



Faculty of Science, Department of Chemistry CHEM 0900: PREPARATORY CHEMISTRY

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Course Syllabus

COURSE DESCRIPTION

The University of Manitoba Undergraduate Calendar describes this course as follows:

The Preparatory Chemistry (CHEM 0900, 0.000 credit hours) course is designed for students with little or no background in chemistry who wish to achieve the prerequisites for advanced courses, or for students who require a refresher course in basic chemistry. Concurrent registration in CHEM 0900 and any of CHEM 1300, CHEM 1301, CHEM 1311 or CHEM 1320 is not permitted. **(Pass/Fail grade only.)** Prerequisite or Concurrent Requirement: Any grade 12 or 40S Mathematics course or the equivalent.

It is your responsibility as a student to ensure that you are entitled to be registered in this course.

The course is also useful for those who are not going to specialize in chemistry because it offers information that can be helpful in becoming a knowledgeable individual and learning about substances that comprise our environment.

The course focuses on thorough and meaningful understanding of a few basic concepts at the expense of rapid treatment of many subject areas; on development of important reasoning skills, and on acquiring a positive initial impression of chemistry.

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COURSE OBJECTIVES

Upon completion of this course, you should be able to:

- Explain why the study of chemistry is important
- Define the scientific approach to problem solving
- Describe the characteristics and explain the concept of matter
- Differentiate between a pure substance and a homogeneous or a heterogeneous mixture
- Express numbers in scientific notation and explain the role and use of significant figures
- Name the standard units of measurement and solve problems involving density and unit conversions
- Convert measurements between the temperature scales
- Use the Periodic table of the elements
- Recognize physical or chemical change in a substance
- Use the language of chemistry, i.e., nomenclature
- Apply the main concepts of chemistry—the mole, molar mass, and Avogadro's number—to solve problems
- Interpret, write, and balance chemical equations

- Classify chemical reactions according to their types
- Perform stoichiometry calculations from chemical equations
- Explain the properties of gases and apply selected gas laws for problem solving
- Solve problems involving molarity, dilution, mass and volume percentages
- Name acids and bases and describe their reactions
- Explain the properties of electrolytes and nonelectrolytes, write net ionic equations
- Balance equations for ionic oxidation-reduction reactions and recognize oxidizing and reducing agents

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COURSE MATERIAL

Mandatory:

- A customized textbook containing selected chapters from *Foundation of College Chemistry* by Morris Hein, Susan Arena, 14th edition, John Wileys & Sons.
- Registration Code for Sapling Learning (Canada) online assignment system.
- **Calculator:** A non-programmable, scientific calculator is **required**.

Optional:

Additional Math Help: Jeffrey R. Appling and Jean C. Richardson; *Math: Survival Guide, Tips and Tricks for Science Students*, 2nd Edition; John Wiley and Sons, 2004; ISBN 0-471-27054-7; available at the U of M Bookstore.

The required materials are available for purchase from the University of Manitoba Bookstore. Order the material immediately if you have not already done so. See your *Distance and Online Education Student Handbook* for instructions on how to make an order.

Websites:

Online assignments will be performed through the Sapling Learning website, Canada:

- There are ten assignments, all having equal weight. See the course schedule for due dates in.
- No extensions or make-up possibilities will be given for any assignment. Special cases may be considered only for documented medical or compassion reasons.

Textbook Companion Website

<http://ca.wiley.com/WileyCDA/WileyTitle/productCd-EHEP002532.html>

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SETTING UP YOUR COMPUTER

ADOBE ACROBAT

To view or print a document in PDF format, you need a PDF viewer (Adobe Acrobat). If you have not already done so, you can download the [Adobe Acrobat Reader](#) for free.

NOTE: For printing, your printer driver needs to be configured for printing to a PostScript Level 1 printer.

Windows: Select "Level 1" in the PostScript options section of the Acrobat Exchange or Reader print dialog.

Macintosh: In the Chooser, select your printer driver. Then select your printer and click the Setup button. Follow any on-screen dialogs that may appear.

Sapling Learning (Canada) Online Assignment System:

Specific instructions for the setup of (and your registration to) your CHEM 0900 Sapling Learning account are provided on the course website through the "Assignments" section. **We strongly recommend that you install and test all required software immediately.** If you encounter difficulties installing your software, contact de_support@umanitoba.ca.

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COURSE CONTENT

The course contains 13 units. Each unit will be accompanied by detailed instructions identical to the kind that a lecturer gives in class. The lecture notes are also provided.

