CHEM 332.001 **Organic Chemistry I Syllabus** **Spring 2021**

Faculty:	Dr. Daniel E. Macks	*Email*:	dmacks@towson.edu
Office hours:	after class & by appointment	*Voicemail*:	(410) 704-3110

Note: Additional information specific to the lab portion of this course will be posted in a separate document.

Course website: There is a Blackboard site for the course, go to https://blackboard.towson.edu for access. You should already be enrolled for the course; please contact me if you have difficulty.

Formal Class Meeting Times:

Mo	10:00–1:50 pm	online
Tu/Th	12:30–1:45 pm	online

Note: this is a fully online course, so some portions will be asynchronous, rather than synchronous during these specific times.

Required Materials for Lecture:

- Textbook: *Organic Chemistry: Principles and Mechanism*, Joel Karty, 2nd Edition, W. W. Norton. This can be accessed through Blackboard as an ebook by the Direct Access program (for more details see https://towsonustore.com/directaccess).
- The solution manual/study guide that accompanies the Karty textbook is highly recommended.
- Smartwork*:* online homework system associated with the textbook
- Model kit: *Molecular Visions* kit by Darling Models is sufficient, others probably okay as well (ask if you have a different type)
- See the posted "Technology Requirements" item for additional information about hardware and software we will use.

Course Catalog Description:

Structure, reactions and their mechanisms, preparation and properties of alcohols, aldehydes, ketones, carboxylic acids and their derivatives, amines, conjugated and aromatic compounds. Laboratory emphasizes synthetic techniques and spectroscopic characterization and identification of compounds using IR, Mass Spec and ^{1}H- and ^{13}C-NMR. Three lecture hours, one hour of laboratory lecture and one three-hour laboratory period. Prerequisite: CHEM 331. Lab/Class fee will be assessed.

Learning Outcomes:

This course is the second of a two-semester sequence designed to introduce students to modern Organic Chemistry. This semester we will focus on the characteristic reactivity of the major functional groups. At the end of CHEM 332 students should be able to:

1. Systematically name compounds containing all the major functional groups using IUPAC nomenclature.
2. Use qualitative bonding models (Lewis, Valence-bond and MO theory) to explain important concepts of reactivity, including: resonance; conjugation; aromaticity; and acid–base behavior.
3. Identify the important reactions of aromatic compounds and the common O- and N-containing functional groups, including carbonyl compounds, and the applications of these reactions in the synthesis of more complex organic molecules.
4. Propose mechanisms for all the major transformations discussed in the course using the arrow-pushing formalism.
5. Propose multi-step syntheses of simple molecules using the transformations described in the course.

Course Requirements

Notice: Due to ongoing uncertainty related to the COVID-19 pandemic and the shift to remote learning, the policies, number and type of assignments, and grading practices in this syllabus are subject to change. Any changes will be communicated to students in writing, including posting specific updates to syllabus items on Blackboard.

A1: Class Attendance: Prompt attendance at all scheduled "live" sessions is mandatory, and will be included as a portion of your course grade along with various types of participation during these sessions. **A2**: **Exam Attendance**: If a student is unable to take a quiz or exam and cannot provide a valid written excuse then the student will receive a grade of 0. If a valid (determined by the instructor) written excuse is provided within 24 hours regarding a situation that could not have been known ahead-of-time, then the weight of the other graded items in this category will be adjusted to compensate for the missed one when calculating the overall course grade. Absences due to foreseeable situations for university-approved types of situations must be brought to the attention of your instructor as soon as they are known; in this case, an alternative time for the quiz or exam will be scheduled if possible, or else the absence will be treated the same as other "excused" absences. Students must let the instructor know in the first week of class about such situations. See https://catalog.towson.edu/undergraduate/academic-policies/class-attendance-absence-policy/ for the TU Policy regarding excused absences.

