



OUTCOMES-BASED EDUCATION (OBE) COURSE SYLLABUS

CSci 103
Discrete Structures II

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 Engineering and Technology
 - a. Produce globally competent engineering graduates by providing students with excellent instruction through updated curriculum; functional and state-of-the-art facilities; and qualified, well-trained, and dedicated faculty and staff;
 - b. Generate new and advance knowledge and technology in engineering and allied sciences through the conduct of relevant researches that can contribute towards sustainable development, climate change mitigation, food security, and advance knowledge in engineering sciences; and
 - c. Engage in relevant need-based community/stakeholder-projects that can make the Philippines and even the world a better place to live in.

5. Quality Objectives of the Department of Computer Science and Technology
 - a. Graduates of the program are IT professionals and researchers, and proficient in designing and developing computing solutions.
 - b. Excellent and relevant education in computer science and technology;
 - c. Generate appropriate knowledge in Information and Communications Technology relevant to agricultural production, processing, utilization, technology generation and dissemination;
 - d. Sustainable linkages and cooperation with public and private institutions in instruction, research and developments and extension.
 - e. Dynamic linkages with other agencies and institutions for the promotion of instruction, research, extension programs in computer science and allied fields.
 - f. Sustained linkages among the various units within the university to support developmental programs.

II. PROGRAM INFORMATION

1. Name of the Program	Bachelor of Science in Computer Science
2. CHED CMO Reference	CHED CMO No. 25 s. 2015
3. BOR Approval	BOR Resolution No. 76 s. 2018

4. Program Educational Objectives and Relationship to Institution Mission

Program Educational Objectives	Mission		
	a	b	c
1. Articulate and discuss the latest developments in the specific field of practice.	✓	✓	✓
2. Work effectively and independently in multi-disciplinary and multicultural teams.	✓	✓	✓
3. Analyze complex problems and identify and define the computing requirements needed to design an appropriate solution.	✓	✓	✓
4. Apply computing and other knowledge domains to address real-world problems.	✓	✓	✓
5. Design and develop computing solutions using a system-level perspective.	✓	✓	✓
6. Utilize modern computing tools.	✓	✓	✓
7. Those employed in industry or entrepreneurial endeavors will demonstrate professional advancement through expanded leadership responsibility, significant technical accomplishment, or other recognition of their contributions.	✓	✓	✓
8. Those who continue their formal education will achieve an advanced degree or other technical certification.	✓	✓	✓

**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	CSci 103
2. Course Title	Discrete Structures II
3. Pre-requisite	CSci 102 – Discrete Structures I
4. Co-requisite	None
5. Credit	3 units
6. Semester Offered	1st semester
7. Number of hours	3 hours lecture per week
8. Course Description	This course is a continuation of Discrete Structures I. The course will tackle on the advance topics that includes functions and sequences, number theory and cryptography, combinatorics, and discrete probability.

9. Program Outcomes (POs) in relation to the Program Educational Objectives (PEOs)									
Program Outcomes (POs)		Program Educational Objectives							
		1	2	3	4	5	6	7	8
a	Apply knowledge of computing fundamentals, knowledge of a computing specialization and mathematics, science and domain knowledge appropriate for this computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.			✓					
b	Identify, analyze, formulate, research literature and solve complex computing problems and requirements reaching substantiated conclusions using fundamental principles of mathematics, computing sciences and relevant domain disciplines.			✓	✓				
c	Apply mathematical foundations, algorithmic principles and computer science theory in the modelling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.			✓					
d	Knowledge and understanding of information security issues in relation to the design, development and use of information systems.				✓				
e	Design and evaluate solutions for complex computing problems, and design and evaluate systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.				✓	✓			
f	Create, select, adapt and apply appropriate techniques, resources and modern computing tools to complex computing activities with an understanding of the limitations to accomplish a common goal.						✓		
g	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.		✓						
h	Communicate effectively with the computing community and with society at large about complex computing activities by being able to comprehend and								

	write effective reports, design documentation, make effective presentations and give and understand clear instructions.								
i	Recognize the legal, social, ethical and professional issues involved in the utilization of computer technology be guided by adoption of appropriate professional, ethical and legal practices.								
j	Recognize the need and the ability to engage in independent learning for continued development as a computing professional.	✓							✓

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	d	e	f	g	h	i	j
CO1: Evaluate function and sequence definitions	/	/	/							
CO2: Use number theory concepts in implementing efficient cryptosystems	/	/	/							
CO3: Utilize various counting principles for combinatorial analysis	/	/	/							
CO4: Solve problems involving uncertainty using probability and Bayes' theorems	/	/	/							

