Instructor: Dr. Ryan Watts, PhD
Email: R.Watts@m.cc.utah.edu

Required Materials
Your brain!

Course Description
This course will introduce students to the world of biotechnology discovery and development and will teach real-world applications of biology in industry. From how to found a company, to the rigorous steps needed to bring a drug to patients, students will introduced to the process of drug discovery and development from multiple perspectives. The course will also offer a basic understanding of functions that work in parallel with discovery research and drug development, including business strategy, portfolio decision-making and program management.

Course Outcomes
This course offers 1.0 credits.
By the end of the course, you will be able to:

● Transmit, flow and interpret biological information
Students will be able to apply a knowledge of genetics, gene expression, growth and development, signal perception and transduction, and physiological regulation to explain how information is stored, transmitted and utilized in biological contexts.

● Apply the process of science
Students will be able to apply the process of science to identify knowledge gaps, formulate hypotheses, and test them against experimental and observational data to advance an understanding of the natural world.

● Explain the relationship between science and society, and engage
Students will be able to evaluate the interactions between biology and society, including the societal impacts of biological research as well as public perception and decision-making about science, and clearly communicate biological concepts and their implications to broad audiences.

● Understand applications of biology and engineering in biotechnology
Students will be able to comprehend a few of the vast opportunities available in the pharmaceutical and biotechnology industry and understand the development process as it related to early discovery through a successful medicine.

Teaching and Learning Methods
The course will consist of lectures from Dr. Watts designed to provide engaging insight into the field of drug development for human diseases, with examples from neurodegenerative disease therapeutics. Students will hear about exciting developments in the genetics linked to neurodegenerative diseases and how they have enabled groundbreaking small and large molecule engineering efforts. Real-world and real-time case studies will be shared and students will be encouraged to consider how to go about tackling the challenges that come with inventing a medicine, and how biotechnology could be an application of their studies. Students should pay close attention to lectures and will be encouraged to ask questions and provide input. There will be no assignments, but students should come to each lecture ready to learn and engage with questions and discussion.

**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. **University Safety Statement.** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

3. **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).

**Course Policies**

*Attendance & Punctuality:* Grading will be based on attendance and completion of final project. Students are asked to attend each lecture and arrive on time.

*Participation:* Students are encouraged to ask questions during or at the end of lectures. If discussion is opened up, participation is welcome.
Food & Drink: Please no eating during class. Water and other beverages are allowed.

Grading Policy (Evaluation Methods & Criteria)
Grading will be based on lecture attendance and final project. Attendance of at least 5/7 of lectures and completion of the final project will be required to receive a passing grade.

Final Project
More information will be provided in class. The final project will entail brief group presentations that identify a barrier in drug discovery, propose a solution to that problem, and lay out a brief implementation plan.

COURSE SCHEDULE

<table>
<thead>
<tr>
<th>DATE</th>
<th>LECTURE TITLE</th>
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<tbody>
<tr>
<td>8/23/19</td>
<td>The Birth of Therapeutic Biotech: Recombinant DNA Technology</td>
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<tr>
<td>8/30/19</td>
<td>The Discovery of Drug Targets and Candidate Molecules</td>
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<tr>
<td>9/6/19</td>
<td>Efficacy and Safety in Animal Models</td>
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<tr>
<td>9/13/19</td>
<td>Project Management, Collaboration, and Leadership in Biotech</td>
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<tr>
<td>9/20/19</td>
<td>Clinical Development and Manufacturing: Testing Medicines in Humans</td>
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<tr>
<td>9/27/19</td>
<td>Founding A Biotech Company</td>
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<tr>
<td>10/4/19</td>
<td>Group Project Presentations</td>
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Finals Week:
There will be no final exam for this course

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.