



SYLLABUS

Advanced Laboratory III

The University of Toledo
Department of Chemistry and Biochemistry
College of Natural Sciences and Mathematics
CHEM 4880, CRN 42029, Section 001

Instructor:	Dr. Michal Marszewski	Offered:	Fall 2021
Email:	michal.marszewski@utoledo.edu	Course Website:	Blackboard Learn
Office Hours:	M-F, 11:30 am–12:30 pm	Lab Location:	BO 2089
Office Location:	WO 2256	Lab Day/Time:	TR, 8:30–11:20 am
Instructor Phone:	(419) 530-1585	Credit Hours:	2
TA:	Manjula Madde Kandage		

SPECIAL COURSE EXPECTATIONS DURING COVID-19

Maintaining a safe campus during the ongoing COVID-19 pandemic remains a top priority. UToledo continues to follow the guidance of the U.S. Centers for Disease Control and Prevention and Ohio Department of Health to keep our campus safe.

ATTENDANCE

The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Before coming to campus each day, students should take their temperature and complete a self-assessment for symptoms of COVID-19, such as cough, chills, fatigue or shortness of breath. Anyone with a temperature at or above 100.0 degrees Fahrenheit or who is experiencing symptoms consistent with COVID-19 should not come to campus and contact their primary care physician or the University Health Center at 419.530.5549. For more information on the symptoms of COVID-19, please go to <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>

COVID-19 testing for sick students is available on both Main Campus and Health Science Campus. Call 419.383.4545 for an appointment. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences. Students should notify their instructors and follow the protocols summarized in this document on [Navigating COVID-Related Course Concerns](#).

In the event that you have tested positive for COVID-19 or have been diagnosed as a probable case, please review the [CDC guidance](#) on self-isolation and symptom monitoring, and report the disclosure to the Division of Student Affairs by emailing StudentAffairs@utoledo.edu or by connecting with their on-call representative at 419.343.9946. Disclosure is voluntary and will only be shared on a need to know basis with staff such as in the Office of Student Advocacy and Support, The Office of Residence Life, and/or the Office of Accessibility and Disability Resources to coordinate supportive measures and meet contact tracing requirements.

FACE COVERINGS

Face coverings are required while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. Students will not be permitted in class without a face covering. If you have a medical reason preventing you from wearing a face covering due to a health condition deemed high-risk by the CDC, submit an [online application](#) to request an accommodation through the Office of Accessibility and Disability Resources. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. Students already affiliated with the Office of Accessibility and Disability Resources who would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility



specialist to discuss their specific needs. You may connect with the office by calling 419.530.4981 or sending an email to StudentDisability@utoledo.edu.

VACCINATION

Doctors and other health care professionals agree that the best way to protect ourselves and each other is to get vaccinated. Case data clearly show that vaccines remain highly effective at preventing serious illness from COVID, including the highly contagious delta variant. If you have not yet received your COVID vaccine, the University encourages you do so as soon as possible. No appointment is needed to get the shot at the UTM Outpatient Pharmacy, University Health Clinic or Main Campus Pharmacy. Once you receive the COVID vaccination, please register on the COVID Vaccine Registry site at: <https://utvaccinereg.utoledo.edu/>.

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 patient 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.

CATALOG/COURSE DESCRIPTION

Laboratory experiments and techniques relating to subjects developed in CHEM 4300. Six hours of laboratory per week. Approved chemical safety goggles meeting the American National Standard Z87.1-1968 must be worn by every student during every laboratory class meeting.

COURSE OVERVIEW

Advanced Laboratory III (CHEM 4880) is a laboratory class that is the final course in the Advanced Laboratory series. This course is a continuation of the previous two laboratory experiences in which students work on laboratory techniques and instrumentation present in modern chemistry laboratories as covered in Instrumental Analysis (CHEM4300) course. They are including but not limited to: gas and liquid chromatography (GC and HPLC), size exclusion chromatography (SEC), mass spectrometry (MS), ultraviolet-visible (UV-VIS) and infrared (IR) spectroscopy, as well as electrochemical methods.

STUDENT LEARNING OUTCOMES

Upon completion of this course, the student will be able to: adequately prepare for analytical work on instrumentation by researching and writing detailed prelab notes, select and employ adequate sample preparation method for instrumental technique used, separate, identify and quantify components present in samples using standard analytical methods, and communicate results of performed experiments and analysis by writing formal reports.

PREREQUISITES AND COREQUISITES

CHEM 3860 with a minimum grade of C- and CHEM 4300 (may be taken concurrently) with a minimum grade of C-

TEXTS AND ANCILLARY MATERIALS

Required instructional materials

All required materials, such as experiment handouts, will be provided via Blackboard. See the Copyright Notice section below.

