UNIVERSITY OF SOUTHERN MINDANAO

COURSE SYLLABUS for Discrete Mathematics

Course Number	AMath 11	Rev. No.	2	Page 1 of 9

EFFECTIVE DATE	REV. NO.	REVISION TYPE	CHANGE DESCRIPTION	PAGE AFFECTED	ORIGINATOR
August 12, 2024	2	Partial	Updated the course number. Changes in the grading system, giving more weight of the exam for higher quality education.	All	Lawton John A. Yabes
August 14, 2023	1	Partial	Changes in the classroom policies, course learning plan and grading system with regards to the change of mode of delivery of instructions from online class to full on face to face class, and additional references are added.	Pages 5-9	Leonard M. Paleta/ Lawton John A. Yabes
August 16, 2022	Ø	New	Newly established compressed syllabus for Applied Mathematics program for use during COVID-19 Pandemic. Flexible mode of instructions is adapted. Suggested readings with corresponding pages\URL and supplemental materials are included.	All	Leonard M. Paleta/ Lawton John A. Yabes
			ELECTRONICALLY RELEASED **2025.07.09**		

Author:	Reviewer:	Verifier:	Validator:	Final Approver:	DCC USE ONLY
					DOCUMENT CONTROL INDICATOR
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Course Developer	Department Curriculum Coordinator	Department Chairperson	CSM Dean	Vice President for Academic Affairs	
Date: 2024. 08. 02	Date: 2024. 08. 02	Date: 2024. 08. 05	Date: 2024. 08. 06	Date: 2024. 08. 09	2024 08.12

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INSTITUTIONAL POLICIES

Vision	Quality and relevant education for its clientele to be globally competitive, culture sensitive and morally responsive human resources for sustainable development.
Mission	Help accelerate socio-economic development[M1], promote harmony among the diverse cultures[M2] and improve quality of life[M3] through instruction, research, extension and resource generation in Southern Philippines.
Core Values	**G**-Goodness, **R**-Responsiveness, **E**-Excellence, **A**-Assertion of Right and **T**-Truth
USM Quality Policy Statement	The University of Southern Mindanao, as a premier university, is committed to provide quality instruction, research development and extension services and resource generation that exceed stakeholders' expectations through the management of continual improvement efforts on the following initiatives. 1. Establish key result areas and performance indicators across all mandated functions; 2. Implement quality educational programs; 3. Guarantee competent educational service providers; 4. Spearhead need-based research outputs for commercialization, publication, patenting, and develop technologies for food security, climate change mitigation and improvement in the quality of life; 5. Facilitate transfer of technologies generated from research to the community for sustainable development; 6. Strengthen relationship with stakeholders; 7. Sustain good governance and culture sensitivity; and 8. Comply with customer, regulatory and statutory requirements.
Goals of the College	1. The College of Science and Mathematics of the University of Southern Mindanao is committed to the comprehensive preparation of the next generation of scientists and mathematicians in this part of the country. 2. The College supplies a condition in which faculty can advance and support high-quality research programs in which students can collaborate and contribute to new knowledge that improves quality of life. 3. The College aspires to be the center of excellence in Science and Mathematics in order to serve diverse students, preparing them for their future careers in line with the vision and mission of the University. 4. The College serves the community and the industry as an impartial source of quality graduates in Science and Mathematics that provides education, literacy, innovation and solution generation to challenges.
Department Objectives	The Department of Mathematics and Statistics aims to: 1. produce students with mastery in the core areas of mathematics and statistics, including algebra, analysis, and geometry; 2. develop students' skills in pattern recognition, generalization, abstraction, critical analysis, synthesis, problem-solving and rigorous argument; 3. express an enhanced perception of the vitality and importance of mathematics in the modern world including inter-relationships within math and its connection to other disciplines; and 4. develop students' skills in creating and evaluating mathematical conjectures and arguments, and in validating their own mathematical thinking.

PROGRAM INFORMATION

Degree Program	Bachelor of Science in Applied Mathematics		CHED CMO Reference	48 series of 2017	BOR Approval	BOR Res. No. 24, s 2020

COURSE DETAILS

Course Title	Discrete Mathematics			
Course Number	AMath 11		Curriculum Component	Major subject
Credit (--Unit)	3 Units	LECTURE (Unit-Hours)	3 Units - 3 Hours	LABORATORY (Unit-Hours) · 0 Units - 0 Hours
Prerequisites	None	Co-requisites	None	Year Level/Semester Offered · 3rd - First Semester
Course Description	This a course that covers the fundamentals of logic, proving, functions and sets, basic counting techniques, and advanced counting techniques.			
Faculty in charge				
Consultation Hours			Contact Information	

