



UNIVERSITY of HAWAII®  
**WINDWARD**  
COMMUNITY COLLEGE

## **BIOC 141: FUNDAMENTALS OF BIOCHEMISTRY**

3 Credits (CRN 60106)

Online

**INSTRUCTOR:** Dr. Christopher Guay

**OFFICE HOURS:** via email/Laulima or in person by appointment

**EMAIL:** cguay@hawaii.edu

**EFFECTIVE DATE:** Spring 2019

### **WINDWARD COMMUNITY COLLEGE MISSION STATEMENT**

*Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawai'i and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide O'ahu's Ko'olau region and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence.*

### **CATALOG DESCRIPTION**

Biological chemistry focusing on the integration of concepts from general, inorganic, and biochemistry and their application to living systems. Satisfies the one-semester chemistry requirement for pre-nursing and pre-dental hygiene majors. (3 hrs. lecture)

*Prerequisites: A grade of 'C' or better in Math 103, or placement in Math 135 or instructor's consent.*

*Prerequisite: A grade of 'C' or better in MATH 25, 26, 28, 29, 75X or higher or consent of instructor.*

*WCC: DP*

### **ACTIVITIES REQUIRED OUTSIDE OF REGULAR CLASS TIMES**

You should plan on spending at least 12 hours per week to study for this class.

- **1 hour per day watching the lecture videos posted on our course website.** This will consist of watching the assigned lecture videos and going through my lecture notes/slides, which are also posted on the course website.
- **3-4 hours for textbook reading assignments.** This will consist of reading the assigned sections in the text. This can be done using the electronic copy of the course text available via the Connect portal or a hard copy of the textbook (purchasing a hard copy of the text is *optional* – it is fine to just use the electronic copy of the text if you are OK with that). Reading the material in the textbook is very important to gaining understanding of the biochemistry concepts that we will cover in this class – just watching the lecture videos is not enough! You will not succeed in this course if you do not do the assigned text readings.

- **4-5 hours working on homework problems and additional practice problems.** It is very important to practice solving problems in order to consolidate your understanding of the course material. You should practice writing out and solving calculation problems by hand even though all of the homework assignments will be submitted online via Connect. For the exams in this course, you will be required to solve problems by hand and show all of your work, so you should make sure to practice this when doing the homework problems. You can work on the problems using your notes and the text at first until things start to click. Then you should try doing some problems without any notes to make sure that you really understand things (this will also be good practice for what you will need to do on the exams).
- **1-2 hours working on other class assignments.** These include online quizzes, online Discussion Board readings and posts, and work on the research project that will be due at the end of the course

## STUDENT LEARNING OUTCOMES

1. Utilize precise chemical language to effectively communicate biochemical and allied health-related concepts and results.
2. Analyze and apply appropriate procedures for solving biochemical and allied health-related calculations involving solids, liquids, gases, and solutions.
3. Relate the location of an element in the periodic table to its electronic structure and chemical reactivity.
4. Describe ionic and covalent bonding theories and apply them to the construction of proper Lewis structures and prediction of molecular characteristics.
5. Relate biochemical and allied health-related concepts, theories and laws to everyday phenomena.

## COURSE TASKS

- **Online activity and class participation:** You will be required to post your thoughts and comments on assigned topics and respond to your classmates' posts on the Discussion Forum on our Laulima course website. Posting topics and deadlines will be announced throughout the course.
- **Homework assignments:** Online homework assignments will be given through our course website via the Connect portal. Refer to the schedule on Connect for the due dates for each assignment. Note that assignments are due on or before the specified date even if that date is a holiday.
- **Quizzes:** An online quiz will be given once per week. The quizzes will be available through our course site on Laulima. The quizzes will have a time limit (roughly 20 minutes, but may be longer or shorter depending on the material covered on the quiz). You will need to complete each quiz by the specified deadline.
- **Research Project:** You will be asked to create a power point presentation (~10 slides) summarizing and discussing an article from a scientific journal related to biochemistry.

Instructions for preparing the research project will be posted on our course website on Laulima.

