Welcome to Chem 2272A! Please read and keep this course outline handy, because it is an official document that contains important course information.

Course Description & Prerequisite Requirements

Calendar description: This course emphasizes the quantitative aspects of chemistry. Starting with classical measurements of volumes and masses, the course will develop statistical tools of estimation, confidence, accuracy, and precision in treating experimental data. This includes an introduction to instrumental methods of analysis.

Extra information: 3 lecture hours, 3 laboratory hours, 0.5 course.

Prerequisite: Chemistry 1301A and 1302B or the former Chemistry 1050, 1100A and 1200B, 1020 or 021, 023, 025.

Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Learning Outcomes

Upon successful completion of this course, the student is expected to demonstrate the ability to:

• Describe the basic principles and procedures to perform quantitative chemical analysis.

• Execute effective mathematical calculations necessary to achieve correct values in quantitative analysis.

• Conduct laboratory experiments of quantitative and instrument analysis with accuracy and precision.

• Compile professional level lab reports that are logically and concisely written with critical data analysis.

• Evaluate the accuracy of and sources of errors for a given quantitative or instrument analytical method.

• Work as a team collaboratively and productively in the lab but complete the lab reports independently.
Dates to Note

For your convenience, a summary of some of the important dates is provided below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday, September 14 by noon</td>
<td>Last day to make registration changes, such as lecture and lab sections. This is the last day to de-register from the course and remove it from your academic record.</td>
</tr>
<tr>
<td>Week of September 17</td>
<td>First week of laboratory rotations</td>
</tr>
<tr>
<td>Monday, October 22, 7:00 pm</td>
<td>Midterm Test (topic cut-off will be announced by Oct. 15)</td>
</tr>
<tr>
<td>Monday, November 12</td>
<td>Last day to drop the course without academic penalty. If you drop the course on or before this date, it will remain on your academic record along with a WDN (withdrawn). If you drop the course after this date, it will result in an automatic F.</td>
</tr>
</tbody>
</table>

Support Services

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health and Wellness (https://www.uwo.ca/health/mental_wellbeing/) for a complete list of options about how to obtain help. Crisis contact information is available at: https://www.uwo.ca/health/mental_wellbeing/crisis.html

Additional student-run support services are offered by the USC, http://westernusc.ca/services.

The website for Registrarial Services is http://www.registrar.uwo.ca.

Accessibility

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Service at (519)661-2147 if you have questions regarding accommodation.
Code of Student Conduct

To foster a supportive and enriching academic environment that is conducive to learning and free inquiry, Western has a Code of Student Conduct (http://www.uwo.ca/univsec/pdf/board/code.pdf).

You can expect your instructor to promote this environment and also respect each student’s unique views and opinions. Because Western is also a part of your environment, we expect the same from you. Activities that disturb another student’s right to this environment will not be tolerated; these include talking in class about matters irrelevant to the course and using electronic devices inappropriately.

You can also expect your instructor to come prepared, on time, and eager to help you learn. In turn, we expect that you will come prepared, on time, and ready to learn.

Lecture Sections

<table>
<thead>
<tr>
<th>Lecture Section</th>
<th>Time (MWF)</th>
<th>Room</th>
<th>Instructor</th>
<th>Office</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>12:30–1:20 pm</td>
<td>NS 7</td>
<td>Dr. Zhifeng Ding</td>
<td>MSA 0203</td>
<td><a href="mailto:zfding@uwo.ca">zfding@uwo.ca</a></td>
</tr>
</tbody>
</table>

Office hours are by appointment (email or in-class).

Email Policies

Your instructor’s email should only be used for administrative purposes. In order to maximize efficiency and to allow your instructors to respond to administrative concerns as quickly as possible, emails of the following nature will not be responded to:

- Questions about course material or on how to do a particular problem in the workbook. Such questions should be taken to the Resource Room or posted on the OWL forum.
- Questions that can be answered based on the information found in this course outline. Being able to find information yourself is an important soft-skill and an employability outcome.
- Requests for grade increases, extra assignments, make-up labs, etc. (see related sections following).

If you email your instructor, you must use your Western email address and include Chem 2272F in the subject line. Messages from a non-Western account or those that do not include Chem 2272F may be blocked by the university’s anti-spam system. It is also useful to include your student number somewhere in the message.