The overview of the topics is provided in the following table:

TOPICS	UNIT
<p>An Introduction to Chemistry</p> <hr/> <p>The Scope of Chemistry. The Scientific Method. The particulate nature of matter. Classifying matter.</p>	1
<p>Standards for Measurements</p> <hr/> <p>Mass and Weight. Measurement and Significant Figures. Rounding off Numbers. Scientific Notation of Numbers. Significant Figures in Calculations. The Metric System. Measurement of: Mass, Volume, Temperature, Density. Units Conversion. Accuracy and Precision.</p>	2
<p>Elements and Compounds</p> <hr/> <p>Names and symbols of the Elements. Periodic Table, Introduction: Elements, Symbols of Elements. Metals, Nonmetals, Metalloids. Compounds. Chemical Formulas.</p>	3
<p>Properties of Matter</p> <hr/> <p>Physical Changes. Chemical Changes. Conservation of Mass.</p>	4
<p>Early Atomic Theory and Structure</p> <hr/> <p>Composition of Compounds. The Nature of Electric Charge. Ions. Subatomic Parts of the Atoms. Atomic Numbers of the Elements. Isotopes of the Elements. Atomic Mass.</p>	5
<p>Nomenclature of Inorganic Compounds</p> <hr/> <p>Common and Systematic Names. Elements and Ions. Binary Compounds. Naming Compounds Containing Polyatomic Ions. Writing Formulas from Names of Compounds and Vice Versa. Naming Acids and Bases.</p>	6
<p>Quantitative Composition of Compounds</p> <hr/> <p>The Mole. Molar Mass of Compounds. Percent Composition of Compounds. Empirical Formula versus Molecular Formula. Calculating Empirical Formulas. Calculating the Molecular Formulas from the Empirical Formulas.</p>	7
<p>Chemical Equations</p> <hr/> <p>Writing and Balancing Equations. What Information Does an Equation Tell us? Types of Chemical Reactions.</p>	8
<p>Calculations from Chemical Equations</p> <hr/> <p>Mole-Mole, Mole-Mass calculations. Limiting reactant and yield calculations.</p>	9
<p>The Gaseous State of Matter</p> <hr/> <p>Properties of Gases. Boyle's, Charles', Avogadro's, Combined and Ideal Gas Laws.</p>	10
<p>Concentration of Solution</p> <hr/> <p>Concentration, Molar Concentration. Mass/Volume % Concentration. Solving problems.</p>	11

Acids, Bases and Salts	12
Reactions of Acids and Bases. Electrolytes and Nonelectrolytes. Dissociation and Ionization of Electrolytes. Strong and Weak Electrolytes. Ionization of Water. Introduction to pH.	
Oxidation-Reduction	13
Oxidation Number. Balancing Ionic Redox Equations in Acidic and Basic Solutions.	

You are strongly encouraged to follow the suggested order, since each unit serves as the foundation for the following one.

Special Needs

We encourage students with disability-related special needs to participate in our programs. If you are experiencing difficulties with your studies or assignments, or have a disability or illness which may affect your course of study, please discuss these issues with a counselor in one of the following Student Affairs offices as soon as possible:

- **Student Accessibility Services**, 155 University Center, 474-6213 (voice), 474-9790.
- **Learning Assistance Center**, 201 Tier Building, 480-1481.
- **Student Counselling and Career Centre**, 474 University Center, 474-8592.

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GRADING

Your levels of knowledge will be evaluated via the assignments, the online tests, and the final examination. The following **Marking Scheme** explains how marks will be distributed to calculate the *final* grade.

Grading	%
Ten assignments	12%
Midterm Exam	32%
Final exam	56%

Assignments

All students are required to complete all assignments.

Midterm Exam Instructions

Students residing in Winnipeg or nearby are required to come to the Fort Garry Campus to write the midterm examination. The midterm will be an invigilated exam. Please see the course website and Instructor Letter for more information. The date, time and location of the midterm will be posted on the course website.

Students Living Outside of Winnipeg

If you reside outside of Winnipeg and are unable to come to the campus, you will be required to take your midterm examination using a Virtual Proctoring Service. The online midterm examination will be posted on the course website. You will need a high speed internet, a webcam, a scanner, a printer, and a headset with a microphone for the midterm exam.

