

**Bergen Community College**  
**Division of Math, Science and Technology**  
**Department of Physical Sciences**

**MASTER Course Syllabus**  
**CHM 262 Organic Chemistry II**

Semester and year:

Course Number:

Meeting Times and Locations:

Instructor:

Office Location:

Phone:

Office Hours:

Email Address:

**COURSE DESCRIPTION:** Organic Chemistry II is a continuation of CHM-260 and includes the study of aromatic and organometallic compounds, spectroscopy, and the chemistry of carbonyl compounds. Topics presented include the theoretical basis for molecular reactivity, molecular modeling, determination of structure with emphasis on spectroscopic methods, mechanisms of chemical reactions, and synthesis of organic compounds. The microscale laboratory emphasizes preparation, purification and identification of organic compounds. Analysis by IR, GC, GC/MS, NMR and UV/VIS are integral to experiments.

**CREDITS/HOURS:** 4 credits/ 6 hours

**PREREQUISITES:** CHM-260

**GENERAL EDUCATION COURSE:** No

**TEXTBOOK:** Organic Chemistry, 3<sup>rd</sup> Edition; D. Klein; John Wiley & Sons, New Jersey, 2017.

**LABORATORY MANUAL:** Laboratory Manual for Organic Chemistry II, CHM 262 BCC, Signature Series, Cengage Learning,

**MOLECULAR MODEL SET:** Darling Molecular Model Set, or other similar model set for Organic chemistry

**COURSE CONTENT (Lecture):**

1. Nuclear Magnetic Resonance Spectroscopy
2. Conjugated Pi Systems and Pericyclic Reactions
3. Aromatic Compounds
4. Aromatic Substitution Reactions
5. Aldehydes and Ketones
6. Carboxylic Acids and Their Derivatives
7. Alpha Carbon Chemistry: Enols and Enolates
8. Amines
9. Organometallic compounds
10. Carbohydrates
11. Amino Acids, Peptides, and Proteins
12. Lipids
13. Synthetic Polymers

**COURSE CONTENT (Laboratory):**

Chemistry laboratory safety

Chemistry laboratory small scale and microscale techniques

Use of a variety of sophisticated instrumentation (UV, IR, GC/MS, refractometer)

Experiments that emphasize the topics contained in the lecture. A detailed list of experiments is found on the last page of this syllabus

Laboratory report writing

Molecular modeling

**LECTURE AND EXAMINATION SCHEDULE: (SAMPLE ONLY)**

<b>Class</b>	<b>Lecture Time Slot</b>
1.	Chapter 15
2.	Chapter 15
3.	Chapter 16
4.	Chapter 16
5.	Chapter 17
6.	Chapter 17
7.	Unit Exam 1 on Chapters 15, 16, 17
8.	Chapter 18
9.	Chapter 18
10.	Chapter 19
11.	Chapter 19
12.	Chapter 19
13.	Chapter 20
14.	Unit Exam 2 on Chapters 18, 19, 20
15.	Chapter 20
16.	Chapter 21
17.	Chapter 21
18.	Chapter 21
19.	Chapter 22
20.	Chapter 22
21.	Exam 3 on Chapters 20, 21, 22
22.	Chapter 23
23.	Chapter 23
24.	Chapter 24
25.	Chapter 24
26.	Chapter 25
27.	Chapter 27
28.	Chapter 27
29.	Unit Exam 4 on Chapters 23-27
30.	Review
31.	Final Exam (Comprehensive)
32.	

The instructor **may** elect to have between three and six examinations as they see fit. Instructors **may elect** to cover chapters 24 – 27 if time is available.