Optional instructional materials

These textbooks are not required but contain background information for the methods and experiments carried out during this course.



- D.T. Sawyer, W.R. Heineman, J.M. Beebe, *Chemistry Experiments For Instrumental Methods*, John Wiley & Sons, Inc., 1984 (ISBN: 0-471-89303-X).
- D.A. Skoog, F.J. Holler, S.R. Crouch, *Principles of Instrumental Analysis*, Cengage Learning, 6th edition, 2006 (ISBN-13: 978-1305577213).
- D.C. Harris, *Quantitative Chemical Analysis*, W. H. Freeman; 9th edition, 2015 (ISBN-13: 978-1464135385).

Required ancillary materials

- Approved safety lab goggles meeting the American National Standard Institute Z87.1-1968
- Standard laboratory notebook (pages must be bound; binder style notebooks are not appropriate)
- USB storage device
- Calculator
- Colored markers, pencils or pens

COPYRIGHT NOTICE

All materials presented or otherwise distributed during this course, including any and all materials distributed during class, posted to Blackboard Learn, or sent via email or cloud storage, are copyrighted and intended for use only by students enrolled in this course for the purpose of participating and completing the course. Reuse, in whole or in part, in any form, is forbidden without a prior explicit permission from the author.

TECHNOLOGY REQUIREMENTS

A computer with a modern browser and internet access, word processor, and spreadsheet and plotting software is required to (a) access the Blackboard Learn where the course materials will be distributed and (b) for data treatment and report preparation. For more information about accessing Blackboard Learn and other useful resources provided through UToledo Online please visit: <https://www.utoledo.edu/dl/students/required-info-online-learners.html>.

ACADEMIC POLICIES

All students at the University of Toledo are expected to read, understand, and follow the academic policies that govern their attendance at the University. These policies include, but are not limited to, academic dishonesty, academic forgiveness, adding and dropping a course, grades and grading, and the missed class policy. Please use the following URL to read a comprehensive list of academic policies that pertain to you in this class and throughout your academic journey: <http://www.utoledo.edu/policies/academic/undergraduate/>. If you have any questions after reading through the policies, please let me know.

Academic honesty

University regulations on academic honesty will be strictly enforced throughout this course <http://www.utoledo.edu/policies/academic/undergraduate/pdfs/3364-71-04%20%20Academic%20dishonesty.pdf>. Violation of these policies can result in a grade of F for the subject laboratory report or even for the entire course. Please note that academic dishonesty in this course includes (but is not limited to) plagiarism of another's work (website, text, pictures, any part of a peer's lab report, etc.) and falsification and fabrication of data. It is the responsibility of the students to ensure that they are familiar with the university regulations at the websites provided.

Missed class

Students are expected to attend every laboratory meeting and complete the assigned experiments according to the course schedule provided in this syllabus. Absences due to extreme and/or irresolvable circumstances, such as illness, car accident, death in the family, etc., may be excused on a case by case basis (<https://www.utoledo.edu/policies/academic/undergraduate/pdfs/3364-71-14%20Missed%20class%20policy.pdf>). You must notify the instructor as soon as possible and no later than 24 hours after the missed laboratory meeting



and provide written documentation, such as a physician's note, an accident report, a pastor's note, etc. Absences due to personal reasons, such as oversleeping, transportation problems, vacation plans, work schedule conflicts, dentist appointments etc. will not be excused. There are two days during the semester when an experiment missed due to an excused absence can be made up. No other days or times will be assigned for makeups. Alternatively, excused missed experiments can be made up for partial credit as in the case of the unexcused absences.

Experiments missed due to an unexcused absence cannot be made up. After obtaining a permission from the instructor, the students can turn in a lab report (up to 50 points) for the missed experiment based on the group member's data and lab notebook notes. However, no points for the pre-lab and post-lab will be given. This will be allowed only once during the semester.

COURSE EXPECTATIONS

Laboratory safety

The complete set of safety rules will be reviewed at the first meeting. If at any time you have questions or concerns regarding safety ask your instructor. Everyone working in the laboratory contributes to the safe working environment. Thus, anyone who endangers the safety of themselves or others will only be given one warning. A second warning will result in the removal from the laboratory and a grade of zero for the experiment. In addition, anyone who causes a serious damage to any instrument will be removed from the lab and receive a grade of zero.

Each student must wear approved safety goggles meeting the American National Standard Institute Z87.1-1968 at all times in the laboratory. The top garments must cover your arms up to and including the wrists and your upper body from and including the waist to the neck. The pants must cover your lower body from and including the waist to and including the ankles. The shoes must cover whole feet from and including the toes to and including the ankles. The garments must not have any holes or other features that expose area of body larger than 1 cm². Garments such as T-shirts, polo shirts, shorts, sandals, flip-flops, and other open toed shoes are not appropriate for laboratory work and will not be allowed. These rules are for your protection and no exceptions will be permitted. Students not following the dress code will not be allowed in the laboratory. Students should come appropriately dressed starting from for the first meeting.

