

Course Outline

1. COURSE INFORMATION			
Session Offered	Winter 2017		
Course Name	Analytical Chemistry		
Course Code	ENGTECH 1AC3		
Date(s) and Time(s) of lectures	C01: Mo 12:30PM - 2:30PM (T13 107); We 1:30PM - 2:30PM (ETB 235) C02: We 10:30AM - 11:30AM (T13 107); Mo 9:30AM - 11:30AM (JHE A101) C03: Fr 12:30PM - 2:30PM (ETB 238); Tu 10:30AM - 11:30AM (ETB 238)		
Program Name	Biotechnology & Process Automation		
Calendar Description	Introduction to laboratory procedures used in chemical analysis for classical wet and instrumental methods; statistical data treatment, gravimetric analysis, volumetric analysis, pH measurements and optical methods. Three hour lectures, one lab (three hours) per week; one term		
Instructor(s)	Dr. Amin Rajabzadeh	E-Mail: rajaba@mcmaster.ca Office Hours: Tu – 12:30 pm -2:30 pm in ETB 203	
	Dr. Zoi Bogdanova	E-Mail: bogdanz@mcmaster.ca	
	Dr. Nicoletta Ladanyi	E-Mail: ladanyi@mcmaster.ca	
	Dr. Walter Cristofoli	E-Mail: cristofw@mcmaster.ca	
2. COURSE SPECIFICS			
Course Description			
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	39
	L	Laboratory, workshop or fieldwork	36
	T	Tutorial	
	DE	Distance education	
	Total Hours		75
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	978-0-495-55828-6	Required Text: Fundamentals of Analytical Chemistry, 8 th or 9 th Edition	Skoog, D.A.; West, D.M.; Holler, F.J.; and Crouch, S.R. Brooks/Cole, Cengage Learning; USA, 2014
	0-07-351109-9	Textbook (optional) Chemistry, 11 th Edition	
	Other Supplies	Source	
	Laboratory Manual for 1AC3 Available on Avenue in the course content: http://avenue.mcmaster.ca		
Prerequisite(s)	<u>ENG TECH 1CH3</u> and registration in Biotechnology or Process Automation		

	Technology
Corequisite(s)	
Antirequisite(s)	
Course Specific Policies	<p>You must pass both Theory and Lab components (50% minimum) for a passing this course.</p> <p>Attendance. Attendance.</p> <p>Regular attendance and active participation in all classroom sessions are essential for success in this course.</p> <p><u>Absences, Late Submissions, and Re-writes.</u></p> <p>(i) Assignments. All assignments must be submitted by the stated deadlines. Late assignments will not be accepted.</p> <p>(ii) Tests. All tests are to be written at the times announced, unless alternative arrangements have been made previously between the student and the professor to cover exceptional circumstances. Students with special needs must follow inform the professor through McMaster Student Accessibility Services of their requirements <u>five days prior to the test date</u> so that alternative arrangements can be made.</p> <p>If you miss a test because of an emergency, you must contact the professor no later than the next business day and also fill out a MSAF which can be accessed through the McMaster University web site. Proof and details of the emergency (such as a doctor's note) must be presented to the professor before alternate arrangements can be finalized. All notes will be verified for their authenticity.</p> <p>All make-up tests are to be written at a pre-arranged time in the designated area in accordance with the student policy manual. Students who fail to appear after having made arrangements for the re-write, according to the above, will be considered "absentees" and will be assigned a grade of zero for the test.</p> <p>In the case of a missed work due to sickness or other compelling reasons, if a makeup test is not possible, the weight of the missed work will be added to the weight of the final exam. In such a case, once a satisfactory documentation of the missed work is submitted, the student should discuss the details with the instructor about the revised evaluation scheme.</p> <p>(iii) Labs. A three-hour lab from the Departmental Manual will be performed <u>every week.</u></p> <p>Students are expected to attend all lab sessions, complete all experiments, and submit a lab report for every lab performed. <i>Failure to do so will automatically result in a grade of zero for the lab. Absence from a lab without prior permission or a suitable explanation will result in a grade of zero for that lab and may result in a grade of F for the course.</i> If a student misses a lab but provides a MSAF, then the final lab mark will be calculated based on the remaining labs. If a student misses the first week of a two-week lab, and provides a MSAF, the instructor may allow the student to complete the missed work in a different lab session, with the permission from the instructor for that section. If this is not possible, the case will be discussed with the class coordinator.</p>

	<p>Labs are due one week after completion of the laboratory work except for the last experiment which should be submitted the next working day. The analysis data as entered in the lab report form during the performance of the lab, which is attested with initials by the instructor, with appropriate post laboratory calculations as required, is the final report to be submitted. You should also include a title page which should contain the following information: your name, lab section, and name of lab partner, name of instructor, experiment performance date, and experiment report date.</p> <p>Reports submitted late without a suitable explanation will incur a penalty of 15% per day, including weekends and statutory holidays.</p> <p>Safety procedures as outlined in the WHMIS training course must be adhered to at all times during laboratory work. Long pants and closed-toe shoes must be worn in the lab.</p>	
Departmental Policies	<p>Students must maintain a GPA of 3.5/12 to continue in the program.</p> <p>In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of “out-of-class” work for every scheduled hour in class. “Out-of-class” work includes reading, research, assignments and preparation for tests and examinations.</p> <p>Where group work is indicated in the course outline, such collaborative work is mandatory.</p> <p>The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception.</p> <p>Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class.</p> <p>Instructor has the right to submit work to software to identify plagiarism.</p>	
3. SUB TOPIC(S)		
Week 1	An introduction to Analytical methods	Chapter 1
Week 2	Sampling and sample treatments, analysis procedures and calculations used in Analytical Chemistry.	Chapter 2, Chapter 4, Chapter 8
Week 3	Errors in Chemical Analysis – Statistical treatment	Chapter 5, Chapter 6
Week 4	Data treatment and evaluation – Quality assurance	Chapter 7
Week 5	Gravimetric analysis – unit dimensional analysis. Gravimetric factor, and percent composition	Chapter 12
Week 6	Gravimetric analysis – solubility and solubility product constant	Chapter 11
Mid-term Recess: Monday, February 20 to Sunday, February 26, 2017		
Week 7	Gravimetric analysis – precipitate formation and filtration	Chapter 12
Week 8	Oxidation-reduction reactions – application in analytical chemistry	Chapter 20
Week 9	Acids, bases, and buffer solutions – measurement of pH	Chapter 14, Chapter 15
Week 10	Volumetric analysis and Precipitation titrations	Chapter 17
Week 11	Spectrochemical methods – Beer’s law and its application	Chapter 24

