GILMAN HIGH SCHOOL Instructor: Mrs. Steinbach
Intro to Biochemistry/CVTC Intro to Biochemistry 806-186 tsteinbach@gilman.k12.wi.us
2026-2027 Syllabus **www.PirateSci.com**

Course Overview

Biochemistry, also known as biological chemistry, is the study of the chemical processes that occur in living organisms. Examples of professions directly related to biochemistry include: analytical chemist, biomedical scientists, healthcare scientist, clinical research associate, forensic scientist, scientific laboratory technician, and toxicologist, to name a few. The primary goal of this course will be to help you develop a solid picture of basic organic and biological chemistry.

This one-year course is designed to meet the curriculum requirements of Chippewa Valley Technical College's Introduction to Biochemistry 806-186. GHS has an articulation agreement with CVTC that provides transcripted credit for Intro to Biochemistry. Thus, this course is considered a CVTC course, as well as a GHS course, and you may choose to receive dual credit. Upon successful completion, you will receive 1.0 GHS credit for Intro to Biochemistry and 4.0 CVTC college credits for Intro to Biochemistry 806-186. FYI, your CVTC college credits are transferrable to other technical colleges and four-year universities.

Course Topics.

Topics to be covered include: (1) recognizing the structure, physical properties, and chemical reactions of organic molecules, body fluids, and acids, as well as (2) understanding biological functions and their relationships to enzymes, proteins, lipids, carbohydrates, and DNA. These topics will be covered at a rapid pace. This includes learning about the presented concepts, conducting related laboratories, and testing your retention and problem solving skills.

Course Competencies.

1. Use appropriate scientific equipment, methods, and safety precautions
2. Predict the effects of pH on biochemical reactions and its role in homeostasis
3. Summarize the structure, physical properties, and chemical reactions of hydrocarbons
4. Summarize the structure, physical properties, and chemical reactions of alcohols, ethers, and thiols
5. Summarize the structure, physical properties, and chemical reactions of amines
6. Summarize the structure, physical properties, and chemical reactions of aldehydes and ketones
7. Summarize the structure, physical properties, and chemical reactions of carboxylic acids and their derivatives
8. Correlate the molecular structure and function of proteins to their roles in biological systems
9. Correlate the structure of enzymes to their biological function
10. Correlate the structure to the functions of key carbohydrates
11. Correlate the structure to the functions of key lipids
12. Diagram the basic metabolic processes
13. Correlate the molecular structures and function of DNA and RNA to their roles in biological systems

Course Prerequisites.

Chemistry with a grade of "B" or better

Course Materials

- Primary Text: Timberlake, K. (2019). *Chemistry: An Introduction to General, Organic, and Biological Chemistry*. 13th Global Ed. New York, NY: Pearson.
- Secondary Text: Hill, J. W., Baum, S. J., & Scott-Ennis, R. J. (2000). *Chemistry and Life: An Introduction to General, Organic, and Biological Chemistry*. 6th Ed. Upper Saddle River, NJ: Prentice Hall.
- Guided Inquiry Text: Garoutte, M. P. & Mahoney, A. B. (2014). *General, Organic, and Biological Chemistry: A Guided Inquiry*. Hoboken, NJ: John Wiley & Sons, Inc.
- School Issued iPad and Earbuds or Headphones
- Loose-leaf Paper and Binder OR Composition-style Notebook and Binder
- Scientific Calculator (capable of executing typical mathematical operations, including logarithms, exponential functions, etc. and handling scientific notation)

Course Format

Inquiry Instructional Approach.

This strategic methodology will allow us to work as a team to outline learning objectives, organize and cover concepts (e.g., guided inquiry activities, argument driven inquiry investigations), as well as infuse structured guided and independent practice opportunities that offer immediate feedback and opportunity for sensemaking. Such interactive learning tasks will be organized in a binder, which will not only encourage organization and reflective practice, but also serve as a portfolio of your learning.

Daily Coursework.

Readings. College-level textbook and/or scientific article readings will be assigned with each lesson.

Cornell-style Notes. Cornell-style notes will be provided and are strongly encouraged to be taken. This research-based approach to note taking, if followed, will encourage concentration and retention. You may choose to use your loose-leaf paper to complete these notes and then place them in your binder, or you may choose to use your composition-style notebook.

