CHEM 202Q: PRINCIPLES OF REACTIVITY

GENERAL INFORMATION:
Instructor: Dr. Nichole Powell

CLASS SCHEDULE:
Section 1: TTh: 9:40 - 10:55 am ET
Section 2: TTh: 8:00 - 9:15 am ET
Section 3: TTh: 4:20 - 5:35 pm ET

(100% online via Zoom)
The Zoom link will be available on the course's Canvas page.

OFFICE HOURS:
By appointment:
- Mondays: 3 - 4 pm ET
- Wednesdays: 11 am - 12 pm ET
Please email me at least 24 hrs in advance to schedule an appointment.
- I will be available immediately after class if you have any questions.

CONTACT DETAILS:
Email: Nichole.powell@emory.edu
Please use your Emory email for all university correspondence. Please allow 48 hours for a response Mondays - Fridays. If you do not hear back from me within 48 hours, you should contact me again and forward your original email.

Mobile: 470-326-6682.
Please reserve this mode of communication for urgent matters such as: issues while taking timed assessments.

COURSE OVERVIEW:
Principles of Reactivity is the second of a two-semester foundational chemistry sequence required by all science majors and pre-health students. The course provides students with a basic understanding of kinetics and thermodynamics of chemical reactions and how these are related to the structure of the reactants and products and the pathways between them. You will use reaction coordinate diagrams and the curved arrow formalism to illustrate reaction mechanisms, and you will be introduced to substitution, elimination, and nucleophilic acyl substitution reactions and their mechanisms. When you finish the course, you will be ready to learn more reactions and their mechanisms and the importance of molecular orbitals in chemical reactivity.

WHAT TO EXPECT IN THIS COURSE:
This course will consist of two required synchronous (“live”) sessions per week and several asynchronous activities (done on your own time). Asynchronous (i.e. watching lectures and other video material, reading, ALEKS, CONNECT homework, and participation in a variety of class online discussion via technology) will be available via Canvas.

During the synchronous sessions, you will work in a group with your classmates to complete worksheets that will expand on the concepts introduced in the lecture videos.

In addition to attending the synchronous sessions, you should commit at least 10-15 hours per week towards this class. This includes time commitments for ALEKS, CONNECT homework, learning new material i.e. readings, watching lectures and other videos, discussion board participation as well as office hours, SI sessions, and studying/practicing chemistry.
COURSE GOALS:

Upon completing this course, you will be able to:

- Use your understanding of chemical bonding and energetics to predict and explain changes in enthalpy, entropy, and free energy for a variety of processes and reactions.
- Use your understanding of collision theory, temperature, and average kinetic energy of the system to make predictions about reaction rate and explain in the context of a reaction coordinate diagram.
- Demonstrate your understanding of chemical equilibrium and acid base chemistry through two different approaches: quantitative (mathematical calculations) and qualitative (structural analysis).
- Apply your understanding of acids and bases, thermodynamics, and kinetics to predict and explain simple organic reactions: substitution, elimination, and nucleophilic acyl substitution.
- Illustrate your understanding of reaction mechanisms by using curved arrow formalisms and proposing reaction coordinate diagrams.
- Interpret experimental kinetic data to distinguish between unimolecular and bimolecular substitution mechanisms and explain the differences in mechanisms from a structural perspective.

CLASS MATERIALS

(REQUIRED):

- McGraw-Hill CONNECT access (this will give you access to both of the required textbooks). This textbook and CONNECT bundle must be purchased through the college’s bookstore.
- ALEKS Registration Code (18 weeks):
  May be purchased through the bookstore or directly online through the course’s Canvas site.
- Scientific calculator
  (must be brought to all synchronous sessions). Calculators that can download and/or store information, can automatically solve equations or perform conversions, or can be programmed, are not allowed on quizzes/exams. The two calculators which are allowed are TI-30Xa or 30X II. These are generally available from places like Amazon or WalMart for under $15. Any other calculators will have to be checked and approved by the instructor at least one session before your first exam/quiz. Please ensure that you have the correct calculator before attempting any exam/quiz.

CLASS MATERIALS

(RECOMMENDED):

- The solutions manuals for the textbooks
- Molecular Modeling Kit (Highly recommended)

TECHNOLOGY REQUIREMENTS:

This course uses Zoom as well as Lockdown Browser and Respondus Monitor. A computer, microphone, webcam and internet access are required.
I have a growth mindset, inclusive grading policy. Since you will grow in your knowledge throughout the semester, I believe that growth should be reflected in your course grade. Your final exam grade may therefore be used to replace your lowest exam grade with the following exceptions: 1) If you have a zero on an exam due to missing the exam without a valid excuse no grade may be replaced, including the zero. 2) If you missed an exam with an accepted excuse only the grade for the excused exam may be replaced. This means that your final exam would count for 17% of your grade, if it is lower than your other exam grades; or 34% of your overall course grade if it is higher than one of your other exam grades.