- **Midterm Exams:** There will be three midterm exams, each of which will cover approximately one-third of the course. Each exam will last for 75 minutes. All exams will be closed book. You must take the exams ***in person*** at the WCC Testing Center (located in the library on the WCC campus). **Note:** If you are not able to come to the WCC Testing Center to take the exams, you must notify me during the first week of class so we can make arrangements for you to take the exams in person at a suitable alternative facility.
- **Final Exam:** The final exam will cover all topics presented in the course (*i.e.*, the exam is cumulative). You will be given 2 hours to complete the exam. The final exam will be closed book. The final exam must also be taken in person at the WCC Testing Center.

## ASSESSMENT TASKS AND GRADING

Grades will be based on the following categories:

- i. Homework and online activity
- ii. Quizzes
- iii. Research project
- iv. Midterm Exam 1
- v. Midterm Exam 2
- vi. Midterm Exam 3
- vii. Final Exam

Your percentage score in each category will be determined, and an average percentage score for the seven categories will be calculated and used to assign your grade for the course as follows:

- A: 100 - 90.0 %
- B: 89.9 - 80.0 %
- C: 79.9 – 70.0 %
- D: 69.0 – 60.0 %
- F: below 60 %

Curving may be employed if deemed necessary.

Grades of I, W, CR, NC are described in the current college catalog. Changing from letter grading (A-F) to CR/NC option must be done by the deadline for the current term – this must be discussed previously with the instructor.

## LEARNING RESOURCES

- Text: J.G. Smith, *General, Organic, & Biological Chemistry*, 4th ed. You will be able to access an electronic copy of our text via the Connect portal, which you can get to from our Laulima page. For instructions on how to access the Connect portal, follow the link to “Getting Started with Connect” under the Modules section of our Laulima course website.
- Note that you are NOT required to purchase a hard copy of the text – it is fine to just do all of the readings in the e-text accessible through the Connect portal. Some people prefer to have a hard copy of the textbook to work with and those are available for purchase, but that

is purely optional. If you do want to purchase a hard copy of the text as a supplemental study resource, you can look for a used copy and probably find one at a discounted price. Older editions of the textbook can often be found at a significantly lower price, and these would be fine to use for studying.

- Course website: Lecture videos, copies of the lecture slides, exam study guides, online quizzes, discussion board postings, and announcements will be posted on our course website. There will also be links to online tutorials and interactive exercises that you can work with for extra practice.
- You will need to have a standard scientific calculator and Internet access.

## DISABILITIES ACCOMMODATION

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor (Ann Lemke) to discuss reasonable accommodations that will help you succeed in this class. She can be reached at 235-7448 or [lemke@hawaii.edu](mailto:lemke@hawaii.edu). You can also stop by her office in Hale ʻĀkoakoa 213 for more information.

## ACADEMIC INTEGRITY (VERY IMPORTANT!!)

Make sure that you are familiar with the sections related to “Academic Dishonesty” in the College’s policies governing student conduct (available on the WCC website). The fundamental principle governing academic integrity and academic dishonesty is that **each student is responsible for presenting his/her own work at all times.**

It is fine to discuss homework assignments with other students and help each other out – I strongly encourage you to study with your classmates outside of class. But it is also important that you learn how to solve problems on your own, and **you must submit your own work.**

Of course it is not OK to collaborate on exams. The following rules will be enforced during exam periods:

- Absolutely no talking once the exam begins. If you have a question or need something during an exam, do not ask your neighbor. Raise your hand and I’ll come help you.
- Keep your eyes on your own paper. If I see you looking at someone else's paper during the quizzes and exams, I will assume you are cheating.
- You are not allowed to bring in any notes or other outside materials to the exams. I will give you copies of the periodic table and other information -- formulas, constant values, etc. (during the lectures, I will tell you which things you need to memorize and which things will be provided for the exams).
- You can (and should) bring a calculator for the exams. But you will only be allowed to use standard scientific calculators – no cell phones, PDA’s (iPhones, Blackberrys, etc.), mini-computers, or any device that can connect to the internet, communicate with other devices, or has data storage capacity.
- No listening to any audio devices (iPods, etc.) during exams.

If you are observed cheating on any of the class assignments (homework, quizzes or exams), you will receive an F for the assignment and I will refer the matter to the Department Head and the Office of the Dean. Cheating is unfair to everyone involved: the teacher, the cheater, and especially the honest students in the class. I adhere to a **zero-tolerance** policy regarding cheating and academic dishonesty, so consider this your first and only warning – there will be no "second chances" in this area.

**Trust me – you do NOT want to test me on this!!!** I have come down hard on students in my classes for cheating before and will not hesitate to do so if necessary in the future.

for more information.