B: Streaming and Other Online Content, Reading Assignments, and Smartwork:
B1. Content: In addition to lectures, videos, PowerPoint and other presentations will be posted, along with day-by-day or theme-by-theme topics and their associated main textbook sections, and more specific pointers and certain assigned readings will be noted periodically in lecture or posted online. You are responsible for all content, regardless of its mode of delivery. **B2: Practice problems:** For practice, the textbook includes problems in each section and chapter, and other practice problems will be provided. These will be graded for completion and possibly spot-checked for additional points (possibly as bonus points toward a subsequent quiz or exam). **B3: Lab–lecture crossover:** Some lab projects will also introduce, review, or extend lecture topics. Lab concepts not strictly related to the procedures and specific data analysis are considered in-scope for lecture and lecture topics may appear in graded parts of relevant lab assignments.

C: Quizzes: There will be 6 quizzes, given on the dates listed on the calendar.

D: Exams: There will be 4 regular exams and a final exam, given on the dates listed on the calendar.

Course Grading Scheme:
The lecture portion of the class is worth 70% and the lab portion 30% of the overall course grade respectively.

Lecture grading:

- Attendance & participation: 10%. This score is earned by prompt and full attendance and engagement at all lecture time-blocks, and the portions of any prelab/lab time-blocks that are designated as containing "lecture" content or activities, unless a session is specifically identified as optional. You must have a webcam on to verify your presence and engagement. There may be one or more poll-questions during online sessions; responding (regardless of the correctness of the response) will also be considered as evidence of your attendance and engagement for that session. You have two "free" unexcused absences. Each additional unexcused absence (or session without full participation) will result in loss of 0.5 of these 5 percentage points.
- Homework 5%: Graded for completion.
- Quizzes: 20%: an equally weighted average after dropping of the two lowest scores (all considered on a percent basis)
- Exams/Final: 65%: an equally weighted average after the following dropping scheme (all considered on a percent basis). The final is listed twice, along with each other exam listed once, and one lowest score is dropped.

Grade boundaries (overall course percent cutoffs):
Grade boundaries used by the instructor are given below. The instructor reserves the right to adjust these boundaries as he sees appropriate at the end of the semester. Although a separate letter grade is not assigned for lab, the grade boundaries below can be used as a guide to progress in lab – the breakdown of the lab scores is given on the lab syllabus.

		≥85.0	B+	≥74.0	C+	≥64.5	D+	<55.0	F
≥88.0	A	≥77.0	B	≥66.0	C	≥55.0	D		
≥86.5	A–	≥75.5	B–						

General Course Policies

A: Academic Integrity

"*The acquisition, sharing, communication, and evaluation of knowledge is at the core of a university's mission. To realize this part of its mission, a university must be a community of trust. Because integrity is essential to the purpose of an academic community, the responsibility for maintaining standards of integrity is shared by all members of that academic community*."
https://www.towson.edu/about/administration/policies/documents/polices/03-01-00-student-academic-integrity-policy.pdf

The university's policy comprehensively details the types of unacceptable behaviors generally known as "cheating". Instances of misconduct will be treated in accordance with this policy and will, at minimum, result in a grade of 0 for the assignment for all involved. Please note that knowingly allowing someone to copy or cheat from you is considered an equal offense and will be punished in the same manner - no attempt will be made to determine who was copying from whom. Further even unsuccessful attempts to receive such assistance may be sanctioned. Grades on assignments for which a student is found to have cheated are ineligible for any sort of curve or drop. Actions that are considered cheating in this course include, but are not limited to:

1. Direct copying of submitted assignments (lab reports, problem sets, exams), including supplying answers to or using answers supplied by third parties such as online homework help-sites.
2. Indirect copying through, for example, extensive paraphrasing or sharing of computer files.
3. Wandering eyes (attempts to look at others' papers), use of cellphones or unauthorized materials during exams and quizzes.
4. Falsification or manipulation of lab data.

B: Copyright, recording, and redistribution

B1: Content copyright: Your instructor retains all copyrights to all original materials distributed or provided for use in this course (including, but not limited to, hard copies and electronic copies of lecture slides, recorded or live/streamed AV materials, software, notes, practice problems, worksheets, assignments, lab materials, and exams). Reposting, selling, or otherwise distributing these materials in any fashion at any time is prohibited by law and university policy. For example, the mere posting of an assignment question to Chegg is a violation. **B2: Recording disclosure:** This notice is to inform you that some or all of our synchronous online meetings may be recorded. All or portions of these recordings may be posted to our course website, and are for use solely by those enrolled in our sections of this course during the semester. You do not have permission to share any part of our course materials with others. No recordings of students will be retained or used beyond the scope of this semester's course. By this notice, you are not granting permission for anything you do in open session to be shared outside the confines of this course. If you have any concern regarding your voice, image, or materials being captured please contact me as soon as possible.