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 1. OBE Syllabus 2. Requirements 3. Assessment System and Activities 4. Class Policies 5. Safety Guidelines and Emergency Response during fire and earthquake		<ul style="list-style-type: none"> Setting of expectations Agreements Learning mode Mode of communication Familiarization of VSUEE/VC 		
CO 1: Evaluate function and sequence definitions					
2-3	Module 1: Functions and Sequences Lesson 1.1: Functions	LO 1.1.1 Determine whether a relation is a function given a domain and range LO 1.1.2 Find the domain and range of functions LO 1.1.3 Compute valid values	<ul style="list-style-type: none"> Demonstrate solving function and sequence problem exercises Inter-active discussion of concepts 	<ul style="list-style-type: none"> Reading of electronic reading material Group study among peers 	Module 1 Post-test

		<p>applied with functions</p> <p>LO 1.1.4 Determine whether a function is an injection, surjection, or bijection</p>			
	Lesson 1.2: Sequences	<p>LO 1.2.1 Find the valid terms of the sequence</p> <p>LO 1.2.2 Synthesize a valid sequence or recurrence relation given sequence definition</p>			
CO 2: Use number theory concepts in implementing efficient cryptosystems					
4-8	Module 2: Number Theory and Cryptography Lesson 2.1: Divisibility and Modular Arithmetic	<p>LO 2.1.1 Compute valid quotient and remainder values when two integers are divided</p> <p>LO 2.1.2 Identify whether two expressions of the same modulus are congruent</p>	<ul style="list-style-type: none"> • Demonstrate solving number theory problem exercises • Demonstrate encryption and decryption methods • Inter-active discussion of concepts 	<ul style="list-style-type: none"> • Reading of electronic reading material • Group study among peers 	Module 2 Post-test
	Lesson 2.2: Integer Representation and Algorithms	<p>LO 2.2.1 Convert integers into binary, octal, and/or hexadecimal expansions</p> <p>LO 2.2.2 Compute valid values of expressions applied with modular exponentiation</p>			
	Lesson 2.3: Primes and Greatest Common Divisors	<p>LO 2.3.1 Determine if an integer is a prime number</p> <p>LO 2.3.2 Give the valid prime factorization of an integer</p> <p>LO 2.3.3 Find and determine the integers that are relatively prime with each other</p> <p>LO 2.3.4 Compute the greatest common denominator and least common multiple of two integers</p>			
	Lesson 2.4: Cryptography	<p>LO 2.4.1 Encrypt messages using shift, block, and public key cryptosystems</p> <p>LO 2.4.2 Decrypt messages using shift, block, and public key cryptosystems</p>			

9	MIDTERM EXAMINATION WEEK				
CO 3: Utilize various counting principles for combinatorial analysis					
10-13	Module 3: Combinatorics				
	Lesson 3.1: Counting Basics	LO 3.1.1 Solve counting problems using the basic rules of counting	<ul style="list-style-type: none">• Demonstrate solving combinatorial problem exercises• Inter-active discussion of concepts	<ul style="list-style-type: none">• Reading of electronic reading material• Group study among peers	Module 3 Post-test
	Lesson 3.2: The Pigeonhole Principle	LO 3.2.1 Solve counting problems using the pigeonhole principle			
	Lesson 3.3: Permutations and Combinations	LO 3.3.1 Solve counting problems using permutations and combinations			
	Lesson 3.4: Binomial Coefficients and Identities	LO 3.4.1 Compute the coefficient/s of binomial expansions LO 3.4.2 Prove equivalences of binomial coefficients and identities			
	Lesson 3.5: Generalized and Generating Permutations and Combinations	LO 3.5.1 Solve counting problems using generalized permutations and combinations LO 3.5.2 Generate permutations of a counting problem using lexicographic ordering			
CO 4: Solve problems involving uncertainty using probability and Bayes' theorems					
14-17	Module 4: Discrete Probability		<ul style="list-style-type: none">• Demonstrate solving discrete probability problem exercises• Inter-active discussion of concepts	<ul style="list-style-type: none">• Reading of electronic reading material• Group study among peers	Module 4 Post-test
	Lesson 4.1: Probability Theory	LO 4.1.1 Solve computing problems involving uncertainty using probability theory concepts			
	Lesson 4.2: Bayes' Theorem	LO 4.2.1 Solve computing problems using Bayes' theorem			
STUDENT SELF-ASSESSMENT SURVEY					
18	FINAL EXAMINATION WEEK				
* VSUEE/VC – VSU E-Learning Environment/ Virtual Classroom					

12. Life-long Learning Opportunities

- Student's mathematical and logical reasoning will further be enhanced since most of the topics/concepts are explained using logical and mathematical definition consisting of theorems, lemmas, and corollaries.
- Algorithmic thinking will be embedded into student's habits, thus, making their habits par systematic.

