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

Instructor: Slavica Isailovic
Email: Slavica.Isailovic@utoledo.edu
Office Hours: by appointment
Offered: Fall 2019
Course Website: Blackboard Learn

TA: Rippa Sehgal
TA Email: Rippa.Sehgal@rockets.utoledo.edu
Lab Location: Bowman-Oddy 2089
Lab Day/Time: T, R 8:30 am - 11:20 am
Credit Hours: 2.000
Lab Hours: 6.000

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), gel electrophoresis (PAGE), size exclusion chromatography (SEC), mass spectrometry (MS), atomic absorption (AA), fluorescence (FL), ultraviolet-visible (UV-VIS) and infra-red (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, communicate results of performed experiments and analysis by writing formal reports.

TEACHING METHODOLOGY
This course is intended to inspire student mastery of techniques and methods through active engagement, participation and necessary practical laboratory work. A variety of learning strategies will be used including in class discussions, group activities and presentations. Students should be prepared when they come to class by completing all assigned readings and/or viewing required videos and completing prelab writing. Coming to class prepared to fully participate is critical to student’s success in the course as in the class activities are a significant part of the grade in the course.

PREREQUISITES AND COREQUISITES
Undergraduate level CHEM 3860 Minimum Grade of C- and Undergraduate level CHEM 4300 Minimum Grade of C-

TEXTS AND ANCILLARY MATERIALS
• standard laboratory notebook, duplicate page style
• colored markers, pencils or pens for labeling printed instrument graphic overlays
• approved safety lab goggles

TECHNOLOGY REQUIREMENTS

• access to utoledo.edu BlackBoard CHEM4880 course site for course information, instructor supplied materials and current grades (syllabus, safety, assignments, handouts, instrument and experiment instructions, etc)
• flash data storage drive for exporting instrument data
• access to internet for independent researching of topics, methods, instruments, etc.
• word processing and spreadsheet and graphing software for lab report writing and creating (i.e. Word, Excel)

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. Student should use the following URL to read a comprehensive list of academic policies that pertain to students in this class and throughout her/his academic journey: http://www.utoledo.edu/policies/academic/undergraduate/

Because of specific nature of lab class and its scheduling, generally there is no make-up work for excused missed class but student will be allowed to participate in the remaining portion of the lab (the techniques are important). Excused absences have 24 hours to contact the instructor or Chemistry Department Main Office by email or phone. Required Documentation must be provided within seven (7) days of the missed class. http://www.utoledo.edu/policies/academic/undergraduate/pdfs/3364-71-14%20Missed%20class%20policy.pdf

University regulations on academic honesty will be strictly enforced throughout this course http://www.utoledo.edu/policies/academic/undergraduate/pdfs/3364-71-04%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), falsification and fabrication of data, etc. It is the responsibility of the students to ensure that they are familiar with the university regulations at the websites provided.

COURSE EXPECTATIONS

Laboratory Safety: Everyone working in the laboratory is responsible for laboratory safety. General safety lab rules will be reviewed at the beginning of semester and students will always have the access to file on safety rules available at course site at BlackBoard. If student has a concern or question, s/he should always ask the instructor. Anyone who endangers the safety of themselves or others in the laboratory will only be given one warning. A second warning will result in the removal of the student from the laboratory and a grade of zero for the laboratory experiment. In addition, anyone who seriously damages any instrument will also be removed from the lab and receive a grade of zero for that experiment. Each student must wear approved safety goggles at all times in the laboratory. Only one warning will be given; each additional warning will result in a five point deduction from the laboratory grade. No shorts, sandals or open toed shoes will be allowed. These rules are for student protection and no exceptions will be permitted.

