UNIVERSITY of GUELPH

College of Engineering and Physical Sciences

Department of Chemistry

CHEM*1040 General Chemistry I

Fall 2021 Student Course Information

*The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this g*athering place is home to many First Nations, Inuit, and Métis peoples and a*cknowledging them reminds us of our important connection to this land where we work and learn.*

Calendar Description: CHEM*1040 General Chemistry I offered Fall & Winter [Credit Wt. = 0.50]
This course introduces concepts of chemistry, the central link between the physical and biological sciences. Principles discussed include chemical bonding, simple reactions and stoichiometry, chemical and solution equilibria (acids, bases, and buffers), and introductory organic chemistry.

Prerequisite(s): 4U Chemistry, (or equivalent grade 12 chemistry) or CHEM*1060

Note: It is a student's responsibility to ensure they have completed the prerequisite and have the necessary experience and background to be successful in this course.

Course Coordinator: Prof. Lori Jones (lojones@uoguelph.ca)

Instructors: Prof. France-Isabelle Auzanneau (fauzanne@uoguelph.ca)
Dr. Rob Reed (rwreed@uoguelph.ca)
Prof. Adrian Schwan (schwan@uoguelph.ca)

Zoom Meetings: Sections 0101 – 0108, 0125, 0126, 0131 & 0134 = MWF 13:30 – 14:20 (A. Schwan)
Sections 0209 – 0216, 0227, 0228, 0232 & 0235 = MWF 11:30 – 12:20 (F.-I. Auzanneau)
Sections 0317 – 0324, 0329, 0330, 0333 & 0336 = TTh 13:00 – 14:20 (R. Reed)

A list of Teaching Assistants (TAs) assigned to specific laboratory sections, and their contact information, is provided on the CourseLink CHEM*1040 course and lab sites.

A. CHEM*1040 LEARNING OUTCOMES

On successful completion of this course, students should be able to:

1. Demonstrate knowledge and understanding of atomic structure, periodic trends, Lewis structures, VSEPR and bonding.
2. Understand and apply the concepts of chemical equilibrium, especially in associating with acids, bases, salts, buffers, and titration curves.
3. Solve quantitative problems (stoichiometric) involving chemical formulas and equations which include solids, liquids, solutions, or gases.
4. Demonstrate knowledge and understanding of physical and chemical aspects of organic molecules and their reactions.
5. Perform laboratory experiments demonstrating safe and proper use of standard chemical glassware and equipment.
6. Record, graph, chart and interpret data obtained from experiments through working co-operatively with others or independently.

B. COURSE MATERIALS

1. **Pearson Mastering Chemistry** (required) – to complete the assigned online homework one must purchase access to a Mastering Chemistry account. A 12-month access code can be purchased from the University Bookstore, Co-op Bookstore or directly from the Mastering Chemistry site ($49.99). W'22 CHEM*1050 will also assign online homework, so the access covers both courses. A free 2-week trial period is provided. To set-up your account, you must follow the registration instructions provided on the CourseLink course site under *Content >> Course Resources >> Pearson Mastering Chemistry Info*.

2. **Calculator** (required) with ln, e^x, $\log_{10}$ and 10^x functions. Calculators or notebook computers capable of storing information are **NOT** allowed during tests/exams, *e.g.,* most graphing calculators. It is your responsibility to have a properly working calculator and know how to use it.

3. **Textbook:** D. Ebbing and S. Gammon, General Chemistry (Cengage Canada). You can use the 10th, 9th, or 8th edition for both CHEM*1040 and CHEM*1050. The publisher provides 10th ed. options, e.g., textbook and/or OWL v2 resources (including e-Book) through our campus bookstores:
   - University Bookstore (*https://bookstore.uoguelph.ca;* $120/$112.50)
   - Co-op Bookstore (https://bookstore.coop/textbooks/order-online; $110.95/$99.95).

   You can also buy directly from Cengage, where Coupon Code DIGITALB2S1305 gives you an additional 10% off the eBook (https://www.cengage.com/coursepages/UGuelph_CHEM1040_Fall21). The Co-op Bookstore also offers the textbook plus soft cover student solutions manual with no OWL v2 resources. Note: OWL v2 is a platform to provide the eBook along with additional resources which are not required.

4. **Organic/Inorganic Molecular Model Kit** (optional). This kit helps with visualising 3D molecular shapes and organic structures, as well as completing the assigned Aspects of Organic Chemistry lab exercises. A kit can be purchased from the University ($16.75) or Co-op ($14.99) Bookstores.

5. **System/Software Requirements** – to ensure you have the best learning experience possible, please review: https://opened.uoguelph.ca/student-resources/system-and-software-requirements

C. LECTURES & SCHEDULE

You can only attend the lecture section in which you are registered. Instructors will cover basically the same material but may do so in a slightly different order.

On CourseLink, under Content > Lecture Info & Materials, you will find resources to help you prepare for your classes each week. You are strongly encouraged to review the relevant material prior to class along with the related textbook sections.

Before your first scheduled class, download a free copy of **Zoom** from zoom.us. You must use your **U of G e-mail** when setting up your Zoom account to enter the scheduled sessions, listed in the CourseLink Calendar tool. For further info on creating or using a U of G Zoom account, please refer to: https://opened.uoguelph.ca/instructor-resources/zoom-for-students

Lectures will be recorded, and the recording links will be posted under Content > Zoom Recordings for all to access. By joining the sessions, you are consenting to the session being recorded. During class, your microphone and video needs to be turned off. You can interact with your Instructor via the Chat or Raised hand functions. Only ask questions that are on topic and try not to ask too many questions all at once. Save other questions for before/after class, during office hours or e-mail. For off-topic discussions, you are advised to use a discord channel, for example.