Week 12	Optical methods – instrumental analysis	Chapter 25
Week 13	Gravimetric analysis – precipitate formation and filtration	Chapter 12
Classes end: Thursday, April 6, 2017 Final examination period: Tuesday, April 11 to Thursday, April 27, 2017 All examinations MUST be written during the scheduled examination period.		
List of experiments		
Lab 0 - Introduction to Laboratory Procedures:	Check-in of equipment; review of laboratory techniques; discussion of safety and reporting of data	
Lab 1 Laboratory Techniques:	An Introduction to the Use of the Analytical Balance and to the Calibration of Volumetric Equipment	
Lab 2 Gravimetric Analysis:	The Determination of Silicon in Cast Iron	
Lab 3 Complexometric Titration:	Determination of Copper in a Copper salt by Titration with EDTA	
Lab 4 Sampling and Analysis:	Mohr Determination of Chloride in a Commercial Salt Sample	
Lab 5 Iodometric Titration:	Iodometric Determination of Copper in Brass	
Lab 6 Spectrophotometry:	Spectrophotometric Determination of Nickel in Steel using Beer-Lambert Law	
Lab 7 - Calibration and Use of a pH Meter:	Determination of Alkalinity in Water Using Titration Curves	
Lab 8 - Method of Standard Addition:	Spectrophotometric Determination of Potassium Chromate Content in a Sample by the method of Standard Addition	
	<i>For lab schedule, please see the list on Avenue</i>	
<p>Note that this structure represents a plan and is subject to adjustment term by term. The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.</p>		
4. ASSESSMENT OF LEARNING *including dates*		Weight
Assignments		10
Quizzes		10
Mid-term tests		20
Labs		25
Final examination (tests cumulative knowledge)		35
TOTAL		100%
Percentage grades will be converted to letter grades and grade points per the University calendar.		
5. LEARNING OUTCOMES		
1. Interpreting terminology and describing methods of analysis found in an analytical laboratory		
2. Explaining sampling procedures, sample selection and sample treatment		
3. Illustrating the working principles and data processing of optical methods of analysis		
4. Using calculations and experimental techniques of gravimetric analysis and precipitation		
5. Carrying out standard preparations and conversion factors for determination of concentrations		
6. Implementing various methods of titration analysis		
7. Demonstrating the ability to work effectively in groups during laboratory activities		
6. POLICIES		

Anti-Discrimination

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.

http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

Academic Integrity

You are required to exhibit honestly and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, located at: <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism. E.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is an on-line self-reporting tool for **Undergraduate Students** to report absences for:

- 1) Relief for missed academic work worth less than 25% of the final grade resulting from medical or personal situations lasting up to three calendar days:
 - Students may submit a maximum of one academic work missed request per term. It is the responsibility of the student to follow up with instructors immediately (within the 3 day period that is specified in the MSAF) regarding the nature of the accommodation. All work due in that time period however can be covered by one MSAF.
 - MSAF cannot be used to meet religious obligation or celebration of an important religious holiday, for that has already been completed or attempted or to apply for relief for any final examination or its equivalent.
- 2) For medical or personal situations lasting more than three calendar days, and/or for missed academic work worth 25% or more of the final grade, and/or for any request for relief in a term where the MSAF has not been used previously in that term:
 - Students must visit their Associate Dean's Office (Faculty Office) and provide supporting documentation.

E-Learning Policy

Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail account, and program affiliation may become apparent to all other students in the course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about this disclosure please discuss this with the course instructor. Avenue can be accessed via

<http://avenue.mcmaster.ca>.

Communications

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

Turnitin (Optional)

This course will be using a web-based service (Turnitin.com) to reveal plagiarism. Students submit their assignment/work electronically to Turnitin.com where it is checked against the internet, published works and Turnitin's database for similar or identical work. If Turnitin finds similar or identical work that has not been properly cited, a report is sent to the instructor showing the student's work and the original source. The instructor reviews what Turnitin has found and then determines if he/she thinks there is a problem with the work. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to

<http://www.mcmaster.ca/academicintegrity/turnitin/students/>

Protection of Privacy Act (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality.

<http://www.mcmaster.ca/univsec/fipppa/fipppa.cfm>

Academic Accommodation of Students with Disabilities Policy

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information consult McMaster's policy for Academic Accommodation of Students with Disabilities

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf>

Students must forward a copy of the SAS accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses NOT to take advantage of a SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. <http://sas.mcmaster.ca>

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University.

http://studentconduct.mcmaster.ca/student_code_of_conduct.html