



## OUTCOMES-BASED EDUCATION (OBE) COURSE SYLLABUS

Course No.: Chem 137.1

Course Title: **BIOCHEMISTRY (LABORATORY)**

### I. UNIVERSITY INFORMATION

#### 1. Vision of the University

A globally competitive university for science, technology, and environmental conservation

#### 2. Mission of the University

Development of a highly competitive human resource, cutting-edge scientific knowledge and innovative technologies for sustainable communities and environment.

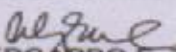
#### 3. VSU Quality Policy Statement

The Visayas State University (VSU), a globally competitive university of science and technology and environmental conservation, is created by law to develop highly competitive human resource, cutting-edge scientific knowledge and innovative technologies for sustainable communities and environment.

Towards this end, we, at the Visayas State University, commit to:

- Produce highly competent, quality and world-class manpower in science and technology, especially for agriculture, environmental management and industry who are proficient in communication skills, critical thinking and analytical abilities;
- Generate and disseminate relevant knowledge and technologies that lead to improved productivity, profitability and sustainability in agriculture, environment and industry; and
- Satisfy the needs and applicable requirements of the industry, the community and government sectors who are in need of quality graduates and technology ready for commercialization through the establishment, operation, maintenance and continual improvement of a Quality Management System (QMS) which is aligned with the requirements of ISO 9001:2015.

It shall be the policy of the university that the quality policies and procedures are communicated to and understood by all faculty, staff, students and other stakeholders and that the system be continually improved for its relevance and effectiveness.

  
**EDGARDO E. TULIN**  
President  
v0 07.16-2019



#### 4. Quality Goals of the College of Arts and Sciences

1. To produce quality manpower and graduates in liberal arts and behavioral sciences chemistry, biology, mathematics, physics, statistics to serve the development needs of the region.
2. To uplift the economic well-being of the region through relevant R and D and extension programs.
3. Enhance regional development of the Visayas for global competitiveness.

#### 5. Quality Objectives of the Department of Pure and Applied Chemistry

- a) Produce highly qualified and skilled Chemists and Chemical Technicians for the university and academia;
- b) Generate relevant knowledge and technologies through basic and applied multi- and inter-disciplinary researches, and
- c) Achieve strong linkages and cooperation with domestic and international institutions and agencies involved in the pursuit of sustainable development.

## II. PROGRAM INFORMATION

1. Name of the Program	Bachelor of Science in Biotechnology
2. CHED CMO Reference	None
3. BOR Approval	BOR Resolution No. 76, s. 2006

#### 4. Program Educational Objectives and Relationship to Institution Mission

Program Educational Objectives	Mission*		
	a	b	c
1. Provide students with fundamental knowledge and laboratory skills necessary for the application to a wide range of biotechnological production processes	√	√	√
2. Engage students in laboratory and coursework and research experience in areas such as plant and animal biotechnology, industrial biotechnology, microbial technology, genetic engineering, biochemical engineering, bioinformatics, environmental biotechnology and the biomedical field	√	√	√
3. Expose students to current biotechnological problems so that they will understand and appreciate the role that molecular biology and biotechnology can play in solving them	√	√	√

\*a - development of a highly competitive human resource, b - cutting-edge scientific knowledge, c - innovative technologies for sustainable communities and environment

## III. COURSE INFORMATION

1. Course Code	Chem 137.1
2. Course Title	Biochemistry I Laboratory
3. Pre-requisite	Chem 127n (Organic Chemistry Lecture) and Chem 127.2 (Organic Chemistry Laboratory)
4. Co-requisite	Chem 137 (Biochemistry I Lecture)
5. Credit	1.0 units
6. Semester Offered	1 <sup>st</sup> semester
7. Number of hours	3 hours per week