FALL 2021 CHEM*1040 LECTURE SCHEDULE

Week	Dates	Topics	CourseLink Resources (see Content tab)	Text Reference
Week 0	Sept. 9 to Sept. 10	Measurement Significant figures Atoms, molecules & ions	Review Video Lessons Self-Assessment Quiz	*Review: Ch. 1, 1.4 – 1.8 & Ch. 2, 2.3 – 2.10
Week 1–2	Sept. 13 to Sept. 24	Atomic structure Periodic trends Lewis structures VSEPR & bonding	Periodic Tables (Week 1) Atomic Structure Practice Quiz (Week 1) VSEPR Interactive Tutorial (Week 2) Molecular Structure Practice Quiz (Week 2) Questions of the Week (Weeks 1 and 2)	*Review: 7.1 – 7.4 Ch. 7, 7.5 Ch. 8, 8.1 – 8.7 Ch. 9, 9.2 – 9.9 Ch. 10, 10.1 – 10.4
Week 3–4	Sept. 27 to Oct. 8	The Mole Stoichiometry & Chemical Rxns	Stoichiometry Video Lessons (Week 3) Nomenclature Practice (Week 3) Stoich. & Rxns Practice Quizzes (Weeks 3-4) Questions of the Week (Weeks 3 & 4) Titration and Analysis Problem (Week 4) Midterm Prep Quiz (Week 4)	*Review 3.1 – 3.5 Ch. 3, 3.6 – 3.8 Ch. 4, 4.1 – 4.4, 4.7 – 4.10 *Review 5.1 – 5.4

Fall Break – From end of classes on Friday, Oct. 8 through to end of Tuesday, Oct. 12

Midterm Test#1: Wednesday, October 13, 8 AM – 6 PM, CourseLink

Week 5	Oct. 13 to Oct. 15	Chemical Equilibrium	Questions of the Week (Week 5) Equilibrium Practice Quiz	Ch. 14, 14.1 – 14.8
Week 6–8	Oct. 18 to Nov. 5	Acids, bases and salts	Acids and Bases Video Lessons (Weeks 6 & 7) Acids and Bases Practice Quiz (Week 7) Salts Video Lessons (Week 8) Salts Practice Quiz (Week 8) Questions of the Week (Weeks 6-8)	Ch. 15, 15.1 – 15.8 Ch. 16, 16.1 Ch. 16, 16.3 – 16.5

Midterm Test#2: Monday, November 8, 8 AM – 6 PM, CourseLink

Week 9	Nov. 8 to Nov. 12	Buffers and titration curves	Buffers Video Lessons (Week 9) Buffers Practice Quiz (Week 9) Titration Curve Animation (Week 9) Titration Curves Practice Quiz (Week 9) Questions of the Week (Week 9)	Ch. 16, 16.6 – 16.7
Week 10–12	Nov. 15 to Dec. 3	Organic chemistry Intermolecular forces Final exam review	Organic nomenclature quizzes (Week 10) Structural isomer tutorial (Week 10) Stereoisomers (Week 10) Organic Chem Practice Quizzes (Weeks 10 & 11) The Macrogalleria (Week 12) Questions of the Week (Weeks 10 - 12)	Ch. 11, 11.5 Ch. 23, 23.1 – 23.7 Ch. 24, 24.1 Organic Chemistry Notes – all questions

Final Examination: Wednesday, December 8, 8:30 AM – 10:30 AM, CourseLink

Note: You are responsible for the topics marked with an asterisk (*) as they are assigned as review and may not be explicitly addressed within the posted video lessons or virtual sessions.

D. FALL 2021 CHEM*1040 LABORATORY SCHEDULE

DATE	Activities	Assessments	Deadline
Week 1 **Sept. 13 – 17**	**Module Zero:** Introduction to First-Year Chemistry Labs (Mandatory Tutorial)	Introduction to First-Year Chemistry Labs Self-Assessment Quiz	Prior to Week 2's Lab Activity
Week 2 **Sept. 20 – 24**	**Module One:** Introduction to Laboratory Equipment (Video Lab)	Introduction to Laboratory Equipment Pre-Lab Quiz & Post-Lab Report	11:59 PM on Fri., Sept. 24
Week 3 **Sept. 27 – Oct. 1**	**Module A:** Atomic Spectroscopy (Lab Simulation)	Marking Module for Atomic Spectroscopy	11:59 PM on Fri., Oct. 1
Week 4 **Oct. 4 – 8**	**Module Two:** Chemical Reactions in Aqueous Solutions (Video Lab)	Chemical Reactions in Aqueous Solutions Pre-Lab Quiz & Post-Lab Report	11:59 PM on Fri., Oct. 8
Week 5 **Oct. 11 – 15** **(No classes Oct. 11 & 12)**	**Student Science Safety I (F21) Course** *Note: this course is delivered via a separate CourseLink site*	Final Assessment quiz on CourseLink *Note: this is accessed via the Student Science Safety I (F21) CourseLink site*	11:59 PM on Fri., Oct. 15
Week 6 **Oct. 18 – 22**	**Module B:** Volumetric Analysis (Lab Simulation)	Marking Module for Volumetric Analysis	11:59 PM on Fri., Oct. 22
Week 7 **Oct. 25 – 29**	**Module Three:** Standardization of NaOH (Video Lab)	Standardization of NaOH Pre-Lab Quiz & Post-Lab Report	11:59 PM on Fri., Oct. 29
Week 8 **Nov. 1 – 5**	**Module C:** Gaseous Equilibria (Lab Simulation)	Marking Module for Gaseous Equilibria	11:59 PM on Fri., Nov. 5
Week 9 **Nov. 8 – 12**	**Independent Study:** No Scheduled Lab Activity		
Week 10 **Nov. 15 – 19**	**Module Four:** Buffers, Titration Curves, and Indicators (Video Lab)	Buffers, Titration Curves, and Indicators Pre-Lab Quiz & Post-Lab Report	11:59 PM on Fri., Nov. 19
Week 11 **Nov. 22 – 26**	**Module Five:** Synthesis of Aspirin (Video Lab)	Synthesis of Aspirin Pre-Lab Quiz & Post-Lab Report	11:59 PM on Fri., Nov. 26
Week 12 **Nov. 29 – Dec. 3**	**Module D:** Aspects of Organic Chemistry (Lab Activity)	Marking Module for Aspects of Organic Chemistry	11:59 PM on Fri., Dec. 3

NOTE: The Introduction to First-Year Chemistry Labs Self-Assessment Quiz will not contribute to your final lab grade but must be completed to gain access to the remaining modules on the CourseLink CHEM*1040 (LAB) F21 site. You must complete a minimum of 6 of the 9 lab activities (i.e., Modules 1-5 and A-D; Video Labs and Lab Simulations/Activities) to be eligible to obtain course credit.

