**Department of Chemistry Syllabus**

This syllabi is advisory only. For details on a particular instructor's syllabus (including books), consult the instructor's course page. For a list of what courses are being taught each quarter, refer to the Courses page. *Every instructor has prerogative to teach the course as they see fit and ultimately the instructor's syllabus supersedes all others.*

***Chemistry 238: Introduction to Chemical Biology***

Approved:

Suggested Textbook: (actual textbook varies by instructor; check your instructor)

Required: Introduction to Bioorganic Chemistry and Chemical Biology by Van Vranken and Weiss

 Material will also be drawn from several texts that cover individual topics (e.g. Nucleic Acids in Chemistry and Biology by Blackburn et al., Combinatorial Chemistry and Molecular Diversity in Drug Discovery by Gordon & Kerwin, Chemical Biology by Schreiber, Kapoor and Wess). In addition, concepts will be presented using case studies from the recent scientific literature.

Suggested Schedule:

Date Topic

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Part 1 – Fundamentals (Chapters 1-2)

Week 1 Syllabus, Introduction to class

Fundamentals of chemical biology

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Part 2 - Synthetic Biology (Chapters 3-8)

Week 2 DNA synthesis-I

 DNA synthesis-II

 Student paper presentation

Week 3 RNA synthesis-I

 RNA synthesis-II

 Student paper presentation

Week 4 Protein synthesis-I

 Protein synthesis-II

 Student paper presentation

Week 5 Oligosaccharide synthesis-I

 Oligosaccharide synthesis II

 Student paper presentation

Week 6 Polyketide and terpene synthesis-I

 Polyketide and terpene synthesis-II

 Student paper presentation

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Part 2 - Chemical genetics (Chapter 9)

Week 7 Forward chemical genetics-I

 Forward chemical genetics-II

Week 8 Student paper presentation

 Reverse chemical genetics-I

 Reverse chemical genetics-II

Week 9 Student paper presentation

 Natural products as probes

Week 10 Essay review

Final exam

Additional Notes:

Prerequisites: Required: Organic chemistry (CHE118, CHE128 or equivalent), Recommended: Pharmaceutical chemistry (CHE130 or equivalent), Biochemistry (BIS102-104 or equivalent).

Learning Goals:

This course is designed for first year graduate students in chemistry or biochemistry and advanced undergraduates. It will provide students with important background information in biological systems and introduce modern experimental techniques necessary for graduate research in chemical biology. Coverage will include an overview of pathways for the synthesis of molecules in nature including a review of cell structure. In addition, material will be presented describing the use of nature's biosynthetic pathways to prepare new chemical entities, such as chemically functionalized and uniquely reactive cell surface glycoproteins and nonnatural nucleic acid polymers. Also, this course will introduce the use of small molecules as biological tools with examples of reverse and forward chemical genetics.