**Sample LABORATORY SCHEDULE:**

<b>Weeks</b>	<b>Lab Assignments</b>
1.	Misc 0214: Literature of Organic Chemistry
2.	Tech 0711: Use of NMR to identify unknown compounds
3.	Reac 0716: Nitration of Acetanilide or Methyl Benzoate
4.	Synt 0717: Diels Alder Reaction
5.	Synt 0718: Grignard Reaction
6.	Synt 0718: Grignard Reaction
7.	Reac 0720: Aldol Condensation
8.	Reac 0731: Luminol Synthesis
9.	Reac 0737: Thiamine-Catalyzed Benzoin Condensation
10.	Reac 0736: Pinacol Rearrangement
11.	Synt 0721: Wittig Reaction
12.	Synt 0713: Fischer Esterification
13.	Reac 2132: Exp 54A Isolation Casein
14.	Reac 2132: Exp 54B Isolation Lactose
15.	Reac 2121: Preparation and Properties of Polymers
16.	Modl 2008: Computational Chemistry
17.	Reac 2089: Preparation of Soap
18.	Reac 2130: Carbohydrates

Faculty should schedule no fewer than 14 weeks of laboratory work from the list of laboratory experiments above.

**GRADING POLICY: (SAMPLE ONLY)**

## Option A\*

Unit Examinations (all 3)	42.8%
Final Examinations (Comprehensive)	14.3%
Laboratory Assignments	28.6%
Research Assignment	14.3%

## Option B\*\*

Unit Examinations (Best 2 out of 3)	28.6%
Final Examinations (Comprehensive)	28.6%
Laboratory Assignments	28.6%
Research Assignment	14.3%

\*Grade Option A is used when the Final Examination is the lowest grade and all four Unit Examinations are taken.

\*\*Grade Option B is used when a student fails to take a Unit Examination for any reason or if a Unit Examination is the lowest grade. Then that Unit Examination is then dropped from the final grade. THERE ARE NO MAKE UP EXAMINATIONS.

Laboratory Experiment Grade:

12 Labs Reports @ 15-25 Points each as indicated in Moodle 200  
THERE ARE NO MAKEUP LABORATORIES.

Lab or Examination Score	Point Value	Letter Grade
100 – 90	4.0	A
90 – 85	3.5	B+
85 – 80	3.0	B
80 – 75	2.5	C+
75 – 70	2.0	C
70 – 60	1.0	D
60 – 0	0.0	F

1. There will be no make-up exams or labs. Any labs or exams missed will be assigned a grade of zero.
2. Any student caught cheating (including using unauthorized formula sheets of any kind) will receive a grade of zero on that particular examination or lab. That zero cannot be replaced by any other examination grade or extra work. Students should read the Bergen Community College Statement on Academic Integrity as found in the college catalog
3. Written lab reports are required. The specific format to follow will be determined by the individual instructor. Students will be required to keep a lab notebook. Laboratory reports in format discussed in the lab are due one week after the completion of the experiment. Late lab reports (up to one week only) will only receive a grade of 50% of the earned score.
4. In order to receive a passing grade in CHM-260 a student **must** obtain a passing grade in both the lecture and laboratory parts of this course.
5. Instructors may make small modifications to the grading policy and/or grading scheme.

### **STUDENT LEARNING OBJECTIVES & ASSESSMENT MEASURES:**

<b>OBJECTIVES:</b> Upon successful completion, the student will be able to:	<b>MEANS OF ASSESSMENT:</b> This outcome will be measured by one or more of the following:
1. Assess the reactivity of molecules using structure, bonding, and stereochemistry.	1. Assessment will be based on appropriate exam and quiz questions, explanation of the results of laboratory experiments, molecular modeling, and homework questions from the text and from the instructor's problem sheets.
2. Explain the outcome of a reaction using reaction mechanisms.	2. Assessment will be based on appropriate exam and quiz questions, explanation of the results of laboratory experiments, molecular modeling, and homework questions from the text and from the instructor's problem sheets.
3. Describe the reactions of alkanes, alkenes, and alkynes.	3. Assessment will be based on appropriate exam and quiz questions, explanation of the results of laboratory experiments, and homework questions from the text and from the instructor's problem sheets.
4. Use spectroscopy to determine the structure of organic molecules.	4. Assessment will be based on appropriate exam and quiz questions, and explanation of the results of laboratory experiments. Compounds synthesized in the laboratory will be routinely characterized by the student using IR spectroscopy and GC/MS.
5. Use important laboratory techniques to purify and characterize organic compounds.	5. Students will be evaluated by instructor observation of how well the student performs distillation, crystallization, and other laboratory techniques in the laboratory.