Communication: Out of class communication will be by email so students are prompted to check their rockets email daily. The instructor is checking her email several times a day and will normally respond to emails within 24 to 48 hours. Students are encouraged to email the instructor regarding their work and studies in the course. Emails are to be sent using assigned rockets.utoledo.edu email. No student emails from private accounts will be answered. Emails
are to contain a salutation, proper grammar (no texting language/symbols) and a closure with the student’s name.
In case of any emergency students should call General Chemistry office at 419.530.2698. Students are required to
access course site at Blackboard regularly to download required supplied files with various lab materials and
instructions (mostly needed for lab preparation). Instructor will be updating and posting new grades weekly and it is
student’s responsibility to check them regularly and promptly report any discrepancies or errors to instructor.
Lab work: Students are not allowed to be late for lab. Everybody should be in the lab at the start time of class,
properly dressed and equipped for safe work, with their prelab notes ready. At the start of every lab all students
participate in class prelab oral session by presenting a part of prelab and leading discussion relating to it. By being
late to lab student is missing the graded discussion portion of prelab. Also, every student takes part in planning and
organizing the work of the day, so being late means missing on a lot very important information for the day’s work.
Students will usually work in pairs with each individual recording results and observations independently. Students
are to attend lab and perform their experiments at their scheduled class times only and are not to try to gain access
to the lab at different times at any circumstances. Teaching assistants have no authority to approve, attend and
supervise undergraduate students in lab outside class time student is registered for. 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. Every student is required to sign in log book of every
instrument s/he used and save all recorded/generated files in individual student folders on instrument’s computer.
Failing to do so results on 5-point deduction for experiment grade per occurrence. Excessive talking about non-lab
related matters during labs is discouraged as it interferes with productivity of everybody in the lab. Lab time should
be efficiently used.
Laboratory Notebooks: Each student is required to keep and maintain a well-organized laboratory notebook.
Duplicate sheet style notebooks are required: copy of lab notebook pages is submitted for grading with every lab
report and is worth 50% of the experiment grade. The course site at BlackBoard will have a detailed explanation on
how to write prelab and lab notes in notebook. Upon satisfactory completion of an experiment, recording of the
collected data (including saving it as instrument specific files on the instrument computer, as well as exporting files
for student later use in lab report writing) and clean-up of work spaces, the instructor will initial first page of lab in
notebook and mark the date it is due with full (typed and printed) lab report. Student is checked out for that
experiment. Reports without instructor’s initials/date due will not be graded and will receive no points.
Pre-labs: Pre-labs must be hand written in lab notebook prior to starting the laboratory period. Detailed explanation
on how to prepare and write prelab, as well as point grading of all required elements, will be available at course site
at Blackboard. If the prelab material is deemed not adequate the student will not be allowed to start work. Also
graded portion of the pre lab is students participation in discussion at the beginning of every experiment (includes
presenting, discussing, demonstrating and commenting).
Lab Reports: Students will type and print a full lab report, worth 50% of experiment grade, for every successfully
completed experiment. It is due at the beginning of the laboratory period one week from the date of lab
completion (date when checked out for the experiment) unless it is the first or the last report of the term, or special
permission is given by the instructor. Lab report due but not handed on time because of absence will be accepted
for both, excused and unexcused absences. Unexcused will have a 20-point per workday deduction (that is NO
points if report is turned one week after due date!) unless turned in by someone else (classmate, roommate, etc) at
the time due. Late lab reports can be submitted to General Chemistry office by handing them only to Ms. Pamela
Samples ( BO2022) or Ms. Charlene Hansen (BO2024) who will date-stamp them and put to instructor’s mailbox.
Students need to keep in mind that reports not turned in class on date due but later during the same day are
considered one day late and will have 20 point deduction already.
Detailed explanations on how to write lab report with all the required elements and grade point distribution will be
available for students at BlackBoard.
Laboratory Technique: In addition to learning instrumental methods and applications, Advanced Laboratory III will
continue student’s development and practice of good laboratory techniques. These include awareness and
compliance with safety rules, proper handling of reagents, glassware, equipment and instrumentation, safe disposal of waste material, and proper lab maintenance, i.e., cleanliness, organization.

OVERVIEW OF COURSE GRADE ASSIGNMENT
Students will always have access to current grade in the course at BlackBoard. The grade is calculated as described below, based on all reports and quizzes done to that moment.

Midterm Grading
Midterm grades are assigned the 8th week of class and are used to assist students with determining their academic standing. Attendance is also recorded during the 8th week 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 must formally withdraw (drop) from the course. You can do this by logging onto the myUT portal, clicking on the “Student” tab, and then under “My Toolkit” click on Register/Drop/Withdraw.

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. The grade for the course will be determined from percent average of all labs and quizzes over grading period. Every lab is worth 100 points: 50 pts for Lab Notebook and 50 pts for Lab Report and every quiz 50 points.

