CHEM 204 Syllabus

FALL 2019

CLASS SCHEDULE (OSB): M-Wed: 2:30-3:45 pm

INSTRUCTOR: Dr. Deepika Das

OFFICE: OSB 402

OFFICE HOURS: Designated hours:
Mon, Wed- 4:00-5:00 pm, Tue-11-12pm
Or by appointment

CONTACT INFORMATION: Email: deepika.das@emory.edu;
Telephone: 770-784-4557

COURSE DESCRIPTION:
Macromolecules is the fourth core chemistry course required by all chemistry major and many pre-health students. CHEM 204 focuses on the chemistry of macromolecules; specifically, how sequence (that is, the order of monomers incorporated into the chain backbone) influences structure and properties. The trajectory of the course evolves from consideration of macromolecules with less sequence specificity to those with more specificity, ultimately to template-encoded bio-macromolecules (proteins and nucleic acids).

CHEM 204 will introduce non-covalent interactions, particularly the importance of weak interactions in the structural context of polymer chemistry, in which, due to their size and repetitive nature, these interactions can have a significant influence on structure and function. The influence of stereochemistry will also be introduced, in particular with regard to its effect on chain conformation. With reference to specific examples, differences in polymer properties will be illustrated in terms of these concepts (e.g., the difference in mechanical properties between stereo-random and stereo-specific polymers). These differences will lead into a discussion of polymer synthesis, in which different control mechanisms (thermodynamic and kinetic) will be introduced to understand how specificity is introduced into polymer structure during synthesis. Functional group chemistry and associated reactive intermediates will be developed in the context of polymer synthesis using several examples including olefin polymerization (radical, Ziegler-Natta, and living anionic mechanisms) to illustrate the different levels of control. This content will reinforce concepts developed in other courses, especially CHEM 202 and 203. CHEM 204 will then move toward development of the concept of template-driven polymerizations (i.e., biosynthesis), initially introducing the idea of an activated monomer using step-growth polymerization of nylon as an example. The analogy will be drawn further in terms of the biological use of ATP as bond activation energy to drive otherwise thermodynamically unfavorable processes (such as biopolymer synthesis). The effect of sequence specificity in biopolymer synthesis will be interpreted in terms of the resulting structural and functional specificity. Biopolymer synthesis will be interpreted in terms of energy consumption and contrasted with less specific synthesis of analogous organic polymers.

COURSE GOALS
Students will:

- Predict and explain polymer structure and properties based on molecular structure of its building blocks and sequence composition.
- Describe the role of non-covalent interactions in polymer structure and properties.
- Identify polymerization reactions based on their chemistry, kinetics and thermodynamics.
- Explain the similarities and distinct features of synthetic and biological polymers.
- Apply computational tools to visualize and model polymer structure.
• Utilize the primary literature to acquire new scientific information.

CLASS MATERIALS (REQUIRED):

COURSE COMPONENTS:

LECTURE:
Lectures will emphasize the concepts and skills necessary for you to understand and investigate chemical behavior. It is also important that you become conversant with the language chemists use. Research on learning shows that explaining concepts helps you to better understand and retain the material that just merely listening to an explanation. It is therefore important that you prepare for each class, actively participate in lecture and ask questions when you do not understand the concepts. To help you understand the course material each class session will involve you working in groups to solve problems and explain your problem-solving strategy.

Attendance
You are expected to attend each class period. Attendance is taken at the beginning of class, and it is your responsibility to ensure that your attendance was correctly recorded before you leave at the end of the class period. You are allowed 3 absences in lecture. Each absence exceeding 3 absences will result in a corresponding point deduction from your final course grade (eg. 4 absences = 1 pt, 5 absences = 2 pts etc). There are no excused absences. Being cited 2 times for any combination of the following behaviors will count as 1 absence: arriving more than 10 minutes late for class, walking in and out of class (unless you are sick), leaving class early, being inattentive or working on other assignments during class.

You are responsible for all material covered in the lecture even if you were absent.

Religious Holidays: Instructors are encouraged, not required, to accommodate students' academic needs related to religious holidays. Please make every effort to negotiate your religious holiday needs within the first two weeks of the semester; waiting longer may compromise your instructor’s ability to extend satisfactory arrangements. If you need guidance negotiating your needs related to a religious holiday, the College Chaplain, Rev. Lyn Pace, ppace@emory.edu, Candler Hall 202, is willing and available to help. **Please be aware that Rev. Pace is not tasked with excusing students from classes or writing excuses for students to take to their professors. Emory’s official list of religious holidays may be found at http://www.religiouslife.emory.edu/faith_traditions/holidays.html.

Problem Sets
It is anticipated that you will be assigned one problem set per week throughout the semester. The assignment will be housed on Canvas. You will be required to upload pdfs of your work so it is recommended that you use a free app such as CamScanner. Late assignments will not be accepted, so ensure that you submit your assignments on time. Your lowest worksheet grade will be dropped.

Keys for file upload questions will be posted on CANVAS. It is your responsibility to verify the correctness of your answers.

Non-graded Assignments
You are expected to complete all assignments regardless of whether or not they will be graded. You are expected to work all problems in your textbook that are indicated on Canvas, unless otherwise noted to prepare for the course.
CHEM 204 Syllabus

**In-class Assignments**
In-class assignments include quizzes and worksheets. You need to submit completed worksheet to receive a cheque. Every five checked worksheets will be grouped and assigned a grade equivalent to one quiz grade. Your lowest grouped worksheet or quiz grade will be dropped. You cannot make up in-class assignments (including worksheets) if you are absent.

