



Course Outline – Introductory Chemistry II

Preliminary Year Program

In the event of a COVID-19 resurgence during the course that necessitates the course moving away from in-person delivery, course content may be delivered online either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). There may also be changes to any remaining assessments at the discretion of the course instructor. In the event of a COVID-19 resurgence, detailed information about the impact on this course will be communicated by the Office of the Dean and by the course instructor.

General Information

Course #: 0012B

Section #: 530 & lab 531

Term: Winter

Year: 2021-22

Delivery: In-person

Course Day and Time: Lecture – Monday 2:30 – 5:30 PM EST and Lab – Wednesday 2:30 – 5:30 PM EST

Course Location: Lecture – Br-201, Lab – Br-2006

Instructor Information

Name: Augusto Matarazzo

E-mail: amataraz@uwo.ca

Office hours for students: By appointment via Zoom or in-person

Office location: UH 351

Lab Instructor Information

Name: Augusto Matarazzo

E-mail: amataraz@uwo.ca

Office hours for students: By appointment via Zoom or in-person

Office location: UH 351

Course Description

This course explores thermodynamics, kinetics and equilibrium of chemical reactions, behaviour of ideal gases, and interpretation of redox reactions. Students will engage in problem solving and apply laws and theories to analyze chemical reactions that support our society with heat, batteries, buffers, and important materials. [Chemistry 0011A/B](#) and [Chemistry 0012A/B](#) in combination are equivalent to the Ontario Grade 12U level chemistry.

Antirequisite(s): Ontario High School SCH4U or equivalent, [Chemistry 0010](#), any university-level Chemistry course.

Prerequisite(s): Registration in a Preliminary Year program at Brescia University College.

Required Course Materials

Title: Chemistry 0012B Course notes

Authors: Jan Mathers, Christina Booker

Availability: Western University Book Store

Title: Chemistry 0012B Lab Manual

Authors: Jan Mathers, Christina Booker

Availability: Western University Book Store

Scientific calculator

Optional Course Materials

Title: Chemistry 12

Author: Christina Clancy

Availability: Western University Book Store

Learning Outcomes

By the end of this course, students will be able to:

- 1) **Explain** the rationale for the chemistry theories discussed during the course through tests, and an examination
- 2) **Apply** appropriate laws and theories to problems through lab reports, tests and an examination
- 3) **Discuss** how chemistry is integrated into the world through the CHEM 0012B assignment
- 4) **Reflect** on their learning progress in the Learning Reflection assignment and make appropriate adjustments in order to master the problems presented
- 5) **Demonstrate** appropriate lab skills and safety procedures during laboratories

Brescia Competencies

The course assignments in Chemistry 0012B will assist students in developing Brescia Competencies. For example, completion of midterm tests and the final exam in addition to submission of laboratory reports will develop written communication, critical thinking and problem-solving skills. Moreover, through the reflection assignments students will have the opportunity to evaluate self-awareness and development. Furthermore, students will also explore inquiry and analysis/social awareness and engagement by participating in the CHEM 0012B assignment, classroom discussions and online discussion forums.

Teaching Methodology and Expectations of Students

Chemistry 0012B will be delivered in-person. Instructional approaches that will be used during the course will include lectures, laboratories, classroom discussions, and online discussion forums.

Code of Conduct

The learning environment for Chemistry 0012B will be supportive, challenging, and respectful. This will be a safe environment to ask questions and take a chance on an unsure answer. As the instructor, I will treat you with respect, and I expect the same respect to be demonstrated by all students.

Communication

Students will receive email at their @uwo.ca address only. Schedules and important information will be posted on the OWL course page. Please check for email and website updates on a regular basis.

All online discussions on the OWL course page and emails are expected to be written in a respectful tone and with professional style. For example, "This idea sucks" is an inappropriate comment, while a better response could be "This idea contradicts the First Law of Thermodynamics and thus I propose the temperature will increase rather than decrease." For another example, "Can u help me I don't know how" is not a formal email, while a professional style could be, "Dear Dr. Matarazzo, I am confused about how to calculate the equilibrium constant. Can we set up an in-person or online meeting to further discuss this? Thanks, Anusha".

Absences

Absence from a test, or exam must be addressed by academic counseling. Please see your academic advisor if accommodation is required. Documentation will be required for accommodation to be provided. If you are excused from a test, your grade will mostly likely be reweighted towards the final exam. If you are excused from the final exam, you will be required to write the Special Exam or next available final exam. Please see the Brescia policies below.

Late Assignments

Your assignments and lab reports will be deducted 10% per day late, and will not be accepted once the marked assignments/reports have been returned to the other students. If extenuating circumstances arise, please contact me via email. If documentation is requested, you must submit your documentation to your academic counsellor to support your case.

Copyright and Intellectual Property

PowerPoint lecture slides and notes, lists of readings, in-class activities, assignment guidelines, and other components of the course materials are typically the intellectual property of the instructor. Unauthorized reproduction through audio-recording, video-recording, photographing, sharing on

social media, or posting on course-sharing websites is an infringement of copyright and is prohibited. Such action may be considered a Code of Conduct violation and lead to sanctions.

Evaluation

Lab Reports (4 Reports x 3.75 %) = 15 %

Midterm Test 1 (January 31st, 2022) = 15 %

Midterm Test 2 (March 7th, 2022) = 15 %

Learning Reflections (2 Reflections x 2.5 %) = 5 %

CHEM 0012B Assignment = 10 %

Class participation – Classroom and online discussion forums = 10 %

Final Exam (date TBA) = 30 %

You must pass the laboratory portion of the course to pass the course (mark $\geq 7.5 / 15$). All the labs count toward the lab mark. None are 'dropped'.

Lab Reports

It is expected that the data for labs will be the same. However, the analysis, calculations, and conclusions must be completed in each student's own words. Direct copying of your lab report or pre-lab exercise is considered plagiarism and will be followed up according to Brescia University College plagiarism policy.

Please see the Evaluation Breakdown table on the following page for Lab report due dates.

- Experiment #1 – Thermochemistry – Calorimetry and Hess's Law
- Experiment #2 – Kinetics – A Study of Reaction Rates
- Experiment #3 – Examining Equilibrium Systems
- Experiment #4 – Redox Reactions

CHEM 0012B Assignment

The purpose of this assignment is to have you discover how chemistry is integrated into the world around us. A rubric for this assignment with specific evaluation details and dates will be posted on OWL.

Learning Reflection

Following the midterm tests, you will submit a brief reflection on your learning process, study habits, and goals for the course. The purpose of this assignment is for you to identify your strengths and weaknesses in this course, assess yourself on your progress, and discuss any changes you want to implement in order to succeed in the course. You will receive feedback on your reflection to support your success in this course. This reflective process is part of one of the Brescia competencies. This assignment will be submitted through OWL and full marks are awarded for completion.

Tests and Exam

Two midterm tests and one final exam will be given to examine your understanding and application of the course content. The tests and final exam will consist of multiple-choice questions. The tests and final exam will be in-person with a time limit of 1 hour and 3 hours respectively. You are permitted to use a scientific, non-programmable calculator on the tests/exam. A reference sheet with formulas will be provided as needed, and you will be informed of this reference sheet prior to the tests/exam. The content range covered on the test will be announced on the OWL course page a week prior to the test. The final exam will be cumulative.

Evaluation Breakdown:

Component	Weight (%)	Date/Deadline	Learning Outcome	Brescia Competencies
Lab report 1	3.75	February 2 nd /2022	5	Communication, critical thinking, problem solving
CHEM 0012B Assignment	10	March 7 th /2022	3	Communication, critical thinking, inquiry and analysis
Midterm 1	15	January 31 st /2022	1,2	Critical thinking, problem solving
Reflection 1	2.5	February 7 th /2022	4	Self-awareness and development

Lab report 2	3.75	February 16 th /2022	5	Communication, critical thinking, problem solving
Lab report 3	3.75	March 2 nd /2022	5	Communication, critical thinking, problem solving
Midterm 2	15	March 7 th /2022	1,2	Critical thinking, problem solving
Reflection 2	2.5	March 14 th /2022	4	Self-awareness and development
Lab report 4	3.75	March 21 st /2022	5	Communication, critical thinking, problem solving
Classroom and Online discussion forums	10	Ongoing throughout the term	1,2	Communication, problem solving, inquiry and analysis, social awareness and engagement
Final exam	30	TBA	1,2	Critical thinking, problem solving

Suggestions for Success

This is a problem-solving course. Many examples are available for you to follow in the Course Notes. However, it is very difficult to do well in this course without **doing the problems on your own**. There are lots of questions in the Course Notes. The final answers to most of the questions are given in the course notes. However - **do not just look at the answers!** This will not assist you in gaining problem solving skills or assessing your understanding. Begin, progress through, and conclude as many questions as you need to grasp the concept. Consider all the practice problems to be “assigned homework”. This course has a heavy workload and it can be difficult to catch up once you fall behind – so do your best to stay on top of the practice problems!

If you are having trouble with any of the concepts, please ask for help as soon as possible. You can also post questions to the OWL discussion page under the appropriate topic. Students are free to answer these content questions, and I will moderate them as well.

Math skills are quite necessary for this course.

Academic Accommodation

For course components worth less than 10% of the total course grade, documentation is not required. Whenever possible students should provide notification in advance of due dates or absence. If advance notification is not possible, the course instructor should be contacted within two business days.

Course Content

Topic 1: Gases

- Use the Combined Gas Law and the Ideal Gas Law to carry out calculations involving one gas or a mixture of non-reacting gases
- Interpret the behaviour of ideal gases using the Kinetic Molecular Theory
- Identify the forces that account for differences between an ideal and real gas

Topic 2: Thermodynamics

- Calculate the energy changes involved in various processes such as heating, cooling, changes of state and chemical reactions
- Use Hess's Law to determine the enthalpy change for a reaction
- Write formation reactions and use these standard heats of formations to predict the enthalpy change for a new reaction
- Use calorimetry to determine the heat of a reaction
- Describe entropy and Gibb's Free Energy and use these values to predict if a reaction is spontaneous

Topic 3: Kinetics

- Explain the factors affecting the rate of a reaction using Collision theory
- Determine the rate law for a specific reaction given appropriate data and identify the order of that reaction, the intermediates and any catalysts
- Calculate the half life time or concentrations involved in first order reactions
- Interpret and apply the Arrhenius equation to appropriate problems

Topic 4: Chemical Equilibrium

- Determine the equilibrium constant and equilibrium expression based on experimental data
- Predict the direction in which a reaction will proceed using Le Chatelier's Principle and the reaction quotient
- Write the equilibrium expression and calculate the amounts of each species present in an equilibrium using equilibrium constants for situations involving low solubility salts, weak acids, weak bases, salts or buffer solutions
- Identify various titration curves and select an appropriate indicator for a titration
- Identify acids, weak acids, bases, weak bases and salts, including conjugate species, write equilibrium equations for these species, and predict the relative pH for a solution of this substance
- Identify the components and value of a buffer solution, and perform calculations to determine the pH and amounts of components in this solution

Topic 5: Redox Reactions

- Determine the oxidation state of an element
- Interpret a redox reaction by identifying the species being oxidized and reduced
- Balance redox reactions
- Identify and describe the importance of each part of an electrochemical cell and write cell notations
- Predict the spontaneity of a reaction based on its cell potential (given, or calculated)
- Calculate current, time or the amount of product in an electrolytic process using Faraday's Law
- Describe the types and chemical processes in primary and secondary batteries
- Explain the issue and chemical process of corrosion

Laboratories

- Correctly use lab equipment such as burettes, mass balances, and pipettes
- Accurately record pertinent observations while following written instructions in a lab setting
- Use experimental data to complete calculations using the correct number of significant figures
- Compare experimental to theoretical data and make inferences as to why there may be differences
- Identify and use appropriate lab safety equipment and procedures

Weekly Organizer:

Class/Topic	Description	Assignment Due
1	Introduction/Gases	
2	Gases	
3	Gases	
4	Thermodynamics	
5	Thermodynamics	Midterm 1, Lab Report 1
6	Thermodynamics	Reflection 1
7	Kinetics	Lab Report 2
8	Reading Week	
9	Kinetics	Lab report 3
10	Chemical Equilibrium	Midterm 2, CHEM 0012B Assignment
11	Chemical Equilibrium	Reflection 2
12	Redox Reactions	Lab report 4
13	Redox Reactions	

2021-22 BRESCIA UNIVERSITY COLLEGE ACADEMIC POLICIES AND REGULATIONS

1. POLICY REGARDING ACADEMIC ACCOMMODATION

The complete policy regarding [Accommodation for Illness - Undergraduate Students](https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12) can be found at https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12.

Students who have long-term or chronic medical conditions which may impede their ability to complete academic responsibilities should seek Academic Accommodation through Student Accessibility Services (https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10).

Personal commitments (e.g., vacation flight bookings, work schedule) which conflict with a scheduled test, exam or course requirement are **not** grounds for academic accommodation.

Students who experience an illness or extenuating circumstance sufficiently severe to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

1. Submitting a **Self-Reported Absence** form provided that the conditions for submission are met;
2. For medical absences, submitting a **Student Medical Certificate (SMC)** signed by a licensed medical or mental health practitioner;
3. For non-medical absences, submitting **appropriate documentation** (e.g., obituary, police report, accident report, court order, etc.) to their Academic Advisor. Students are encouraged to contact their Academic Advisor to clarify what documentation is acceptable.

Requests for Academic Consideration Using the Self-Reported Absence Portal

Students who experience an unexpected illness or injury or an extenuating circumstance of 48 hours or less that is sufficiently severe to render them unable to meet academic requirements should self-declare using the online Self-Reported Absence portal. This option should be used in situations where the student expects to resume academic responsibilities within 48 hours. Note that the excused absence includes all courses and academic requirements within the up to 48 hours, it is not intended to provide an excused absence from a single course while students fulfill their academic responsibilities in other courses during that time.

The following conditions are in place for self-reporting of medical or extenuating circumstances:

1. Students will be allowed **a maximum of two self-reported absences** between September and April and one self-reported absence between May and August;
2. The duration of the absence will be for a maximum of 48 hours from the time the Self-Reported Absence form is completed through the online portal, or from 8:30 am the following morning if the form is submitted after 4:30 pm;
3. The excused absence will terminate prior to the end of the 48 hour period if the student undertakes significant academic responsibilities (writes a test, submits a paper) during that time;
4. Self-reported absences will **not** be allowed for scheduled final examinations; midterm examinations scheduled during the December examination period; or for final lab examinations scheduled during the final week of term;
5. Self-report absences may **not** be used for assessments worth more than 30% of any course;
6. Any absences in excess of 48 hours will require students to present a Student Medical Certificate (SMC), or appropriate documentation;
7. Students **must** communicate with their instructors **no later than 24 hours after the end of the period covered by the Self-Reported Absence form** to clarify how they will fulfil the academic expectations they may have missed during the absence.

Request for Academic Consideration for a Medical Absence

When a student requests academic accommodation (e.g., extension of a deadline, a makeup exam) for work representing 10% or more of the student's overall grade in the course, it is the responsibility of the student to provide acceptable documentation to support a medical or compassionate claim. All such requests for academic accommodation **must** be made through an Academic Advisor and include supporting documentation.

Academic accommodation for illness will be granted only if the documentation indicates that the onset, duration and severity of the illness are such that the student could not reasonably be expected to complete their academic responsibilities. Minor ailments typically treated by over-the-counter medications will not normally be accommodated.

The following conditions apply for students seeking academic accommodation on medical grounds:

1. Students must submit their Student Medical Certificate (SMC) along with a request for relief specifying the nature of the accommodation being requested no later than two business days after the date specified for resuming responsibilities. An SMC can be downloaded from http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf ;

2. In cases where there might be an extended absence or serious issue, students should submit their documentation promptly and consult their Academic Advisor for advice during their recovery period;
3. Whenever possible, students who require academic accommodation should provide notification and documentation in advance of due dates, scheduled tests or examinations, and other academic requirements;
4. Students **must** communicate with their instructors **no later than 24 hours** after the end of the period covered by the SMC to clarify how they will fulfil the academic expectations they may have missed during the absence;
5. Appropriate academic accommodation will be determined by the Dean's Office/Academic Advisor in consultation with the course instructor(s). Academic accommodation may include extension of deadlines, waiver of attendance requirements, arranging Special Exams (make-ups), re-weighting course requirements, or granting late withdrawal without academic penalty.

The [full policy on requesting accommodation due to illness](#) can be viewed at:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12

2. ACADEMIC CONCERNS

If you feel that you have a medical or personal challenge that is interfering with your work, contact your instructor and Academic Advisor as soon as possible. Problems may then be documented and possible arrangements to assist you can be discussed at the time of occurrence rather than on a retroactive basis. Retroactive requests for academic accommodation on medical or compassionate grounds are not normally considered.

If you think that you are too far behind to catch up or that your work load is not manageable, you should consult your Academic Advisor (https://www.brescia.uwo.ca/enrolment_services/academic_advising/index.php). If you consider reducing your workload by dropping one or more courses, this must be done by the appropriate deadlines; please refer to <http://brescia.uwo.ca/academics/registrar-services/> or the list of official sessional dates in the Academic Calendar (<http://www.westerncalendar.uwo.ca/SessionalDates.cfm?SelectedCalendar=Live&ArchiveID=>).

You should consult with the course instructor and the Academic Advisor who can help you consider alternatives to dropping one or more courses. *Note that dropping a course may affect OSAP eligibility and/or Entrance Scholarship eligibility.*

3. ABSENCES

Short Absences: If you miss a class due to a minor illness or other problems, check your course outline for information regarding attendance requirements and make sure you are not missing a test or assignment. Cover any readings and arrange to borrow notes from a classmate. Contact the course instructor if you have any questions.

