

**UNIVERSITY OF CALGARY  
FACULTY OF SCIENCE  
DEPARTMENT OF CHEMISTRY  
SYLLABUS  
WINTER 2019**

**1. Course: CHEMISTRY 551, Organic Synthesis**

LEC	DAYS	TIME	ROOM	INSTRUCTOR	OFFICE	EMAIL	OFFICE HOURS
L01	MWF	11:00-11:50	SA 121	T.G. Back	SB 217	<a href="mailto:tgback@ucalgary.ca">tgback@ucalgary.ca</a>	TBA
T01	W	13:00-13:50	SA 147	T.G. Back	SB 217	<a href="mailto:tgback@ucalgary.ca">tgback@ucalgary.ca</a>	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", 2<sup>nd</sup> 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*, 2<sup>nd</sup> ed., Prentice Hall, New Jersey, 2003

M.B. Smith and J. March, *Advanced Organic Chemistry*, 5<sup>th</sup> (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", 3<sup>rd</sup> (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:    January 7, 2019