**Examinations**
Three (3) exams are scheduled during the regular class period. 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 or sending a note to class. If I accept your excuse, 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.

**Anticipated Exam Schedule:**

<table>
<thead>
<tr>
<th>Exam</th>
<th>Projected Date</th>
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<tbody>
<tr>
<td>1</td>
<td>Mon, Sept 23rd</td>
</tr>
<tr>
<td>2</td>
<td>Wed, Oct 23rd</td>
</tr>
<tr>
<td>3</td>
<td>Mon, Nov 25th</td>
</tr>
</tbody>
</table>

Exam dates are subject to change. The sections covered in each exam will be announced in class.

**Final Exam – 9-12 am on Wednesday, Dec 18**

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.

**COURSE GRADE:**
Your course grade will be computed as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Problem Sets</td>
<td>10%</td>
</tr>
<tr>
<td>In class assignments</td>
<td>6%</td>
</tr>
<tr>
<td>Exams (3)</td>
<td>66%</td>
</tr>
<tr>
<td>Final Exam (Cumulative)*</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

* Your final exam grade may 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.

**Grading Scale**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
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<tbody>
<tr>
<td>A</td>
<td>93 – 100</td>
</tr>
<tr>
<td>A-</td>
<td>90 – 92</td>
</tr>
<tr>
<td>B+</td>
<td>87 – 89</td>
</tr>
<tr>
<td>B</td>
<td>83 – 86</td>
</tr>
<tr>
<td>B-</td>
<td>80 – 82</td>
</tr>
<tr>
<td>C+</td>
<td>77 – 79</td>
</tr>
<tr>
<td>C</td>
<td>73 - 76</td>
</tr>
<tr>
<td>C-</td>
<td>70 - 72</td>
</tr>
<tr>
<td>D+</td>
<td>67 - 69</td>
</tr>
<tr>
<td>D</td>
<td>60 – 66</td>
</tr>
<tr>
<td>F</td>
<td>below 60 F</td>
</tr>
</tbody>
</table>

Final course grades will only be available in OPUS. Final exam grades will not be distributed.

**Errors in grading:**
Exams should be reviewed immediately upon return for grading or addition errors. If there appears to be an error, submit your request for a regrade in writing no later than three days after the exam was
CHEM 204 Syllabus

returned in class. The Regrade Request form is available in Canvas. Please note that partial credit is awarded at my discretion and is not negotiable.

HONOR CODE
It is expected that you will adhere to the Honor Code [http://oxford.emory.edu/catalog/regulations/honor-code.html](http://oxford.emory.edu/catalog/regulations/honor-code.html). It is expected that you will not cheat, contribute to or condone the cheating of others. You are therefore expected to submit your own best effort on all assignments. Exams will not be proctored unless it is believed that the Honor Code is being violated. Pens/pencils and a non-programmable calculator are the only tools you are allowed to bring to and use in exams (no cell phones). Having a cell phone during a quiz/exam will be treated as a violation of the Honor Code. Unless otherwise specified, collaboration is not allowed in any assignment to be submitted.

CRITICISM/FEEDBACK
Criticism/feedback is given in a variety of ways – dependent on the type of assignment. Below is the key for criticism/feedback given on quizzes/exams.
- CAL – calculation error
- CON – inadequate understanding of concept
- FORM – incorrect formula or wrong use of formula

“RULES OF ENGAGEMENT”
Class should be an environment that is conducive to learning and free from distractions that could interfere with the learning process. Expectations regarding class deportment and interpersonal interaction will be discussed on the first day of class. Below are a few general notes.
- You are expected to arrive to class on time and stay for the entire class period (no walking in and out of class unless you are sick).
- You are expected to be attentive and participate during class.
- You are expected to bring your lecture notes.
- Laptops, tablets, and cell phones are only to be used for class purposes. You will be asked to leave the class if you are caught using these devices for purposes other than the current class assignment.

Q&A SESSIONS
A brief question and answer session will be conducted in the class session prior to each exam or at an announced out of class meeting time (as time permits).

CANVAS
Canvas will be the primary means of communicating outside of class. It will also house supplementary course resources. Students are also expected to read the Canvas site regularly.

AVAILABLE RESOURCES
- Physical copies of the textbook used in this course (as well as solutions manual) are available as course reserves in the library.
- A few modeling kits are also available in the library reserves.
- Need help? – please come to office hours at the first sign of trouble.

ACCOMMODATION
The Office of Accessibility Services (OAS) works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, please contact the OAS and complete the registration process. Faculty may not legally provide you with accommodations until an accommodation letter has been processed and discussed with them; accommodations do not start until this point and are not retroactive. Students registered with OAS who receive a letter outlining specific academic accommodations are thus strongly encouraged to immediately coordinate a meeting with their
professors to discuss a protocol to implement accommodations that will (or may) be needed over the course of the semester. This meeting should occur as early in the term as possible. Contact Megan Bohinc in OAS for more information at (770) 784-4690 or oas_oxford@emory.edu.

ADDITIONAL INFORMATION
Exam keys will be posted on Canvas. Exam keys are posted 24 hrs after the exam is returned in class. It is very important that you spend time reworking questions you had difficulty with before looking at the exam key. If you are still having difficulty after consulting the key – please see me for help.

COURSE SCHEDULE
A Course Schedule that details the topics that will be covered each class is available on CANVAS.

* The learning objectives for each module are available on Canvas.

The course schedule is subject to change.

Student work submitted as part of this course may be reviewed by Oxford College and Emory College faculty and staff for the purposes of improving instruction and enhancing Emory education.

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.