Constructive feedback is very valuable to us. Please do not hesitate to contact any one of the instructors if you have any comments or feedback on any aspect of Chem 2272F. We are always trying to improve the course so that we can improve your experience!
Course Website

News and course updates will be posted on Western’s OWL system (http://owl.uwo.ca). This is the primary method by which information will be disseminated to all students in the class, so you are responsible for checking OWL on a frequent basis.

Course Materials

Chemistry 2272F Course Textbook: Quantitative Chemical Analysis, 9th Ed., D. C. Harris

Please go to website for renting or purchase:

https://store.macmillanlearning.com/ca/product/Quantitative-Chemical-Analysis/p/146413538X?searchText=harris

You have the option to purchase just the ebook through the student store. The 6 month price is at about $62.99.

You will also have the option to rent from this link also...a 4 month rental is at about $58.99 (just click on hardcover to see options).

Chemistry 2272F computer software: Microsoft Excel for data analysis (available in 2272 lab computers)

Chemistry 2272F Laboratory Manual (2018 edition, to be announced)

- Old editions may not be used. Students must bring this year’s edition to every experiment.

Lab Coat

- For your protection, a proper lab coat is required. Designer lab coats, which are often sold as hospital scrubs or consultation coats, are not acceptable, because they are too short or do not offer sufficient protection to the upper body.

Safety Glasses

- Safety glasses may also be purchased through the Chem Club. Times and location will be posted on OWL.
- If you wear glasses, it is important that the safety glasses fit over them properly. The safety glasses should sit close to your forehead.
**Mobile Device or iClicker**

- Audience response systems (“clickers”) will be used to provide immediate feedback on your understanding of course concepts. You will require a web-enabled device (phone, laptop, etc.) or an iClicker. Participation marks are awarded for the use of “clickers”. You must use your own “clicker” account and may not submit responses for any other student. The data collected using the devices will not be used for research purposes without your consent.

  The lecture environment will be engaging and lively with discussion. Research has shown that students who participate are more likely to obtain a better grade in the course. **Come to classes and participate actively!!!**

**Sharp EL-510R(B) or Sharp EL-510RN(B) scientific calculator**

- To ensure fairness to everyone in the course, the Sharp EL-510R(B) and Sharp EL-510RN(B) are the only calculator models permitted in the labs and during tests and exams. All other brands and Sharp models will be confiscated. Proctors and instructors for tests and exams do not lend calculators. It is your responsibility to bring the correct calculator and to ensure that it is in proper working order. It’s not a bad idea to bring a spare calculator of the same model. Obviously, you will not be allowed to share calculators during tests and exams.
## Outline of Lecture Topics

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Class Topic</th>
<th>Chapter in Harris</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Administration</td>
<td></td>
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<tr>
<td>2</td>
<td>Measurement Basics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Errors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statistics</td>
<td>3-4</td>
</tr>
<tr>
<td>3</td>
<td>Introduction to Titration</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>Systematic Treatment of Equilibrium</td>
<td></td>
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<tr>
<td></td>
<td>Activity</td>
<td></td>
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<tr>
<td></td>
<td>Acid-Base Equilibria</td>
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<tr>
<td></td>
<td>Complexation Equilibria</td>
<td>8-12</td>
</tr>
<tr>
<td>5</td>
<td>Electrochemistry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electrodes and Potentiometry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redox Titrations</td>
<td>14-16</td>
</tr>
<tr>
<td>6</td>
<td>Atomic Spectroscopy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absorption Spectroscopy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emision Spectroscopy</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>Molecular Spectroscopy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absorption Spectroscopy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Luminescence Spectroscopy</td>
<td>18,20</td>
</tr>
</tbody>
</table>

In all of the topics, the primary focus is on the *understanding* of the concepts. Please try to garner a thorough, in-depth understanding of the material, because that is what allows success in chemistry. Accordingly tests and exams will be designed to evaluate your comprehension of the material and your ability to apply it to new and different scenarios, and not simply your ability to regurgitate memorized facts or substitute numbers into formulas.
Laboratory Information

Laboratory sections are shown below. Labs are held in MSA 1220.

