



ORIGINAL COURSE IMPLEMENTATION DATE: September 2000
 REVISED COURSE IMPLEMENTATION DATE: September 2019
 COURSE TO BE REVIEWED (six years after UEC approval): October 2022
 Course outline form version: 10/27/2017

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: CHEM 241	Number of Credits: 4 Course credit policy (105)														
Course Full Title: Analytical Chemistry Course Short Title: <i>(Transcripts only display 30 characters. Departments may recommend a short title if one is needed. If left blank, one will be assigned.)</i>															
Faculty: Faculty of Science	Department (or program if no department): CHEMISTRY														
Calendar Description: An introduction to analytical chemistry with an emphasis on analysis of solutions. Lecture material includes handling and interpreting of experimental measurements, equilibrium, principles of titrimetry, electrochemical methods, statistical analysis, analytical separation and chromatography. Laboratory experiments illustrate lecture materials.															
Prerequisites (or NONE):	CHEM 114.														
Corequisites (if applicable, or NONE):	None														
Pre/corequisites (if applicable, or NONE):	None														
Antirequisite Courses <i>(Cannot be taken for additional credit.)</i> Former course code/number: Cross-listed with: Dual-listed with: Equivalent course(s): <i>(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)</i>	Special Topics This course is offered with different topics: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes <i>(Double-click on box to select it as checked.)</i> If yes, different lettered courses may be taken for credit: <input type="checkbox"/> No <input type="checkbox"/> Yes, repeat(s) <input type="checkbox"/> Yes, no limit <i>(The specific topic will be recorded when offered.)</i>														
Typical Structure of Instructional Hours <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Lecture/seminar hours</td><td style="text-align: center;">45</td></tr> <tr><td>Tutorials/workshops/Seminars</td><td></td></tr> <tr><td>Supervised laboratory hours</td><td style="text-align: center;">39</td></tr> <tr><td>Experiential (field experience, practicum, internship, etc.)</td><td></td></tr> <tr><td>Supervised online activities</td><td></td></tr> <tr><td>Other contact hours:</td><td></td></tr> <tr><td style="text-align: right;">Total hours</td><td style="text-align: center;">84</td></tr> </table>	Lecture/seminar hours	45	Tutorials/workshops/Seminars		Supervised laboratory hours	39	Experiential (field experience, practicum, internship, etc.)		Supervised online activities		Other contact hours:		Total hours	84	Transfer Credit Transfer credit already exists: <i>(See bctransferguide.ca.)</i> <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes Submit revised outline for rearticulation: <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes <i>(If yes, fill in transfer credit form.)</i>
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Total hours	84														
Grading System <input checked="" type="checkbox"/> Letter Grades <input type="checkbox"/> Credit/No Credit															
Expected Frequency of Course Offerings: Annually <i>(Every semester, Fall only, annually, every other Fall, etc.)</i>															
Labs to be scheduled independent of lecture hours: <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes															
Department / Program Head or Director: Cory Beshara	Date approved: April 13, 2018														
Faculty Council approval	Date approved: September 7, 2018														
Dean/Associate VP: Greg Schlitt (Acting)	Date approved: September 7, 2018														
Campus-Wide Consultation (CWC)	Date of posting: October 19, 2018														
Undergraduate Education Committee (UEC) approval	Date of meeting: October 26, 2018														

Learning Outcomes:

Upon successful completion of this course, students will be able to:

- Identify absolute and relative errors.
- Identify random and systematic errors.
- Present results, and test for precision and accuracy.
- Prepare standard solutions and use appropriate calibration methods.
- Use Microsoft Excel to perform scientific calculations and produce graphs.
- Use volumetric glassware correctly to prepare solutions and perform titrations.
- Perform a back titration and analyse data.
- Use pH meter and ion-selective electrodes correctly to perform a redox titration.
- Describe basic concepts of analytical separation.
- Describe basic concepts of precipitation and perform a precipitation titration.
- Describe basic chromatographic theory (HPLC and GC).

Prior Learning Assessment and Recognition (PLAR)

Yes No, PLAR cannot be awarded for this course because

Typical Instructional Methods (*Guest lecturers, presentations, online instruction, field trips, etc.; may vary at department's discretion.*)

Lectures, labs, group problem-solving sessions.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (*If more space is required, download Supplemental Texts and Resource Materials form.*)

Author (surname, initials)	Title (article, book, journal, etc.)	Current ed.	Publisher	Year
1. Harris, D.C.	Quantitative Chemical Analysis, 9 th ed	<input checked="" type="checkbox"/>	Freeman and Co	2016
2.		<input type="checkbox"/>		
3.		<input type="checkbox"/>		

Required Additional Supplies and Materials (*Software, hardware, tools, specialized clothing, etc.*)**Typical Evaluation Methods and Weighting**

Final exam:	40%	Assignments:	5%	Field experience:	%	Portfolio:	%
Midterm exam:	30%	Project:	5%	Practicum:	%	Other:	%
Quizzes/tests:	%	Lab work:	20%	Shop work:	%	Total:	100%

Details (if necessary):**Typical Course Content and Topics**

- Statistics
- Method Validation
- Chemical Equilibrium
- Titrations
- Fundamentals of Electrochemistry
- Electrodes and Potentiometry
- Redox Titrations
- Introduction to Analytical Separations
- Gas Chromatography (GC) and High-Performance Liquid Chromatography (HPLC)

LABORATORY EXPERIMENTS

Representative experiments for this course:

- Introduction to Microsoft Excel and graphing with Microsoft Excel
- Dilution and calibration curve
- Precipitation and K_{sp}
- Fajans titration
- Wine titration
- pH meter and galvanic cell
- Redox titration
- HPLC