



Natural Sciences and Mathematics  
Division of Chemistry and Biochemistry

## BC/CH 334L Analytical Chemistry Lab

Section 01      Monday      Henry Hall, L8 Laboratory      2:30 – 5:20 PM  
Credits: #1      Term: Spring 2026

### Instructor Information

**Instructor:** Dr. Kelvin Frazier

**Email:** [kelvin.frazier@chaminade.edu](mailto:kelvin.frazier@chaminade.edu)

**Office Location:** Henry Hall 206C

**Office Hours:** MWF 11:30am-12:30pm using Calendly <https://calendly.com/kelvin-frazier>

### Communication

Questions for this course can be emailed to the instructor at [kelvin.frazier@chaminade.edu](mailto:kelvin.frazier@chaminade.edu). I respond to student emails by the next school day in most cases. Typically, this will be within 24 hours, but response time may be longer for e-mails sent during the evening, weekend, or holidays. It is the responsibility of the student to check their email frequently.

### School & Department Information

#### School of Natural Sciences and Mathematics

Office Location: Wesselkamper, Room 116

Phone: (808) 440-4204

If you have questions regarding the Division of Chemistry and Biochemistry, reach out to your instructor or the School of Natural Sciences and Mathematics.

### Course Description & Materials

#### Catalog Course Description

One three-hour laboratory period per week to accompany CH 334. Separation techniques and quantitative identifications of chemical entities are discussed, including gravimetric, volumetric, and spectrophotometric analyses. Students will gain an understanding of many chemical techniques used in the qualitative and quantitative analysis of a variety of samples. In addition to learning basic analytical laboratory skills, students will become familiar with sampling

techniques, statistical treatment of data, propagation of error, maintenance of a laboratory notebook, and the use of software to manage chemical data.

### **Course Overview**

This course gives an introduction to the student classical wet and instrumental analysis. Emphasis will be given to the methods commonly used in a standard laboratory setting. Raw data from the analysis will be processed to a format that is acceptable current standard of scientific writing.

### **Time Allocation**

The unit of semester credit is defined as university-level credit that is awarded for the completion of coursework. One credit hour reflects the amount of work represented in the intended learning outcomes and verified by evidence of student achievement for those learning outcomes. Each credit hour earned at Chaminade University should result in a minimum of 45 hours of engagement, regardless of varying credits, duration, modality, or degree level. This equates to one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester. Terms that have alternative lengths, such as 10 week terms, should have an equivalent amount of faculty instruction and out-of-class student work to meet each credit hour. Direct instructor engagement and out-of-class work result in total student engagement time of 45 hours for one credit. The number of engagement hours may be higher, as needed to meet specific learning outcomes.

### *Specific Credit Situations*

The minimum 45 hours of engagement per credit hour can be satisfied in fully online, internship, or other specialized courses through several means, including (a) regular online instruction or interaction with the faculty member and fellow students and (b) academic engagement through extensive reading, research, online discussion, online quizzes or exams; instruction, collaborative group work, internships, laboratory work, practica, studio work, and preparation of papers, presentations, or other forms of assessment. This policy is in accordance with federal regulations and regional accrediting agencies.

#### **Credit Hours:**

3 hour per class lab.	(Subtotal = 21)
1 hours of review/repeat review/memorization per class lab.	(Subtotal = 4)
1 hours of safety quiz preparation per quiz (4 quizzes)	(Subtotal = 4)
1 hours of lab notebook quiz	(Subtotal = 4)
3 hours of lab report writing	(Subtotal = 9)
3 hours for Oral Presentation preparation and recording	(Subtotal = 3)

Total Hours = 45

## Required Materials

- No laboratory manual is required. Experimental procedures will be posted on Canvas prior to the scheduled lab meetings. It is your responsibility to read this material prior to class and be prepared for upcoming experiments.
- Students are required to wear fully enclosed shoes, laboratory coats and safety glasses in lab at all times. Long pants are also highly recommended underneath laboratory coats.
- A laboratory notebook (composition book) and scientific calculator are required and should be brought to each class. You will not be permitted to use your cell phone as a calculator.
- A mobile device (phone, tablet, or laptop) is required for quizzes.
- A tablet or laptop are recommended to be brought to class during each period to use spreadsheet functions

## [Canvas \(<https://chaminade.instructure.com>\)](https://chaminade.instructure.com)

All course evaluations will be conducted via Canvas, so even if you are teaching face-to-face courses, your students will have to access the site.