6. Employ molecular modeling to study energy relationships between molecules of similar structure.	6. Students will be evaluated by the instructor in their use of molecular modeling (Spartan) software and by their explanation of results in lab reports.
7. Use electrostatic potential maps to emphasize the electrophilic/nucleophilic character of functional groups.	7. Students will be evaluated by the instructor in their use of molecular modeling (Spartan) software and by their explanation of results in lab reports.
8. Demonstrate proficiency in using available instrumentation in laboratory experiments. Students will be evaluated by the instructor in the laboratory in their use of TLC, GC/MS, UV, NMR and IR instrumentation.	8. Students will also be evaluated through the grading of their laboratory reports.
9. Write laboratory reports that conform to accepted technical writing protocols.	9. Students will be evaluated by the quality of their laboratory reports.
10. Students will learn to practice critical thinking skills and apply them to both material presented in lecture and the analysis of data generated in the lab.	10. Students will be evaluated by observation in the laboratory and analysis of experimental results. Assessment will also be based upon performance on exam questions.

At the discretion of the instructor, assessment measures may be somewhat modified.

### **SUPPLEMENTARY READINGS / MATERIALS:**

1. Structure and Function; K. Peter C. Vollhart and Neil Schore; 6<sup>th</sup> Edition; W.H. Freeman & Company; New York, 2016.
2. A microscale Approach to Organic Laboratory Techniques 5<sup>th</sup> Edition; Donald L. Pavia, Gary M. Lampman, George S. Kriz, Randall G. Engel; Brooks/Cole, CA, 2013
3. Macroscale and Microscale Organic Experiments, 7<sup>th</sup> Edition; Kenneth L. Williamson, Robert Minard and Katherine M. Masters; Houghton Mifflin Company; New York, 2017 (expected).
4. Spectrometric Identification of Organic Compounds, 8<sup>th</sup> edition, Robert M. Silverstein, Francis X. Webster, David Kiemle; David L. Bryce; John Wiley and Sons; New York, 2015.
5. Organic Chemistry, 9<sup>th</sup> edition; Leroy Wade; Jan Williams Simek; Pearson, I, 2017
6. Organic Chemistry 9<sup>th</sup> edition; John McMurry; Cengage Learning; Boston, 2016
7. Organic Chemistry 8<sup>th</sup> edition; Paula Yurkanis Bruice; Pearson NJ; 2016
8. Organic Chemistry, 9<sup>th</sup> Edition; Francis A. Carey; Robert Giulieno; McGraw-Hill Inc.; New York, 2013.
9. Organic Chemistry, 7<sup>th</sup> Edition; William H. Brown and Christopher S. Foote; Eric Anslyn, Brent L. Iverson; Brooks & Cole; New York, 2014.

### **Additional Notes**

- A scientific calculator is required. Cell phones cannot be used for calculations.
- Safety glasses or goggles must be purchased by the student.

**ATTENDANCE/LATENESS POLICY:**

All students are expected to attend punctually every scheduled meeting of each course in which they are registered. If a student is absent, s/he is responsible for learning the material covered, including homework assignments and any handouts. Small study groups to review lecture and homework material are usually found to be helpful. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

**OTHER POLICIES:**

**Electronic Devices:** The use of portable electronic devices such as pagers and cell phones is not permitted while class is in session. Please silence these devices before entering class.