Detailed instructions on how to use the Virtual Proctoring System can be found under the Assignment Section

Date and Duration of the Midterm – See the Course Website

Final Examination

The final exam lasting a total of three hours will be conducted at the University of Manitoba, Fort Garry campus or at an alternate location off-campus. **All students must declare an exam location.** The Registrar's Office is responsible for scheduling the final exam. Once finalized, the exam date and time information will be posted on the University of Manitoba Exam site. You will need to bring pens, a calculator, and student I.D. to the final examination.

Students with legitimate reasons may apply to the Dean of their faculty for an examination deferral. Students without a deferral, and who do not write the final examination, will be given a grade of **F NP**. The proposed date/time for **CHEM 0900 Deferred Examination** is TBA. If you have a University class or laboratory scheduled for this time, see the course coordinator, Dr.

E.Smirnova, to make the alternate arrangements for the deferred examination.

Final Grade

The final grade is either **PASS** or **FAIL**. A Passing Final Mark **MUST** be 70% or higher. In the event that a failing grade is obtained, **NO other means** (e.g., writing an essay) will be accepted to make a student pass the course.

Review of Final Exam Script: The Faculty of Science has established a policy to offer students the opportunity to review their final exam script prior to the end of the Grade Appeal period. Application forms are available on the Chemistry Department website.

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ACADEMIC INTEGRITY POLICIES

Plagiarism

Copying another student's examination, laboratory reports, or assignments, or an instructor's answer sheet from a previous year is plagiarism. Plagiarism and other forms of cheating are prohibited. The full definition of plagiarism and the possible penalties associated with it are outlined in the General Calendar of the University. If you quote other sources of information in a laboratory report or other assignment, you must give proper credit.

Cheating

The possession of unauthorized materials during an examination, including "crib notes" (whether hand-written or contained within a computer/calculator), is considered cheating and subject to action by the Student Disciplinary By-Law. Only calculators are permitted in an examination – no texts, notes, dictionaries, etc. Students found with cell phones, pagers, text in their calculators or other unauthorized material during a chemistry examination will be given a grade of zero (0) on that examination.

Faculty of Science Statement on Academic Dishonesty

The Faculty of Science and The University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations, laboratory reports or assignments as serious offences and may assess a variety of penalties depending on the nature of the offence. Acts of academic dishonesty include, but are not limited to, bringing unauthorized materials into a test or exam, copying from another individual, using answers provided by tutors, plagiarism, and examination impersonation. **Cell phones, pagers, PDAs, MP3 units or electronic translators are explicitly listed as unauthorized materials, and must not be present during tests or examinations.**

Penalties that may apply, as provided for under the University of Manitoba's Student Discipline By-Law, range from a grade of zero for the assignment or examination, failure in the course, to expulsion from the University. The Student Discipline By-Law may be accessed at:

http://umanitoba.ca/faculties/science/resources/Science_StatementOnAcademicDishonesty2013.pdf

Suggested minimum penalties assessed by the Faculty of Science for acts of academic dishonesty are available on the Faculty of Science Academic Dishonesty Guidelines and Penalties web-page:

http://umanitoba.ca/faculties/science/resources/Acad_Dishon_TABLE_RevCSS_AdminC_Jul2012_WEB.pdf

All Faculty members (and their teaching assistants) have been instructed to be vigilant and report all incidents of academic dishonesty to the Head of the Department.

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DISTANCE AND ONLINE EDUCATION (DE) STUDENT RESOURCES

In your course website there are links for the following:

- Contact Distance and Online Education Staff
- Distance and Online Student Handbook
- Distance and Online Education Website

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ACKNOWLEDGEMENTS

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The University of Manitoba	
<p>Dr. Elena Smirnova earned her Ph.D. at the Moscow State University (MSU), a premier university in Russia. She subsequently taught Analytical Chemistry and Instrumental Methods courses for students at the Faculties of Chemistry, Medicine, Biology, Geology, and Soil Science at the same university.</p> <p>Dr. Smirnova also performed research in the fields of Kinetic Methods of Analysis (MSU) and Clinical Pharmacology (the State Cardiology Centre, Moscow). Dr. Smirnova joined the Chemistry Department at the University of Manitoba in the summer of 1998. Her primary focus is teaching first- and second-year courses and supervising the laboratories for the second-year courses.</p> <p>Dr. Smirnova received numerous teaching awards, the most prestigious of which is the Olive Beatrice Stanton Award for Teaching Excellence (Summer 2010).</p>	
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University of Manitoba, Distance and Online Education

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