

ORGANIC CHEMISTRY

Dr. Joseph C. Cannistra 228 Collier Ext. 1432 e-mail: cannistraj@moravian.edu	Office Hours	
	Mon. (M)	10:00 AM -> 11:00 AM
	Wed. (W)	11:00 AM -> 12:00 PM
	Thurs. (R)	9:00 AM -> 10:00 AM
	Fri. (F)	10:00 AM -> 11:00 AM
Or by appointment		

Class Hours
MTWF 8:55-9:45 AM
PPHAC 102

Lab Hours
TR 12:45 – 3:45 PM
WF 1:15 – 4:15 PM
211 Collier

REQUIRED MATERIAL

- Organic Chemistry*; by Jonathan Clayden, Nick Greeves and Stuart Warren; Oxford University Press, 2012 (ISBN: 978-0-19-927029-3) (CGW)
- Making the Connections: A How-To Guide for Organic Chemistry Lab Techniques*; Second Edition, by Anne B Padías, Hayden McNeil 2011 (ISBN: 978-0-7380-4135-3 - paperback) (Padías)
- 1002A/Organic Chemistry Introductory A-Set (Models)

SCHEDULE OF CLASS TOPICS FOR CHEM 212

Equilibrium Controlled Reactions, cont:

- C. Reactions of Carbonyl Compounds, cont. [CGW Chapter (CH) 5: all]
 - 1. How and Why Does It Happen?
 - a. Addition Reactions, cont. [CGW CH 6: all; CH 20: all; CH 22: pp. 498-510; CH 26: pp. 614-639]
 - b. Addition-Elimination Reactions [CGW CH 11: all]
 - c. Acyl Substitution Reactions [CGW CH 10: all; CH 26: pp. 640-654]
 - 2. How Are They Related?

Organic Structure: A Closer Look

- A. Stereoisomerism [CGW Chapter (CH) 14: all]
- B. Bond Rotations and Conformational Analysis [CGW CH 16: all]

Kinetically Controlled Reactions:

- A. Review of Equilibrium Controlled Reactions [CGW CH 12: pp. 240-249, 266-267]
- B. Kinetics vs. Thermodynamics [CGW CH 12: pp. 250-265]
- C. Nucleophilic Substitution at Saturated Carbons [CGW CH 15: all]
- D. Elimination Reactions [CGW CH 17: all]
- E. Addition Reactions [CGW CH 19: all]
- F. Electrophilic Aromatic Substitution [CGW CH 21: all]
- G. Free Radicals and Reactions thereof [CGW CH 37: all]
- H. Biomolecules and Biological Reactions [CGW CH 42: all]

COURSE GOALS

This course is designed to help you to **discover** important aspects of the area of science identified as Organic Chemistry, to **develop the FUNDAMENTAL CONCEPTS and REASONING SKILLS** that help us organize and understand organic reactions and to **be able to use your skills to apply fundamental concepts to unfamiliar organic structures or reaction conditions**. We define **understanding of concepts** as the **ability to use these concepts effectively in a variety of contexts**. The process of **discovery begins with chemical data** and requires that you **apply your previous experience to analyze the data and propose reasonable explanations** for trends in each new data set. The sequence of topics is designed such that **each new activity builds on the understanding that you developed in earlier analyses**.

COURSE ORGANIZATION AND CLASSROOM ACTIVITIES

Groups and Student Collaboration

To aid you in your study of organic chemistry, each of you will be assigned to a **class discussion group**. Each group will consist of four or five students. For most of the laboratory experiments, you will also work in **research groups**. There may be some personnel overlap between class groups and research groups, but usually, they will operate independently. Each member of your group will have specific duties to assure that the workload is evenly distributed and **to help each student develop the required range of process skills necessary to be successful**. The first set of groups has been assigned alphabetically, but the compositions of groups will be changed periodically throughout the semester. Regardless of changes in group composition, specific role assignments will change each class period (See **CLASS GROUP STRUCTURE** pp. 4-5.).

Class Format

This course employs a discussion format that is unconventional for science courses. The value of class periods is largely dependent upon what each student contributes. Each day you will be given an activity with specific data and questions meant to guide your analysis for the following class period. Throughout the class period, we will randomly select several groups to present their group responses to specific questions within the activity. Generally, these presentations will form the basis for whole-class discussions. Consequently, **your group will be asked to draw initial conclusions from data BEFORE any whole-class discussion of the material has taken place**. After initial group presentations, a 5-10 minute whole-class discussion of these initial conclusions will be allowed. During this whole-class discussion, additional groups may be selected to respond to the original groups' presentations, while other volunteer responses will also be considered in efforts to reach a consensus as to the best interpretation of the data being analyzed. At any time during this whole-class discussion, you may be asked to consider this new information as individual groups in efforts to continue towards a consensus in a whole-class discussion. When a specific issue is settled, we will then move on to the next consideration, gradually building our understanding of organic chemistry. After each class, each group submits **an electronic Recorder's Report**, which includes the group responses to activity questions (See Recorder on p. 5). **After each class activity there will be out-of-class reading assignments and application questions. Also, you will be expected to work together outside of class in preparing daily class assignments, analyzing lab data, and devising answers to questions for exams** (See *Evaluation* p. 3). This process may be a bit uncomfortable at first, since initially you will have to rely on your group's combined logic rather than something you have gotten from a lecture or textbook. However, as the semester progresses, your knowledge, application, and confidence in using these concepts of organic chemistry will increase, making you more comfortable with presenting your ideas. The course structure encourages you to **take responsibility for, and an active part in, your learning** of organic chemistry. Educational research indicates that students who work in groups with their peers tend to learn more in their courses. We hope that you will find that working with the members of your group will give you better insight in your analyses of the daily assignments.

Communication Between Class Members and Instructors

Often students immediately request names of potential tutors for this course. We have no problems with your seeking assistance from people who have had the course before, but our experience indicates that, in general, students who have problems in this course benefit much more from **seeking our help outside of class**. We realize that you might have significant concerns about going to an instructor's office when you have problems (e. g. "If I tell him that I have problems, he'll think I'm not very smart.") But this course is designed as a "community of scholars" to initially determine what class members understand and don't understand, and then to work together to help everyone gain facility with the material. To this end, **any information obtained concerning problems students have is beneficial to the class as a whole and the best place to express these concerns and/or any confusion is in class**. We recognize that you may be uncomfortable expressing a lack of understanding to the whole class. However, the **course continually builds upon itself**, so it is **critical that you solve your problems of understanding as soon as possible**. We recommend that you come and talk with us about problems that you feel uncomfortable about expressing in class.

ADMINISTRATIVE POLICIES*Laboratory Discussions and Periods*

Students are required to attend **all** AM laboratory discussions (See schedule in the Lab Manual) and all scheduled lab periods unless excused due to a valid medical excuse (verified by the Health Center or a personal physician) or other accepted **prior** excuse. Make-ups or grade adjustments for excused absences will be arranged. **Grades for work missed due to unexcused absences will be marked as zero.**

Missed Exams or Quizzes

Students are required to take all exams and quizzes. There will be **NO MAKE-UPS**. If an **exam or quiz is missed** without an accepted **prior excuse** or a valid medical excuse, the grade for that work will be **zero**. The grade for an exam or quiz missed due to an excused absence will be determined from the grades earned on the remaining exam(s) (including the final exam) or quizzes, i.e. more value will be added to subsequent exams or quizzes. The final exam will be given at the time specified by the registrar during the final exam period, 1:30 PM on Monday, May 4th. Make-up finals for those with verified conflicts will be given on the last day of the final exam period.

NOTE: **Trips scheduled for other courses or travel schedules for weekends or breaks are NOT acceptable excuses** for missing classes, quizzes, exams, lab discussions or lab periods.

Grades and Grade Distribution

All grades will be determined on an absolute letter grade scale, so there is **no disadvantage to any student for helping another**. In fact, often students develop a much better understanding of the concepts and reasoning skills needed in the course by **dealing with the different problems and viewpoints of other students**. **Collaboration is an important basis for the design of this course and of science in general.**

Your **grades** on all work in this course will be given as **letter grades**. Grades of F are counted as a full letter grades below D- (So the average of a C- and an F is a D-). The contributions of all course activities to your final grade are listed below:

Library Project (Completion required to pass the course)	2 %
On-line homework	8 %
Quizzes (15) [Jan. 23, 30; Feb. 6, 13, 20, 27; Mar. 6, 13, 20, 27; Apr. 3, 10, 17, 24; May 1]	10 %
Group Work	10 %
Mid-term Exams (2) [Feb. 18 & Apr. 1]	30 %
Laboratory (See the Lab Syllabus in the Lab Manual for an explanation)	20 %
Final Exam [1:30 PM on Monday, May 4 th]	20 %
	TOTAL 100 %

On-line Homework

After we complete most activities you will have an electronic homework application assignment through the Sapling Learning System (<https://www.saplinglearning.com/>). Sapling's chemistry questions are delivered in a web browser to provide real-time grading, response-specific coaching, improvement of problem-solving skills, and detailed answer explanations. Dynamic answer modules enable one to interact with 3D models and figures, utilize drag-and-drop synthetic routes, and draw chemical structures—including stereochemistry and curved arrows. Altogether, Sapling is cheaper than a tutor, provides more value than a solutions manual, and goes beyond a mere assessment exercise to give a learning experience. See the First Class Assignment Sheet for instructions to enroll in Chem 212 on Sapling; the cost is \$40 for the semester, unless you have previously purchased the combined year for \$60.

Quizzes

There will be twelve 5 minute **individual in-class quizzes** most weeks. (See above and CHEM 212 Spring Term Calendar, pp. 6-7) The quizzes are designed to provide encouragement for everyone to continue to be involved in group activities, feedback on your development of new

material weekly throughout the semester, and to complete out of class application assignments. They also serve to give us feedback as to what each student does or does not understand.

Group Work

Evaluation of your contribution to group work will be based upon (Daily Grade %):

- Your group's initial presentations in class and responses to questions in class (33.3%)
- Your group's submission of Electronic Recorder's Reports (33.3%)
- Your individual voluntary contributions to class discussions (33.3%).

Group Work Grades for each week will be available in the Grade Center on the course Blackboard site. **It should be noted that an absent student cannot earn a contribution to a group grade on the day of an absence whether excused or not.**

Mid-term Exams

The two **major exams** during the semester will be **in-class closed-book exams** on Wednesday, February 18th and Wednesday, April 1st. The exams will consist of some specific "simpler" questions, and up to 4 "more complex" questions, which will require you to apply concepts developed in class to new situations. However, **one week prior to each exam** (Wednesday, February 11th and Wednesday, March 25th) a handout with example "simpler" questions, and up to 6 specific "more complex" questions will be distributed. The "simpler" questions will be representative of the type of "simpler" questions that are likely to be on the exam. However, the **"more complex" questions** on the exam will be taken **verbatim from the handout** distributed. You will then have one week to work alone, **with your group members**, or anyone else **in the class** to devise answers to the questions. During your deliberations, you may ask questions of us, but you are not allowed to consult any student assistant in the course or anyone not involved in the course this semester. The exams will be written in class on Wednesday, February 18th and Wednesday, April 1st. A periodic table of the elements will be provided and **you may bring molecular models, a calculator, and writing implements to the exam, but NO notes, books, handouts, or electronic material may be used and there will be NO consultation or collaboration among students during the exam.** Thus, you can work together in devising answers, but the final copy of your exam should express your own understanding of the material.

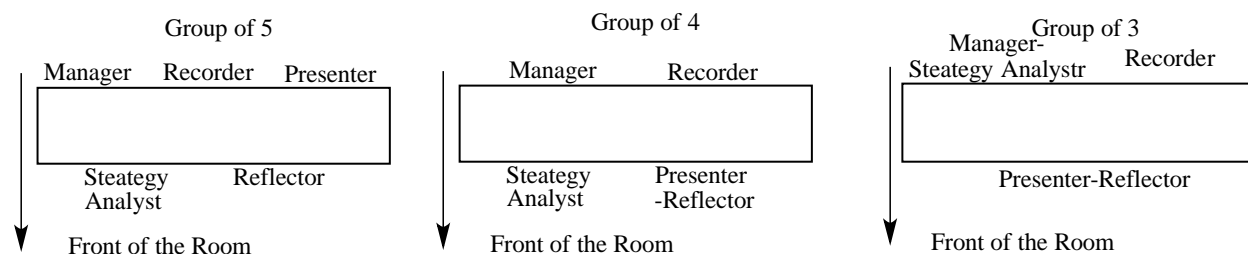
Final Exam

The final exam will be written during the 3-hour final exam period beginning at 1:30 PM on Monday, May 4th. The question handout for the final exam will be distributed after class on Monday, April 27th. Rules for preparing for and writing the final exam are the same as those for the mid-term exams.

CLASS GROUP STRUCTURE

Group Composition and Dynamics

As indicated in the Administrative Policies, much of your class work in CHEM 212 will usually be done in groups of four or five (and sometimes three) students. Each member of the group has a specific role to play in making your collective learning experiences profitable. The definitions of the specific roles to be assigned are listed below. The initial membership assignments of the groups were alphabetical. Group membership will change at times during the semester. However, one aspect of group work will remain constant, for **each class period all members of the group will be assigned new roles and have specific positions at the table.** (See the diagram below and note that **the manager is facing the front of the room.**)



Group Role Definitions

Manager

Manages the group. Ensures that the group has the **appropriate materials** (class and lab textbooks, molecular models, etc.), **members are fulfilling their roles**, the **assigned tasks are being accomplished on time**, and **all members of the group work through activities step-by-step together and understand the concepts**. The Manager **communicates with the instructor** when information or assistance is required and is responsible for seeing that group recorder's reports **are submitted in a timely manner**.

Recorder

Obtains the **group tablet laptop**, **downloads the electronic activity from the course Google Drive**, **renames the activity with the group name**, and **records group answers and warrants** for the group's claims for each question in the electronic class activity for the day. Is **responsible for determining that all group members understand and agree on the group's response** to an activity question **before moving on** to the next question. At the end of each class period, **copies the group Electronic Recorder's Report back to the course Google Drive** and returns the **group tablet laptop** to the cart **assuring that it is properly plugged in for charging**. The Electronic Recorder's Report will be considered to be the official group response to each day's activities.

