

**UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
SYLLABUS
WINTER 2021**

1. Course: CHEMISTRY 551, Organic Synthesis

LEC	DAYS	TIME	INSTRUCTOR	OFFICE	EMAIL	TELEPHONE
L01	MWF	11:00-11:50	T.G. Back	SB 217	tgback@ucalgary.ca	403-220-6256
T01	W	13:00-13:50	T.G. Back	SB 217	tgback@ucalgary.ca	403-220-6256

Departmental Office: Room SA 229, Tel: 403-220-5341, e-mail: uginfo@chem.ucalgary.ca

- 2. Course Description:** *Lectures: Concepts and strategies of synthesizing molecules with emphasis on retrosynthetic analysis, useful reactions and chemo- regio- and stereoselectivity.*
- 3. Recommended Textbook:** *"Organic Synthesis – The Disconnection Approach", 2nd Edition, by S. Warren and P. Wyatt, Wiley, 2008.*
- 4. Topics Covered and Suggested Additional Reading:**
 History and Milestones of Organic Synthesis
 Logistics
 The Retrosynthetic Approach: bond disconnections, transforms, synthons, synthetic equivalents, umpolung
 Chemoselectivity
 Aromatic Chemistry
 Amination Reactions
 Protecting Groups in Synthesis
 Stereoselectivity: diastereoselectivity, enantioselectivity, chiral templates, resolution, chiral auxiliaries, chiral catalysts
 Alkene synthesis
 Cycloadditions: masked functionality, Diels-Alder and hetero-Diels-Alder, ketenes and alkenes in [2+2] reactions, photochemical cycloadditions, cascade processes
 Carbonyl Condensations: enolate chemistry, aldol regio- and stereochemistry, directed aldol reactions, surrogate aldol reactions
 Aliphatic Nitro Compounds
 Oxidative Cleavage
 Three-Membered Rings as Synthetic Intermediates and Targets
 Rearrangements: ring contractions and ring expansions; e.g. Beckmann, Curtius, Tiffeneau-Demjanov, carbocation, biomimetic, sigmatropic

The following are related texts, but are not required:

Warren, S., *Designing Organic Syntheses: a Programmed Introduction to the Synthron Approach*, Wiley and Sons, 1978.
 Wyatt, P., Warren, S. *Organic Synthesis – Strategy and Control*, Wiley and Sons, 2007

Other Reference Books:

General Organic Chemistry

Ege, S., *Organic Chemistry*, D.C. Heath (any edition)
 Carey, F.A., *Organic Chemistry*, McGraw Hill (any edition)
 Jones, M. and Fleming, S.A., *Organic Chemistry* (any edition)
 Or any other comparable introductory organic text

Advanced Organic Chemistry

Miller, B., *Advanced Organic Chemistry*, 2nd ed., Prentice Hall, New Jersey, 2003
 M.B. Smith and J. March, *Advanced Organic Chemistry*, 5th (or other) Ed., Wiley and Sons, 2001.
 P. Wyatt, S. Warren, "Organic Synthesis-Strategy and Control", Wiley, Chichester, U.K., 2007.
 G.S. Zweifel, M.H. Nantz, "Modern Organic Synthesis", Freeman, New York, 2006.

Organic Synthesis in General:

Smith, M.B., "Organic Synthesis", 2nd Ed., McGraw-Hill, New York, 2002.

Total Synthesis

Corey, E.J.; Cheng, X.-M, The Logic of Chemical Synthesis, 1989, Wiley and Sons

Nicolaou, K.C., Sorensen, E.J., Classics in Total Synthesis, 1996, VCH

Nicolaou, K.C., Snyder, S.A., Classics in Total Synthesis II, 2003, VCH

Protecting Groups:

T.W. Greene, P.G.M. Wuts, "Protective Groups in Organic Synthesis", 3rd (or other) Ed., Wiley-Interscience, New York, 1999

There are also numerous online resources. SciFinder Scholar is especially useful for finding information related to Organic Synthesis.

Department Approval: Approved by Department Head

Date: