



School of Science

CHEM 111

Chemistry 111 – Chemical Energetics and Dynamics

Term: Winter 2023 (202202)

Number of Credits: 3

Course Outline

INSTRUCTOR: Kailey Wright

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OFFICE LOCATION: A2410

COURSE DESCRIPTION

This course is a continuation of the study of the fundamental principles of chemistry with an emphasis physical chemistry. Topics of study include chemical equilibrium, acid/base chemistry, chemical kinetics, nuclear chemistry, thermodynamics, and electrochemistry. The course also includes some descriptive chemistry of a selection of main group elements and transition metals. The mandatory laboratory component of the course will illustrate and reinforce most topics presented in the lectures.

Successful completion of this course and its companion CHEM 110 will satisfy the requirement for 6 credits of first year chemistry in the science and engineering degree programs at most Canadian and US universities.

COURSE REQUIREMENTS

Prerequisite(s): Chemistry 110, or permission of the instructor.

Students are expected to come to this course with an understanding of the topics covered in Chemistry 110 as many of these basic concepts will serve as the foundation for this course.

EQUIVALENCY OR TRANSFERABILITY

UBC	With CHEM 110 = CHEM 111 (4) + CHEM 123 (4)
UBCO	With CHEM 110 = CHEM 111 (3) + CHEM 113 (3)
UVIC	With CHEM 110 = CHEM 101 (1.5 units) + CHEM 102 (1.5 units)
UNBC	CHEM 101 (3) + CHEM 121 (1)
SFU	CHEM 122 (2) – Q + CHEM 126 (1) - Q
TRU	CHEM 1200 (3)

Receiving institutions determine course transferability. Find further information at:

<https://www.yukonu.ca/admissions/transfer-credit>

LEARNING OUTCOMES

Upon successful completion of the course, students will:

- have further developed their critical thinking skills
- be able to discuss chemical concepts, theories, and examples of fundamental chemistry
- have developed basic hands-on laboratory skills in experimental investigation of chemical questions

COURSE FORMAT

Weekly breakdown of instructional hours

Lectures: 3 hours. Tutorials: 1 hour (incorporated into the lecture times). Labs: 3 hours. It is expected that this course will require 3-5 hours of homework, studying, report writing, and additional reading outside of these times. It is important to note that the time required will vary substantially by individual.

Delivery format

Lectures and Tutorial: This portion of the course will be delivered **in person** during the scheduled time. Material is regularly posted on Moodle, the course LMS. This material will include problem sets, course announcements, links to content in the (free) online textbook, suggested practice problems, and other online resources or interesting material related to the course. Partial notes will be made available in advance of the lessons, and it is expected that students come to class prepared with any questions they may have about the material to be covered. If a student misses class they are expected to contact the instructor or their colleagues with questions about any material they have missed.

Laboratory: Three hours per week of face-to-face instruction, delivered in the Chemistry lab at Ayamdigut campus (A2803). Students will be expected to hand in a report after each laboratory session. More details are available in the Laboratory Manual, which will be provided at your first session.

EVALUATION

Problem Sets	15%
Test 1	15%
Test 2	15%
Final Exam	25%
Laboratory Work	30%
Total	100%

Students must receive a pass (50%) in BOTH the lecture and laboratory components in order to receive a pass in the course. Additionally, students must have attended, completed, and graded at least 75% of the laboratory work, regardless of circumstance. This ensures that a passing mark also reflects a competency on the bulk of the course material.

Problem Sets: There will be 10 problem sets due on an approximately weekly basis. The best 8 out of 10 assignments will count toward the final grade. Problem Sets will involve a variety of questions or problems related to the course material. You will have at least one week to complete each assignment. Late problem sets will not be accepted under any circumstances (receiving a mark of 0).

Tests and Examinations: There will be two 60-minute term tests held during scheduled class time. Each test is worth 15% of the final grade. The final exam, worth 25% of the final grade, will take place during the University's exam period. The final format, date, and venue will be announced as soon as it is known.

Laboratory Component: - As a whole, the laboratory component is worth 30% of the final grade. This will be based on lab performance (10%), pre-lab questions (10%), and lab reports (80%). The specific evaluation criteria for the lab are detailed in the lab manual. Laboratory Reports handed in late will be assessed a penalty of 10% per day.

COURSE WITHDRAWAL INFORMATION

Refer to the YukonU website for important dates. <https://www.yukonu.ca/admissions/important-dates>

TEXTBOOKS & LEARNING MATERIALS

As a step to making education more affordable, we will be using LibreText Textbooks. Some copies of traditional textbooks will be placed on reserve in the library. All other resources on Moodle are provided digitally under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License and can be printed as you see fit. You will need access to a computer or other suitable device, as internet access is required for this course.

The Laboratory Manual for Chemistry 111 will be provided. You will need to provide your own notebook for use as a Lab Notebook. This must be a separate notebook, not the one you are using for course notes. You may continue to use the laboratory notebook that you started in Chemistry 110.

Students will need to provide their own safety glasses. These MUST be clear (not tinted) and ANSI Z87.1 (or later) or CAS 94.1 (or later) certified; this information will be on the packaging. These are the same kind of safety glasses required in the Trades and can be purchased wherever such safety equipment is sold. Laboratory coats are mandatory, and students can purchase these online ahead of time, or from the campus bookstore.

ACADEMIC INTEGRITY

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to Academic Regulations & Procedures for further details about academic standing and student rights and responsibilities.

ACCESSIBILITY AND ACADEMIC ACCOMMODATION

Yukon University is committed to providing a positive, supportive, and barrier-free academic environment for all its students. Students experiencing barriers to full participation due to a visible or hidden disability (including hearing, vision, mobility, learning disability, mental health, chronic or temporary medical condition), should contact [Accessibility Services](#) for resources or to arrange academic accommodations: access@yukonu.ca.

TOPIC OUTLINE (specific dates of topic coverage are subject to change)

Week	Unit	Topic
1	1	Chemical Equilibria – equilibrium condition, equilibrium constant, applications, Le Chatelier's Principle
2, 3	2	Acid-Base Equilibria – definitions, strength, pH, polyprotic acids, ionic acids and bases, Lewis acids and bases
3 – 5	3	Applications of Aqueous Equilibria – buffers, titrations and pH curves, solubility, complexation
6	4	Chemical Kinetics – rates, rate laws, reaction mechanism, catalysis
7, 8	5	Thermochemistry – energy, thermodynamics, enthalpy, Hess' Law enthalpies, energy sources. Bond energy. Phase changes.
9, 10	6	Spontaneity, Entropy and Free Energy – spontaneous processes, 2 nd law of thermodynamics, entropy changes in reaction, free energy and reactions. Thermodynamics and equilibrium
11, 12	7	Electron-transfer Reactions – balancing redox reactions, galvanic cells, standard reduction potentials, cell potential, applications
12, 13	8	Descriptive main group chemistry

**Specific dates of topic coverage may be subject to change. Some topics may not be covered depending on time constraints.*