

**UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF CHEMISTRY
SYLLABUS
WINTER 2017**

1. Course: CHEMISTRY 551, Organic Synthesis

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	EMAIL	OFFICE HOURS
L01	MWF	11:00-11:50	SA 119	T.G. Back	SB 217	tgback@ucalgary.ca	TBA
T01	W	13:00-13:50	SA 235	T.G. Back	SB 217	tgback@ucalgary.ca	TBA

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- 2. Course Description:** *Lectures: Concepts and strategies of synthesizing molecules with emphasis on carbon-carbon bond-forming reactions, protecting groups, chemo- region- and stereoselectivity.*
- 3. Recommended Textbook:** *"Organic Synthesis – The Disconnection Approach", 2nd Edition, by S. Warren and P. Wyatt, John Wiley and Sons, 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 Synthon 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

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

Organic Transformations: Larock, R.C., Comprehensive Organic Transformations, 1989, VCH; Trost, B.M., Comprehensive Organic Synthesis, 1991, New York, Pergamon

Organic Reagents: Paquette, L.A., Encyclopedia of Reagents for Organic Synthesis, Wiley and Sons, 1995; Fieser, M., Fieser and Fieser's Reagents for Organic Synthesis, Wiley and Sons, V. 1-29.

Note: SciFinder Scholar provides the means to find a great deal of information related to organic synthesis online.

Department Approval: Approved by Department Head

Date: December 21, 2016