## Learning Outcomes

### Program Learning Outcomes (PLOs)

#### *Chemistry Mission Statement*

Chemistry has justifiably been labeled 'The Central Science'. Training in this discipline is therefore beneficial for all citizens of the modern world. All materials in the universe are made up of chemicals; a knowledge of chemistry is indeed a knowledge of ourselves.

The mission of this program is to:

- Promote molecular literacy (i.e. awareness of the importance of physical, chemical, and biological changes on the atomic and molecular scale)
- Provide hands-on laboratory training using modern chemical techniques and instrumentation
- Engage students in an undergraduate research program
- Enable students to integrate knowledge of the physical world
- Educate about the entry requirements, career pathways, and progression into advanced education in the chemical sciences

#### *Program Learning Outcomes in Chemistry*

Upon completion of the undergraduate program in Chemistry, students will be able to:

1. Apply the scientific method as it is used in organic chemistry, inorganic chemistry, analytical chemistry, physical chemistry, and molecular sciences
2. Recognize and explain chemical theory as it applies to the physical world

3. Visualize, evaluate, validate, and interpret results of chemical analyses as part of an integral and quality education (This PLO is a link to our Marianist Values of to provide an integral, quality education)
4. Solve problems using analytical reasoning, professional resources, professional conduct, and ethical behavior
5. Communicate chemical information effectively in oral and written formats

Course Learning Outcomes	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5
1. Apply quantitative analytical techniques (gravimetric, volumetric, and spectrophotometric) to determine chemical composition.	X		X		
2. Analyze and interpret experimental data to draw evidence-based conclusions and identify sources of systematic and random error.	X	X	X		
3. Demonstrate accurate and precise quantitative measurement techniques and maintain complete, traceable laboratory records.	X	X	X	X	
4. Collaborate effectively with peers to collect, analyze, and interpret experimental data.	X			X	X
5. Operate and evaluate analytical instrumentation (e.g., spectrophotometers) to obtain reliable chemical data.	X	X	X		
6. Apply statistical methods to evaluate data quality, uncertainty, and error propagation in chemical measurements.	X		X	X	
7. Communicate experimental results effectively through written laboratory reports and oral presentations using standard scientific conventions.			X		X

### Marianist Values

This class represents one component of your education at Chaminade University of Honolulu. An education in the Marianist Tradition is marked by five principles and you should take every opportunity possible to reflect upon the role of these characteristics in your education and development:

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

The Natural Sciences Division provides an *integral, quality education*: sophisticated integrative course content taught by experienced, dedicated, and well-educated instructors.

- We *educate in family spirit* – every classroom is an *Ohana* and you can expect to be respected yet challenged in an environment that is supportive, inclusively by instructors who take the time to personally get to know and care for you.
- We *educate for service, justice, and peace*, since many of the most pressing global issues (climate change, health inequity, poverty, justice) are those which science and technology investigate, establish ethical parameters for, and offer solutions to.
- We *educate for adaptation and change*. In science and technology, the only constant is change. Data, techniques, technologies, questions, interpretations, and ethical landscapes are constantly evolving, and we teach students to thrive on this dynamic uncertainty.

The study of science and technology can be formative, exploring human creativity and potential in the development of technologies and scientific solutions, the opportunity to engage in the stewardship of the natural world, and the opportunity to promote social justice. We provide opportunities to engage with the problems that face Hawai‘i and the Pacific region through the Natural Sciences curriculum, in particular, those centered around severe challenges in health, poverty, environmental resilience, and erosion of traditional culture. The Marianist Educational Values relate to Native Hawaiian ideas of *mana*, *na‘auao*, *ohana*, *aloha* and *aina*. We intend for our Natural Sciences programs to be culturally-sustaining, rooted in our Hawaiian place, and centered on core values of *Maiau*, be neat, prepared, careful in all we do; *Makawalu*, demonstrate foresight and planning; *‘Ai*, sustain mind and body; *Pa‘a Na‘au*, learn deeply.

