CONCORDIA UNIVERSITY
DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY
CHEMISTRY 498/670
BIOSYNTHESIS
COURSE INFORMATION

COURSE FORMAT: Lectures ONLY.

INSTRUCTOR: Brandon Findlay
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OFFICE HOURS: By appointment only.

OUTLINE: Focusing on compounds with historical and medicinal value, this course will examine the biosynthesis of complex organic molecules by bacteria, fungi, plants and animals.

This biochemistry course may serve as an organic chemistry replacement.

PREREQUISITES: CHEM 324 and CHEM 375. Students may not take both this course and CHEM 498/670 – Secondary metabolism for credit.

GRADING:

Class participation	5%
Presentation	20%
Midterm Exam	25%
Final Exam	50%

PRESENTATIONS: Each student will give a 20-25 minute presentation on a key advance touching on course material, either in pairs (undergraduates) or alone (graduate students). Students will be evaluated on the quality of their talk and their response to questions from the audience. Asking questions and providing constructive feedback on student presentations will contribute to a student's participation grade.

SUBJECTS COVERED:

Background
-Cofactors.
-Isotope labeling strategies.
-Enzyme inhibition.

Biosynthesis of steroids and terpenes
-Isoprenyl pyrophosphate.
-Oxidation reactions and formation of terpenes.
-Sesquiterpenes and steroid biosynthesis.

Biosynthesis of alkaloids
-Amino acid-derived alkaloids.
-Alkaloid-terpene hybrids.
-Modified nucleic acids

Phenylpropanoids

Aminoglycosides

Fatty acids
-Synthesis of saturated and unsaturated fatty acids.

Biosynthesis of polyketides
T1 – Modular domain structure, genes.
T1 part 2 – Iterative domains and the ACP (fungal).
T2 – Oxytetracycline.

Polyethers

Non-ribosomal peptide synthases (NRPS)

PKS-NRPS hybrids

Isolation of natural products
-Plant and animal natural products.
-Microbial natural products

Bioproduction

Heterologous pathway synthesis