Problem Sets. A list of recommended problems will be assigned from our textbook and/or guided inquiry activities. You are strongly encouraged to solve all problems. Completing this work will help you think critically and practice your problem solving skills. Answer keys will be provided so you can get immediate feedback and seek out any additional assistance when needed. You may choose to use your loose-leaf paper to complete these problem sets and then place them in your binder, or you may choose to use your composition-style notebook.

Daily coursework will not be graded since its primary role in our learning is solidifying sensemaking.

Laboratory Studies/Reports.

Laboratories. Laboratories will allow for a hands-on, direct experience of concepts covered in class. You will gain proper laboratory technique skills, as well as communicate procedures, observations, results, and conclusions in words and writing through the Argument Driven Inquiry model. Furthermore, you will apply experimental techniques to solve chemical problems. To enhance the laboratory experience, some video-based interactives and interactive computer simulations will also be utilized.

Your competency in the lab will be assessed in two ways: via your laboratory log and laboratory reports. A laboratory log will include your pre- through post-lab recordings. Your log will be submitted and serve as formative assessments of your learning. Lab log submissions may be revisited, if you so choose, to show growth in your understanding. Alternatively, laboratory reports are summative assessments and therefore may not be redone, with the exception of your first report. Both must be submitted on time (see syllabus Late Policy section).

Safety in the lab is vital. You will be required to sign and abide by a safety contract, as well as follow laboratory directions in order to participate.

Quizzes, Tests, Midterm Exam, and Final Exam.

Quizzes. Quizzes are formative assessments that will be given approximately weekly, after a lesson or small group of lessons. They must be taken on time (see syllabus Late Policy section) and may not be retaken.

Tests. Tests will be given after the completion of each chapter or chapter grouping. Tests are summative assessments that must be taken on time (see syllabus Late Policy section) and may not be retaken.

Midterm and Final Exams. Two comprehensive exams will be given throughout the school year. These exams will take place approximately at the middle and end of the school year. Midterm and final exams are summative assessments that must be taken on time (see syllabus Late Policy section) and may not be retaken.

Grading Scale and Assessment Values

Since this is a dual credit course, you will have two separate grades reported: one according to GHS policy and the other according to CVTC policy.

GHS GRADING

Assessments will be given the following values.

- Mid-Check for Understanding/Practices (i.e., formative assessments), 20%
- End-Check for Understanding/Practices (i.e., summative assessments), 80%

Quarter will be determined through the weighted grading system described above. Semester grades will be determined through the weighted system below.

- 45% Quarter A
- 45% Quarter B
- 10% Comprehensive Semester Exam*

CVTC GRADING

A final grade will be determined through a weighted system.

- 20% Quarter I
- 20% Quarter II
- 5% Comprehensive Midterm Exam
- 20% Quarter III
- 20% Quarter IV
- 15% Comprehensive Final Exam

**NOTE: The comprehensive exam will be dropped if it adversely influences the semester grade.*

GHS Grading Scale

100-93.....A	89-87.....B+	79-77.....C+	69-67.....D+	59-⇩ ..... F
92-90.....A-	86-83.....B	76-73.....C	66-63.....D	
	82-80.....B-	72-70.....C-	62-60.....D-	

Late Policy.

Coursework must be turned in on the assigned due dates. Late coursework will be limited to a maximum score of 70%. Completed notes and problem sets must be submitted in addition to the missing, closed quiz to receive limited credit. Not taking a test or exam on the assigned date and time will limit your maximum score to no more than 90% if taken within 48 hours of the scheduled test time, or 80% if taken after 48 hours. Special consideration may be given if a doctor or parent note is provided to confirm illness or family emergency. All make-up exams must be completed within 5 days of the originally scheduled exam time.

Grading Feedback from Instructor.

Typically, CVTC instructors will return assignments within one week of the due date, but no more than two weeks. It is my intent to return your tests the next day or as soon as everyone has completed the test, whichever comes first. And, I will return your laboratory reports within one week of the due date or as soon as everyone has competed the report, whichever comes first.

Academic Assistance

If you should have moments of struggle in this course, please see me immediately. I will help you to get to the root of your concerns and establish a plan of action that provides additional scaffolding (e.g., individualized instruction, graphic organizers, targeted problem-solving opportunities, etc.). I will also be monitoring your growth through formative assessment opportunities and will initiate a meeting, plan of action, etc. if necessary. Your academic success is very important to me.