E. EVALUATION

Your final course grade will be based on the following components:

Form of Assessment	Weight	Learning Outcome(s)
Mastering Chemistry Online Homework Assignments (Best 10 assignment scores out of 11)	10%	1 – 4 and 6
CourseLink Online Laboratory Work (Modules A - D)	10%	1 – 6
CourseLink Video Laboratories (Modules 1 - 5)		
Pre-Lab Quizzes	2.5%	1 – 6
Post-Lab Reports	12%	1 – 6
CourseLink Student Science Safety I (F21) Course (First grade attempt)	0.5%	5
Test 1 (60 min., Wed., Oct. 13, available 8 AM – 6 PM)	15%	1, 3 and 6
Test 2 (60 min., Mon., Nov. 8, available 8 AM – 6 PM)	20%	1 – 3 and 6
Final Exam (120 min., Wed., Dec. 8, 8:30 AM – 10:30 AM)	30%	1 – 4 and 6

Note: To obtain credit, a minimum of 50% in the overall course **AND** at least **six out of the nine** lab activities must have been completed, else a maximum final grade of 49% is assigned.

1. **Mastering Chemistry Online Homework (required):** Chemistry is not a subject that can be easily learned by simply reading a book. To consolidate your understanding, one must work with the course concepts on a regular basis. Interactive homework is one way to keep up and test your understanding. Mastering Chemistry 12-month access can be purchased directly online from the Mastering Chemistry site, or by way of an access code purchased from one of the bookstores. Your account can be used to add the W'22 CHEM*1050 Mastering Chemistry course site next semester.

   You must follow the instructions provided on CourseLink (*Content >> Course Resources >> Pearson Mastering Chemistry Info*) to set-up your account. Mastering is linked to the CHEM*1040 CourseLink site and can only be accessed through the **Pearson MyLab and Mastering link**, located on the course home page. Complete the "Intro to MasteringChemistry" to familiarize yourself with the system.

   There are 11 assignments. Each is comprised of a quiz (weighted 50%; 2 attempts/question) and adaptive follow-up questions (50%; multiple attempts), generated after the quiz is completed. Your worst assignment grade will be dropped prior to calculating your final grade out of 10. Quizzes are due **Thursdays 11:59 PM, starting Sept. 23**, and the adaptive follow-ups are due by the following **Sunday 11:59 PM**. If a quiz or adaptive follow-up is not attempted by the deadline, a grade of zero is assigned.

2. **Virtual Laboratories (required):** Located on CourseLink CHEM*1040 (LAB) F21 site.
   Module zero will familiarize you with the lab requirements, and completion of its corresponding Introduction to First-Year Chemistry Labs Self-Assessment Quiz will grant you access to the remaining laboratory content and activities this semester.

   a) **Online Laboratory Work – Modules A to D:** Each module consists of 2 parts: simulated experiments, or a set of lab activities, and a marking module. Background information and worksheets to record your work are provided for each activity. The marking module link is released after you visit the simulation and/or lab notes/worksheets. The simulated experiments can be done as many times as you wish however, some assign a new "unknown" number with each attempt. Make sure to record and keep track of this number for grading purposes.

Once you have completed all activities and calculations, **only then** open the marking module to evaluate your work. You have one attempt and 60 minutes to enter your answers – which is more than ample time for all. **Marking modules are due Fridays at 11:59 PM** (refer to Laboratory Schedule – page 4). If an assigned marking module is not submitted by the deadline, a grade of zero is assigned.

Submitted marking modules can be reviewed starting the Monday following the due date and for a two-week period. You can review your answers, the correct answers and any feedback provided.

b) **Video Laboratories – Modules Zero to Five:** Background information, laboratory procedures and video activities are provided for you to complete and collect data. Each laboratory is assessed through a pre-lab quiz and a post-lab report.

A **pre-lab quiz** must be attempted to gain access to the corresponding laboratory video(s), and you have 2 attempts at each quiz. Using Universal Design principles, all quizzes have been designed with ample time for all to complete. If a quiz is not attempted, a grade of zero is assigned. Each quiz can be reviewed starting the Monday following the week during which the lab is scheduled, and for a two-week period. You will be able to review your answers, the correct answers and any feedback provided.

A **post-lab report** cannot be accessed until you have reviewed the corresponding laboratory video(s) in full. The post-lab reports must be completed during the week that the lab activity is scheduled. The post-lab reports do not need to be completed in one sitting. You have one attempt and will be able to save your progress and continue later (as long as it is the week the lab activity is scheduled and the deadline for the activity has not yet passed). **Post-lab reports are due Fridays at 11:59 PM** (refer to Lab Schedule – page 4). If an attempt is not submitted by the assigned deadline, a grade of zero is assigned

3. **CourseLink Lab Safety Course (required)**: You must complete the "*Student Science Safety I (F21)*" course by **Friday, October 15, 11:59 PM** (refer to Laboratory Schedule – page 4). It takes 2-3 hours to complete. You have unlimited attempts to achieve a grade of 90% or better on the final assessment, however, the grade on your first attempt is worth 0.5% of your final grade in the course. If an attempt is not submitted by the assigned deadline, a grade of zero is assigned.

4. **Practice Online Quizzes (optional)** – see *CourseLink >> Content >> Week #*
A *Self-Assessment Quiz* is available until Sept. 26, 11:59 PM and can be accessed twice. Find out what you know! There are also topic specific practice quizzes posted under each Week's module. These quizzes can be attempted multiple times to help you test your knowledge.

