

BC (CH) 430L Instrumental Analysis Laboratory Spring 2019

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Office Hours: Tues 11:30-1:30, Fri 9:30-11:20

Spring 2019 Lab Meeting Times/Location:

Tuesdays (8:30 – 11:20AM) & Thursdays (8:30 – 11:20AM):

Henry Hall 223 (Note: Henry Hall Lab 7 and Lab 8A will be our hands-on training rooms)

NOTE: There will be additional laboratory meeting times in addition to the ones listed in this course syllabus. They will be announced and scheduled throughout the semester. The purpose will be to maximize individualized times for performing experiments on advanced instrumentation.

Course Description (2 Credit Hours):

Instrumental analysis laboratory (BC/CH 430L) is a one semester course targeting students with an interest in the field of biomedical research and/or education, as well as those intending to obtain a graduate level of science degree. The laboratory course will cover topics from the theoretical background of electrical theory, spectrometer devices, to hands-on application utilizing advanced instrumentation such as Liquid Chromatography/Mass Spectrometry (LCMS), Fourier Transform Infrared (FTIR) Spectroscopy and Gas Chromatography/Mass Spectroscopy (GCMS). Advanced structural elucidation utilizing spectral data from 1- and 2-dimensional Nuclear Magnetic Resonance (NMR) Spectroscopy and state-of-the-art molecular modeling docking studies will be performed with x-ray crystallographic structure of proteins and their interaction with drugs. *Prerequisites: BI 360/L or equivalent*

Course Learning Outcomes:

Students completing BC (CH) 430L will demonstrate an understanding:

1. of electronic components of a spectrometer.
2. of basic concepts of electrical theory.
3. of polarity with respect chromatographic separation technologies.
4. of advanced spectroscopic methods for the elucidation and purity assessment of molecules.
5. of docking small molecules to specific protein targets in molecular modeling.

Required Materials:

Students should bring a laboratory coat, safety glasses and scientific calculator to each class meeting. Be advised that classes scheduled for classroom material may also involve visits to the laboratory, and it is your responsibility to be prepared for both locations at each meeting. This is considered to be part of your professional development as a scientist and will be taken into consideration as part of your Attendance and Professional Practice grades.

Grading

Attendance is very important. You will have attendance points deducted for every unexcused absence. In addition, you will have in-class work problems and discussion directly associated with homework and quizzes.

The course grades will be based on the following total points and scale:

GRADE SCORE ITEMIZATION:

Instructor	Item	Score (Points)
Dr. Kawakami	5 In-Class Worksheets	50
Dr. Kawakami	5 Quizzes	50
Dr. Kawakami	Mid-Term Exam I	100
Dr. Kawakami	LCMS Project Report	125
Dr. Perrault	Mid-Term Exam II	100
Dr. Perrault	GC-MS Certification	100
Dr. Perrault	Final Project Poster Presentation	100
Dr. Perrault	Attendance & Professional Practice	25
	Total	650

FINAL GRADE POINTS AND SCALE

A	585-650	90-100 %
B	520-584	80-89 %
C	422-519	65-79 %
D	292-421	45-64 %
Fail	below 292	below 45%

MARIANIST CHARACTERISTICS

An education in the Marianist Tradition is marked by five principles:

1. Education for formation in faith
2. Provide an integral, quality education
3. Educate in family spirit
4. Educate for service, justice and peace
5. Educate for adaptation and change

REMINDERS OF IMPORTANT UNIVERSITY-WIDE POLICIES

The following policies are summarized from the Student Handbook. Please be sure that you have reviewed these and other policies in your most recent handbook. This can be found at <https://studentaffairs.chaminade.edu/>.

1. Attendance

Students are expected to attend all classes. The University assumes you are mature enough to be responsible for your own behavior. Any absence of two weeks or more will be reported to the Office

of the Associate Provost and the Registrar. You must notify me in writing of any illness which prevents you from attending class. Notification may be done by e-mail, calling me at my office, or by leaving word at the Faculty Services (735-4739). Anyone who stops attending a course, without officially withdrawing may receive a failing grade. Students with three or more unexcused absences will lose one letter grade.

