CHEM 6440/8440 Carbohydrate Chemistry
The University of Toledo
Department of Chemistry and Biochemistry
College of Natural Sciences and Mathematics
CRN: 57234 (CHEM 6440-044) or 57235 (CHEM 8440-044)

Instructor: Dr. Jianglong Zhu
E-Mail: Jianglong.Zhu@UToledo.Edu
Office Hours: T, R, 10 am - 12pm
Office: WO 3265
Phone: 419-530-1501

Class Location: BO 2059
Class Day/Time: T, R, 12:30 - 2:20 pm
Credit Hours: 4
Term: Fall 2020

**SPECIAL COURSE EXPECTATIONS DURING COVID-19**

**ATTENDANCE**
The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Students must perform a daily health assessment, based on CDC guidelines, before coming to campus each day, which included taking their temperature. Students who are symptomatic/sick should not come to class and should contact the Main Campus Health Center at 419-530-3451. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences. Students should notify their instructors and these absences may not require written notice.

**FACE COVERINGS**
All students must wear face coverings while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. NO students will be permitted in class without a face covering. If you have a medical reason that prevents you from wearing a face covering due to a health condition deemed high-risk for COVID-19 by the Centers for Disease Control and Prevention (CDC), you should submit a request for an accommodation through the Student Disability Services Office (SDS) by completing the online application. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. If a student is already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs.

**SOCIAL DISTANCING**
Students should practice social distancing inside and outside the classroom please follow signage and pay attention to the seating arrangements. Do not remove stickers or tape from seats and/or tables, this is there to provide guidance on the appropriate classroom capacity based on the recommended 6 feet of social distancing between individuals. Please be conscious of your personal space and respectful of others. Also be cognizant
of how you enter and exit the room; always try to maintain at least 6 feet of distance between yourself and others.

**DESKS AND WORK SPACES**

Students will need to sanitize their desks and/or work space before class with the University provided sanitizing spray and paper towels their desks.

**SPECIAL NOTES**

It’s important to note that based on the unpredictability of the COVID-19 virus things can change at any time so please be patience and understanding as we move through the semester. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.

**COURSE/CATALOG DESCRIPTION**

CHEM 6440/8440 Carbohydrate Chemistry, [4 credit hours]. Topics in carbohydrate chemistry, including chemical synthesis of complex oligosaccharides, complex glycoconjugates (glycolipids, glycopeptides, and glycoproteins). Four hours lecture per week.

**COURSE OVERVIEW/TEACHING METHODOLOGY**

This course covers various chemistry topics in carbohydrate molecules, e.g. oligosaccharides and glycoconjugates (glycolipids, glycopeptides, and glycoproteins). These topics include nomenclature of carbohydrates, structure determination of carbohydrates, chemical synthesis of oligosaccharides and glycoconjugates, and synthesis and biological studies of carbohydrate-based vaccines.

Chalk talk and PowerPoint presentation will be the main approach for teaching this course. Students are encouraged to actively participate in the learning process by asking questions and discussing topics during lecture and/or outside classroom, e.g. during office hours. Problem sets, quizzes, and exams will used to access students’ learning effectiveness.

**STUDENT LEARNING OUTCOMES**

Students who successfully complete this course will be able to:

- Name various types of carbohydrate molecules and draw their structures;
- Understand chemical and enzymatic synthesis of complex oligosaccharides;
- Understand chemical and enzymatic synthesis of complex glycoconjugates including glycolipids and glycoproteins;
- Develop feasible strategies for the synthesis of complex oligosaccharides and glycoconjugates;
- Understand the basics of synthesis and biological studies of carbohydrate-based vaccines;

In addition, PhD students who register for CHEM8440 will be assigned course projects involving comprehensive review of certain literature topics in carbohydrate chemistry for development of their critical thinking skills. Students are required to give presentations in the class on their assigned projects.

**PREREQUISITES AND COREQUISITES**

Admission in the Graduate College.

**REQUIRED AND RECOMMENDED MATERIALS**

Recommended Materials:

COURSE STRUCTURE

Lecture:
- Lecture sessions are designed to clarify the concepts covered in this course and provide examples of what is expected of you.
- Attendance is expected and you are responsible for all material, and problems covered in class.

Homework:
Selective homework problems will be regularly assigned and answer keys will be provided as needed. Homework problems will be graded and some exam problems will be similar to the homework problems.

Blackboard:
- Blackboard is a course management system provided by the University of Toledo and can be accessed at https://blackboard.utdl.edu/. Your access code is your UTAD user name and password.
- You should consult the site regularly for news and announcements. Handouts, lecture notes, practice exams, and exam solutions will be posted. The system also permits you to check your grades at any time and to email your instructor or other students in the class.

Examinations:
Exams are given as listed on the schedule. Make-up exams will not be given for any circumstance. Excused absences will be given only to students who miss a midterm exam under the conditions listed below. If an excuse is acceptable, your final course grade will be computed based on all work except that exam. The final exam cannot be excused. For all exams you must show a photo identification card. You will not be permitted to use a calculator nor have a cell phone on your desk.

- There will be three mid-term examinations (100 points + 5 bonus points = 105 points total each). You can earn up to 105 points in each exam.

- Students’ presentations on comprehensive review of literature are scheduled at 12:30 - 2:20 pm, Dec 1 and 3 and will be given remotely via Webex.