5. **Tests and Final Examination (required):** delivered via CourseLink >> Quizzes

Test #1 (60 min.):	Wednesday, October 13, available 8 AM – 6 PM
Test #2 (60 min.):	Monday, November 8, available 8 AM – 6 PM
Final Exam (2 hrs):	Wednesday, December 8, 8:30 AM – 10:30 AM

The tests and final exam are common to all sections, delivered through CourseLink and are closed book. Notes, printed material of any kind, any communication with other students or any other aids are not permitted. Calculators capable of storing text or formulas are **not permitted**. Constants, a simple periodic table, and solubility rules will be provided in the header or footer of the online tests and exam.

a) **Format:** The midterm tests are designed to test your knowledge of the course material up to and including Week 4 (Test #1) and Week 8 (Test #2) lectures, corresponding text references and laboratories. Test #2 will have a heavier emphasis on the material since Test #1. Each test consists

of multiple choice and short answer questions to be completed individually within 60 minutes. Using Universal Design principles, **everyone will be given up to time plus one half (90 minutes) to complete the questions**. (Students registered with Student Accessibility Services (SAS) who have accommodations of greater than time x1.5 will have their accommodations applied to the 60-minute tests.) Past written midterms, designed for 80 minutes, can be found under Content >> Course Resources >> Tests & Exam Resources. Midterm Prep Quizzes are found under "Quizzes".

The online 2-hour exam, scheduled by the Registrar's office, evaluates the entire course via multiple choice and short answer questions. Students registered with SAS will have their time accommodations applied to the 2-hr examination.

b) **Respondus LockDown Browser and Monitor** (webcam) is required to proctor your online tests and final exam. Download and install LockDown Browser and Monitor prior to the first test (https://download.respondus.com/lockdown/download.php?id=273932365). A Practice Test is provided to ensure the software is set up properly and that you are comfortable using it prior to your first test (refer to Quizzes tab). **Videos and further info** on Respondus are posted under Content >> Course Resources >> Tests & Exam Resources >> Instructions & Respondus Links on the CourseLink course site. If you encounter any technical issues or have any concerns about meeting system requirements, contact CourseLink Support (https://opened.uoguelph.ca/student-resources/Technical-Support) They can help you find solutions.

c) **Additional Info & Advice:** Respondus is a program that uses AI to recognize unusual activities and flag them for instructors. Your goal is to minimize the number of flags produced. **When you are flagged, it does NOT mean you have done something wrong**, just something has occurred that Respondus does not understand. We know that most flagged events are not indicative of academic misconduct. However, it is advantageous to minimize the number of events.

i) **Respondus Pre-Checks:** Before your test/exam, make sure your desk is clear of everything except what is allowed. Before you officially start the test/exam, and the test clock begins to count down, you will be asked to complete a scan of your test environment. You are allowed:

- A calculator – you need to show it clearly to your camera during the environment scan.
- Either a hand-held white board or some scrap paper – you need to show your camera that both sides are blank before you start your test/exam.
- Pens/Pencils for doing your work, which you also show to your camera.
- Your U of G ID card, which you must clearly show to the system when it is requested.
- Water bottle/glass etc. – OK but show that there is nothing written on it.

Show your test environment as much and as best you can – particularly the space around your computer within arms length. You need to show there are no notes, or anything posted behind your computer, on the ceiling or under your desk, etc. **Review "Video Demo of the Environment Check" prior to your 1st test** so you know what to expect (location given in b).

ii) **When writing the exam:**

- **Lighting is key!** Your room cannot be too dark and there can be no light source pointing at your camera, e.g., a bright window directly behind you or a ceiling fixture shining light into your camera. This prevents the system from clearly seeing your face and lots of flags will be generated. Lighting towards your face from behind the camera is optimal.
- No hats, hoodies, or headphones; Tie long hair back; Try to keep your hands off your face so the system can recognize your face and please don't chew gum (you confuse the system).
- Keep your face within your camera's view – this is easiest if you are not too far from or too close to the camera. We know people will look down to work on questions, which is OK, but your video will be flagged multiple times if the program can only see the top of your head!
- If something happens, e.g., you drop your pencil and need to pick it up or a family member enters your room, speak to your camera, and briefly describe the situation.

- Use the washroom before you begin. If you absolutely must go during a test/exam speak to your camera to say where you are going and return as quickly as possible.

You are strongly encouraged to try the **Practice Test with Respondus and Monitoring** (multiple times if you want) prior to your first test so you know what to expect and how the system works.

F. EQUAL OPPORTUNITY AND EVALUATION POLICY

The University is committed to academic integrity and has high ethical and moral standards. All students will be treated equally and evaluated based on the criteria set out in this outline. Evaluation criteria are based strictly on achievement and not effort. **There is no extra work for extra credit** or to "make up" a grade. The need to obtain a higher grade for various reasons is not grounds for increasing a grade. If your grade were "bumped", where you received a grade you did not legitimately earn, that would be unfair to all the other students in the course.

G. COURSE RESOURCES

1. **CHEM*1040 Website** – access through portal *http://www.uoguelph.ca/courselink/*
   Your **Username** is the part of your U of G e-mail address before the "@" sign. Your **password** is the same as your University e-mail. The course website provides a wealth of resources *(i.e.,* video lessons, animations, questions of the week, and previous midterms, *etc*.), practice quizzes and a discussion board to post your course questions. Weekly announcements are posted on the course homepage to help you stay up-to-date and form the main mode of communication regarding the course. **It is your responsibility to access this site on a regular basis and read all posted announcements.** CourseLink Support: https://opened.uoguelph.ca/student-resources/Technical-Support
2. **Instructors** – will be available at certain times for consultation and assistance. Office hours will be arranged at the beginning of the semester and posted on CourseLink with their lecture materials.
3. **Chemistry Learning Centre** – Get Ready for First-Year Chem Resource site
   Teaching Assistants (TAs) are available to assist you with both the lecture and laboratory material virtually. Hours will be posted on CourseLink under "Announcements". The virtual sessions are accessed through the Virtual Classroom on the Get Ready for First-Year Chem resource site.
4. **Supported Learning Groups** (SLGs) – widget located on CHEM*1040 homepage
   SLGs are free online peer-lead study groups held on a weekly basis. Attendance is voluntary and open to all students in the course. SLGs are facilitated by student leaders who have successfully completed the course. SLG leaders work with faculty/staff to create study activities that integrate course content with effective approaches to learning. They are not tutors. The peer-supported group study format exposes students to various approaches to learning, problem solving, and exam prep. Use the widget on the CHEM*1040 homepage to enroll, view the schedule and access the virtual SLG sessions.