### **Native Hawaiian Values**

Education is an integral value in both Marianist and Native Hawaiian culture. Both recognize the transformative effect of a well-rounded, value-centered education on society, particularly in seeking justice for the marginalized, the forgotten, and the oppressed, always with an eye toward God (Ke Akua). This is reflected in the ‘Olelo No‘eau (Hawaiian proverbs) and Marianist core beliefs:

1. Educate for Formation in Faith (Mana) E ola au i ke akua (‘Olelo No‘eau 364) May I live by God.
2. Provide an Integral, Quality Education (Na‘auao) Lawe i ka ma‘alea a kū‘ono‘ono (‘Olelo No‘eau 1957) Acquire skill and make it deep.
3. Educate in Family Spirit (‘Ohana) ‘Ike aku, ‘ike mai, kōkua aku kōkua mai; pela iho la ka nohana ‘ohana (‘Olelo No‘eau 1200) Recognize others, be recognized, help others, be helped; such is a family relationship.
4. Educate for Service, Justice and Peace (Aloha) Ka lama kū o ka no‘eau (‘Olelo No‘eau 1430) Education is the standing torch of wisdom.
5. Educate for Adaptation and Change (Aina) ‘A‘ohe pau ka ‘ike i ka hālau ho‘okahi (‘Olelo No‘eau 203) All knowledge is not taught in the same school

## Course Activities

### Discussions

Music Devices and Cellular Phones: Unless specifically permitted by your instructor, use of music devices and cell phones is prohibited during all Natural Science and Mathematics classes, as it is discourteous and may lead to suspicion of academic misconduct. Students unable to comply will be asked to leave class.

Out of consideration for your classmates, please set your cell phone to silent mode during class. Students are encouraged to bring laptops or tablets to class, as the instructor will assign online activities and readings that will require the use of a laptop or tablet. Laptops and tablets should not be misused, such as for checking distracting websites. Use your best judgment and respect your classmates and instructor.

### Quizzes

The quiz is posted on Canvas. (Class does not meet in-person on a quiz day).

## Course Policies

### Attendance

The following attendance policy is from the 2019-2020 Academic Catalog (p. 54-55). Faculty members should also check with their divisions for division-specific guidelines.

Students are expected to attend regularly all courses for which they are registered. Student should notify their instructors when illness or other extenuating circumstances prevents them from attending class and make arrangements to complete missed assignments. Notification may be done by emailing the instructor's Chaminade email address, calling the instructor's campus extension, or by leaving a message with the instructor's division office. It is the instructor's prerogative to modify deadlines of course requirements accordingly. Any student who stops attending a course without officially withdrawing may receive a failing grade.

Unexcused absences equivalent to more than a week of classes may lead to a grade reduction for the course. Any unexcused absence of two consecutive weeks or more may result in being withdrawn from the course by the instructor, although the instructor is not required to withdraw students in that scenario. Repeated absences put students at risk of failing grades.

Students with disabilities who have obtained accommodations from the Chaminade University of Honolulu Tutor Coordinator may be considered for an exception when the accommodation does not materially alter the attainment of the learning outcomes.

Federal regulations require continued attendance for continuing payment of financial aid. When illness or personal reasons necessitate continued absence, the student should communicate first with the instructor to review the options. Anyone who stops attending a course without official withdrawal may receive a failing grade or be withdrawn by the instructor at the instructor's discretion.

### **Late Work**

We recognize student's situation can change rapidly. It is important to communicate with your instructor so that they can help you to meet the learning objectives of the course.

0-24 hours late 5 points deduction  
24-48 hours late 10 points deduction  
48-72 hours late 15 points deduction  
72-96 hours late 20 points deduction  
96-120 hours late 25 points deduction  
>120 hours late 30 points deduction or receive a zero

Please be sure to let your instructor know in advance if you cannot attend class for any reason. Unexcused absences for two consecutive weeks may result in being withdrawn from the course by the instructor. A planned, excused absence must be communicated to the instructor at least one week prior to the class. Necessary arrangements will be made to meet student learning objectives. An unplanned, excused absence must be communicated to the instructor within one week of the missed class. Necessary arrangements will be made to meet student learning objectives if the timeframe of notice is met.