<table>
<thead>
<tr>
<th>Lab Sections</th>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>013</td>
<td>Monday</td>
<td>2:30 pm – 5:30 pm</td>
</tr>
<tr>
<td>021</td>
<td>Tuesday</td>
<td>9:30 am – 12:30 pm</td>
</tr>
<tr>
<td>023</td>
<td>Tuesday</td>
<td>2:30 pm – 5:30 pm</td>
</tr>
<tr>
<td>033</td>
<td>Wednesday</td>
<td>2:30 pm – 5:30 pm</td>
</tr>
</tbody>
</table>

All labs will be in ChB Room 094 (lower ground level in Chemistry Building).

Lab Coordinator: Dr. Christoopher Levy  
See course website

Students who arrive unprepared or late for a lab will receive a zero for that lab. No credit will be given for the prelab exercises. Students are deemed late if they arrive after the lab doors have closed. Lab technicians and teaching assistants have the right to eject students from the lab.

Due to limited resources, students are asked to work in pairs or groups of three in the lab. However, each student is expected to learn all aspects of the experiments. Likewise, each student is expected to contribute equally with their highest level of skills and effort. In the event of unequal contributions, the TAs will require the students to work individually for the remaining of the lab.

Safety and Dress Code

Western is committed to workplace health and safety, and has strict safety regulations. Even your instructor has to follow them! Lab TAs and technical staff will remove students who, in their opinion, do not meet the safety requirements or are not prepared, as described below. **These students, and those who arrive late, will receive a zero for the entire experiment, and no credit will be given for the prelab exercise.**

Eye Protection

Safety glasses or goggles must be worn by everyone whenever laboratory work, including the getting, cleaning, and returning of glassware, is being performed. Students who wear prescription glasses must wear appropriate safety glasses or goggles over their regular glasses. If you wear contact lenses, you must inform the lab TA that you are wearing contact lenses.
Safety glasses can be rented for $2 per lab period.

Lab Coat, Pants, Socks, and Footwear

The Occupational Health & Safety Office at Western mandates “shoulder-to-toe” coverage. A detailed description of the dress code is available in the Lab Manual. For hygienic reasons, we do not rent shoes, socks, pants, or lab coats.

Lab coats must be worn, buttoned up. Students must have a lab coat to enter the laboratory. They may not leave after the video or the prelab talk to get a lab coat or have one delivered.

Students must wear ankle-length pants, socks that cover the ankle, and shoes that cover the whole foot (top, sides, and back) without any “cutout holes.” Shorts, sandals, and capris are among the items of clothing that are not acceptable. No skin may show at the ankles even when you are seated.

Evaluation

Components

Tests and exams are necessary to assess your mastery of core concepts. Your overall course grade, out of 100, will automatically be the higher of the two grades calculated by the two methods shown below. Listed next to the respective components are their maximum contributions toward the course grade.

<table>
<thead>
<tr>
<th>Component</th>
<th>Notes</th>
<th>Method #1</th>
<th>Method #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>See lab manual</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>
| “Clickers”    | Marked on participation only. The score you receive will be based on the percentage of questions answered:
|               | 80% or more = 4; 70–79% = 3; 60–69% = 2; 40–59% = 1; Less than 40% = 0 | 4         | --        |
| Midterm Test  | Monday, October 22, 7:00–9:00 pm          | 20        | 20        |
| Final Exam    | Scheduled by the Registrar, 3.00 hours     | 36        | 40        |

To obtain credit for the course, all three requirements below must be met:

1. Obtain a minimum of 50% on the overall course grade, as calculated above.
2. Obtain a minimum of 50% on the laboratory component. This mark is calculated from all experiments. A missed experiment is assigned a mark of zero unless it has been “excused” (see section on Missed Course Components).
3. Miss no more than two experiments, whether excused or not.
Students who fail to meet requirement #2 or #3 will receive a course grade no greater than 40% (even if the calculated course grade is higher) and will not receive credit for the course.

Important Legalities

It is Department of Chemistry policy that any student repeating a chemistry course must repeat the entire course, including the lab component. There are no lab exemptions.