Eating, drinking, and smoking (including electronic smoking) is prohibited in class.

Communication

Course materials and grades will be posted to the Blackboard so students are prompted to check the course's site regularly. It is student's responsibility to download, study, and bring all required materials to each laboratory meeting. Students are also prompted to check their Rockets email daily for updates and information related to the course.

I am checking my email several times a day and will generally respond to your email within 24 to 48 hours. I will only respond to emails from the official Rockets email address.

Lab work

Students should be in the room at the beginning of the meeting and have their pre-lab notes and required materials ready. You are expected to (i) have read the required materials, (ii) have sufficient understanding of the conducted experiments, and (iii) have sufficient background knowledge. Students should come prepared for the experiment starting from for the first meeting. The instructor will ask questions about the experiment and methods used. Students who are unprepared for the lab will not be allowed to do the experiment and will receive a grade of zero for this experiment. You are also encouraged to (a) pre-calculate the volumes, concentrations, etc. to save time in the lab and (b) plan your work and use the lab time efficiently.

Students will usually work in pairs but each student should record results and observations independently.



The experiments are designed to be completed within the allotted time and no additional time will be given. You can only perform the experiment scheduled for the day and can only perform experiments at the days and times scheduled for this course. Performing experiments (i) not scheduled for your group for the day or (ii) outside the course hours is explicitly forbidden and will result in disciplinary action.

The use of personal electronic devices during class (cell phones, computers, etc.) is reserved for class related materials and contents only, and only in areas of the lab free of chemicals and lab equipment.

At the completion of the experiment, students should (1) sign in log book of every instrument they used, (2) save the collected data as an instrument specific files on the instrument computer in the individual student's folder, (3) export raw data to files and make a copy on the student's personal storage devices for later data treatment and lab report preparation, and (4) clean-up after your work, including cleaning and putting back all glassware and equipment used, waste disposal, putting back all chemicals and solutions used, and wiping down the work surfaces used. Failing to follow these instructions will result in 5-point deduction for the experiment per occurrence

Laboratory notebook

Each student is required to keep and maintain a well-organized laboratory notebook. At the completion of the experiment the instructor will sign your notebook and mark the date the full lab report is due. A copy of your lab notebook pages is submitted for grading with every lab report. Reports without instructor's signature and due date will not be graded and will receive no points. You can either use a duplicate sheet style notebook or submit a photocopy of the notebook pages. All materials must be legible otherwise they will not be graded.

Laboratory assignments

Each student will come prepared to the lab meeting with their own hand-written pre-lab notes. Each student will also keep their own laboratory notebook as detailed above and will turn in a copy of the notebook together with the completed lab report. Lab reports will be submitted on paper during the scheduled course hours. Late submission will incur 10 points penalty. Reports not turned in class on the due date but later during the same day are considered one day late. Reports late more than 5 days will not be accepted. Information about the expectations for the pre-lab notes, laboratory notebook notes, and the report will be posted to the Blackboard.

OVERVIEW OF COURSE GRADE ASSIGNMENT

Students will have access to their grades via the Blackboard.

Each experiment is worth 100 points. This consists of pre-lab (notes and answers to the instructor's questions) worth 25 points, laboratory notebook notes worth 25 points, and a lab report worth 50 points.

Midterm Grading

Midterm grades are used to assist students with determining their academic standing. Attendance is also recorded to meet state and federal laws regarding financial aid disbursement. Please note, if you are not attending class it could affect your financial aid (scholarships, grants, loans or Federal Work Study). If you decide you are not going to attend this class (or any other class you have registered for), you should formally withdraw (drop) from the course. You can do this by logging on to the myUT portal, clicking on the "Student" tab, and then under "MyToolkit" click on Register/Drop/Withdraw.

Your midterm score will be the sum of all points earned from the assigned experiments. Your score will be converted to a letter grade based on the grading scale provided below.

Final Grading

Students who do not attend class or stop attending at some point throughout the semester will be given a final grade of "F" which will affect student's overall grade point average. To formally withdraw from this or any other course student needs to contact the Registrar's Office.



Your final score will be the sum of all points earned from the assigned experiments. Your score will be converted to a letter grade based on the grading scale provided below.