Determination of valid excuses for missed classes is at the sole discretion of the instructor.

Student athletes should communicate absences to the instructor with the earliest possible notice. Students are not allowed to miss class for practices.

### **Extra Credit**

**There is no “extra credit” for BC/CH 334L and no rounding of grades.**

### **Changes to the Syllabus**

While the provisions of this syllabus are as accurate and complete as possible, your instructor reserves the right to change any provision herein at any time. Every effort will be made to keep

you advised of such changes, and information about such changes will be available from your instructor.

### **Grades of Incomplete**

Students and instructors may negotiate an incomplete grade when there are specific justifying circumstances. When submitting a grade the "I" will be accompanied by the alternative grade that will automatically be assigned after 90 days. These include IB, IC, ID, and IF. If only an "I" is submitted the default grade is F. The completion of the work, evaluation, and reporting of the final grade is due within 90 days after the end of the semester or term. This limit may not be extended.

### **Lab Notebooks**

The lab notebook is where all notes, raw data and calculations for experiments will be documented as well as who participated in the experiment and when the experiment occurred. Lab notebooks must be bound, written in blue or black ink, and have pages numbered. Mistakes happen and are expected; however, they still need to be readable, thus mistakes are only to be crossed out with a single line, and NO correction tape/white out should be used. Lab notebooks should not be rewritten to make it look prettier. Notebooks will be checked at the beginning and end of each lab meeting to assess completion and accuracy.

The first page of your lab notebook should be a table of contents that includes the following information:[date(s) of experiment, experiment title, page number]

Each entry for a LAB experiment should include:

- Title
- Purpose
- Introduction (some key points/equations)
- Procedure Notes / Data Collected (actual data recorded from instruments)
- Calculations (show your work for any calculations here)
- Results/Conclusion

### **Lab Reports**

The lab reports will be evaluated for completion and accuracy of the information required. They should be brief and concise, and contain the following:

- An abstract describing the purpose of the experiment, the method used, and the results obtained
- Any relevant chemical equations
- Sample calculations
- Sources of error and statistical treatment of data

Failure to demonstrate that you contributed a sufficient amount of written work to the group lab report will result in a deduction or a final grade of zero with no opportunity for make-up. Additionally, a negative peer review of your lab report performance could also result in a deduction.

### **Writing Policy**

Plagiarism will not be tolerated and will be checked.

### **Final Grades**

The course grade will be based on the points earned from laboratory reports, worksheets, quizzes, and class participation. The approximate breakdown is as follows:

30% = Laboratory Report  
20% = Project Oral Presentation  
20% = Project Written Report  
20% = Lab Notebook Quiz  
10% = Attendance and Attitude  
(following safety precautions, participation, preparedness and notebook checks)

Students can expect timely and regular feedback on lab reports, oral reports, and quizzes.

Final grades are submitted to [Self-Service](#):

GRADE	Percentage	
A	90 – 100%	Outstanding scholarship and an unusual degree of intellectual initiative
B	80 – 89%	Superior work done in a consistent and intellectual manner
C	70 – 79%	Average grade indicating a competent grasp of subject matter
D	60 – 69%	Inferior work of the lowest passing grade, not satisfactory for fulfillment of prerequisite course work
F	Below 60%	Failed to grasp the minimum subject matter; no credit given

### **Important Information**

## **Academic Honesty**

Academic honesty is an essential aspect of all learning, scholarship, and research. It is one of the values regarded most highly by academic communities throughout the world. Violations of the principle of academic honesty are extremely serious and will not be tolerated.

Students are responsible for promoting academic honesty at Chaminade by not participating in any act of dishonesty and by reporting any incidence of academic dishonesty to an instructor or to a University official. Academic dishonesty may include theft of records or examinations, alteration of grades, and plagiarism, in addition to more obvious dishonesty.