Please note that for asynchronous online courses, attendance or participation requirements maybe different than for synchronous or in-person courses.

Extended Absences: If you have an extended absence, you should contact the course instructor and an Academic Advisor. Your course instructor and Academic Advisor can discuss ways for you to catch up on missed work, and arrange academic accommodations if appropriate and warranted.

It is important to note that the Academic Dean may refuse permission to write the final examination in a course if the student has failed to maintain satisfactory academic standing throughout the year or for too frequent absence from the class or laboratory

(http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_68).

4. SCHOLASTIC OFFENCES

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence at:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20.

Students are responsible for understanding the nature of and avoiding the occurrence of plagiarism and other academic offences. Note that such offences include plagiarism, cheating on an examination, submitting false or fraudulent assignments or credentials, impersonating a candidate, or submitting for credit in any course without the knowledge and approval of the instructor to whom it is submitted, any academic work for which credit has previously been obtained or is being sought in another course in the University or elsewhere. Students are advised to consult the section on Scholastic Discipline for Undergraduate Students in the Academic Calendar.

If you are in doubt about whether what you are doing is inappropriate or not, consult your instructor, the Academic Dean's Office, or the Registrar. A claim that "you didn't know it was wrong" is not accepted as an excuse.

The penalties for a student guilty of a scholastic offence (including plagiarism) include refusal of a passing grade in the assignment, refusal of a passing grade in the course, suspension from the University, and expulsion from the University.

Plagiarism:

Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked Tests/exams:

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. Software currently in use to score computer-marked multiple-choice tests and exams performs a similarity review as part of standard exam analysis.

5. PROCEDURES FOR APPEALING ACADEMIC EVALUATIONS

All appeals of a grade must be directed first to the course instructor. If the student is not satisfied with the decision of the course instructor, a written appeal is to be sent to the School Chair. If the response of the Chair is considered unsatisfactory to the student, they may then submit a written appeal to the Office of the Dean. If the student is not satisfied with the decision of the Dean, they may appeal to the Senate Review Board Academic (SRBA), if there are sufficient grounds for the appeal and if the matter falls within the jurisdiction of the SRBA. For information on academic appeals consult your Academic Advisor or see the Student Academic Appeals – Undergraduate in the Academic Calendar

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_14.

Note that final course marks are not official until the Academic Dean has reviewed and signed the final grade report for the course. If course marks deviate from acceptable and appropriate standards, the Academic Dean may require grades to be adjusted to align them with accepted grading practices.

6. PREREQUISITES

Unless you have either the prerequisites for a course or written Special Permission from the Dean to enroll in it, you will be removed from the 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 prerequisite(s).

7. SUPPORT

Support Services

The Brescia University College Registrar's website, with a link to Academic Advisors, is at <http://brescia.uwo.ca/academics/registrar-services/> . Students can access supports through Brescia's Student Life Centre (<http://brescia.uwo.ca/life/student-life/>) and Learning Skills Services at Western (<https://www.uwo.ca/sdc/learning/>)

Mental Health and Wellness

Students may experience a range of issues that can cause barriers to your learning, such as increased anxiety, feeling overwhelmed, feeling down or lost, difficulty concentrating and/or lack of motivation. Services are available to assist you with addressing these and other concerns you may be experiencing. You can obtain information about how to obtain help for yourself or others through **Health & Wellness at Brescia** (https://brescia.uwo.ca/student_life/health_and_wellness/index.php) and **Health and Wellness at Western**, http://uwo.ca/health/mental_wellbeing/index.html.

Sexual Violence

All members of the Brescia University College community have a right to work and study in an environment that is free from any form of sexual violence. Brescia University College recognizes that the prevention of, and response to, Sexual Violence is of particular importance in the university environment. Sexual Violence is strictly prohibited and unacceptable and will not be tolerated. Brescia is committed to preventing Sexual Violence and creating a safe space for anyone in the Brescia community who has experienced Sexual Violence.

If you or someone you know has experienced any form of Sexual Violence, you may access resources at https://brescia.uwo.ca/safe_campus/sexual_violence/index.php .

Portions of this document were taken from the Academic Calendar, the Handbook of Academic and Scholarship Policy, and the Academic Handbook of Senate Regulations. This document is a summary of relevant regulations and does not supersede the academic policies and regulations of the Senate of the University of Western Ontario.