C: Chemistry Department Statement on Classroom Diversity

The students, faculty, and staff at Towson University represent a diverse and vibrant community of learners and scholars. As a community, we value the unique contributions of each individual and promote active participation in all aspects of the learning process by each community member. Your instructor supports Towson University's goal of fostering a diverse and inclusive educational setting. Your instructor strives to create a classroom environment built upon the principles of mutual respect and support. Toward this end, all members participating in this course are expected to demonstrate respect for all other members of the class. If you feel these expectations have not been met, please speak with your instructor or the designated diversity liaison, Dr. Cindy Zeller (czeller@towson.edu). For further information regarding the diversity and inclusion policies of Towson University, please see Towson University's Academic Strategic Plan "Goal 2 Strategy 1: Exposure to Diversity" , the Fisher College of Science and Mathematics Diversity Action Plan, and the Chemistry Department Diversity Action Plan.

D: Students with Disabilities

Students with any sort of disability who may need special consideration must see *me during the first week of class* with appropriate paperwork. This course is in compliance with Towson University policies for students with disabilities. Students with disabilities are encouraged to register with Disability Support Services (DSS), 7720 York Road, Suite 232, 410-704-2638 (Voice) or 410-704-4423 (TDD). Students who suspect that they have a disability but do not have documentation are encouraged to contact DSS for advice on how to obtain appropriate evaluation. A memo from DSS authorizing your accommodation is needed before any accommodation can be made.

E: Course Repeat Policy

Students may not repeat a course more than once without prior permission of the University Academic Standards Committee. Students may opt to repeat lecture without performing the laboratory portion of the course if they have obtained an overall lab score of 80% or above for the same lab course at Towson and subject to certain other restrictions. Students in this situation must have their previous lab grade verified by their current instructor by the end of the change-of-schedule period. The student's previous lab grade will be used in calculation of their overall grade in the current semester.

How to Study Organic Chemistry Successfully:

Organic chemistry is essentially a critical-thinking and problem-solving course. These skills can take time to develop and require YOU to put effort into acquiring them. The following study strategies are guaranteed to NOT yield good results when studying Organic chemistry:

1. Cramming the night before exams
2. Reliance on rote memorization rather than learning and understanding

Rather, your efforts should focus on understanding the relatively few fundamental principles, and how these apply to the many different situations encountered through problem-solving. So, here are my keys to success:

1. **Organic chemistry requires consistent sustained effort:** Studying every day will be far more effective than cramming in the day leading up to an exam. Successful students spend at least 2-3 hours studying outside class for every hour spent in lecture.
2. **Attend every class**: I will discuss some of the material in different ways from the textbook, emphasize different aspects, and include or exclude various details. Organic chemistry is a very interconnected subject and seeing the material in a variety of ways can better equip you to understand the material clearly.
3. **Study the underlying reasons:** Although there is no avoiding the need to memorize some basic facts and "lab math", trying to memorize your way through this course might lead to early success but likely long-term and overall non-success. There is just too much, and not enough time to keep it all in mind with all details correct! Learning the underlying concepts, unifying patterns, and analysis/problem-solving methods requires "knowing" less while still being able to apply at least reasonably successfully to any given situation, even one that does not look exactly like one you remember directly.
4. **Practice problem-solving**: The more you practice on a regular basis, the easier the problem-solving methods will become, and the more likely it is you will be able to remember and apply them on exams. Look back at your own previous exams as a guide for where your problem-solving skills and study-techniques need improvement.
5. **Begin studying now and don't get left behind**: It is crucial to understand, learn and know the basic background material presented in the first few weeks of the course, and to be able to recall fundamental concepts from both semesters of general chemistry. On these foundations, everything else is built - without this basic knowledge you will be lost and unable to catch up.
6. **Seek help early if you have trouble understanding something**: Various resources are available to you.
    (1) Me! Email as soon as you have a concern. The more thoughtful your question, the more useful an answer you can get.
    (2) The Chemistry Tutoring Center and other peer-led review/practice sessions. Availability and modes/types of services will be announced.
    (3) Classmates. Forming study groups and discussing problems with other students is often helpful, although ensure that you understand how to do the problems by yourself.
    (4) The Provost has a useful Resources for Students website that discusses your and our academic expectations and responsibilities.

