CHE 3070 & 3070L **Instrumental Analysis**
Department of Chemistry Syllabus Fall 2026

Instructor
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Office Hours:
MW: 1:45 – 2:30 pm and by appointment

Course Meeting Times
MWF 2:45 – 3:50 pm
Ryan Learning Center 102

Laboratory (Sator Hall 216)
Section 1: Thursday, 8:30 – 11:30 pm
Section 2: Thursday, 1:30 – 4:30 pm

Textbook
Rouessac & Rouessac, *Chemical Analysis: Modern Instrumentation and Techniques*, 3rd edition.

Recommended: Harris & Lucy, *Quantitative Chemical Analysis*, any recent edition.

Course Description: Instrumental Analysis (2 Units)
Analytical analysis using instruments such as gas chromatography, high performance liquid chromatography, ultraviolet-visible, FT-infrared and nuclear magnetic resonance spectroscopy, and mass spectrometry.

Course Website (Canvas)
Additional readings, practice problems, exam keys, and extra copies of class handouts will be available *only* on the course website. The detailed class schedule is available on canvas.

Group Literature Presentations
A major objective for this course is for you to be able to think critically about real-world applications of chemical instrumentation. With this goal in mind, the class will conduct group discussions of journal articles describing recent applications in chemical instrumental analysis.

During each presentation day, as a *participant*, you'll receive credit for coming prepared to class and actively participating in the discussion. Once during the semester, as *presenters*, your group will receive credit for leading the discussion (including giving an 10-15 minute group presentation introducing the paper, leading a brief discussion of the instrumental method and relevant issues it brings up).

Problem Sets
Problem sets will be assigned for each topic. The problems will be graded based on *participation* and *effort*.

Prelecture Reading Questions
A prelecture reading quiz will be available in canvas for each lecture class. The assignment will describe the reading to be completed before the next lecture and ask a few simple questions.

Exams
There will be two exams (one hour each). See the course schedule for the dates of the exams. The second exam is the final exam: **Monday, October 19**. Makeup examinations will be given only for excused absences. In such cases, appropriate documentation must be provided within two working days of the end of the excused absence.

Laboratory
Carefully selected laboratory exercises will give you an opportunity to apply both theoretical and technical aspects of chemical instrumental analysis. Patience, critical thinking, and intellectual independence will serve you well in this laboratory!

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Grades

Your final grade will be determined as follows:

Group Literature Presentations	10%
Prelecture Reading Questions	10%
Class Participation	5%
Problem Sets	10%
Laboratory	25%
Exams (2)	40%
Total	**100%**

Grade cutoffs: A, 100-90; B, 90-80; C, 80-70; D, 70-60; F, 60 and below. +/- will be assigned within these ranges.

CHE3070 Goals	CHE3070 Outcomes
Students will:	Students will be able to:
1. learn how to select an appropriate instrumental method	a. identify strengths and limitations of instrumental methods (including UV-Vis absorption spectroscopy, atomic absorption and emission spectroscopy, IR spectroscopy, atomic and molecular mass spectrometry, and gas- and liquid-chromatography) b. compare instrumental methods with respect to precision, detection limit, linear range and selectivity c. employ standards in instrumental analyses, including internal and external standards, and the method of standard addition
2. understand the relationship between signal and noise	a. identify sources of noise (both general and method-specific) and strategies for reducing each type b. calculate the signal-to-noise ratio for a particular data set c. calculate the number of scans required to improve signal-to-noise ratio by a specified amount
3. understand the theory behind chemical instruments	a. draw a diagram to represent the energy changes during various types of spectroscopy b. convert between wavelength, frequency, wavenumbers, and energy of electromagnetic radiation c. describe the chemical phenomenon responsible for a particular signal d. convert between absorbance and % transmittance e. determine the concentration of an unknown sample using Beer's Law f. describe sources of deviation from Beer's Law and strategies for preventing or correcting the deviation g. using experimental data, determine the column efficiency and resolution for a chromatographic separation
4. learn the components of chemical instruments	a. identify the major components in several types of chemical instrumentation and explain how they work b. draw a block diagram for a particular instrument or configuration c. justify the choice of a particular component, configuration, or experimental condition in an instrumental method
5. apply knowledge of instrumental analysis to real-world problems	a. perform UV-vis, ICP-OES, and IR spectroscopy; and gas- and liquid-chromatography and analyze the resulting data b. present an article from the recent chemical literature highlighting the instrumental method used, and write a brief abstract summarizing the key points from the article you presented c. write a concise and clear report describing the background, experimental procedure, results, data analysis, and conclusions of an instrumental analysis

Program Learning Outcomes: CHEM PLO 2 (HPLC) and ENVS PLO 3 (HPLC, ICP, IR, UV-vis) will be assessed directly by faculty laboratory instructors' observation of students' use of instruments.

PLNU Mission: To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

General Education Mission

PLNU provides a foundational course of study in the liberal arts informed by the life, death, and resurrection of Jesus Christ. In keeping with the Wesleyan tradition, the curriculum equips students with a broad range of knowledge and skills within and across disciplines to enrich major study, lifelong learning, and vocational service as Christ-like participants in the world's diverse societies and culture.

Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Traditional Undergraduate Records: Final Exam Schedules site. If you find yourself scheduled for three (3) or more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

PLNU Academic Honesty Policy

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. For all student appeals, faculty and students should follow the procedures outlined in the University Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

PLNU Academic Accommodations Policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2533). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. Professors are able to view a student's approved accommodations through Accommodate.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

PLNU Attendance and Participation Policy

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an "F" grade.

Spiritual Care

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If you have questions, a desire to meet with the chaplain or have prayer requests you can contact your professor or the Office of Spiritual Life and Formation.

Sexual Misconduct and Discrimination

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that accommodations and resources are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix.

Artificial Intelligence (AI) Policy
You are allowed to use Artificial Intelligence (AI) tools (e.g., ChatGPT, Gemini Pro 1.5, GrammarlyGo, Perplexity, etc) as a study tool, but you are not allowed to use AI tools on exams and quizzes. If you have any doubts about using AI, please gain permission from the instructor.

State Authorization
State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on State Authorization to view which states allow online (distance education) outside of California.

PLNU Copyright Policy
Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.]

PLNU Recording Notification
In order to enhance the learning experience, please be advised that this course may be recorded by the professor for educational purposes, and access to these recordings will be limited to enrolled students and authorized personnel.
Note that all recordings are subject to copyright protection. Any unauthorized distribution or publication of these recordings without written approval from the University (refer to the Dean) is strictly prohibited.

Lomabooks Instructions for Students
This course is part of our course material delivery program, **LomaBooks**. The bookstore will provide each student with a convenient package containing all required physical materials; all digitally delivered materials will be integrated into Canvas.
You should have received an email from the bookstore confirming the list of materials that will be provided for each of your courses and asking you to select how you would like to receive any printed components (in-store pick up or home delivery). If you have not done so already, please confirm your fulfillment preference so the bookstore can prepare your materials.
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