8. Course Description	The laboratory course involves the introduction of common skills, techniques needed in performing biochemical experiments. It aims provide biochemical knowledge and correlation of principles with experimental data.
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9. Program Outcomes (POs) in relation to the Program Educational Objectives (POEs)						
Program Outcomes (POs)		Program Educational Objectives				
		1	2	3	4	5
a	Produce graduates with excellent laboratory and practical skills in biotechnology necessary for a wide range of biotechnological processes	√	√	√	√	√
b	Prepare graduates for advanced study in the life sciences and for positions in biotechnology industry	√	√	√	√	√
c	Harness the theoretical and analytical skills of students to develop new industrial production systems and novel research ideas based on fundamental principles of biotechnology	√	√	√	√	√

10. Course Outcomes (COs) and Relationship to Program Outcomes (POs)			
After completing this course, the student must be able to perform the following COs:	Program Outcomes Code		
	a	b	c
CO1 Explain the rationale behind the Biochemistry experimental procedures: selection of glass wares, equipment, solvents, and reaction conditions for a specific reaction.	I	I	I
CO2 Plan and conduct a variety of biochemical reactions, including safety precautions.	I	I	I
CO3 Apply safety precautions in the laboratory	E	E	E
CO4 Properly analyze and present experiment data.	E	E	E
CO5 Demonstrate good logbook keeping-detailed record of what is done.	D	D	D

Legend: I – Introductory, E – Enabling, D – Demonstrative

Each letter indicates the expected level of competency that each CO should provide for each PO.

11. Course Content and Plan					
Week	Topics	Learning Outcomes	Teaching and Learning Activities		Assessment Tasks
			Teaching Activities	Learning Activities	
1	Class Orientation OBE Course Syllabus	At the end of this unit, the student should be able to;	Meeting 1	Participate in the discussion	



	<p>VSU Vision, Mission and Quality Policy Statement</p> <p>Class Policies</p> <p>Requirements</p> <p>Grading System and Activities</p> <p>Laboratory Manual</p> <p>Submission of requirements</p> <p>MSDA (Material Safety Data Sheet)</p> <p>Laboratory Journal</p> <p>Laboratory Reports (Format and Writing)</p> <p><b>Values Integration:</b> Open-mindedness, Responsibility, and readiness for learning</p>	<p>State the basic information regarding the course.</p> <p>Familiarize the content of an MSDS.</p> <p>Identify the parts of laboratory journals and scientific reports.</p> <p>Discuss the course policies</p> <p>Identify the class requirements</p> <p>Review the safety precautions in the laboratory</p>	<p>Q &amp; A for clarification, a set of expectations, and getting-to-know-each-other</p> <p>Class interaction</p> <p>Sharing of Ideas</p> <p>Feedbacks</p> <p><b>VSUEE/VC*:</b> Introduction and navigation of the Virtual Classroom:</p>	<p>Class interaction</p> <p>Sharing of Ideas</p> <p>Feedbacks</p> <p>Familiarization with the virtual classroom</p>	<p>Oral recitation</p>
<p><b>CO1:</b> Explain the rationale behind the Biochemistry experimental procedures: selection of glass wares, equipment, solvents, and reaction conditions for a specific reaction.</p> <p><b>CO2:</b> Plan and conduct a variety of biochemical reactions, including safety precautions.</p> <p><b>CO3:</b> Apply safety precautions in the laboratory.</p> <p><b>CO4:</b> Properly analyze and present experiment data.</p> <p><b>CO5:</b> Demonstrate good logbook keeping-detailed record of what is done.</p>					
2	<p><b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 1</b></p> <p><b>Exercise No. 1</b> Biochemical calculations</p>	<p>Review manipulation of numbers in biochemical calculations.</p> <p>Review conversion factors and stoichiometric calculations</p>	<p>Meeting 2</p> <p>Discussion through PowerPoint presentation</p> <p>Q &amp; A for clarification</p> <p>Class interaction and participation</p>	<p>Note-taking</p> <p>Class interaction</p> <p>Seatwork and/or board work exercises</p> <p>Answering Problem solving exercises</p>	<p><b>Quiz # 1</b></p> <p>Answer quiz during class schedule</p> <p><b>Laboratory report # 1</b></p> <p>Due Date: 1 week after discussion</p>