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

In 3-5 years, the **BSAM** graduates of USM shall		MISSION		
		M1	M2	M3
PEO 1	Provide leadership in various development programs both public and private	✓		
PEO 2	Equip with technical, conceptual and human resource skills	✓		✓
PEO 3	Pursue entrepreneurial activities	✓		✓
PEO 4	Able to adapt to diverse culture		✓	
PEO 5	Pursue advanced studies in emerging related fields		✓	✓

NOTE: *The PEO's are based on the professional, industry, local, national and international needs and requirements of the program identified through consultation with constituents and stakeholders.*

PROGRAM OUTCOMES (PO) — Upon graduation, the University of Southern Mindanao **BSAM** students must be able to:	PEO1	PEO2	PEO3	PEO4	PEO5	PEO6	PEO7	PEO8	PEO9	PEO10	...
a) Articulate and discuss the latest development in the specific field of practice.		✓									
b) Effectively communicate orally and in writing using both English and Filipino		✓		✓							
c) Work effectively and independently in multidisciplinary and multi-cultural teams			✓	✓							
d) Act in recognition of professional, social and ethical responsibility	✓										
e) Preserve and promote "Filipino historical and cultural heritage"				✓							
f) Participate in the generation of new knowledge in research and development projects.		✓									
g.) Demonstrate broad and coherent knowledge and undestanding in the core areas of physical and natural sciences.		✓									
h.) Apply critical and problem solving skills using the scientific method.		✓									
i.) Interpret relevant scientific data and make judgements that include reflection on relevant scientific and ethical issues.	✓	✓			✓						
j.) Carry out basic mathematical and statistical computations and use appropriate technologies in the analysis of data.		✓			✓						
k.) Communicate information, ideas, problems, and solutions, both orally and in writing, to other scientists, decision makers, and the public.	✓	✓	✓	✓							
l.) Relate science and mathematics to the other disciplines.		✓	✓	✓	✓						
m.) Design and perform safe and responsible techniques and procedures in laboratory or field practices.		✓									
n.) Critically evaluate input from others.		✓		✓							
o.) Appreciate the limitations and implications of science in everyday life.		✓									
p.) Commit to the integrity of data.		✓		✓	✓						
q.) Gain mastery in the cores areas of mathematics: algebra, analysis, and geometry.		✓			✓						
r.) Demonstrate skills in pattern recognition, generalization, abstraction, critical analysis, synthesis, problem-solving and rigorous argument.		✓									
s.) Develop an enhanced perception of the vitality and importance of mathematics in the modern world including inter-relationships within math and its connection to other disciplines.		✓		✓							
t.) Appreciate the concept and role of proof and reasoning and demonstrate knowledge in reading and writing mathematical proofs.		✓			✓						
u.) Make and evaluate mathematical conjectures and arguments and validate their own mathematical thinking.		✓			✓						
v.) Communicate mathematical ideas orally and in writing using clear and precise language.	✓	✓									

NOTE: Minimum PO's shall come from the PSG/CMO of the program if applicable. Other additional PO's may come from consultations with constituents and stakeholders.

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COURSE OUTCOMES (CO)	POa	POb	POc	POd	POe	POf	POg	POh	POi	POj	POk	POl	POm	POn	POo	POp	POq	POr	POs	POt	POu	POv
Upon passing this course, the students must be able to: **Course Alignment to Program Outcomes**	I					I						I						I		I		
CO 1 Translate mathematical statements from common English to formal logic and vice-versa.	I					I						I						I		I		
CO 2 Verify the validity of an argument using rules of inference.	I					I						I						I		I		
CO 3 Identify the difference among various types of proof: direct proof, proof by contradiction, and proof by cases; and use an appropriate method in proving mathematical statements	I					I						I						I		I		
CO 4 Use the proper notations on sets and functions and perform operations on them.	I					I						I						I		I		
CO 5 Apply the basic and advanced counting techniques to solve counting problems.	I					I						I						I		I		
CO 6 Solve problems involving recurrence relations, generating functions and inclusion-exclusion principle.	I					I						I						I		I		

* **Level** (follow the legend used in the most relevant PSG/CMO)

[I] = Introductory. This introduces the student to the Program Outcome (PO). **[E]** = Enabling. This enables the student to attain the Program Outcome (PO) **[D]** = Demonstrative. This demonstrates the student's attainment of the Program Outcome (PO)

