Advanced Analytical Chemistry  
The University of Toledo 
Department of Chemistry and Biochemistry, College of Natural Sciences and Mathematics 
(CHEM 3360)-CRN: 18433

Instructor: Ajith Karunarathne  
Office Hours: T&W-> 2-3 PM  
Email: ajith.karunarathne@utoledo.edu  
Office Location: BO 2098  
Office Phone: 419-530-7880  
Class Location: Bowman-Oddy 2087

Term: Spring, 2018

Class Day/Time for 001, 091
M&W → 1.00-3.50PM

Class Day/Time for 002-3, 092-3
T&R → 1.00-3.50PM

Credit Hours: 2

COURSE/CATALOG DESCRIPTION
This laboratory teaches some practical analytical methods for quantitative determination of an analyte.
2.000 Credit hours,
Levels: Undergraduate
Schedule Types: laboratory

COURSE OVERVIEW
The class consists of a range of ‘wet chemistry’ techniques, which include acid base, precipitation, complexometric and redox titrations, chromatographic and spectrophotometric analysis. A special emphasis will be given on sample preparation, dealing with interferents, method optimization, data analysis, validation, and statistical treatment of data. This laboratory also has a strong focus on proper recording data in a laboratory notebook as well as reporting and interpretation of the data.

STUDENT LEARNING OUTCOMES
At the end of the course, students are expected to have hands on skills in basic experimental methods and associated theoretical understanding in analytical chemistry.

PREREQUISITES AND COREQUISITES

REQUIRED TEXTS AND ANCILLARY MATERIALS
Laboratory handbook is available on the blackboard. Additional reading material will be provided as needed.
- Laboratory Manual (check the blackboard)
- Laboratory Notebook (bound, duplicate sheet style)
- Laboratory safety goggles (full coverage)
- Labcoat as needed
Note that proper clothing and footwear are required to ensure safety while in the laboratory. Students not properly dressed will not be allowed into the laboratory! Legs, arms, shoulders and feet should be covered all the time in the laboratory.

- Full length Pants (Should cover the lower limbs,
- Flat closed-toe footwear with full heel and sock,
- Eating, drinking and the use of communication, entertainment devices are not allowed.

TECHNOLOGY REQUIREMENTS
Scientific calculators

UNIVERSITY POLICIES
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.

ACADEMIC POLICIES
Attendance:
There are NO MAKEUPS for this laboratory. If you have a valid excused absence (see university webpages for policy on what constituted a valid excuse) you will be allowed to participate in the remaining portion of the lab (the techniques are important) and if you are incapable of finishing the entire lab in that time, adjustment to your grade will be made. Unexcused absences will be handled similarly, but no leeway will be made. Excused absences have 24 hours to contact the instructor, TA or Chemistry Department Main Office by email or phone. Documentation must be provided within seven (7) days of the missed class. Reports due but not handed on time because of absences will still be accepted for both excused and unexcused absences. Unexcused, though will be docked up to 20 points unless turned in by someone else (classmate, roommate, etc) at the appropriate time.

Academic Dishonesty:
You are urged to refer to the University's policy on Academic Dishonesty and the Student Code of Conduct, which can be found on the university’s website. 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, any part of a peer's lab report, etc), falsification of data, etc.

Students Requiring Special Assistance:
Students requiring special assistance may identify themselves to the instructor at the beginning of the semester.

Special needs during exams: If a restroom break is required during an examination, during
the break, you will not be allowed to access any study materials, carry backpacks with you, or use electronic media. The exam clock will continue countdown during the break.

COURSE EXPECTATIONS

Lab Notebooks:
All data must be entered directly into a bound notebook. Duplicate sheet style notebooks are preferred. Proper format for entry is included on page 6 of the lab manual. 8

Prelabs:
The prelabs are mandatory and designed to help guide your thinking about the experiments to be done. The prelabs are posted on blackboard. You will have to complete the prelab before you enter the laboratory.

