Building upon the methodology learned in your introductory organic chemistry classes, this course will focus on the art and science of total synthesis. Special attention will be paid to modern asymmetric transformations, organometallic coupling strategies (particularly Pd- and Ru-mediated reactions), and considerations of synthetic efficiency. A significant portion of the evaluation for this course will be based upon a proposal for the synthesis of a complex natural product.

Course Content:

1. **Named reactions** and reagents of use to the modern synthetic chemist.
2. **Vocabulary** commonly used to discuss and evaluate total syntheses.
3. **Concepts** frequently invoked in the planning and execution of a synthesis.
4. Considerations of **how one actually makes complex molecules**.

Anyone who has taken previous organic courses will have learned a certain amount about topics 1–3. Arguably, however, topic 4 is most important to those wanting to advance in careers involving synthetic organic chemistry. In this course, named reactions, vocabulary, and concepts of reactivity or stereochemistry will be presented (as much as possible) within the context of notable total syntheses from the last 50 years. Hopefully, by the end of this course you will have increased your catalogue of named reactions while simultaneously developing an appreciation of the complexities involved in designing and executing your own complex syntheses of natural products or designed molecules.

Evaluation:

<table>
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<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>pKa quiz</td>
<td>5 %</td>
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<tr>
<td>assignment 1</td>
<td>5 %</td>
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<tr>
<td>assignment 2</td>
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<td>assignment 3</td>
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<tr>
<td>midterm exam</td>
<td>15 %</td>
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<tr>
<td>synthesis proposal</td>
<td>25 %</td>
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<tr>
<td>final exam</td>
<td>25 %</td>
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<tr>
<td>participation</td>
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Your final grade will be reported as a numerical percentage, in keeping with UVic’s policies on grade reporting. Letter grades are derived from numerical percentages as follows:

- **A+** 90-100%
- **A** 85-89%
- **A-** 80-84%
- **B+** 77-79%
- **B** 73-76%
- **B-** 70-72%
- **C+** 65-69%
- **C** 60-64%
- **D** 50-59%
- **F** < 50%
- **N** incomplete performance
Course Website:
web.uvic.ca/~chem432/ has old examinations, supplementary material, and other useful information. Lecture notes are also posted but are intended for review only. Do not bring them to class.

Textbook:
Strategic Applications of Named Reactions in Organic Synthesis by Laszlo Kurti and Barbara Czako is the assigned textbook, and will be required to complete assignment 1. The bookstore charges too much for this text, so I encourage you to order a copy online instead (CDN $117 at Amazon; eligible for free shipping). In addition to being useful for this course, you’ll find that Kurti and Czako’s book will be a really useful resource for you later on. In an era where most reference books have been supplanted by web resources, I still find myself drawing ideas and references from this book on a regular basis. If you really can’t afford it, I’ve also placed a copy on reserve in the library.

Additional Texts:
The following books will be useful to you throughout the course (especially for your final assignment), and have also been placed on reserve:


Other Resources:
Your second-year organic chemistry textbooks will be very useful for looking up all those reactions that you once knew. For more exotic named reactions, you may wish to consult one of the many lists available online. I’ve posted some links to these on my group website: web.uvic.ca/~wulff/Links.htm. Wikipedia also has some surprisingly advanced treatments of important named reactions… caveat lector!

Important Dates (also see attached calendar):

- Tuesday, Jan. 7th  – first lecture
- Wednesday, Jan. 15th  – pKa quiz
- Wednesday, Jan. 29th  – assignment #1 due
- Wednesday, Feb. 12th  – assignment #2 due
- February 17th to 21st  – reading break
- Friday, Feb. 14th  – SciFinder information session (in class; please bring laptop & mouse)
- Wednesday, Feb. 26th  – assignment #3 due
- Wednesday, Mar. 11th  – midterm exam
- Wednesday, Mar. 25th  – draft of synthesis proposal due
- Friday, April 3rd  – last class; synthesis proposal due

assignments are due at the beginning of class; no extensions will be given
Testable Material:

Because this course does not take the form of a long list of material suitable for memorization, a few of you will be concerned with “what will be on the exam”. To assist you in studying for the midterm and final (which, incidentally, collectively total only 40% of your course mark), I’ve prepared a list of reactions (see attached) that I will be drawing from over the duration of the course. For maximal success on the exams, you should know the following:

- a) reactions covered in previous courses, indicated in the attached list (note the red checkmarks).
- b) reactions discussed in the lecture (note: a few of the reactions on the list may not be covered in any given year; reactions that aren’t covered will not be tested).
- c) reactions covered in assignments 1 and 2 (note: these assignments intentionally present material that is not explicitly discussed in the course).
- d) reactions covered in the handouts.

Much of the exam will also be devoted to proposing mechanistic hypotheses for reactions you haven’t necessarily seen before, and for designing workable syntheses. Be sure you get some practice on these skills – simply memorizing named reactions will not get you far.

Note that additional video content will also be appearing on CourseSpaces site. This is intended as review material and so will not be explicitly tested. However, you are strongly encouraged to review this information before coming to class and before your midterm and final exam. It will also likely help you with the assignments.

Academic Integrity:

Instances of plagiarism, copying during exams, or other abuses of academic integrity will be dealt with as harshly as possible, within the confines of the University’s academic integrity policy. (see: https://web.uvic.ca/calendar2020-01/undergrad/info/regulations/academic-integrity.html) Having said this, I strongly encourage you to work together with your colleagues on assignments 1–3, and study together for tests. Arguing with one another about the course material is extremely helpful in mastering the content from Chemistry 432 / 533.

Equity and Good Behaviour:

The University promotes a safe, respectful and supportive learning, working, and living environment. University policies prohibit discrimination, harassment, and sexualized violence. The Equity and Human Rights office (EQHR) is a resource for all UVic community members, including students. EQHR provides education, information, assistance and advice in aid of building and supporting an inclusive and respectful campus. When issues and concerns arise, EQHR assists those involved through the range of support and resolution options available under the Sexualized Violence Prevention and Response policy and Discrimination and Harassment policy. EQHR staff are available by appointment—contact information and resources can be found at https://www.uvic.ca/equity/.

The Department of Chemistry expects everyone participating in university activities in the department to model respectful behaviour and abide by applicable University policies. For more information please contact: Sandra Carlson, Department Secretary: dsecchem@uvic.ca or in person at Elliot 301.