**ATTENDANCE:**
Attending our synchronous class sessions is important and will involve you working in groups to understand the course material each class session by solving problems and explaining your problem-solving strategy. You may be absent from two synchronous sessions before it affects your course grade. Each additional absence will result in a corresponding point deduction from your final course grade.

**LECTURE QUIZZES AND CLASS WORKSHEETS:**
An overview lecture is provided before each synchronous session in order to prepare you for the concepts that will be explored. Quizzes are embedded in these lectures to help you assess your understanding of the content. The video lectures (and quizzes) should be completed before the corresponding synchronous session in order for you to receive a score. Completing the lectures will prepare you to explore the concepts covered on the class worksheets. These worksheets will be completed with your group and will be due at the end of the class session, unless specified otherwise.

**DISCUSSION BOARD:**
The discussion board is where you will support each other during the course by asking and answering questions and giving advice, etc. Meaningful discussion board engagement at least one every two weeks will earn the allotted 1%.

**EXTRA CREDIT:**
Extra credit at the end of the semester is not something that will not be given for this class. The grading structure is straightforward, and you should be aware of your standing and what you need to do to improve it all semester. Extra credit may be earned on each exam.

**ACADEMIC HONESTY POLICY:**
It is expected that you will adhere to the Honor Code
http://oxford.emory.edu/catalog/regulations/honor-code.html
You are therefore expected to submit your own best effort on all assignments. Pens/pencils, blank paper and a non-programmable calculator are the only tools you are allowed to use on exams. Unless otherwise specified, collaboration is not allowed on any assignment to be submitted.

**LATE ASSIGNMENT POLICY:**
It is important to manage your time well and keep up with your assignments. You have the ability to earn 24% of your course grade by completing ALEKS, CONNECT assignments, and Lecture quizzes giving yourself enough time to earn 100% on each assignment. ALEKS calculates your grade based on percent completion at the time the assignment is due. You may submit your CONNECT assignments late, note that the grade earned will be reduced by 20% per hour. The grade on late quizzes/exams will be reduced by 20% per minute.

**ASSESSMENTS AND GRADING POLICY:**

**EXAM SCHEDULE:**
Exam 1: Thursday, Sept. 17th
Exam 2: Thursday, Oct. 22nd
Exam 3: Thursday, Nov 19th
Final Exam:
Tuesday, Dec. 8th 3 - 5:30 pm ET.

Three (3) exams are scheduled during the synchronous course sessions. No make-up examinations will be given. Excuses including the reason for missing an exam must be presented before the scheduled exam- this may be done by email. Ensure that your excuse is verified and accepted by the Advising Support Center. If your excuse is accepted, the grade obtained on the final exam will count in place of the missed exam. If your excuse is not accepted you will receive a zero for that exam. You may only be excused from missing 1 exam.

The final examination is mandatory and will be comprehensive. Any material discussed during the semester may be included in this exam. Final exams will not be returned and the answers will not be given.

**GRADING SCHEME:**

A = 92.5 – 100
A- = 89.5 – 92.4
B+ = 86.5 – 89.4
B = 82.5 – 86.4
B- = 79.5 – 82.4
C+ = 76.5 – 79.4
C = 72.5 – 76.4
C- = 69.5 – 72.4
D+ = 66.5 – 69.4
D = 59.5 – 66.4
F = BELOW 59.5

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OFFICE OF ACCESSIBILITY SERVICES:
If you have a documented disability and have anticipated barriers related to the format or requirements of this course, or presume having a disability (e.g. mental health, attention, learning, vision, hearing, physical or systemic), and are in need of accommodations for this semester, we encourage you to contact the Office of Accessibility Services (OAS) to learn more about the registration process and steps for requesting accommodations at oas_oxford@emory.edu.

If you are a student that is currently registered with OAS and have not requested or received a copy of your accommodation notification letter, please notify OAS immediately.

Students who have accommodations in place are encouraged to coordinate with their professor during the first week of the semester, to communicate specific needs for the course as it relates to approved accommodations. Accommodations may not be implemented until the instructor is provided an accommodation letter and discusses the accommodation plan for this course face to face with the OAS student. Accommodations may not be implemented retroactively.

- For additional information regarding OAS, please visit the website: http://equityandinclusion.emory.edu/access

COUNSELING AND CAREER CENTER:
http://oxford.emory.edu/counseling/
The counseling and career center provides many services at no cost to help address students' personal and career development needs, including personal counseling, career counseling, and psychiatric services. To schedule an appointment, call 770.784.8394.