**STUDENT AND FACULTY SUPPORT SERVICES:**

1. Students experiencing difficulty with the arithmetic or problem solving aspects of this course should acquaint themselves with the services of the Tutoring Center and Smarthinking.
2. The BCC Library provides extensive support services for student research.
3. Faculty office hours may be a productive vehicle for assistance in understanding the course material.
4. Bergen Community College aims to create inclusive learning environments where all students have maximum opportunities for success. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Specialized Services at 201-612-5269 or via email at [ossinfo@bergen.edu](mailto:ossinfo@bergen.edu) for assistance.

**FACULTY ABSENCE PROCEDURE:**

A daily listing of cancelled classes will appear in a glass case near the main corridor on the first floor. Another such listing will appear in a glass case in Ender Hall. Students can consult these cases before going to class. If students find a class cancelled which has not been listed, they should report this to the Divisional Dean's Office, A304, or the Evening Office C107.

Gen Ed Goals	BCC Gen Ed Goals CHM 262 Organic Chemistry II	Student Learning Objective
1. Scientific Knowledge & Reasoning		1,2,3, 10
2. Society & Human Behavior		
3. Humanistic Prospective		
4. Historical Prospective		
5. Quantitative Knowledge and Skills		6,7,10
6. Written & Oral Communications		9
7. Technological Competency		4,5,8
8. Information Literacy		9
9. Global & Cultural Awareness		
10. Ethical Prospective		

CHM262 Organic Chemistry II Course Outcomes	
Topic/Activity/Assignments	Student Learning Objectives
Chapter 15: Nuclear Magnetic Resonance Spectroscopy	4, 8
Chapter 16: Conjugated Pi Systems and Pericyclic Reactions	1, 2, 4
Chapter 17: Aromatic Compounds	1, 2, 4, 6
Chapter 18: Aromatic Substitution Reactions	1, 2, 6, 7
Chapter 19: Aldehydes and Ketones	1,2
Chapter 20: Carboxylic Acids and Their Derivatives	1, 2
Chapter 21: Alpha Carbon Chemistry: Enols and Enolates	1, 2, 7
Chapter 22: Amines	1, 2, 7
Chapter 23: Organometallic Compounds	4, 8
Chapter 24: Carbohydrates	1, 6
Chapter 25. Amino Acids, Peptides, and Proteins	1, 6
Chapter 26: Lipids	1, 6
Chapter 27: Synthetic Polymers	1, 2

The above calendar may be adjusted at the discretion of the instructor

<u>CHM 262</u> Lab Outcomes			
Week	Number	Lab Assignments	LEARNING OBJECTIVES
1.	Misc 0214	Lit of Org Chem	4,5,9,10
2.	Tech 0711	NMR	4, 8
3.	Reac 0716	Nitration	4,5,9,10
4.	Synt 0717	Diels Alder	4,5,9,10
5.	Synt 0718	Grignard	4,5,9,10
6.	Synt 0718	Grignard	4,5,9,10
7.	Reac 0720	Aldol Condensation	4,5,9,10
8.	Reac 0731	Luminol	4,5,9,10
9.	Reac 0737	Thiamine Catalyzation	4,5,9,10
10.	Reac 0736	Pinacol	4,5,9,10
11.	Synt 0721	Wittig	4,5,9,10
12.	Synt 0713	Fischer Esterification	4,5,9,10
13.	Reac 2132	Exp 54A Isolation Casein	5,9,10
14.	Reac 2132	Exp 54B Isolation Lactose	5,9,10
15.	Reac 2121	Preparation and Properties of Polymers	4,5,9,10
16.	Modl 2008	Computational Chemistry	5,9,10
17.	Reac 2089	Prep of Soap	5,9,10
18.	Reac 2130	Carbohydrates	5,9,10

All BCC students enrolled in credit courses are entitled to a WebAdvisor account. With WebAdvisor, you may register online, pay your bill, check your schedule, room assignments, GPA, and find out what courses you need to take. To find out more about WebAdvisor or to sign up online, visit <http://go.bergen.edu>! While there, please make sure you give us your preferred email address. You'll find directions how to do this at <http://go.bergen.edu/email>. 5/18