Instructor: Professor Jessica Kramer  
Email: jessica.kramer@utah.edu  
Phone Number: 801-213-2039  
Office Hours: TBD & Email or call for appointment  
Office Location: 5209 SMBB  
Skype/IM/Canvas Conference Office Hours: [TBD]

Required Materials  
[TBD]

Course Description  
The primary theme of this course is modern tools and methods engineers can use to precisely design biomolecules and biomimetics. The course focus will be directed toward applications as therapeutics, sensors, medical materials, and as tools for fundamental discoveries about life processes in health and disease. Oligonucleotides, polypeptides, polysaccharides, and lipids will be discussed in terms of their molecular structure, sites of chemical modification, synthetic approaches, modern analytical techniques, and nano to bulk hierarchical assemblies. Students will also work in teams to create contemporary content for Wikipedia pages on relevant course topics.

Note: This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements.

Course Schedule

<table>
<thead>
<tr>
<th>Lecture #</th>
<th>Date</th>
<th>Lecture Topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>T, 1/8</td>
<td>Categories of biomolecules and their sites of modification</td>
</tr>
<tr>
<td>2</td>
<td>R, 1/10</td>
<td>Bioconjugations and bioorthogonal chemistry</td>
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<tr>
<td>3</td>
<td>T, 1/15</td>
<td>DNA/RNA structure, synthesis, sequencing</td>
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<tr>
<td>4</td>
<td>R, 1/17</td>
<td>Oligonucleotide mimetics: PNA and TNA</td>
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<tr>
<td>5</td>
<td>T, 1/22</td>
<td>DNA assemblies and DNA templated synthesis</td>
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<tr>
<td>6</td>
<td>R, 1/24</td>
<td>Nucleic acid aptamers, sensors, and riboswitches</td>
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<tr>
<td>7</td>
<td>T, 1/29</td>
<td>Oligonucleotide therapeutics and CRISPR</td>
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<tr>
<td>8</td>
<td>R, 1/31</td>
<td>Proteins: structure, synthesis, and sequencing</td>
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<tr>
<td>9</td>
<td>T, 2/5</td>
<td>Protein design and evolution</td>
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<tr>
<td>10</td>
<td>R, 2/7</td>
<td>Unnatural amino acids + protein engineering methods</td>
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</tbody>
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Course Outcomes
By the end of this course, you will be able to:

- illustrate the structures and sites of chemical modification of oligonucleotides, polypeptides, polysaccharides, and lipids
- relate single molecule structures to hierarchical assembly properties
- describe biomedical modern applications of designed biomolecules

Teaching and Learning Methods
This course will feature lectures given by the primary instructor, several expert guest lectures, small group discussions and a group project to create content for Wikipedia pages.

University Policies
1. *The Americans with Disabilities Act*. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

2. *Addressing Sexual Misconduct*. Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of
accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

3. Please visit the University of Utah student handbook website for a drop and withdrawal policies, and University resources for Wellness, Learners of English as an Additional/Second Language, the Veterans Center, the LGBT Resource Center, and more. https://registrar.utah.edu/handbook/

4. Other important information to consider including:
   a. Student Code: http://regulations.utah.edu/academics/6-400.php
   b. Accommodation Policy (see Section Q): http://regulations.utah.edu/academics/6-100.php

Course Policies

Attendance & Punctuality: Attendance is not required but is strongly recommended especially considering the bulk of the course material will be derived from primary literature rather than a textbook. Students are advised to consult with the instructor for any extended absences.

Participation: All students are encouraged to participate in in-class discussions. Participation in assigned group projects is mandatory.

Canvas: Course announcements and other course communications will be sent through Canvas. All assignments should be turned in through Canvas.

Assignments: TBD

Grading Policy (Evaluation Methods & Criteria)
TBD