

UNIVERSITY OF CALGARY
DEPARTMENT OF CHEMISTRY
COURSE SYLLABUS
WINTER 2016

COURSE: CHEMISTRY 655, Advanced Organic Synthesis

TEXTBOOK: The course does not follow any specific textbook. Additional sources of information will be provided in lectures. See also the Suggested Reading List below:

SUGGESTED READING:

General overview:

1. "Organic Synthesis" by M.B. Smith, 2nd edition, McGraw Hill, 2002.
2. "Organic Synthesis – Strategy and Control" by P. Wyatt and S. Warren, Wiley, 2007

Reagents and reactions:

1. "Advanced Organic Chemistry" by M.B. Smith and J. March, 7th edition, McGraw Hill, 2007. (Earlier editions are also very useful).
2. "Greene's Protective Groups in Organic Synthesis" by P.G.M. Wuts and T.W. Greene, 4th or later ed., J. Wiley, 2007.
3. "Comprehensive Organic Synthesis: Selectivity, Strategy and Efficiency in Modern Organic Chemistry" ed. by B.M. Trost and I. Fleming, Pergamon, 1991, Vol. 1-9.
4. "Encyclopedia of Reagents for Organic Synthesis", ed. by L.A. Paquette, Wiley, 1995. (An electronic version of this source also exists).

Synthetic strategy and total synthesis:

1. "The Logic of Chemical Synthesis" by E.J. Corey and X.M. Cheng, J. Wiley, 1989.
2. "Total Synthesis of Natural Products: The Chiron Approach" by S. Hanessian, Pergamon Press, 1983.
3. "Enantioselective Synthesis. Natural Products from Chiral Terpenes" by T.-L. Ho, Wiley, 1992.
4. "Classics in Total Synthesis" by K.C. Nicolaou and E.J. Sorensen, VCH, 1996 and "Classics in Organic Synthesis II" by K.C. Nicolaou and S.A. Snyder, VCH, 2003. "Classics in Total Synthesis III: Further Targets, Strategies, Methods" by K.C. Nicolaou J.S. Chen, VCH, 2011.
5. "The Way of Synthesis" by T. Hudlicky and J.W. Reed, Wiley-VCH, 2007

Note: There is no substitute for regular perusal of the current literature!

Description of course content:

Introduction:

Will vary with the background of those enrolled.

Skeletal assembly:

Methods for C-C bond formation, incorporation of heteroatoms, annulation techniques.

Functional group manipulation:

Oxidation, reduction; introduction, removal and transposition of functional groups; use of protecting groups.

Stereochemistry:

Stereocontrol will be stressed throughout the course, including recent methods for enantioselective synthesis (e.g. use of chiral templates, auxiliaries, catalysts, etc.).

Total synthesis of complex products:

The above topics will be presented wherever possible in the context of total syntheses where they served a key role. A critical presentation of several total syntheses drawn from the classical and current literature will also be made. Target compounds include natural products as well as molecules of theoretical interest.