## **TITLE IX**

Title IX prohibits discrimination on the basis of sex in education programs and activities that receive federal financial assistance. Specifically, Title IX prohibits sex discrimination; sexual harassment and gender-based harassment, including harassment based on actual or perceived sex, gender, sexual orientation, gender identity, or gender expression; sexual assault; sexual

exploitation; domestic violence; dating violence; and stalking. For more information regarding your rights under Title IX, please visit: [https://windward.hawaii.edu/Title\\_IX/](https://windward.hawaii.edu/Title_IX/).

Windward Community College is committed to the pursuit of equal education. If you or someone you know has experienced sex discrimination or gender-based violence, WCC has resources to support you. To speak with someone confidentially, contact the Mental Health & Wellness Office at 808-235- 7393 or [Kaahu Alo](mailto:Kaahu.Alo), Designated Confidential Advocate for Students, at 808-235-7354 or [kaahualo@hawaii.edu](mailto:kaahualo@hawaii.edu). To make a formal report, contact the Title IX Coordinator, Karla K. Silva-Park, at 808-235-7468 or [karlas@hawaii.edu](mailto:karlas@hawaii.edu).

Use this schedule as a guide to determine which sections in the text you should be reading (and the corresponding lecture videos, tutorials, etc., that you should be working with) over the course of the semester.

DATE		TEXT SECTION	TOPIC	OTHER COURSE ASSIGNMENTS	
January	7	M	1.1	Introduction	
	8	Tu	1.2, 1.3	States of matter; classification of matter	
	9	W	1.4	Measurements	
	10	Th	1.5	Significant figures	
	11	F	1.6	Scientific notation	
	12	Sa	1.7	Unit conversion; dimensional analysis	
	13	Su	1.8	Clinical conversion factors	
	14	M	1.9	Temperature	Online HW#1 Due
	15	Tu	1.10	Density and specific gravity	
	16	W	2.1	Elements	
	17	Th	2.2	Atomic structure	
	18	F	2.3	Isotopes	Online HW#2 Due
	19	Sa	2.3	Isotopes	
	20	Su	2.4	The periodic table	
	21	M	2.4	The periodic table	
	22	Tu	2.5	Electronic structure	Online HW#3 Due
	23	W	2.6	Electronic configuration	
	24	Th	2.6	Electronic configuration	
	25	F	2.7	Valence electrons	
	26	Sa	2.7	Valence electrons	
	27	Su	2.8	Periodic trends	Online HW#4 Due
	28	M	2.8	Periodic trends	
	29	Tu	3.1	Introduction to bonding	
	30	W	3.2	Ions	
	31	Th	3.2	Ions	
February	1	F	3.3	Ionic compounds	Online HW#5 Due
	2	Sa	3.3	Ionic compounds	
	3	Su	3.4	Naming ionic compounds	
	4	M	3.4	Naming ionic compounds	Midterm 1 available at WCC Testing Center
	5	Tu	3.4	Naming ionic compounds	Midterm 1 available at WCC Testing Center
	6	W	3.5	Physical properties of ionic compounds	Midterm 1 available at WCC Testing Center
	7	Th	3.5	Physical properties of ionic compounds	Online HW#6 Due Midterm 1 available at WCC Testing Center
	8	F	3.6	Polyatomic ions	Midterm 1 available at WCC Testing Center
	9	Sa	3.6	Polyatomic ions	
	10	Su	4.1	Introduction to covalent bonding	
	11	M	4.2	Lewis structures	
	12	Tu	4.3	Exceptions to the octet rule	Online HW#7 Due
	13	W	4.4	Resonance	
	14	Th	4.5	Naming covalent compounds	
	15	F	4.5	Naming covalent compounds	
	16	Sa	4.6	Molecular shape	
	17	Su	4.6	Molecular shape	Online HW#8 Due
	18	M	4.7	Electronegativity and bond polarity	
	19	Tu	4.7	Electronegativity and bond polarity	
	20	W	4.8	Polarity of molecules	
	21	Th	4.9	Covalent drugs and medicinal products	
	22	F	5.1	Introduction to chemical reactions	
	23	Sa	5.2	Balancing chemical reactions	
	24	Su	5.3	Types of Reactions	
	25	M	5.4	Oxidation and Reduction	Online HW#9 Due
	26	Tu	5.4	Oxidation and Reduction	
	27	W	5.5	The Mole and Avogadro's Number	
	28	Th	5.6	Mass to Mole Conversions	
March	1	F	5.7	Mole calculations in chemical equations	