H. POLICY ON MISSED WORK

1. **Missed Tests:** If you do not write one of the midterm tests, e-mail Prof. Jones via your U of G account. Include your full name, student ID number and an explanation. If a valid excuse is received, the percentage value of the test will be determined based on your final exam performance. Otherwise, a grade of zero will be assigned. **No make-up tests will be provided.**
2. **Missed Final Examination:** If you miss a final exam, contact your Program Counsellor as soon as possible (refer to *www.uoguelph.ca/uaic/programcounsellors* for contact info). An official request must be made within **five working days** of the missed examination. Consult the Undergraduate Calendar: https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/

3. **Other Work:** When you find yourself unable to meet an in-course requirement, due to illness or compassionate reasons, e-mail Prof. Jones via your U of G account. Include your full name and ID number. If a valid excuse is received, your work will be re-evaluated; otherwise, a grade of zero is assigned. Undergraduate regulations and procedures for Academic Consideration are found at https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/.

4. Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

I. CHEM*1040 EXPECTATIONS

1. Academic Integrity, Ethics and Etiquette

The course website and virtual class meetings are considered our classroom and the same protections, expectations, guidelines, and regulations used in face-to-face settings apply, plus other policies and considerations that come into play specifically because this course is delivered online. Inappropriate online behaviour will not be tolerated, where examples include:

- Posting inflammatory messages about your instructor or fellow students,
- Using obscene or offensive language online,
- Copying or presenting someone else's work as your own,
- Adapting information from the Internet without using proper citations or references,
- Buying/selling lab reports or assignments,
- Posting or selling course materials to course notes websites,
- Recording lectures without the permission of the instructor,
- Having someone else complete your quiz or completing a quiz for/with another student,
- Stating false claims about lost quiz answers or other assignment submissions,
- Threatening or harassing a student or instructor online,
- Discriminating against fellow students, instructors, and/or TAs,
- Using the course website to promote profit-driven products or services,
- Attempting to compromise the security/functionality of CourseLink, and
- Sharing your username and password.

Original work performed in good faith is assumed with all course components. University of Guelph students have the responsibility of abiding by the University's policy on academic integrity, which prohibits several forms of academic offences, including cheating; falsification; plagiarism; unauthorized collaboration; or recording and/or dissemination of instructional content without express permission of the instructor.

Your graded submissions for online assignments, tests and exams should be your own, individual work. You may not share content from any assignments, tests, exams, etc. with 3rd-parties such as Chegg, CourseHero, Reddit, or any other content repositories. If found guilty of academic misconduct, a grade of zero is a common penalty on such course components, as well as a letter documented the offence being placed in your official student file.

It is also presumed that the data you collect, all data analysis and written/typed calculations and responses that you submit for grading are yours alone. We often find examples of plagiarism in which lab reports are copied from someone else, or from a previous semester. In short, if you have not done something yourself, do not attempt to pass it off as original work.

If you have any questions about what might cross the line, please do not hesitate to ask a TA or Instructor prior to submitting your work. Further info can be found in the Undergraduate Calendar: https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/.

2. Knowledge and Understanding

The pre-requisite for CHEM*1040 is two full high school chemistry courses (*e.g.*, Ontario 3U and 4U or grade 11 and 12 chemistry). In reviewing the course content of CHEM*1040 you may feel you know most of the material already. **Don't be misled!** The topics may be familiar, but we will provide a deeper understanding of the fundamental concepts within chemistry.

The purpose of CHEM*1040 (and CHEM*1050) is to build upon your previous exposure to the subject. You will need to move away from just memorization terms and definitions and spend more time thinking about the processes and concepts within chemistry. This will lay the foundation for more advanced courses such as analytical chemistry (*i.e.*, CHEM*2400 or CHEM*2480), biochemistry (*i.e.*, BIOC*2580), organic chemistry (*i.e.*, CHEM*2700), inorganic chemistry and physical chemistry (*i.e.*, CHEM*2060, CHEM*2880 and CHEM*2820). **Note that the course is not designed to "teach" you chemistry. It is, however, constructed to help you learn chemistry.**

For some, it may have been more than a year since you last took a chemistry course, and it is not unrealistic to assume that you have forgotten some of what you have already learned. We will review some basic concepts, but this will not be a comprehensive review. **You must carefully review the sections of the textbook that have been assigned as review on your own.** You may find the CourseLink Get Ready for First-Year Chemistry resource site is helpful during this review.

a) What We Expect You Already Know/Understand:

- classifications of matter and terms associated with its physical properties (e.g., temperature; density, homogeneous vs. heterogeneous mixtures). (Refer to Sections 1.4 and 1.7)
- how to report the number of significant figures in each quantity and **how to round off the result of a calculation to the correct number of significant figures**. (Refer to Section 1.5 in text as well as the introductory notes within your laboratory manual.)
- SI base units, SI prefixes (from *tera* through to *femto*) and converting between units. (Sections 1.6 and 1.8)
- basic concepts and terminology associated with atoms and atomic structure (*e.g.*, electron, proton, neutron, atomic number, mass number, atomic mass unit, isotope, natural abundance, mole, molar mass) (Sections 2.3–2.4)
- information provided by any periodic table (e.g., atomic symbols and names, period versus group), and be familiar with the overall structure and organization of the modern periodic table. (Sect. 2.5)
- names of groups 1, 2, 17 and 18; how to classify an element as a metal, non-metal or metalloid based on its position in the periodic table; the common forms of the most common non-metals: H_2, F_2, Cl_2, Br_2, I_2, N_2, O_2, P_4, S_8. (Section 2.5)
- names and formulas of simple inorganic and organic compounds. Familiarise yourself with Tables 2.4 to 2.6. Sections 2.6–2.8 and pages 1–26 in the Organic Notes.
- how to write and balance simple chemical equations by inspection. (Sections 2.9 –2.10)
- concepts and calculations that involve quantities of atoms, ions or molecules, Avogadro's number, molar mass, and molecular formula. (Sections 3.1 – 3 .2)
- to use % composition & molar mass to determine empirical and molecular weights. (Sect'ns 3.3–3.5)
- how to use a balanced chemical equation to relate masses and moles of reactants and products. (Sections 3.6 – 3.7)