Guidelines for Success

You are starting your career right now. How so? Your classroom performance is likely to be a direct reflection of the type of performer you will be in your job. For example, if you show up to class late, you run the risk of that behavior pouring over into work. Because of this, be sure that you are performing at a level that you believe is the best representation of yourself at all times. Here are some additional guidelines for success:

- **Prepare yourself for learning** before the day of class. Read all the assigned materials and complete the assigned learning tasks. Ask questions about the content. Think about how the content relates to you, and how it might connect to your future career.
- **Engage yourself in our learning community.** Actively participate. The more you do, the more you will learn.
- **Complete tasks on time.** It is disruptive to the learning process when students are arriving at different times or missing deadlines. Notify your instructor if you have a situation or a scheduling conflict.
- **Dress appropriately** when learning on campus or when performing tasks in learning labs.
- **Communicate professionally.** Be respectful to each other and each other's ideas. This means not interrupting others or talking to your neighbor while others are talking. Use positive, inclusive language when addressing someone's comments, even when their opinion is different than your own. Type professional emails that include a salutation and contain a business tone.

CVTC Academic Integrity Statement

Students are always expected to do their own work unless advised that collaboration is acceptable. Buying, borrowing, or copying others' work is not permitted. Students may use facts from other sources if re-written in their own words. Failure to use proper citation procedures is considered plagiarism. Plagiarism may result in a grade of "0" and a referral to Student Services for discipline based on college policy.

CVTC Artificial Intelligence (AI) Statement

Individuals may use AI (Artificial Intelligence) tools (such as ChatGPT, generative AI) to aid in learning and academic endeavors. It is essential to acknowledge the role of AI as a support tool and maintain academic integrity by ensuring that all submitted work is original and properly cited. Any act of academic dishonesty, including but not limited to plagiarism or cheating, will follow the College policy on academic dishonesty found in the student handbook.

CVTC Equity, Diversity, Equal Opportunity, and Disabilities Accommodations Statement

CVTC will provide equal access to and opportunity in its programs and facilities, without regard to race, ethnicity, color, creed, religion, national origin, ancestry, sex, disability, age, arrest or conviction record, marital status, parental status, mental health, veteran's status, pregnancy, or sexual orientation.

Tentative Lesson Schedule, Semester I

Week	Lesson Topics	Readings	Laboratories	Summative Assessments
UNIT 1…Chemistry Foundations				
Sep 1 (4 pd wk)	Lab Safety, Biochemistry, and Biotechnology Overview			
Sep 7 (4 pd wk)	Ionic Compounds; Molecular Compounds; Lewis Structures; Electronegativity and Bond Polarity; Intermolecular Forces	Sec 6.1-6.9	Intermolecular Forces (Sec 6.9, PI)	
Sep 14	Chemical Equations; Reaction Types; Redox Reactions; Energy in Chemical Reactions	Sec 7.4-7.6 & 7.9	Carrot Tissue Culture	
Sep 21	Solutions; Electrolytes and Nonelectrolytes; Solubility; Properties of Solutions	Sec 9.1-9.3 & 9.6		Ch 6, 7, & 9 Test
Sep 28	Acids and Bases; Brønsted-Lowry; Acid-Base Strength (Henderson-Hasselbach equation)	Sec 10.1-10.3	Acids and Bases (Sec 10.1, PI)	
Oct 5	Acid-Base Equilibrium; Dissociation of Water	Sec 10.4-10.5	Reversible Reactions (Sec 10.4, PI)	
Oct 12	pH Scale; Reactions of Acids and Bases; Buffers	Sec 10.6-10.8	Properties of Biological Buffers (Sec 10.8)	Lab Report
Oct 19	Buffers	Sec 10.8		Ch 10 Test
UNIT 2…Fundamentals of Organic Chemistry				
Oct 26 (QTR 1 end 10/30)	Organic Compounds; Alkanes; Alkanes with Substituents; Properties of Alkanes	Sec 11.1-11.4	Pipetting and Gel Loading Practice	
Nov 2	Alkenes and Alkynes; Cis-Trans Isomers; Addition Reactions for Alkenes; Aromatic Compounds	Sec 11.5-11.8		Ch 11 Test
Nov 9	Alcohols, Phenols, Thiols, and Ethers; Properties of Alcohols	Sec 12.1-12.2	Electrophoresis 101	
Nov 16	Aldehydes and Ketones; Reactions of Alcohols, Thiols, Aldehydes, and Ketones	Sec 12.3-12.4		Ch 12 Test
Nov 23	*BREAK*			
Nov 30	Carboxylic Acids; Properties of Carboxylic Acids	Sec 14.1-14.2	Thin Layer Chromatography (Sec 12.2, 12.3, & 14.2; PI)	
Dec 7	Esters; Hydrolysis of Esters; Amines; Amides	Sec 14.3-14.6		Ch 14 Test
Dec 14	Comprehensive Review of Units 1 and 2			MIDTERM EXAM
Dec 21 (2 pd wk)	Macromolecules of Life		Taking Macromolecules to the Micro	
Dec 28	*BREAK*			
UNIT 3…Biological Macromolecules				
Jan 4	Carbohydrates; Chiral Molecules; Fischer Projections of Monosaccharides; Haworth Structures of Monosaccharides	Sec 13.1-13.4	Structure and Properties of Carbohydrates (Sec 13.1)	Lab Report
Jan 11	Chemical Properties of Monosaccharides; Disaccharides; Polysaccharides	Sec 13.5-13.7		Ch 13 Test
Jan 18 (4 pd wk, SEM I end 1/20)	Lipids; Fatty Acids; Waxes and Triacylglycerols; Chemical Properties of Triacylglycerols	Sec 15.1-15.4		