DATE		TEXT SECTION	TOPIC	OTHER COURSE ASSIGNMENTS	
March	2	Sa	5.8	Mass calculations in chemical equations	Online HW#10 Due
	3	Su	5.8	Mass calculations in chemical equations	
	4	M	5.9	Percent Yield	
	5	Tu	5.10	Pacemakers	Research project: Description of intended journal article due
	6	W	6.1	Energy	
	7	Th	6.2	Energy changes in reactions	Online HW#11 Due
	8	F	6.2	Energy changes in reactions	
	9	Sa	6.3	Energy diagrams	
	10	Su	6.3	Energy diagrams	
	11	M	6.4	Reaction rates	Online HW#12 Due Midterm 2 available at WCC Testing Center
	12	Tu	6.4	Reaction rates	Midterm 2 available at WCC Testing Center
	13	W	6.5	Equilibrium	Midterm 2 available at WCC Testing Center
	14	Th	6.5	Equilibrium	Midterm 2 available at WCC Testing Center
	15	F	6.5	Equilibrium	Midterm 2 available at WCC Testing Center
	16	Sa	6.6	Le Châtelier's Principle	
	17	Su	6.6	Le Châtelier's Principle	Online HW#13 Due
Mar 18-22 (M-F)		<b>SPRING BREAK!!</b>			
<b>Relax, study, catch up, work on your research paper</b>					
	23	Sa	6.7	Body temperature	
	24	Su	7.1	The three states of matter	Research project: Outline due
	25	M	7.2	Gases and pressure	
	26	Tu	7.3	Gas laws relating pressure, volume and temperature	
	27	W	7.3	Gas laws relating pressure, volume and temperature	Online HW#14 Due
	28	Th	7.4	Avogadro's law (volume and moles)	
	29	F	7.5	Ideal gas law	
	30	Sa	7.6	Dalton's law and partial pressures	
	31	Su	7.7	Intermolecular forces	
April	1	M	7.8	The liquid state	Online HW#15 Due
	2	Tu	7.9	The solid state	
	3	W	7.10	Specific Heat	
	4	Th	7.11	Energy and phase changes	
	5	F	7.12	Heating and cooling curves	
	6	Sa	8.1	Introduction to solutions	Online HW#16 Due
	7	Su	8.2	Electrolytes and non-electrolytes	Research project: Rough draft due
	8	M	8.3	Solubility — general features	
	9	Tu	8.4	Solubility — effects of temperature and pressure	
	10	W	8.5	Concentration units	
	11	Th	8.5	Concentration units	Online HW#17 Due
	12	F	8.6	Molarity	Comments on research project drafts due
	13	Sa	8.6	Molarity	
	14	Su	8.7	Dilution	
	15	M	8.8	Colligative properties	Online HW#18 Due Midterm 3 available at WCC Testing Center
	16	Tu	8.8	Colligative properties	Midterm 3 available at WCC Testing Center
	17	W	8.9	Osmosis and dialysis	Midterm 3 available at WCC Testing Center
	18	Th	9.1	Introduction to acids and bases	Midterm 3 available at WCC Testing Center
	19	F	9.2	Reactions of Bronsted-Lowry acids and bases	Midterm 3 available at WCC Testing Center
	20	Sa	9.3	Acid and base strength	Online HW#19 Due
	21	Su	9.4	Equilibrium and acid dissociation constants	
	22	M	9.5	Dissociation of water	
	23	Tu	9.6	The pH scale	
	24	W	9.6	The pH scale	Online HW#20 Due
	25	Th	9.7	Common acid-base reactions	
	26	F	9.8	Acidity and basicity of salt solutions	
	27	Sa	9.9	Titration	
	28	Su	9.9	Titration	Online HW#21 Due
	29	M	9.10	Buffers	
	30	Tu	9.11	Buffers in the blood	
May	1	W		REVIEW FOR FINAL	
	2	Th		REVIEW FOR FINAL	Online HW#22 Due

**Research project: Final draft due on Sunday, May 5 (by 11:59 pm) !!!**

**FINAL EXAM: Available at WCC Testing Center May 6-10 (Monday - Friday)**