EMORY STATEMENT ON CIVIL DISCOURSE:
We believe the manner in which we interact with each other is critical to cultivating and maintaining a meaningful and effective intellectual environment. We encourage a climate of respect and inclusiveness that welcomes and embraces community members with diverse backgrounds and life experiences. We deliberately seek multiple perspectives and support the free and open exchange of ideas and civil discourse. We affirm the inherent dignity in all of us and we strive to maintain a climate of justice marked by respect for each other. Our community can only continue to thrive when we approach each conversation with an open mind and when each member can contribute fully.
Every Emory employee who is informed about an allegation of sexual misconduct involving any student is required to notify a Title IX Coordinator either directly or through their relevant reporting structure. However, employees who serve in a professional role in which communications are afforded confidential status under the law (e.g., medical providers, therapists, and professional and pastoral counselors) are not bound by this requirement but may, consistent with their ethical and legal obligations, be required to report limited information about incidents without revealing the identities of the individuals involved, to a Title IX Coordinator or Deputy Title IX Coordinator. All members of the Emory community are encouraged to promptly report incidents of sexual harassment and discrimination.

For more information, visit: https://equityandinclusion.emory.edu/title-ix/sexual-misconduct/index.html

WE'RE ALL IN THIS TOGETHER:
We want our classroom community to thrive no matter the classroom delivery method or your individual methods of participating in class. This semester is unusual in that there is a pandemic. Our goal is for all students to receive a high-quality experience to the extent possible.

Due to the unusual nature of the semester, communication is important. I commit to responding to emails within 48 hours of receipt M-F and my intention to respond faster than that most of the time.

Likewise, if your situation changes regarding health, housing, or in any other aspect of your ability to participate in the class, please log into the Student Health Portal: Portal: https://login.emory.edu/idp/profile/SAML2/Redirect/SSO?execution=e1s1 and then contact your professor as soon as feasible.

It is easier for us to address your needs if we know about them as soon as they arise. This does not mean we can successfully respond to every request for consideration, but we emphasize that our goal is to treat you all equitably and do what we can to help you succeed in this course.

IF YOU BECOME SICK OR ARE QUARANTINED:
This semester due to the pandemic, some students might be sick. If you have a documented illness, please make sure to email me so that we can discuss your individual circumstances.
Please also contact me via email if you are in quarantine.

TITLE IX REPORTING:
Every Emory employee who is informed about an allegation of sexual misconduct involving any student is required to notify a Title IX Coordinator either directly or through their relevant reporting structure. However, employees who serve in a professional role in which communications are afforded confidential status under the law (e.g., medical providers, therapists, and professional and pastoral counselors) are not bound by this requirement but may, consistent with their ethical and legal obligations, be required to report limited information about incidents without revealing the identities of the individuals involved, to a Title IX Coordinator or Deputy Title IX Coordinator. All members of the Emory community are encouraged to promptly report incidents of sexual harassment and discrimination.

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**SCHEDULE OF ASSIGNMENTS/ACTIVITIES:**
- Assignments and activities are subject to change. Please check the course's Canvas site daily.

<table>
<thead>
<tr>
<th>Date (2020)</th>
<th>Wk</th>
<th>Class #</th>
<th>Topic</th>
<th>ALEKS assignments (Due Day before Class at 11:59 pm)</th>
<th>CONNECT assignments (Post-class)</th>
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<td>Free Energy &amp; Intro to Equilibrium</td>
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<td>Le-Chatelier, Connecting Equilibrium &amp; Free Energy</td>
<td>EQ &amp; LeChatelier (7)</td>
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**Module 2: Acid-Base Chemistry, Redox Reactions, and Biological Applications**
- Readings: Burdge: Chaps. 16, 17 & 18; Carey: Chapt: 1

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<tr>
<td>9/8</td>
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<td>Intro. To Acid Base Chemistry</td>
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<td>9/10</td>
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<td>Weak Acids &amp; Bases</td>
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<td>9/15</td>
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<td>Predicting Acid Strength - Qualitatively</td>
<td>Acids &amp; Salts (5)</td>
<td>Carey: Acid strength &amp; Eq</td>
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<td>Exam 1</td>
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<td>Predicting Acid Strength – Qualitative cont.</td>
<td>Acids &amp; Salts &amp; Buffers (4)</td>
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<td>Salt hydrolysis and Buffers</td>
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<td>Redox Chemistry and Biological Applications of Buffers and Redox</td>
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<td>Buffers</td>
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**Module 3: Molecular Orbital Theory and Substitution Reactions of Compounds**
- Readings: Burdge: Chaps. 7 & 14; Carey: Chaps: 1, 2, 18 & 20

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<td>10/15</td>
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<td>Reactions driven by Entropy or Stability</td>
<td>Carey: Module 3</td>
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**Module 4: Kinetics of Greenhouse Gases and Substitution Reactions of Alkyl Halides**
- Readings: Burdge: Chapt. 19; Carey: Chaps: 5, 6, & 7

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<td>Kinetics and Mechanisms: Substitution Reactions</td>
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<td>Relative Rates in Substitution Reactions: Part I</td>
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<td>Rxn pathways for Carbocations Pt. II</td>
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