



COURSE OUTLINE

CHEM 110 THE STRUCTURE OF MATTER

3 CREDITS

PREPARED BY: Kailey Wright, Instructor, Chemistry

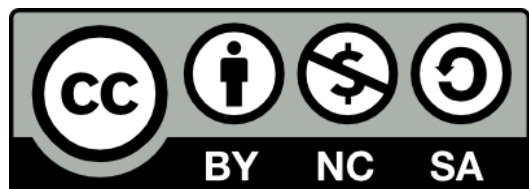
DATE: August 25, 2020

APPROVED BY: Joel Cubley, Chair, School of Science

DATE: August 26, 2020

APPROVED BY SENATE: Click or tap to enter a date

RENEWED BY SENATE: Click or tap to enter a date



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THE STRUCTURE OF MATTER

INSTRUCTOR: Kailey Wright

OFFICE LOCATION: A2410

E-MAIL: kwright@yukonu.ca

OFFICE HOURS: Wednesday 11a -12p

CLASSROOM: Online

TIME: Primarily Asynchronous

COURSE DESCRIPTION

This course covers both the common practical aspects of chemistry as well as the theoretical principles that describe this science. Topics of study include the structure of the atom, electron configuration, the nature of chemical bonding and a look at liquids, solids and gases at a molecular level. Other topics of study include reaction stoichiometry and an introduction to organic chemistry and biochemistry. Lab sessions illustrate and reinforce most of the topics presented in the lectures.

PREREQUISITES

Chemistry 11 (CHEM 050). Chemistry 12 (CHEM 060) is strongly recommended. Mathematics 12 (MATH 060) is co-requisite.

Students are expected to come to this course with an understanding of basic nomenclature (chemical naming and formula writing), stoichiometry (equation balancing and chemical calculations) and simple atomic structure. This material will be briefly reviewed during the first week of class. If you feel a bit rusty on these subjects you are strongly advised to see the instructor prior to the start of the course.

RELATED COURSE REQUIREMENTS

This course is being offered as a primarily asynchronous online course with a face-to-face lab component. This course will necessitate access to a computer with internet access and some word processing software (can be open source or otherwise).

EQUIVALENCY OR TRANSFERABILITY

Yukon University CHEM 110(3):

SFU Chem 121 (3) – Q/B-Sci

UAS Chem 105 (3)

UNBC Chem 100(3) + Chem 120(1)

UAF Chem 105X (3)

URegina Chem 102 (3)

TRU Chem 1100 (3)

Yukon University CHEM 110(3) + CHEM 111(3):

UVic Chem 101 (1.5 units) + Chem 102 (1.5 units)

UBC Chem 111(4) + Chem 123 (4)

LEARNING OUTCOMES

Upon successful completion of this course, students will:

- have developed critical thinking skills.
- be able to understand and apply fundamental chemistry concepts.
- have developed basic laboratory skills.

COURSE FORMAT

Lectures: Three hours per week, available online using the Zoom platform.

Labs: Three hours per week of face-to-face instruction, delivered in the Chemistry lab at Ayamdigut campus (A2803). Social distancing measures will be in place as well as other standard University COVID-19 precautions.

Tutorials: One hour per week, incorporated into the lecture times.

ASSESSMENTS:

Attendance and Participation – This will be purely for the lecture portion of the course and will require your continued participation (and completion) in the weekly activities on Moodle. If you keep up with your coursework this 5% of your grade will be free!

Assignments - There will be 10 assignments due on an approximately weekly basis. The best 8 out of 10 assignments will count toward the final grade. Assignments 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 assignments 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 lab time. Each test is worth 15% of the final grade. The final exam, worth 20% of the final

grade, will take place in December. 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%), lab quizzes (5%), and lab reports (75%). The specific evaluation criteria for the lab are detailed in the lab manual.

EVALUATION:

Assignments	15%
Test 1	15%
Test 2	15%
Participation	5%
Final Exam	20%
Laboratory Work	30%
Total	100%

REQUIRED TEXTBOOKS AND MATERIAL

As a step to making education more affordable, we will be using LibreText and BC Open Textbooks as our 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.

The Laboratory Manual for Chemistry 110 will be provided. You will need to provide your own notebook for use as a Lab Notebook (more information will be provided in the first lab session).

ACADEMIC AND STUDENT CONDUCT

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/ Admissions & Registration web page.

PLAGIARISM

Plagiarism is a serious academic offence. Plagiarism occurs when a student submits work for credit that includes the words, ideas, or data of others, without citing the source from which the material is taken. Plagiarism can be the deliberate use of a whole piece of work, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.). Students may use sources which are public domain or licensed under Creative Commons; however, academic documentation standards must still be followed. Except with explicit permission of the instructor, resubmitting work which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the University.

YUKON FIRST NATIONS CORE COMPETENCY

Yukon University recognizes that a greater understanding and awareness of Yukon First Nations history, culture and journey towards self-determination will help to build positive relationships among all Yukon citizens. As a result, to graduate from ANY Yukon University program, you will be required to achieve core competency in knowledge of Yukon First Nations. For details, please see www.yukonu.ca/yfnccr.

ACADEMIC ACCOMMODATION

Reasonable accommodations are available for students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon University Academic Regulations (available on the Yukon University website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, they should contact the Learning Assistance Centre (LAC): lac@yukonu.ca.

TOPIC OUTLINE

Week	Unit	Topic
1 2	1	Fundamental Concepts (Review) - Atoms, molecules, compounds, empirical formulas - Measurements, moles, solution concentration and dilution - Chemical equations, stoichiometry, yields
2 3	2	Atoms and Light - Absorption and emission spectra - Properties of electrons, quantization and quantum numbers - Shapes of atomic orbitals
4	3	Atomic Energies and Periodicity - Electron configurations - Periodicity of atomic properties - Ions and ionic compounds
4 5	4	Fundamentals of Chemical Bonding - Bond length, electron sharing, polarity - Lewis structures and molecular shapes - Covalent bond properties
6	5	Theories of Chemical Bonding - Localized models, hybridized orbitals, multiple bonds - Molecular orbital theory - Resonance, delocalized π systems
7 8	6	Organic Chemistry Structures - hydrocarbon structures, nomenclature, stereochemistry
8 9	7	Organic Chemistry Reactions - nucleophiles, electrophiles, mechanisms - substitution reactions - elimination reactions - addition reactions
10 11	8	Behaviour of Gases - Ideal gas law, gas mixtures, stoichiometry - Molecular view of gases - Molar mass determination, gas density, rates of movement - Real gases

12 13	9 10	Band Theory of Solids Intermolecular Forces - melting and boiling points - types of forces - properties of liquids
13 14	11	Properties of Solutions - solubility - colligative properties - colloids, suspensions, surfactants

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