3	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 2</b>  <b>Exercise No. 2</b> pH and Buffer System	Calibrate pH meter.  Choose and prepare appropriate buffer systems.  Titrate amino acids	<b>Meeting 3</b>  Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 2</b>  Answer quiz during class schedule  <b>Laboratory report # 2</b>  Due Date: 1 week after discussion
4	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 3</b>  <b>Exercise No. 3</b> Carbohydrates	Identify some physical and chemical characteristics of typical carbohydrates using biochemical tests.  Differentiate types of carbohydrates using biochemical tests.  Be able to identify an unknown sample of carbohydrates during chemical tests	<b>Meeting 4</b>  Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 3</b>  Answer quiz during class schedule  <b>Laboratory report # 3</b>  Due Date: 1 week after discussion
5	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 4</b>  <b>Exercise No. 4</b> Lipids	Observe some physical and chemical properties of lipids  Distinguished between saturated and unsaturated fats.	<b>Meeting 5</b>  Pre-lab discussion  Laboratory experimentation	Taking notes  Submission of Lab journal  Submission of laboratory reports	<b>Quiz # 4</b>  Answer quiz during class schedule  <b>Laboratory report #</b>



		Observe saponification of triacylglycerol in the preparation of soap.	Q & A for clarification Class interaction	Assessments	<b>4</b>  Due Date: 1 week after discussion
		Test for reaction of soap with soft water, oil and $\text{CaCl}_2$	Perform experiments		
6	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 5</b>  <b>Exercise No. 5 Amino Acids</b>	Identify the functional group of amino acids  Determine the pH of various amino acids in water.  Know how to use chromatography to separate amino acids in a mixture.  Use Rf values to identify amino acids.	Meeting 6  Pre-lab discussion Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 5</b>  Answer quiz during class schedule  <b>Laboratory report # 5</b>  Due Date: 1 week after the discussion
7	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 6</b>  <b>Exercise No. 6 Proteins</b>	Identify the functional group of amino acids  Determine the pH of various amino acids in water.  Know how to use chromatography to separate amino acids in a mixture.  Use Rf values to identify amino acids.	Meeting 7  Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 6</b>  Answer quiz during class schedule  <b>Laboratory report # 6</b>  Due Date: 1 week after the discussion
8	<b>MIDTERM EXAMINATION</b>				
9	<b>Chem 137.1 Biochemistry I Laboratory Manual</b>	Associate the presence of enzyme with the	Meeting 8	Taking notes	<b>Quiz # 7</b>  Answer



	<b>Exercise No. 7</b>  <b>Exercise No. 7</b> <b>Enzyme Activity</b>	catalysis of chemical reactions in living cells.  Determine the effect of enzyme concentration, substrate concentration, temperature, pH, and heavy-metal salts upon the activity of salivary amylase.	Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Submission of Lab journal  Submission of laboratory reports  Assessments	quiz during class schedule   <b>Laboratory report # 7</b>  Due Date: 1 week after the discussion
10	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 8</b>  <b>Exercise No. 8</b> <b>Vitamins</b>	Identify vitamins as water or fat soluble.  Determine the Vitamin C content in a variety of citrus juices and other solutions.  Determine the effect of heat upon vitamin C.	Meeting 9  Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 8</b>  Answer quiz during class schedule   <b>Laboratory report # 8</b>  Due Date: 1 week after the discussion
11	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 9</b>  <b>Exercise No. 9</b> <b>Chemistry of Urine</b>	Test urine for pH, specific gravity, and the presence of electrolytes and organic compounds.	Meeting 10  Pre-lab discussion	Taking notes  Submission of Lab journal	<b>Quiz # 9</b>  Answer quiz during class schedule



		Test urine for the presence of abnormality occurring compounds of proteins, glucose and ketone bodies.	Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Submission of laboratory reports  Assessments	Laboratory report # 9  Due Date: 1 week after the discussion
12	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 10</b>  <b>Exercise No. 10</b> Chemicals in Food and Drugs	Describe the chemical components present in food and drugs by reading the labels of containers.  Research the functions and biological effects of those chemical compounds	Meeting 11  Present power point for discussion  Q & A for clarification  Class interaction  Sharing of Ideas Feedbacks	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 10</b>  Answer quiz during class schedule  <b>Laboratory report # 10</b>  Due Date: 1 week after the discussion
12	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 11</b>  <b>Exercise No. 11</b> Digestion of Food Stuff	Identify digestion as a process of hydrolysis.  Determine the hydrolysis products of carbohydrate, fat and protein digestion.	Meeting 11  Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 11</b>  Answer quiz during class schedule  <b>Laboratory report # 11</b>



