams are based mostly on material that is covered in class.
  Three habits will help in mastering each topic as it arises, and will reinforce the topics previously covered:
  - ✓ **Read** the assigned material *before* it is covered in lecture and watch my own Ipad videos. You can explore more in your own time but you might encounter the same topics with more details for higher level chemistry.
  - ✓ **Work** through the **example** and **practice problems** from the textbook within each assigned chapter.
  - ✓ **Work** a large number and wide variety of problems "as many **end-of-chapter problems as possible".** All in-chapter examples and practice exercises should be done. To reward your hard work I might use some of the problems from your book for exams and quizzes.

- Engage with Resources: Students are strongly encouraged to download lecture notes from **ICollege** before coming to class**.** The lecture **visual aids** for the instructor and **are not intended** to be *"the only source of study"* for the students. **You need to study from the textbook for all exams.** Each student has the responsibility of checking their email and ICollege on a daily basis.

- Cheating: All tests taken must represent your individual, unaided efforts. To receive or offer information during an examination is cheating. The use of unauthorized supplementary materials during tests is also cheating. A student who cheats on an exam will receive **a zero for that exam which cannot be dropped as the lowest grade**. Any suspected offenses may also be referred to the Department Chairman and/or the Dean of Students for appropriated disciplinary action. The Department of Chemistry follows the university policy on academic honesty published in the "Faculty Affairs Handbook" and the "On Campus: The Undergraduate Co-Curricular Affairs Handbook."

- **Georgia State University Student Conduct and Integrity Policy:** *The Georgia State University Policy on Academic Honesty* is applicable to this course, including but not necessarily limited to infractions in the areas of ***plagiarism,*** *cheating on examinations, unauthorized collaboration, falsification,* and *multiple submissions*. This policy is published in *On Campus: the Student Handbook*, available to all members of the university community. **Conduct or actions that disrupt class,** examination, or laboratory periods or falsification of information related to chemistry courses by any student will be taken as a violation of the policies of the Board of Regents of the University System of Georgia and the Georgia State University Student Code of Conduct, Section 6.0. Any suspected offenses may be referred to the Department Chair.