Questions of academic dishonesty in a particular class are first reviewed by the instructor, who must make a report with recommendations to the Dean of the Academic Division. Punishment for academic dishonesty will be determined by the instructor and the Dean of Academic Division and may include an “F” grade for the work in question, an “F” grade for the course, suspension, or dismissal from the University.

For the most up to date information, please refer to the [Academic Honesty Policy](#) on the Chaminade University Catalog website.

## **TITLE IX AND NONDISCRIMINATION STATEMENT:**

Chaminade University of Honolulu is committed to providing a learning, working and living environment that promotes the dignity of all people, inclusivity and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. As a member of the University faculty, I am required to immediately report any incident of sex discrimination or gender-based violence to the campus Title IX Coordinator. For pregnant and parenting students, I am also obligated to provide you with similar resources for support and protections available to you. My goal is to make sure that you are aware of the range of options available to you and have access to the resources and support you need.

## **[Nondiscrimination Policy & Notice of Nondiscrimination](#)**

The university is committed to comply with all State and Federal statutes, rules, and regulations which prohibit discrimination. The university is committed to a policy of nondiscrimination on the basis of race, sex, gender identity and expression, age, religion, color, national origin (including shared ancestry and ethnic characteristics), ancestry, citizenship, disability, genetic information, marital status, breastfeeding, arrest and court record (except as permissible under

State law), sexual orientation, or status as a covered veteran. Inquiries about Title IX or general Civil Rights concerns may be referred to the University's Title IX Coordinator, the U.S. Department of Education's Office for Civil Rights, or both and contact information may be found [HERE](#). On-campus Confidential Resources may also be found here at [CAMPUS CONFIDENTIAL RESOURCES](#).

The University's Nondiscrimination Policy and Grievance Procedures can be located on the University webpage at:

<https://chaminade.edu/compliance/title-ix-nondiscrimination-policies-procedures/>.

To report information about conduct that may constitute sex discrimination or make a complaint of sex discrimination under Title IX, please refer to the [Campus Incident Report form](#). Chaminade University of Honolulu prohibits sex discrimination in any education program or activity that it operates.

The NOTICE of NONDISCRIMINATION can be found here: [Notice of Nondiscrimination](#).

#### **Hazing Prevention Resources and Athlete Helpline:**

Assists athletes, parents, coaches, and any allies interested in ensuring physical and mental safety for sports communities by offering confidential emotional support, crisis intervention, informational athlete-focused resources, and guidance related to concerns about any type of abuse—*including hazing*.

#### Chaminade University's Hazing Policy:

<https://catalog.chaminade.edu/studenthandbook/codeofconduct>

<https://hazingpreventionnetwork.org/athlete-helpline/>

<https://hazingpreventionnetwork.org/how-to-report-hazing/>

**Basic Needs Resources:** <https://chaminade.edu/basic-needs/>

#### **Campus Safety/ SafeSwords**

A program for students, faculty and staff, who may feel uncomfortable or unsafe walking alone on campus, at any time of the day. Call security, and a security professional will meet you at your location on campus. The security professional will escort you to your residence hall, car, etc. Students may utilize this when walking to and from night classes around campus or after late night events. [SafeSwords Webpage](#)

### **CUH Alert Emergency Notification**

To get the latest emergency communication from Chaminade University, students' cell numbers will be connected to Chaminade's emergency notification text system. When you log in to the Chaminade portal, you will be asked to provide some emergency contact information. If you provide a cellphone number, you will receive a text from our emergency notification system asking you to confirm your number. You must respond to that message to complete your registration and get emergency notifications on your phone.

### **Assessment for Student Work**

With the goal of continuing to improve the quality of educational services offered to students, Chaminade University conducts assessments of student achievement of course, program, and institutional learning outcomes. Student work is used anonymously as the basis of these assessments, and the work you do in this course may be used in these assessment efforts.

### **Student Conduct Policy**

Campus life is a unique situation requiring the full cooperation of each individual. For many, Chaminade is not only a school, but a home and a place of work as well. That makes it a community environment in which the actions of one students may directly affect other students. Therefore, each person must exercise a high degree of responsibility. Any community must have standards of conduct and rules by which it operates. At Chaminade, these standards are outlined so as to reflect both the Catholic, Marianist values of the institution and to honor and respect students as responsible adults. All alleged violations of the community standards are handled through an established student conduct process, outlined in the Student Handbook, and operated within the guidelines set to honor both students' rights and campus values.