- meaning of terms such as empirical formula, molecular formula; structural formula; anion; cation; oxidation state; limiting reagent; excess reagent; actual, theoretical and percent yields; molarity (Sections 3.8 and 4.7)
- units of pressure used for gas law problems and be able to convert between them. (Section 5.1)
- concepts and terminology associated with the ideal gas law (PV = nRT) (Sections 5.3 – 5.4)
- difference between wavelength and frequency and are familiar with the electromagnetic spectra and the different regions of the spectra (X-ray, UV, visible, IR, Microwave, radio). (Section 7.1)
- concept of a photon and how the energy of a photon is directly proportional to the frequency and inversely related to wavelength. (Section 7.2)
- when and why the Bohr Theory of the atom is useful, and as well as its limitations, and why it is not correct. (Section 7.3)
- how to work with exponential (i.e., scientific) notation, logarithms (*e.g.,* log & ln), exponentials (i.e., 10^x and e^x) and the quadratic formula. Practice: *https://atrium.lib.uoguelph.ca/xmlui/handle/10214/1755*
- how to solve for an unknown within a linear equation. In some instances, it may be helpful if you can solve for two unknowns using two linear equations.
- how to use a table of (x,y)-data pairs to construct a plot. For straight line plots, you will be expected to calculate slope.

b) **CHEM*1040 Learning Objectives** – the course can be subdivided into six sub-sections and the learning objectives for each (based on the textbook) are as follows:

Atomic structure and Periodic Table (Sections 7.4 – 8.7 and 9.2 – 9.3)

1. Understand the significance of the quantum numbers, understand how they can be used to code for the electron energy levels within atoms and know the shapes of the boundary surfaces of *s*, *p,* and *d* orbitals. (Sections 7.4 – 7.5)
2. Understand the organization of the periodic table in terms of the types of orbitals being filled; be able to apply the Pauli Exclusion Principle and Hund's Rule. (Sections 8.1 – 8.2 and 8.4)
3. Predict the magnetic behaviour of an atom or ion. (Section 8.4)
4. Write ground-state electron configurations for any atom or ion using only the Periodic Table. (Sections 8.3 and 9.2)
5. Know periodic trends such as atomic dimensions and how atomic dimensions change as a function of position in the Periodic Table; compare the sizes of two atoms, two ions, or an atom and ion. (Sections 8.6 and 9.3)
6. Define ionization energy, electron affinity and electronegativity. Know how these parameters change as a function of position in the Periodic Table. (Section 8.6)

Lewis structures, VSEPR & bonding (Sections 9.4 – 9. 9 and 10.1 – 10.4)

1. Apply the Octet Rule to the construction of Lewis structures for multi-atom, multi-element molecules. Be able to recognize violations of the rule. (Sections 9.4 – 9.6 and 9.8)
2. Know what resonance is and be able to draw resonance structures. (Section 9.7)
3. Show how formal charges can facilitate the generation of "better" Lewis structures. (Section 9.9)
4. Apply VSEPR Theory to Lewis structures to determine approximate molecular geometries. (Sect. 10.1)
5. Understand the significance of electronegativity and use it to identify polar bonds; use geometry to identify polar molecules. (Sections 9.5 and 10.2)
6. Understand the logic behind the need to invoke hybridization of atomic orbitals; use number of electron pair locations to determine hybridization used by the central atom. (Section 10.3)

7. Describe single, double, or triple bonds in terms of the overlap of hybrid or pure atomic orbitals. (Section 10.4)

Stoichiometry (Sections 3.6 – 3.8, 4.1 – 4.4 and 4.7 – 4.10)

1. Relate quantities in chemical equations (*e.g.*, single & multi-stepped reactions) (Sections 3.6 – 3.7)
2. Connect the concepts of limiting reagent (or reactant), theoretical yield, actual yield, and percentage yield. Be able to work problems related to these concepts. (Section 3.8)
3. Perform calculations involving molarity. Be able to determine solution concentration, prepare a solution or interconvert units. (Sections 1.8, 4.7 – 4.8 and 4.10)
4. Apply the solubility rules in Table 4.1 to either compounds or reactions. (Sections 4.2 – 4.3)
5. Differentiate between molecular and net ionic equations. Be able to write either. (Section 4.2)
6. Write precipitation and neutralization reactions. (Sections 4.3 – 4.4)
7. Understand the logic behind both gravimetric and volumetric analyses, and be able to perform stoichiometric calculations involving solids, solutions, or gases. (Sections 4.9 – 4.10 & 5.3 – 5.5)

Chemical Equilibrium (Chapter 14)

1. Describe the characteristics of dynamic equilibrium. (Section 14.1)
2. Connect the dependence of K on the way the balanced equation is written. What happens to K if the reaction is reversed? (Section 14.2)
3. Write a K expression for homogenous or heterogeneous equilibrium. (Sections 14.2 – 14.3)
4. Relate K to ***extent of reaction***, relative amount of reactant/product at equilibrium. (Sect. 14.4)
5. Relate Q value to ***direction of reaction***, forward or reverse, to reach equilibrium. (Section 14.5)
6. Be able to solve an equilibrium problem. (Section 14.6)
7. Use Le Chatelier's principle to describe the effect of a stress on an equilibrium position, equilibrium constant K, concentrations, or pressures. Stresses include adding or removing a reagent, a temperature change, or a change in overall volume or pressure. (Section 14.7)

Acids, bases, salts, buffers, and titration curves (Chapters 15 and 16):