					Due Date: 1 week after the discussion
13	<b>Chem 137.1 Biochemistry I Laboratory Manual Exercise No. 12</b>  <b>Exercise No. 12</b> Energy Production in the Living Cell	To observe the reactions of glucose in glycolysis and fermentation.	Meeting 12  Pre-lab discussion  Laboratory experimentation  Q & A for clarification Class interaction  Perform experiments	Taking notes  Submission of Lab journal  Submission of laboratory reports  Assessments	<b>Quiz # 12</b>  Answer quiz during class schedule  <b>Laboratory report # 12</b>  Due Date: 1 week after the discussion

14 **FINAL EXAMINATION**

\* VSUEE/VC – VSU E-Learning Environment/ Virtual Classroom

**12. Life-long Learning Opportunities**

The students can identify the biomolecules, its type and properties. Correlate Biomolecules to the biochemical processes in the laboratory and relate and/or associate the biochemical concepts and applications learned with everyday living.

**13. Contribution of Course to Meeting the Professional Component (%)**

General Education: 10%  
 Basic Education (Foundation): 30 %  
 Professional Chemistry: 60 %

**14. References and Other Learning Resources**

**A. Textbook(s)/ E-Books**  
 References

Garrett, H, Reginald and Grisham Charles M. 2013. Biochemistry. Fifth Edition. Brooks/Cole, Cengage Learning. CA, USA.

March, Frederick, et al. 2019. Introduction to General, Organic, and Biochemistry, 12<sup>th</sup> Edition.

Cengage Learning, Boston, MA

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Page 9 of 13  
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 v1 11-19-2021

No. 22-DPAC-1-09



McMurry, J. 2016. Organic Chemistry. 9<sup>th</sup> Ed. Brooke/Cole Publishing Co. CA, USA.  
Murray, Robert K et al. 2003. Harper's Illustrated Biochemistry, Twenty-Sixth Edition. McGraw

Hill Companies, Inc., New York, USA.

Nelson, David L. and Michael M. Cox. 2017. *Lehninger Principles of Biochemistry*, 7<sup>th</sup> Edition. W.H. Freeman: New York, USA.

Smith, Michael B. 2020. Biochemistry: An Organic Chemistry Approach, CRC Press, Florida, USA.

#### B. Other Learning Resources

*Journals*

*Videos*

*Websites*

*Webinars*

*Open Educational Resources*

### 15. Course Assessment and Evaluation

The performance of students will be assessed and evaluated based on the following:

50% Midterm + 50% Final Term = 100% (Overall Final)

Item No,	Assessment Tasks	Percentage Contribution (1)	No. of Times in the Semester (2)	Individual Task % Contribution (1/2)
1	Quizzes (Q)	30%	12	2.5/Q
2	Laboratory Report (LR)/Scientific Report(SR)	20%	12	1.67/LR
3	Term Examination (TE)	40%	2	20/TE
4	Project (Pr)	10%	1	15/Pr

COs	Assessment Tasks	Weight in Percent	Minimum Average for Satisfactory Rating	Target and Standards
CO 1 – CO 5	Quizzes (12)	30%	60 %	At least 60% of the students have at least 60% score
	Laboratory Report/Scientific Report (12)	20%		
	Term Examination (2)	40%		
	Project (1)	10%		
<b>TOTAL</b>		<b>100%</b>		

#### Grading System (% Passing: 60%)

Range	Grade	Range	Grade
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97 - 100	1.00	75 - 79	2.25
93 - 96	1.25	70 - 74	2.50
89 - 92	1.50	65 - 69	2.75
85 - 88	1.75	60 - 64	3.00
80 - 84	2.00	Below 60	5.00

## 16. Course Policies

1. Laboratory experiments are done face to face. Absences will forfeit the student of any make-up laboratory experiment as well as the laboratory report after the experiment has been performed. However, the student may take quizzes regarding the missed laboratory experiment.