Students should conduct themselves in a manner that reflects the ideals of the University. This includes knowing and respecting the intent of rules, regulations, and/or policies presented in the Student Handbook, and realizing that students are subject to the University's jurisdiction from the time of their admission until their enrollment has been formally terminated. Please refer to the Student Handbook for more details. A copy of the Student Handbook is available on the Chaminade website under Student Life.

For further information, please refer to the Student Handbook.

<https://catalog.chaminade.edu/generalinformation/studentaffairs/studenthandbook2324/studenthandbook>

## **Student with Disabilities Statement**

Chaminade University of Honolulu offers accommodations for all actively enrolled students with disabilities in compliance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA) of 1990, and the ADA Amendments Act (2008).

Students are responsible for contacting Kokua Ike: Center for Student Learning to schedule an appointment. Verification of their disability will be requested through appropriate documentation and once received it will take up to approximately 2–3 weeks to review them. Appropriate paperwork will be completed by the student before notification will be sent out to their instructors. Accommodation paperwork will not be automatically sent out to instructors each semester, as the student is responsible to notify Kokua Ike via email at [ada@chaminade.edu](mailto:ada@chaminade.edu) each semester if changes or notifications are needed.

## **Kōkua ‘Ike: Tutoring & Learning Services**

Chaminade is proud to offer free, one-on-one tutoring and writing assistance to all students. Tutoring and writing help is available on campus at Kōkua ‘Ike: Center for Student Learning in a variety of subjects (including, but are not limited to biology, chemistry, math, nursing, English, etc.) from trained Peer and Professional Tutors. Please check [Kōkua ‘Ike’s](#) website for the latest times, list of drop-in hours, and information on scheduling an appointment. Free online tutoring is also available via TutorMe. Tutor Me can be accessed 24/7 from your Canvas account. Simply click on Account > TutorMe. For more information, please contact Kōkua ‘Ike at [tutoring@chaminade.edu](mailto:tutoring@chaminade.edu) or 808-739-8305.

## **Technical Assistance for Canvas Users:**

- Search for help on specific topics or get tips in [Canvas Students](#)
- [Live chat with Canvas Support for students](#)
- Canvas Support Hotline for students: +1-833-209-6111
- Watch this [video to get you started](#)
- [Online tutorials](#): click on “Students” role to access tutorials

Contact the Chaminade IT Helpdesk for technical issues: [helpdesk@chaminade.edu](mailto:helpdesk@chaminade.edu) or call (808) 735-4855

## Course Schedule

The Professor may modify elements of this syllabus according to the operational needs of the class

Week	Dates	Experiment
1	1/12	Lab Check-In: Syllabus and Safety Information
2	1/19	<b><i>HOLIDAY: MARTIN LUTHER KING JR. DAY</i></b>
3	1/26	Tools of the Trade
4	2/2	<b>Lab 1A: Gravimetric Determination of Calcium</b>
5	2/9	<b>Lab 1A: Gravimetric Determination of Calcium</b>
6	2/16	<b><i>HOLIDAY: PRESIDENT'S DAY</i></b>
7	2/23	<b>Lab 1B: EDTA Titration of Calcium</b>
8	3/2	<b>Lab 2A: Gravimetric Analysis of Iron</b>
9	3/9	<b>Lab 2B: Spectrophotometric Analysis of Iron</b> <b>Lab 1 Report Due</b> <b>Pitch Lab 3 Procedure</b>
10	3/16	<b>SPRING RECESS</b>
11	3/23	<b>Lab 3: Characterization of BBQ Sauce Preparation</b>
12	3/30	<b>Lab 3: Characterization of BBQ Sauce</b> <b>Lab 2 Report Due</b>
13	4/6	<b>Lab 3: Characterization of BBQ Sauce (Additional Time)</b>
14	4/13	<b>Lab Notebook Quiz</b>
15	4/20	<b>Lab 3 Report Due</b>
16	4/27	<b>LAST DAY OF INSTRUCTION/Oral Presentation Due</b>