1. Differentiate between the three definitions of acids and bases (*i.e.,* Arrhenius, Brønsted-Lowry, and Lewis). Identify examples of each. (Sections 15.1 – 15.3)
2. Identify the six common strong acids (refer to Table 15.1).
3. Identify strong bases (group I and II hydroxides and oxides) (refer to Table 15.1)
4. Identify conjugate acid/base pairs in an acid/base reaction. (Section 15.2)
5. Write an equation for the auto-ionization of water and its K expression. (Section 15.6)
6. Recognize strong acid and base aqueous solutions and determine the pH and equilibrium concentrations. (Sections 15.7 – 15.8)
7. Calculate pH from $[H^+]$ or $[H^+]$ from pH; relate $[OH^-]$ and $[H^+]$ using K_w. (Section 15.8)
8. Recognize weak acids and weak bases, write an equation for the dissociation of an acid or base in water, identify the substances acting as the acid and base on either side. (Sections 16.1 and 16.3)
9. Write the equilibrium constant expression for a weak acid or weak base dissociation, determine pH and equilibrium concentrations. (Sections 16.1 and 16.3)
10. Relate K_a and K_b using K_w. (Section 16.4)

11. Classify salts as producing neutral, acidic, or basic solutions in water; determine the pH of a salt solution (Sections 16.4 – 16.5).
12. Recognize and determine the pH of buffer solutions; suggest a reasonable buffer solution to maintain a certain pH. (Section 16.6)
13. Understand how and why an indicator changes color (Sections 15.8 and 16.7).
14. Know the difference between equivalence point (or stoichiometric point), endpoint, and midpoint (or half equivalence/half stoichiometric point) (Section 16.7).
15. Evaluate the reaction between a strong acid and strong base, a weak acid and strong base or a strong acid and weak base to determine the pH at various points including: (1) before the titration, (2) before the equivalence point, (3) at the equivalence point and (4) after the equivalence point. (Section 16.7)
16. Write an equation for an acid/base reaction and determine the direction from acid/base strengths.

Organic chemistry (Organic Notes; Sections 11.5, 23.1 – 23.7 and 24.1 – 2)

1. Identify and name the various functional groups. (Organic Notes (ON) pp. 1 – 22)
2. Identify and relate the different types of isomers. (ON pp. 23 – 30)
3. Identify types of intermolecular forces present between molecule (Sect. 11.5 & ON pp. 31 – 32)
4. Compare and contrast boiling points, melting points and water solubility based on intermolecular forces. (ON pp. 32 – 34)
5. Identify chemically reactive centres (electrophiles, nucleophiles, and free radicals), reaction intermediates and intermediates stability. (ON pages 35 – 36)
6. Know the following representative organic reactions:
   (a) *Alkanes* – substitution reaction through halogenation (ON pp. 36 – 38)
   (b) *Alkenes* – addition of acid or hydrogen & polymerisation (ON pp. 39 – 42)
   (c) *Alkyl Halides* – nucleophilic substitution reactions (ON pp. 42 – 43)
   (d) *Alcohols* – oxidation with dichromate and acid (ON pp. 44 – 45)
   (e) *Aldehydes/Ketones* – addition of H_2 & nucleophilic attack of H_2O & alcohol (ON pp. 45 – 47)
   (f) *Carboxylic Acids* – formation of esters and polyesters (ON pp. 47 and 49 – 50)
   (g) *Esters* – formation of amides and polyamides (ON pp. 48 and 50 – 52)
7. Differentiate between addition and condensation polymers (ON pp. 40 – 42 and 49 – 52).
8. Recognise the acid & base properties of organic compounds and their salts. (ON pp. 52 – 53)

J. END OF CHAPTER PROBLEMS

There is a good correlation between mastering the course concepts on a week-by-week basis and performance in the course. Problems are assigned to provide additional reinforcement of the principles covered in the course, to allow you to practice problem-solving techniques and to check your own knowledge before the midterm tests and final exam. For the end-of-chapter problems, answers are provided at the back of your textbook. For full solutions, consult the textbook's Student Solutions Manual, provided online if you have purchased access to OWL v2.

Work the problems in the week the material is covered in lectures. A common reason why students are unsuccessful in CHEM*1040 is that they fall so far behind with the material that they never catch up. Lectures become harder to comprehend without the reinforcement effect of constant practice. If you have any difficulties, **seek help early**!

The questions within the text are organised according to categories (*e.g.*, Review, Concept and Cumulative-Skills Problems). If you find the early review questions unchallenging, move on to the other sections. Additional "Questions of the Week" are provided on CourseLink under each week, which represent types of questions that may appear on tests or the final examination. The list that follows aligns with the 10th edition textbook. If you are using the 8th or 9th edition, a list for those editions can be found on the CourseLink course site, under Content >> Course Resources.

Review (Week 0)

Chapter 1: 1.35, 1.41, 1.81, 1.83, 1.127.

Chapter 2: 2.43, 2.65, 2.75, 2.77, 2.79, 2.83, 2.85, 2.91, 2.93, 2.99, 2.101, 2.109, 2.119, 2.123.

Chapter 3: 3.37, 3.39, 3.45, 3.61, 3.65, 3.67, 3.73.

Atomic structure, periodic trends, molecular structure, and bonding (Week 1 – 2)

Chapter 7: 7.25, 7.33, 7.37, 7.45, 7.69, 7.87, 7.97, 7.114, 7.117.

Chapter 8: 8.39, 8.43, 8.49, 8.61, 8.63, 8.65.

Chapter 9: 9.43, 9.45, 9.49, 9.57, 9.59, 9.63, 9.65, 9.69, 9.71, 9.77, 9.93, 9.97, 9.99, 9.128, 9.139.

Chapter 10: 10.31, 10.33, 10.35, 10.39, 10.41, 10.45, 10.49, 10.53, 10.65, 10.69, 10.73, 10.100.

Stoichiometry and Reactions (Week 3 – 4)

Chapter 3: 3.24, 3.81, 3.83, 3.89, 3.91, 3.93, 3.97, 3.103, 3.105, 3.117, 3.119, 3.135, 3.137.

Chapter 4: 4.31, 4.35, 4.37, 4.39, 4.41, 4.43, 4.51, 4.69, 4.71, 4.77, 4.81, 4.85, 4.87, 4.89, 4.93, 4.107, 4.109, 4.111, 4.115, 4.119, 4.123, 4.127, 4.141, 4.151.