Strategy Analyst

At the direction of the manager, **reads each activity question to the group to help the group stay together**. As the activity develops, **focuses on how the sequence of questions in the activity leads the group to develop particular concepts**. At the end of each activity, leads the Strategy Analyst's Report Discussion of the logic behind the sequence of questions of the activity and assures that the sense of the group is documented by the recorder.

Presenter

When necessary, presents group claims and warrants to the class when requested by the instructor. These claims and warrants will usually be presented in conjunction with the recorder's report projected on the screen in front of the class and will be the bases for whole class discussions. **Shares information with other groups** when indicated by the manager or instructor.

Reflector

Observes and comments to the manager **on group dynamics and behavior** with respect to the learning process and **the effectiveness of the group** in dealing with daily assignments. May be called upon to report to the group, the instructor, or the entire class concerning how well the group is operating or what needs improvement and why. Assures that all **group members recognize the concepts developed** in each activity. At the end of each activity, leads the Reflector's Report Discussion identifying the group's consensus on the key concepts developed by the group, their warrants for the development and identifying the group's remaining questions.

NOTE: For groups of **four students**, one student will fill both the **Presenter and Reflector** roles. For **three students**, the **Manager** will also fill the **Strategy Analyst** role.

COLLABORATION AND ACADEMIC HONESTY

Collaboration among students in class and in preparation for class discussion is generally encouraged and required for most classes. Educational research indicates that students learn best when they engage in discussions and analyses of class material with their peers. However, the final version of all written work submitted for evaluation must be prepared without consultation with other students. To be fair to all students in the course and to assure maximum learning for each student, we follow all the guidelines for academic honesty spelled out in the *Moravian College Student Handbook* (See College Website <http://www.moravian.edu/studentLife/handbook/academic/academic2.html>).

DISABILITY SUPPORT

Students who wish to request accommodations in this class for a disability should contact Ms. Elaine Mara, Assistant Director of Academic & Disability Support, located on the first floor of Monocacy Hall (extension 1401). Accommodations cannot be provided until authorization is received from the Academic & Disability Support office.

**CHEM 212 Spring Term Calendar
January 2015**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
18	19 MLK Class Begins Week 1	20	21	22	23 Quiz 1	24
25	26 PreLab Disc. <u>Last Day</u> <u>For Course</u> <u>Changes</u> Week 2	27	28	29	30 Quiz 2	31

February 2015

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 PreLab Disc. Week 3	3	4	5	6 Quiz 3	7
8	9 PreLab Disc. Week 4	10	11 <u>Exam I</u> <u>Questions</u>	12	13 Quiz 4	14
15	16 PreLab Disc. Week 5	17	18 <u>EXAM 1</u>	19	20	21
22	23 PreLab Disc. Week 6	24 Experiment 1 Lab Report	25 Experiment 1 Lab Report	26 Experiment 1 Lab Report	27 Experiment 1 Lab Report	28 Quiz 5

CHEM 212 Spring Term Calendar
March 2015

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 PreLab Disc. Week 7	3	4	5	6 Mid-Term Quiz 6	7 Spring Recess
8 Spring Recess	9 Spring Recess	10 Spring Recess	11 Spring Recess	12 Spring Recess	13 Spring Recess	14 Spring Recess
15	16 PreLab Disc. Week 8	17 Experiment 2 Lab Report	18 Experiment 2 Lab Report	19 Experiment 2 Lab Report	20 Experiment 2 Lab Report Quiz 7	21
22	23 PreLab Disc. Week 9	24	25 <u>Exam II Questions</u>	26	27 Quiz 8	28
29	30 Week 10	31 No PM Lab				

April 2015

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 <u>EXAM II</u> No PM Lab	2 No PM Lab	3 Easter	4 Easter
5 Easter	6 Easter Week 11	7	8	9	10 Quiz 9	11
12	13 PreLab Disc. Week 12	14	15	16	17 Quiz 10	18
19	20 Week 13	21 Experiment 3 Lab Report	22 Experiment 3 Lab Report	23 Experiment 3 Lab Report	24 Experiment 3 Lab Report Quiz 11	25
26	27 <u>Final Exam Questions</u> Week 14	28 Experiment 4 Lab Report	29 Experiment 4 Lab Report	30 Experiment 4 Lab Report		

CHEM 212 Spring Term Calendar
May 2015

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 Experiment 4 Lab Report Quiz 12	2 Classes End
	Week 14 cont.					
3	4 CHEM 212 FINAL EXAM 1:30 PM	5 FINAL EXAMS	6 FINAL EXAMS	7 FINAL EXAMS	8 FINAL EXAMS	