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

General Education: 60%
Basic ICT: 20%
Professional Computer Science: 20%

14. References and Other Learning Resources

A. Textbook(s)

1. Rosen, Kenneth H. *Discrete mathematics and its applications*. Eighth Edition. McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121, 2019. ISBN 978-1-259-67651-2.

B. Online Resources

1. A Course in Discrete Structures. Rafael Pass, Wei-Lung Dustin Tseng.
<https://www.cs.cornell.edu/~rafael/discmath.pdf>
2. Discrete Structures Lecture Notes. Vladen Koltun. Winter 2008. Stanford University, Stanford, CA 94305, USA; vladlen@stanford.edu
<https://web.stanford.edu/class/cs103x/cs103x-notes.pdf>

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	Module Post-tests (MP)	50	4	12.50
2	Term Exams (TE)	50	2	25.00
TOTAL		100%		

COs	Assessment Tasks	Weight in Percent	Minimum Average for Satisfactory Rating	Target and Standards
CO 1	Module 1 Post-test	12.50	60 %	At least 50% of the students have at least 60% score
CO 2	Module 2 Post-test	12.50		
	Midterm Exam	25.00		
CO 3	Module 3 Post-test	12.50		
CO 4	Module 4 Post-test	12.50		
	Final Exam	25.00		
TOTAL		100%		

Grading System (% Passing: 60%)

Range	Grade	Range	Grade
95.56-100.00	1.00	52.50-59.99	3.25
91.11-95.55	1.25	45.00-52.49	3.50
86.67-91.10	1.50	37.50-44.99	3.75
82.22-86.66	1.75	30.00-37.49	4.00

77.78-82.21	2.00	22.50-29.99	4.25
73.33-77.77	2.25	15.00-22.49	4.50
68.89-73.32	2.50	07.50-14.99	4.75
64.44-68.88	2.75	00.00-07.49	5.00
60.00-64.43	3.00		

16. Course Policies

- **VSU E-Learning Portal** (<https://elearning.vsu.edu.ph/>) is the official learning portal for this course.
- If the pre-requisite course/s of this course is graded INC and not complied before Midterm Exam Week, the student will automatically be dropped from the course.
- This syllabus is designed for face-to-face lecture classes.
- Deadlines are absolute unless extended due to any force majeure e.g., natural disasters, hospitalization (inpatient), sickness (outpatient), war, suspension of classes via VSU OP memoranda. In the event of sickness (outpatient), it must be supported with a medical certificate signed by the doctor with his license number attached, otherwise the claim will not be accepted.
- University policies are strictly followed. Please be guided accordingly.

This class policy serves as our written agreement for the whole midyear. 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

Faculty:

- Whiteboard, marker, and eraser

Student:

- VSUEE (E-learning portal)
- Electronic reading materials

18. Revision History

Revision number	Date of Revision	Date of implementation	Highlights of Revision
00	December 28, 2018	August 1, 2019 1 st semester, AY 2019-2020	New syllabus creation
01	October 2, 2019	N/A	ISO OBE syllabus format transfer
02	May 6, 2020	August 10, 2020 1 st semester, AY 2020-2021	Revised for the blended mode of learning (pandemic season)
03	August 24, 2022	September 12, 2022 1 st semester, AY 2022-2023	Revision of topics, assessment tasks, learning mode and grading system

19. Preparation

	Name	Signature	Date Signed
Prepared by	Jomari Joseph Barrera		

IV. INSTRUCTOR/PROFESSOR INFORMATION

1. Name of Instructor/Professor	Jomari Joseph A. Barrera
2. Office and Department	Department of Computer Science and Technology
3. Telephone/Mobile Numbers	(053) 565 0600 loc. 1022 / +63 970 068 4506
4. Email Address	jomarijoseph.barrera@vsu.edu.ph
5. Consultation Time	Monday and Wednesday 1 – 2 PM

20. Department Instructional Materials Review Committee:

Committee	Name	Signature	Date Signed
Member:	Eugene Val D. Mangaoang		
Member:	Michael Anthony Jay B. Regis		
Member:	Jude B. Rola		
Chairperson:	Jonah Flor O. Maaghop		

	Name	Signature	Date Signed
Verified by:	JANNET C. BENCURE College Dean		
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
 - 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.

REMINDER:

1. *The author should not be part of the DIMRC.*
2. **If the author is the Department Head, he/she will be replaced by another chairperson from among the senior faculty members.*
3. ***If the author is the College Dean, the Head of Instructional Materials Development will approve.*
4. *Follow the next higher supervisor, no same person*
5. *For the component campuses, if the author is the College Dean, the Director for Academic Affairs will approve.*
6. *If the author is the Department Head and at the same time the College Dean, the Director for Academic Affairs will be the Chairperson of the DIMRC, and the Chancellor will approve it.*

(3) Distribution of copies: OHIMD, Department, Faculty