Typical Grading Scale
(+ grades upper 1/3 of range and – grades lower 1/3 of range)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90 - 100 %</td>
</tr>
<tr>
<td>B</td>
<td>80 - 89 %</td>
</tr>
<tr>
<td>C</td>
<td>65 - 79 %</td>
</tr>
<tr>
<td>D</td>
<td>50 - 64 %</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 49 %</td>
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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. Your safely 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 • The University of Toledo’s Title IX (Sexual Misconduct) Policy - 3364-50-01 • Nondiscrimination 3364-50-02 • Nondiscrimination on the basis of disability - Americans with Disability Act compliance 3354-50-03 • Consensual romantic and/or sexual relationships - Policy 3364-25-65 • Student Code of Conduct 3364-30-04 Please use this URL to view a more comprehensive list of student policies: https://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 Student Disability Services, 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 affiliation with Student Disability Services and are experiencing disability access barriers or are interested in a referral to healthcare resources for a potential disability or would like information regarding eligibility for academic accommodations, please contact the Student Disability Services Office (http://www.utoledo.edu/offices/student-disability-services/) 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. The university provides a variety of academic and support services on campus to help you succeed and reach your fullest potential. Whether you need to ask a question, get help with an assignment, seek advice from a counselor, find a job or join a club, UToledo is there for you! Just use the following URLs to find the academic support or service you need:
Tutoring: http://www.utoledo.edu/success/lec/
Library: http://www.utoledo.edu/library/
Success Coaching: https://www.utoledo.edu/successcoach/
Student Affairs: http://www.utoledo.edu/studentaffairs/
Career Services: http://www.utoledo.edu/success/career/

SAFETY AND HEALTH SERVICES FOR UT STUDENTS
In addition to the university policies developed to ensure your health and well-being as a student, there are also a number of on and off campus resources available to support you including a food pantry! Please use the following link to view a comprehensive list Campus Health and Safety Services available to you as a student.
Link to Food Pantry: http://www.utoledo.edu/studentaffairs/food-pantry/
## COURSE SCHEDULE (tentative, subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates (T &amp; R)</th>
<th>Experiment</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>8/27 &amp; 8/29</td>
<td>PIP</td>
</tr>
<tr>
<td>2</td>
<td>9/3 &amp; 9/5</td>
<td>PH</td>
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<tr>
<td>3</td>
<td>9/10 &amp; 9/12</td>
<td>BL</td>
</tr>
<tr>
<td>4</td>
<td>9/17 &amp; 9/19</td>
<td>BCA</td>
</tr>
<tr>
<td>5</td>
<td>9/24 &amp; 09/26</td>
<td>(Quiz 1) IR</td>
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<tr>
<td>6</td>
<td>10/1 &amp; 10/3</td>
<td>FL</td>
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<tr>
<td>7</td>
<td>10/8 &amp; 10/10</td>
<td>MS &amp; No class (Fall Break)</td>
</tr>
<tr>
<td>8</td>
<td>10/15 &amp; 10/17</td>
<td>AA</td>
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<tr>
<td>9</td>
<td>10/22 &amp; 10/24</td>
<td>(Quiz 2) SEC</td>
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<tr>
<td>10</td>
<td>10/29 &amp; 10/31</td>
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</tr>
<tr>
<td>11</td>
<td>11/5 &amp; 11/7</td>
<td>GC</td>
</tr>
<tr>
<td>12</td>
<td>11/12 &amp; 11/14</td>
<td>LC</td>
</tr>
<tr>
<td>13</td>
<td>11/19 &amp; 11/21</td>
<td>ABS</td>
</tr>
<tr>
<td>14</td>
<td>11/26 &amp; 11/28</td>
<td>NMR &amp; No Class (TXG)</td>
</tr>
<tr>
<td>15</td>
<td>12/3 &amp; 12/5</td>
<td>(Quiz 3) Last report due &amp; Check out</td>
</tr>
</tbody>
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Laboratory Experiment Abbreviations (Readings from: H- Harris, S-Skoog)

- **PIP** - Pipette lab (handout, H)
- **BL** – Beer’s Law (handout, S, H, Sawyer modified exp. 6–1)
- **PH** – Potentiometric Methods (Sawyer exp. 2–1)
- **BCA** – Protein Assay (handout)
- **FL** – Fluorescence Spectroscopy (Sawyer exp. 10–1, S, H)
- **IR** – Infrared Spectroscopy (handout, Sawyer, S, H)
- **ABS** – UV–VIS spectroscopy (Sawyer exp. 6–4, S, H)
- **SEC** – Size Exclusion Chromatography (Sawyer exp. 14–1, H, S)
- **PAGE** – Polyacrylamide gel electrophoresis (handout, S, H)
- **GC** – Gas Chromatography (Sawyer exp. 12–3, handout, S, H)
- **MS** – Mass Spectrometry (handouts, S, H)
- **LC** – HPLC (Sawyer exp. 13–1, handouts, S, H)
- **EC** – Electrochemistry (Sawyer exp. 4–1, S, H)
- **AA** – Atomic Absorption Spectroscopy (Sawyer, handout, S)
- **NMR** – Nuclear Magnetic Resonance Spectroscopy (Sawyer exp. 11-1)