CHEM 332.001 Organic Chemistry II Syllabus—Lab Addendum Spring 2021

Learning Outcomes:

Students who are successful in the lab portion of this class will, by the end of the course:

1. Be able to apply principles of stoichiometry, acid-base behavior, equilibrium, kinetics, solubility and reactivity to understand and analyze the procedures performed in lab, and those discussed in the lecture course.
2. Be able to analyze and interpret ^{1}H- and ^{13}C-NMR spectroscopic data in conjunction with IR spectra and mass spectra to determine the structures of organic compounds.
3. Have a greater understanding of some important reactions of major functional groups by studying these reactions in-depth in lab, including analysis of by-products by GC-MS.

Overview:

The CHEM 332 laboratory is the second half of a two-semester organic chemistry lab sequence that accompanies the corresponding lecture component. Ideally, your work in lab should complement and reinforce the concepts you have learned in lecture and place them in the proper chemical context. In this course, we will revisit many of the laboratory techniques that you learned in CHEM 331 (extraction, IR spectroscopy, etc.) and introduce several new ones (e.g. working with water-sensitive reagents, ^{13}C-NMR). The experiments in this course are designed to address the following three fundamental concepts:

1. Synthesis – How do we carry out an organic chemical reaction?
2. Purification – How do we isolate the desired products(s) after the reaction is complete?
3. Characterization – How do we verify the identity and determine the purity of the product?

Course Requirements

A: Due to the unified "lecture + lab" nature of this course and the all-remote format, there will generally not be discrete "lecture" vs "lab" class time-blocks. Therefore, anything identified as a "class" or "session" or other policy statement in the main syllabus equally applies to any lecture- or lab-related aspect of this course.

B: Streaming and Other Online Content, Reading Assignments, and Smartwork:

B1. Content: In addition to lectures, videos, PowerPoint and other presentations will be posted, along with day-by-day or theme-by-theme topics and their associated main textbook sections, and more specific pointers and certain assigned readings will be noted periodically in lecture or posted online. You are responsible for all content, regardless of its mode of delivery. **B2: Practice problems:** For practice, the textbook includes problems in each section and chapter, and other practice problems will be provided. These will be graded for completion and possibly spot-checked for additional points (possibly as bonus points toward a subsequent quiz or exam). **B3: Lab–lecture crossover:** Some lab projects will also introduce, review, or extend lecture topics. Lab concepts not strictly related to the procedures and specific data analysis are considered in-scope for lecture and lecture topics may appear in graded parts of relevant lab assignments.

C: Lab Quizzes: There will be 4 quizzes, given on the dates listed on the calendar.

D. Lab Reports: A lab report is due for each experiment, which will include collecting and organization the data/observations in a prescribed manner, analyzing the data, making specific conclusions, and answering questions regarding the practical and theoretical aspects of the experiment. The exact scoring breakdown (components and point values) on each report will vary based on the experiment's complexity and the specific analysis and conclusions related to it.

D: Lab Exams: There will be 1 lab exam at the end of the semester (not during finals week), covering general knowledge of the techniques and spectroscopy methods you have learned.

Course Grading Scheme:
The lecture portion of the class is worth 70% and the lab portion 30% of the overall course grade respectively.