Grading scale

A	≥ 90%	C	≥ 70%
A-	≥ 86%	C-	≥ 66%
B+	≥ 83%	D+	≥ 63%
B	≥ 80%	D	≥ 60%
B-	≥ 76%	D-	≥ 57%
C+	≥ 73%	F	< 57%

UNIVERSITY POLICIES

Your safety and well-being as a University of Toledo student is important to the faculty, staff, and administration; as such please take a minute to review the following university policies that apply to you as a student of the University: <https://www.utoledo.edu/title-ix/policies.html>. Please use this URL to view a more comprehensive list of student policies: <https://www.utoledo.edu/policies/audience.html/#students>

Institutional Classroom Attendance Policy

Please be aware that the university has implemented an attendance policy, which requires faculty to verify student participation in every class a student is registered at the start of each new semester/course. For this course, if you have not attended/participated in class (completed any course activities or assignments) within the first 14 days, I am required by federal law to report you as not attended. Unfortunately, not attending/participating in class impacts your eligibility to receive financial aid, so it is VERY important that you attend class and complete course work in these first two weeks. Please contact me as soon as possible to discuss options and/or possible accommodations if you have any difficulty completing assignments within the first two weeks.

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](#). Students can find this policy along with other university policies listed by audience on the [University Policy webpage](#) (<http://www.utoledo.edu/policies/audience.html/#students>).

Academic Accommodations

The University of Toledo embraces the inclusion of students with disabilities. We are committed to ensuring equal opportunity and seamless access for full participation in all courses. For students who have an Accommodations Memo from the Office of Accessibility and Disability Resources, I invite you to correspond with me as soon as possible so that we can communicate confidentially about implementing accommodations in this course.

For students who have not established accommodations with the Office of Accessibility and Disability Resources and are experiencing disability access barriers or are interested in a referral to health care resources for a potential disability, please connect with the office by calling 419.530.4981 or sending an email to StudentDisability@utoledo.edu.

ACADEMIC AND SUPPORT SERVICES

Please follow this link to view a comprehensive list of [Student Academic and Support Services](#) (<http://www.utoledo.edu/studentaffairs/departments.html>) available to you as a student.



SAFETY AND HEALTH SERVICES FOR UT STUDENTS

Please use the following link to view a comprehensive list [Campus Health and Safety Services](http://www.utoledo.edu/offices/provost/utc/docs/CampusHealthSafetyContacts.pdf) (<http://www.utoledo.edu/offices/provost/utc/docs/CampusHealthSafetyContacts.pdf>) available to you as a student.

INCLUSIVE CLASSROOM STATEMENT

In this class, we will work together to develop a learning community that is inclusive and respectful. Our diversity may be reflected by differences in race, culture, age, religion, sexual orientation, gender identity/expression, socioeconomic background, and a myriad of other social identities and life experiences. We will encourage and appreciate expressions of different ideas, opinions, and beliefs so that conversations and interactions that could potentially be divisive turn, instead, into opportunities for intellectual and personal development.

COURSE SCHEDULE

The following experiment schedule is only an estimate and is subject to change due to many factors, including weather, class cancelations, and instrument availability. You will be notified in advance by the instructor about any changes to the schedule.

WEEK	DATES	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1	8/31 & 9/2	BLL	UV-Vis	FTIR	BCA
2	9/7 & 9/9	BCA	BLL	UV-Vis	FTIR
3	9/14 & 9/16	FTIR	BCA	BLL	UV-Vis
4	9/21 & 9/23	UV-Vis	FTIR	BCA	BLL
5	9/28 & 9/30	GC	PAGE	SEC	HPLC
6	10/5 & 10/7	GC-MS	GC	PAGE	SEC
7	10/12 & 10/14	HPLC	GC-MS	GC	PAGE
8	10/19 & 10/21	<i>Makeups</i>	<i>Makeups</i>	Fall break	Fall break
9	10/26 & 10/28	SEC	HPLC	GC-MS	GC
10	11/2 & 11/4	PAGE	SEC	HPLC	GC-MS
11	11/9 & 11/11	PH	PH	EC*	EC*
12	11/16 & 11/18	EC*	EC*	PH	PH
13	11/23 & 11/25	<i>Makeups</i>	<i>Makeups</i>	Thanksgiving	Thanksgiving
14	11/30 & 12/2	SEM-EDX*	SEM-EDX*	SEM-EDX*	SEM-EDX*
15	12/7 & 12/9	<i>Checkout</i>	<i>Checkout</i>	<i>Checkout</i>	<i>Checkout</i>

Experiments key

BLL	Beer-Lambert law	EC	Electrochemistry
UV-Vis	UV-Vis spectroscopy	PH	Potentiometric methods
FTIR	Infrared spectroscopy	PAGE	Polyacrylamide gel electrophoresis
BCA	Protein assay	SEM-EDX	Scanning electron microscope & energy-dispersive X-ray spectroscopy
HPLC	High-performance liquid chromatography	*Exact date TBD	
GC	Gas chromatography		
GC-MS	Gas chromatography-mass spectrometry		
SEC	Size exclusion chromatography		