Exam Absence Policies
Refer to UT Missed Class Policy (http://www.utoledo.edu/fac senate/missed_class_policy.html). Students who will not be able to take an exam at the scheduled time due to an irresolvable conflict with a major responsibility must provide some written documentation to verify the conflict. This situation may occur for students on official university business, including athletes. Approval must be obtained before the scheduled test date.

Students who do not take an exam due to illness, car accident, and death in the family or similar extreme circumstance should inform their instructor of their difficulties within 24 hours of the exam. These difficulties must also be documented by a physician's note, an accident report, pastor’s note, etc. Contact information for the police department, pastor, etc. must be included on the note or report. A telephone call or email within 24 hours of missing the exam is also required: 419-530-1501. In all other circumstances, a missed exam will result in a grade of 0. Exams cannot be excused for personal reasons. Examples of missing an exam due to personal issues include, but are not limited to: oversleeping, transportation problems, vacation plans, work schedule conflicts, child care issues, sick children, fire alarms in adjacent
buildings, etc. Please plan accordingly.

Academic Dishonesty:
The academic honesty policies, as stated in the 2013-2014 UT Catalogue will be STRICTLY ENFORCED. Any student found violating the UT academic honesty policies will be penalized in accordance with these policies. You should read the university’s policy on Academic Dishonesty found at http://www.utoledo.edu/catalog/2000catalog/admissions/academic_dishonesty.html .

Special Needs:
If you have special needs with respect to your participation in this course, please make an appointment to discuss this matter with your instructor. The instructor will work with you and the Office of Accessibility to make appropriate accommodations for your needs.

Communication:
You are urged to communicate with the instructor about any aspect of the course which concerns you or which might limit your success. We want you to be successful in this course, so let’s work together!

UNIVERSITY POLICIES

Policy Statement on Non-Discrimination on the basis of Disability (ADA). The University is an equal opportunity educational institution. Please read The University’s Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.

ACADEMIC ACCOMMODATIONS

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.

COURSE GRADES AND GRADING POLICIES

Course Points:
The following is the distribution of possible points in the course:

- Quizzes: 50 points
- Homework Assignments: 150 points
- Exams (three exams, 100 points each): 300 points
- Comprehensive review of literature*: 100 points

* For PhD students who register for CHEM8440.

Midterm Grading
Midterm grading serves as a point in the term where the instructor of record may provide a midterm grade assessment and may identify any student who has never attended, has stopped attending, or who is not actively participating in the course. In addition, students may use midterm grade to help make a decision in regards to withdrawing from the course.

The U.S. Department of Education requires the University to document both active participation and satisfactory academic progress as part of the compliance with federal financial aid regulations. Students receiving Title IV Federal Aid funds are required to have regular attendance and satisfactory academic progress in their courses to receive federal aid.
Final Grading

Your final grades will be calculated based on a total of 500 points for MS students and 600 points for PhD students, respectively.

Grading Scale:

- A = 85-100%
- B = 72-84%
- C = 60-71%
- D = 49-59 %
- F = 48% and below

These cutoffs may be lowered depending on the difficulty level of the exams, but the course will not be graded on a curve.

Attendance/Class Participation:

On occasions during the term, instructors are asked to report student attendance. These reports can affect your financial aid, so you will want to be sure that you are in attendance for all classes. However, you will remain enrolled in the class independent of these reports. That is, you remain registered for the class and will receive a final grade unless you take the action of dropping or withdrawing. The attendance will be taken at four random occasions during the semester. Each attendance is associated with 5 bonus points, which means you will receive 5 bonus points if you attend the class and sign the attendance sheet.

**COURSE SCHEDULE (TENTATIVE)**

The table below will give you a general idea of our pace throughout the course. Be sure to note announcements which may revise this schedule. BE SURE THAT YOUR TRAVEL AND EMPLOYMENT PLANS DO NOT CONFLICT WITH THIS SCHEDULE – INCLUDING THE FINAL EXAM.

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Chapter: Topic</th>
<th>Notes</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug 17 - Aug 28</td>
<td>Nomenclature and structures of carbohydrate molecules</td>
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<td>2-3</td>
<td>Aug 24 - Sep 4</td>
<td>Protecting groups for carbohydrate synthesis</td>
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<td>4-10</td>
<td>Sep 7 – Oct 23</td>
<td>Chemical synthesis of oligosaccharides and glycoconjugates</td>
<td>Exam 1, Thursday, 9/17</td>
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<td>Exam 2, Thursday, 10/22</td>
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<td>11-12</td>
<td>Oct 26 – Nov 6</td>
<td>Chemo-enzymatic synthesis of oligosaccharides and glycoconjugates</td>
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<td>13-15</td>
<td>Nov 9 – Nov 27</td>
<td>Synthesis and biological studies of carbohydrate-based vaccines</td>
<td>Exam 3, Tuesday, Nov 24</td>
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<td>Nov 24 is the last day of classes.</td>
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<td>November 25 – 27 is Thanksgiving</td>
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<td>Day. Classes are cancelled.</td>
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<td>Finals Week</td>
<td>Nov 30 – Dec 4</td>
<td>Student presentations by Webex</td>
<td>12:30 - 2:20 pm, Dec 1 and 3</td>
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