Tentative Lesson Schedule, Semester II

Week	Lesson Topics	Readings	Laboratories	Assessments
Jan 25	Phospholipids; Cholesterol, Bile Salts, and Steroid Hormones; Cell Membranes	Sec 15.5-15.7		Ch 15 Test
Feb 1	Proteins and Amino Acids	Sec 16.1		
Feb 8	Proteins: Primary Structure	Sec 16.2	Structure and Properties of Proteins (16.1-3)	Lab Report
Feb 15 (4 pd wk)	Proteins: Secondary, Tertiary, and Quaternary Structures	Sec 16.3	Isolation of a Protein Lab (16.1-3)	
Feb 22 (4 pd wk)	Enzymes	Sec 16.4		
Mar 1	Factors Affecting Enzyme Activity	Sec 16.5	Digestive Enzymes with pH (Sec 16.5, PI)	Ch 16 Test
Mar 8	Components of Nucleic Acids; Primary Structure of Nucleic Acids	Sec 17.1-17.2	Onion DNA Staining (Sec 17.1)	
Mar 15	DNA Double Helix and Replication	Sec 17.3-17.5	From Gene to Protein (Sec 17.5, PI)	
Mar 22 (3 pd wk, QTR 3 end 3/24)	Genetic Mutations; Recombinant DNA	Sec 17.7-17.8		Ch 17 Test
UNIT 4…Basic Metabolic Processes				
Mar 29 (3 pd wk)	Fundamentals of Restriction Digests and DNA Sequence Analysis		Restriction Digest Basics	
Apr 5	Metabolic Pathways and ATP Energy; Digestion of Foods; Coenzymes in Metabolic Pathways	Sec 18.1-18.3	Sodium Alginate Respiration Lab (Sec 18.1)	Lab Report
Apr 12	Glycolysis; Citric Acid Cycle; Electron Transport and Oxidative Phosphorylation	Sec 18.4-18.6	Exploring Lactose Digestion (18.2, PI)	
Apr 19 (4 pd wk)	Glycolysis; Citric Acid Cycle; Electron Transport and Oxidative Phosphorylation	Sec 18.4-18.6	Cellular Respiration (Sec 18.6, PI)	
Apr 26 (4 pd wk)	Oxidation of Fatty Acids	Sec 18.7		Sec 18.1-18.6 Test
May 3	Oxidation of Fatty Acids & Degradation of Amino Acids	Sec 18.7-18.8		
May 10	Degradation of Amino Acids	Sec 18.8		
May 17	Comprehensive Review of Units 3 and 4			FINAL EXAM

NOTE: PI denotes Pivot Interactives (https://www.pivotinteractives.com), an authentic, interactive video-based lab platform.