Lab Reports:
Reports are due at the beginning of the next lab session following the completion of that lab. (Finish on Thursday, then labs are due on the following Tuesday.) Format of the lab report is described in the lab manual (Laboratory manual can be found on the blackboard. When revisions for the manual are made, you will be informed. These can be turned in on standard paper. Lab reports are expected to be typed and printed, with photocopy or scanned attachment of your data. Your results and calculation sample should be clearly marked. Graphical representation of data is preferred in a computerized format (using excel, origin).

Honors Students:
All Honors students will be assigned an additional project, whose successful completion will be required to receive Honors credit. A meeting will be scheduled with all enrolled Honors students during the first quarter of the semester to outline and discuss this project. A deadline for completion of this project will also be specified.

GRADING
The grading scale for exams and the final project is as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
<td>1000</td>
</tr>
<tr>
<td>A-</td>
<td>86-89.9%</td>
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</tr>
<tr>
<td>B+</td>
<td>82-85.9%</td>
<td>100</td>
</tr>
<tr>
<td>B</td>
<td>78-81.9%</td>
<td>100</td>
</tr>
<tr>
<td>B-</td>
<td>74-77.9%</td>
<td>100</td>
</tr>
<tr>
<td>C</td>
<td>70-73.9%</td>
<td>100</td>
</tr>
<tr>
<td>C-</td>
<td>66-69.9%</td>
<td>100</td>
</tr>
<tr>
<td>D</td>
<td>62-65.9%</td>
<td>100</td>
</tr>
<tr>
<td>D-</td>
<td>58-61.9%</td>
<td>100</td>
</tr>
<tr>
<td>D+</td>
<td>54-57.9%</td>
<td>100</td>
</tr>
<tr>
<td>C</td>
<td>50-53.9%</td>
<td>100</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 50%</td>
<td>100</td>
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</tbody>
</table>

10 Laboratory Experiments (tentative) - 100 points each
1 Lab Practical - 200 points
Total - 1200 points
Point Distribution:

• **20% of your lab grade (20 points per experiment) will be based on the accuracy and precision of your analysis.** This class is about analysis and technique. Your grade will reflect your ability to accurately and reproducibly determine the amount of unknown. The following scale will be used to determine the accuracy and precision score based on the calculated error %:

  *In order to pass the course, you are required to have at least half of the total points assigned for the accuracy and precision.*

  - < 1% = 20 points; 1 – 2% = 18 points; 2 – 3% = 16 points; 3 – 4% = 14 points; 4 – 5% = 12 points; 5 – 6% = 10 points; 6 – 7% = 8 points; 7 – 8% = 6 points; 8 – 9% = 4 points; 9 – 10% = 2 points; > 10% = 0 points.

  - TAs will also consider the precision, representation and interpretation of the data.

• **60% of your lab grade will be based on the quality of your lab write-up/report.** Guidelines for writing an effective laboratory report will be provided.

• **10% of your lab grade will be for answering prelab questions and Just in Time questions (JITT),** which will be provided either by the instructor, the TA, on blackboard or in the laboratory manual.

• **10% of your lab grade will be based on the care with which observations and data are recorded in your laboratory notebook.** Guidelines for data recording and keeping your laboratory notebook will be provided.

**COMMUNICATION GUIDELINES**

**E-mail preferred**

<table>
<thead>
<tr>
<th>Room: BO 2047</th>
<th>E-mail: <a href="mailto:ajith.karunarathne@utoledo.edu">ajith.karunarathne@utoledo.edu</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Office: BO 2098B</td>
<td>Office hours: 10-11 am or by appointment</td>
</tr>
<tr>
<td>TA-Section 001 and 0091 Dinesh Kankanamge-BO 2098A</td>
<td>Wednesday 5-6 pm <a href="mailto:dinesh.kankanamge@rockets.utoledo.edu">dinesh.kankanamge@rockets.utoledo.edu</a></td>
</tr>
<tr>
<td>TA-Section 002 Kanishka Senarath-BO 2098A</td>
<td>Wednesday 5-6 pm <a href="mailto:kanishka.senarath@rockets.utoledo.edu">kanishka.senarath@rockets.utoledo.edu</a></td>
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**COURSE SCHEDULE**

A detailed course schedule will be posted on the blackboard.