2. A laboratory report is submitted one week after the experiment has been completed. The format of the laboratory report is attached in the VSUEE. All laboratory reports will be filed by the students and are submitted at the end of the semester in a portfolio of all assessments.

3. The official virtual classroom is VSU E-Learning Environment (VSUEE) (<https://elearning.vsu.edu.ph>). A class orientation will be done in relation to the use and navigation of the platform.

4. Quizzes will be done every meeting so students are expected to be prepared. Assignments are the schematic diagrams of all the experiments. Each student shall pass a schematic diagram that will be checked before each experiment is conducted.

5. A student is excused from his absence if a) he/she is sick, and b) important matter to attend to.

6. The Chem 137.1 Biochemistry I Laboratory Manual is our official instructional material in this subject. It will serve as your guide for the whole semester. Whether you have an internet connection or not, use it. A pdf copy of the manual is in the VSUEE.

7. In the submission of lab reports, there are deductions for late submissions and ON-TIME submission is much appreciated.

8. If you have any inquiries/clarifications, you may contact the course instructor/professor during the official class schedule; Monday to Friday ONLY.

9. All students are reminded to observe all policies, regulations, and rules of the university and other related laws of the land and are advised to read, understand, and practice the provisions of the VSU Student Manual.

10. Lastly, as we embark in this "new normal". Let us have an open mind and heart as we adjust in this new way of delivering the teaching-learning process and still continue to aim for quality in education.

This class policy serves as our written agreement for the whole semester. If there are any changes to enhance the class learning opportunity within the semester, it will be communicated accordingly


## 17. Course Materials and Facilities Available

- 1] Chem 137.1 Biochemistry I Laboratory Manual/Reference Chemistry Books
- 2] Wifi/Internet/Videos
- 3] Laptop/Desktop/Smartphone
- 4] DLP Projector and Projector Screen



5]	Classroom
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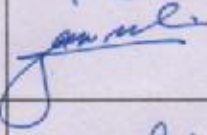
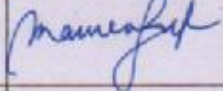
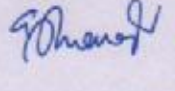
18. Revision History			
Revision number	Date of Revision	Date of Implementation	Highlights of Revision
00	11/20/2020	12/01/2020	ISO compliant format
01	09/07/2022	09/12/2022	ISO compliant format

19. Preparation			
Prepared by	Name	Signature	Date Signed
	JAILENN JANNARAIN S. PURAY		Sept 9, 2022

#### IV. INSTRUCTOR/PROFESSOR INFORMATION

1. Name of Instructor/Professor	JAILENN JANNARAIN S. PURAY
2. Office and Department	Department of Pure and Applied Chemistry
3. Telephone/Mobile Numbers	09124475153
4. Email Address	jailenn.puray@vsu.edu.ph
5. Consultation Time	Mon - Fri 8 AM - 5 PM (if available)

#### 20. Department Instructional Materials Review Committee:

Committee	Name	Signature	Date Signed
Member:	ATOZ A. VASQUEZ		Sept. 12, 2022
Member:	JACOB GLENN F. JANSALIN		Sept 13, 2022
Member:	MA. ROBELYN A. INSIK		Sept 12, 2022
Chairperson:	ELIZABETH S. QUEVEDO		Sept 12, 2022

	Name	Signature	Date Signed
Verified by:	MA. THERESA P. LORETO Dean, CAS		
Validated by:	NANCY D. ABUNDA Head, IMD		

#### Note:

- 1) The number of POs will depend on each degree program offered
- 2) COs and Relationship to POs

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- a. (I) - **Introductory** – an Introductory Course to an outcome
- b. (E) - **Enabling** – an Enabling Course or a course that strengthens the outcome
- c. (D) - **Demonstrated** – a Demonstrative Course or a course demonstrating an outcome.

Distribution of copies: OHIMD, Department, Faculty