Federal regulations require continued attendance for continuing payment of financial aid. If attendance is not continuous, financial aid may be terminated. When illness or personal reasons necessitate continued absence, the student should officially withdraw from all affected courses. Anyone who stops attending a course without official withdrawal may receive a failing grade.

2. Classroom Department

- You are expected to be punctual; unexcused tardiness will be considered an absence.
- Smoking and alcoholic beverages are prohibited in all classrooms, whether or not class is in session.
- No pets are allowed in class. Exceptions will be made in the case of service animals.
- Cell phones may be used when instructors authorize for pedagogical reasons or in-class activities. They may not be used to make or receive personal calls or messages during a class, as a matter of safety and courtesy.
- Appropriate footwear and clothing will be worn during all classes, as well as in the library, cafeteria and administrative offices.
- Laboratory usage policy will be followed strictly at all times (2017-18 Student Handbook, page 81).

3. Academic Honesty

Students are responsible for promoting academic honesty at Chaminade by not participating in or facilitating others' participation in any act of academic dishonesty, and by reporting incidences of academic dishonesty (such as theft of tests, records, and other confidential materials, altering grades, and/or plagiarism) to their instructors.

4. Freedom of Expression

Students may be required to know thoroughly the specific bodies of knowledge or interpretations or theories set by the professor, but are free to reserve personal judgment as to the truth or falsity of them. Students are expected to maintain the standards of academic performance articulated in course syllabi, supplemental readings, assignments, and Academic and Student Affairs policies. The instructor is considered the normal and competent judge of academic work. Students have an appeals process in the rare cases of unjust grading and evaluation by the procedure detailed in the Academic Grievance section of the Student Handbook.

CLASS SCHEDULE**Part I, Instructor: Dr. Kawakami**

Week of	Topic
1/14	Course Introduction and Part I Pre-test. Basic electrical theory (Split-Phase or Three-Phase), Site Preparation and Site Acceptance Plan
1/21	NMR, The Instrument. ^1H -NMR in 1 Dimension. Worksheet 1
1/28	Quiz 1 (WS #1). ^{13}C -NMR and Higher Order ^1H -NMR. Worksheet 2
2/4	Quiz 2 (WS #2). 1D NMR Splitting Patterns/Coupling Constants. Through Space NMR (Nuclear Overhauser Effect). Worksheet 3
2/11	Quiz 3 (WS #3). Homonuclear and Heteronuclear 2D-NMR. Worksheet 4
2/18	Quiz 4 (WS #4). Midterm Examination I.
2/25	HP-TLC, Rotary Evaporator and Medium Pressure Flash Columns HPLC and Mass Spec (LCMS), the Theory. Hands-On LCMS. Worksheet 5 (Additional Hours will be assigned for small groups of 2 to 3 for LCMS projects in Flow Injection Analysis mode). Part 1 Post-test. <i>*Note Quiz 5 to be given on 3/5.</i>

Part II, Instructor: Dr. Perrault

Date	Topic	Notes
3/5 and 3/7	Part II Pre-test, Introduction to GC-MS GC-MS Training	
3/12 and 3/14	GC×GC-MS GC×GC-MS Training	
3/19 and 3/21	Project planning	
3/26 and 3/28	Spring Recess	No Class
4/2 and 4/4	Chemometrics Demonstration Review	
4/9 and 4/11	Exam, Poster Instructions Projects	Independent Scheduling
4/16 and 4/18	Projects	Independent Scheduling
4/23 and 4/25	Projects	Posters due 4/25 by 5:00 PM
4/30 and 5/2	Poster Presentations Part II Post-test, Survey and Course Evaluations	

*GC-MS certification test must be scheduled one-on-one with Dr. Perrault before 4/30. Failure to schedule and complete certification test prior to 4/30 will result in a grade of 0/100. Please plan ahead when scheduling this, as there will be limited availability during the last week of instruction.