Students who arrive late for a lab will receive a zero for that lab. No credit will be given for the prelab exercises. Students are deemed late if they arrive after the lab doors have closed. Lab technicians and teaching assistants have the right to remove students from the lab.

It is university policy that a regularly scheduled class (lecture, lab) takes precedence over tests and exams. Therefore, if another course schedules a test or exam that takes place during your lab period, the instructor for that course must accommodate you.

Aside from the specified calculator, no other electronic devices (phones, iPods, etc.) may be in your possession during tests and exams, even for timekeeping purposes.

Audience response systems (“clickers”) will be used to collect information during class. There are 4 marks associated with the responses. The data collected using the devices will not be used for research purposes without your consent.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Computer-marked, multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Missed Course Components

If you are seeking academic accommodation because of a medical (physical or mental) illness, please begin by contacting the Academic Counselling Office of your home faculty (or affiliated college). Western’s policy on academic accommodation for illnesses can be found at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf.

All requests for academic accommodation must go through your faculty’s Academic Counselling Office, so please contact them and not your instructor.

If you are a science student, the Academic Counselling Office of the Faculty of Science is located in NCB 240, and can be contacted at 519-661-3040 or scibmsac@uwo.ca. Their website is http://www.uwo.ca/sci/undergrad/academic_counselling/index.html.

If you are an engineering student, the Academic Counselling Office of the Faculty of Engineering is located in SEB 2097, and can be contacted at 519-661-2130 or engugrad@uwo.ca. Their website is http://www.eng.uwo.ca/undergraduate/about_us/index.html.
A student requiring academic accommodation due to illness must use the Student Medical Certificate (https://studentservices.uwo.ca/secure/medical_document.pdf) when visiting an off-campus medical facility.

**Missed Labs**

**There are no make-up labs, and it is not possible to reschedule them.** If you miss a lab for any reason, you will be assigned a mark of zero for that lab. If the missed lab is due to a reason that is approved by your faculty’s Academic Counselling Office, the zero will be replaced by a mark of EXCU (excused), which shifts the weight of the missed lab onto all of the other labs.

You must, as soon as you’re able to do so, submit documentation to your faculty’s Academic Counselling Office. If they approve your circumstances, we will be notified.

Tests and exams will contain questions related to the theoretical aspects of the experiments. You are responsible for the material pertaining to the missed labs.

**Missed Tests or Final Exam**

If you are unable to write the midterm test, contact your faculty’s Academic Counselling Office as soon as possible. If your circumstances are approved, you will be able to write the make-up test on **Monday, October 29, 7:00–9:00 pm**. If you are unable to write the make-up midterm test, the weight of the midterm test will be shifted to the Final Exam.

If you are unable to write the Final Exam, contact your faculty’s Academic Counselling Office as soon as possible. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam) in January of 2019.

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

**Equal Opportunity and Evaluation Policy**

We are here to help you achieve your goals. We want you to do well in the course. We were, at one time, students ourselves, so we understand the importance of course grades and the hard work that you will invest into this course.

Most importantly, we also have to be fair. The university is committed to academic integrity and has high ethical and moral standards. All students will be treated equally and evaluated using the criteria presented in this course outline and their respective weights. The evaluation criteria are based strictly on actual achievement, not on effort or how hard the student tried. Claims of an excellent academic history, of attendance in the course components, or of personal issues (family, relationship, financial, etc.) cannot be used to justify a higher grade in the course because they are not criteria for evaluation. There is no extra work available for extra credit or to “make up” another grade. We do not offer any extra assignments, essays, experiments, or other work of any kind to any student.
The requirement for a higher grade in order to, for example, maintain a scholarship, enter a program, or obtain a higher GPA for various reasons, is not a justifiable reason for increasing your grade. If we increased or “bumped” your grade (*i.e.* gave you a grade that you did not legitimately earn), it would be unfair to the other students and also a great disservice to the scholarships and programs who are evaluating all students on the basis of their grades.

**Acknowledgements**

This course is supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students’ Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing paperwork in the Faculty of Science Dean’s Office. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the chair of your department or email the Science Students’ Council: ssc@uwo.ca.

**Chemistry on Social Media**

Find the Department of Chemistry at Western on Facebook and Twitter!

- Facebook: @ChemistryatWestern
- Twitter: @westernuchem

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