Lab grading:

- Attendance & participation: The requirement for live-session attendance, and the grading associated with it as part of the "lecture" grading of this course, covers all live sessions regardless of whether the content is lecture or lab. There is no separate grading associated with attendance in lab.
- Lab Homework: 5%: Graded for completion.
- Lab Quizzes: 10%: an equally weighted average on a percentage basis.
- Lab Reports: 70%: an equally weighted average on a percentage basis. The one submitted report earning the lowest percentage will be dropped (i.e., only reports submitted by the "late acceptance" deadline are subject to dropping—in the event of a score of zero due to non-submission by the "late" deadline, the lowest other earned score will be dropped instead). The exact scoring breakdown (components and point values) within each report will vary based on the experiment's complexity and the specific analysis and conclusions related to it. Late lab reports will be penalized 10% of report grade per calendar day late or part thereof, including weekend days. No report will be accepted more than two days (48 hours) late.
- Lab Exam: 15%.

Spring 2021 CHEM 332.001 Tentative Course Schedule (revised)

	S	M	T	W	T	F	S	
January	24	25 IR Rev. Aldehydes/Ketones	26 (Hemi)acetals	27	28 (Hemi)acetals	29	30	January
	31	1 S/N Variants Bond Order	2 Lect Quiz 1 Ald/Ket. H–/C–	3	4 Ald/Ket. H–/C–	5	6	
February	7	8 1H-NMR Rev.	9 Lect Quiz 2 Lab Intro	10	11 Alcohol Oxidation	12	13	February
	14	15 1H-NMR (cont) Acyl Groups	16 Lect Exam 1	17	18 Snow Day	19	20	
	21 LR1 (Vanillin)	22 Redox Acyl Subst.	23 Acyl Subst.	24	25 Lect Quiz 3 H–/C–	26	27	
	28	1 H–/C–	2 Lab Quiz 1 (IR) MS	3 LR2 (Lidocaine I)	4 Lect Exam 2	5	6	
March	7	8 Lab Quiz 2 (1H) 13C-NMR	9 Enol(ate)s	10 LR3 (Grignard)	11 T vs k Effects α-Halogenation	12	13	March
	14	15	16	17 Spring Break	18	19	20	
	21 LR4 (Nylon)	22 Lab Quiz 3 (MS) α-Substitution	23 Lect Quiz 4 Aldol	24	25 Aldol	26	27	

	28 LR5 (Aldol)	29 Lab Quiz 4 (13C) Radicals	30 Lect Exam 3	31	1 Aromaticity	2	3	
April	4 LR6 (Polystyrene)	5 Unified Spect. EAS	6 EAS	7	8 EAS	9	10	April
	11 LR7 (Unknowns)	12 Lect Quiz 5 Diels–Alder	13 Diels–Alder	14	15 Diels–Alder	16	17	
	18 LR8 (Diels–Alder)	19 Lect Exam 4 Amines	20 Amine SN2	21	22 Hofmann	23	24	
	25 LR9 (Lidocaine II)	26 Lect Quiz 6 ENS	27 Amide Reduction	28	29 Gabriel	30	1	
May	2 LR10 (Ar Subst.)	3 Lab Exam	4 Imine Reduction	5	6 Wittig	7	8	May
	9 LR11 (Adipic Acid)	10 Review	11 Review	12	13	14	15	
	16	17	18 Final: 12:30–2:30	19	20	21	22	

Finals Week

Finals Week

Scheduling notes:

Quizzes and exams are indicated on the calendar. They will be at the start of the scheduled timeblock on the given day.

"LR"=lab report due

A homework assignment will be due immediately preceding each quiz and exam (except the Final)

There will be at least some synchronous content at each scheduled class meeting. Some will be formal lecture, some will be problem-solving/workshop sessions. Some lecture content will be assigned videos or readings to supplement or replace coverage in live lecture.

Textbook alignments (main Karty chapters for each major set of topics):

Aldehydes/ketones	E, 17, 18
Acyl groups	F, 20, 21
Enol(ate)s	7, 10, 18, 21
Aromatics	14, 22, 23
Diels–Alder	24
Amine-related	10, 17, 18, 20
IR/NMR/MS	15, 16

Many textbook sections have forward- and backward-references to other chapters. so some topics could include sections beyond those listed here. Specific section guidance will be included in each lecture. This course may also include material not covered in the textbook.

There will be additional topics carried as overall themes or periodic highilights rather than the focus of a specific lecture.

Certain lab experiments may include additional course topics as part of their prelab-lecture (textbook references will be included in the relevant lab materials).