Chapter 5: 5.75, 5.77, 5.79, 5.119, 5.137, 5.143.

Acid-Base Equilibrium (Week 5 – 8)

Chapter 14: 14.23, 14.25, 14.35, 14.37, 14.39, 14.41, 14.43, 14.55, 14.57, 14.59, 14.61, 14.63, 14.73, 14.75, 14.83, 14.87, 14.121, 14.123.

Chapter 15: 15.27, 15.29, 15.31, 15.33, 15.35, 15.41, 15.53, 15.57, 15.59, 15.61, 15.67, 15.71, 15.85, 15.99.

Chapter 16 (Weak Acids/Bases): 16.1, 16.9, 16.23, 16.25, 16.35, 16.39, 16.41, 16.45, 16.51, 16.53, 16.55, 16.57, 16.101, 16.111, 16.115.

Chapter 16 (Salts): 16.27, 16.59, 16.63, 16.65.

Buffers and Titration Curves (Week 9)

Chapter 16 (Buffers): 16.29, 16.71, 16.73, 16.75, 16.77, 16.81, 16.83, 16.113, 16.121, 16.141.

Chapter 16 (Titration Curves): 16.15, 16.31, 16.85, 16.87, 16.89, 16.93, 16.107, 16.109, 16.119, 16.135, 16.143.

Organic Chemistry & Intermolecular Forces: (Week 10 – 12)

Chapter 11: 11.63, 11.69, 11.71, 11.105, 11.109 b & d.

Organic Chemistry Notes for CHEM*1040: All study questions from each section.

Chapter 23: 23.14, 23.25, 23.29, 23.35, 23.39, 23.41, 23.53, 23.55, 23.65, 23.75.

Chapter 24: 24.29, 24.53, 24.55.

K. ADVICE FROM STUDENTS ON HOW TO DO WELL IN CHEM*1040

- "Be sure to mark down all your deadlines."
- "Read a bit ahead in the text. The lectures make much more sense..."
- "Keep on top of the lecture material and textbook reading/question assignments... the midterm tests and final exam will not seem half as difficult!"
- "Try to understand what you are doing, not just know how to do it."
- "KNOW your material and be able to explain it well to someone else with little difficulty."
- "Ask questions if you don't understand … it will not get better with time."
- "… read textbook, pay attention in lecture, ask questions, visit your Prof., go to SLG's, go to the Chem Learning Centre, whatever you need to do, do it. Resources are there, you just need to go get them."

L. UNIVERSITY POLICIES and INFORMATION

1. **Academic Advisors** – If you are concerned about any aspect of your academic program, make an appointment with a Program Counsellor within your degree program. For contact info, please refer to: *https://www.uoguelph.ca/uaic/programcounsellors*

2. **Academic Assistance** – If you are struggling to succeed academically, the Learning Commons (*https://www.lib.uoguelph.ca/*) offers numerous academic resources, including workshops related to time management, taking multiple choice exams and general study skills. You can also set up individualized appointments with a learning specialist.

3. **Academic Integrity** – The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all of us to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. Please note: Whether a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse you from the responsibility of verifying the academic integrity of your work before submission. If you are in any doubt as to whether an action on your part could be construed as an academic offence, consult your Instructor or Faculty Advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar: https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

4. **Accessibility** – The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

   When accommodations are needed, students are required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway. Accommodations are available for both permanent and temporary disabilities. Note that common illnesses, such as a cold or the flu, do not constitute a disability.

   Use of the SAS Exam Centre requires students to make a booking at least 7 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For more info, go to the SAS website: *www.uoguelph.ca/sas*

5. **Copies of out-of-class assignments** – Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

6. **Copyright of Course Materials** – All course materials are copyrighted by the Department of Chemistry, the instructor who prepared the materials or the publisher who provided the materials. These materials can only be reproduced with permission and in conjunction with associated copyright rules. **Note**: Lectures and laboratories **cannot** be recorded or copied without the permission of the presenter. Material recorded with permission is restricted to personal use for that course, unless further permission is granted.

7. **Course Evaluation** (CEVAL) – Students will be invited to complete a short online evaluation of their TA**,** as well as their Instructor and the course, near the end of the semester. The department regards this information as important in evaluating the course, as well as your TA and Instructor's performances. All comments are reviewed, and suggestions are followed whenever possible. To access the online evaluation, go to *https://courseeval.uoguelph.ca/*.

8. **Communication** – As per university regulations, all students are required to check their <uoguelph.ca> e-mail account **regularly**: e-mail is the official route of communication between the University and its students. In this course, students are required to regularly read the posted announcements on the CHEM*1040 course home page.

9. **Use of Personal Information** – Personal information is used by University officials to carry out their authorized academic and administrative responsibilities and to establish a relationship for alumni and development purposes. The University of Guelph's policy on the Collection, Use and Disclosure of Personal Information can be found in the Undergraduate Calendar: *https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml*

10. **Resources** – Academic Calendars provide information about the University of Guelph's procedures, policies and regulations: *www.uoguelph.ca/registrar/calendars/index.cfm?index*

    a) **Drop Date**: Courses that are one semester long must be dropped by the end of the last day of classes to have the course removed from your transcript. Evaluate your performance regularly. If you find you are not doing well, seek advice from your Instructor. It is better to drop a course than to have a failing grade permanently on your transcript. Regulations and procedures for dropping courses are available in the Undergraduate Calendar: *https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml*

    b) **Schedule of Dates**:
    www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/index.shtml
    e.g., Th., Dec. 2 – classes rescheduled from Tue., Oct. 12, Tuesday schedule in effect
    Fri., Dec. 3 – classes rescheduled from Mon., Oct. 11, Monday schedule in effect.

11. **Wellness** – If you are struggling with personal or health issues:
    a) **Counselling Services** (*https://wellness.uoguelph.ca/counselling/*) offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
    b) **Student Health Services** (*https://wellness.uoguelph.ca/health/*) provides medical attention.
    c) For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers offers workshops and sessions related to stress management and high-performance situations (https://www.selfregulationskills.ca/)