COURSE LEARNING PLAN

Intended Learning Outcomes (ILO) By the end of the learning experience*, students must be able to:	Aligned to CO:	Time Frame (Week)	Course Content (Topics)	Teaching & Learning Activities (TLA)		Learning Materials	Assessment Tasks (AT)	Suggested Readings
				Teaching Activities	Learning Activities			
1.1 Explain the vision, mission, UQPS of the University 1.2 Explain the goals and objectives of the college. 1.3 Explain the Program Educational Objectives, Students Outcomes, and Course Outcomes.		1	**Orientation on Classroom and University Policies as well as Grading System** • Discussion on PEO, SO and CO	Orientation Lecture/Discussion	Reading; Assignment	Computer; Chalkboard	Recitation	[8]
2.1 Determine whether a sentence is a proposition or not.	CO1 CO2	2-4	**Propositional Logic** ▪ Propositional Equivalence	Lecture/	Reading and Solving	Instructional Module	Assignments Quizzes	[2]Page 47-117 [3] Page 1-64

ILO	CO	Week	Topic	Teaching and Learning Activities			Assessment	References
2.2 Describe the 2.3 Know how to make a truth table of a given proposition 2.4 Discuss and use predicates and quantifiers			▪ Predicates and Quantifiers ▪ Nested Quantifiers ▪ Rules of Inference	Video Presentation/addressing students questions			Exams	[5]Page 1-39 [6] Page 50-70 [7]Page 1-49 [9] [10]
3.1 Prove using direct proof 3.2 Prove by proof by contradiction 3.3 Prove by proof by cases 3.4 Determine which proof to use on a given mathematical statement 3.5 Define sets 3.6 Perform operations on a given set 3.7 Define functions	CO3 CO4	5-8	**Introduction to Proofs** ▪ Proof Methods and Strategy ▪ Sets ▪ Set Operations ▪ Functions	Lecture/ Video Presentation/addressing students questions	Reading and Solving	Instructional Module	Assignments Quizzes Exams	[1] Page 27-33 [2]Page 123-186,247-302 [3]Page 66-180 [4]Page 1-66 [5] Page 42-52,86-117 [6] Page 71-99 [7]Page 49-56 [9]
All ILOs covered in Midterm		Week 9	MIDTERM EXAMINATION					
4.1 Identify the rules and principles of counting 4.2 Discuss and use the pigeonhole principle 4.3 Define and know the difference of permutations and combinations 4.4 Define Binomial Coefficients 4.5 Apply combinations and permutations on counting	CO5	10-13	**Counting** ▪ The basis of Counting ▪ The Pigeonhole Principle ▪ Permutations and Combinations ▪ Binomial Coefficients ▪ Generalized Permutations and Combinations	Lecture/ Video Presentation/addressing students questions	Reading and Solving	Instructional Module	Assignments Quizzes Exams	[1]Page 33-48 [2]Page 1-41 [3]Page 265-332 [4]Page 88-103 [5]Page 177-200 [6] Page 181-224 [7]Page 343-436
5.1 Define recurrence relations 5.2 Solve Linear recurrence relations 5.3 Define generating functions 5.4 Discuss and use the the inclusion-exclusion principle	CO6	14-17	**Advanced Counting Techniques** ▪ Recurrence Relations ▪ Solving Linear Recurrence Relations ▪ Generating Functions ▪ Inclusion-Exclusion Principle	Lecture/ Video Presentation/addressing students questions	Reading and Solving	Instructional Module	Assignments Quizzes Exams	[2]Page 415-505 [3] Page 333-374 [4]Page 107-121 [5]Page 201-226 [6]Page 153-179 [7]Page 261-342
All ILOs covered in the Course		18	FINAL EXAMINATION					

* any interaction, course, program, or other experience in which learning takes place (https://www.edglossary.org/learning-experience/).

Textbook/References

[1] Biggs,N.L., Discrete Mathematics, 1st Edition, Oxford University Press, 1985
[2] Grimaldi, R.P., Discrete and Combinatorial Mathematics, 5th Edition, Pearson,2003.
[3] Johnsonbaugh, R., Discrete Mathematics, 7th Edition, Pearson, 2007.
[4] Lipschutz, S. and Lipson, M., Discrete Mathematics, 3rd Edition,McGraw-Hill, 2009
[5] Rosen, K.H. Discrete Mathematics and Applications, 6th Edition, McGraw-Hill, 2007.
[6] Ross, K.A., Discrete Mathematics, 5th Edition, Pearson, 2002.
[7] Koshy,T., Discrete Mathematics with applications, 1st Edition,Academic Press, 2003
[8] USM Student Manual

Online References

[9] Levin, O. (2018, January 29). Discrete mathematicsan open introduction. Discrete Mathematics. http://discrete.openmathbooks.org/dmoi2/dmoi.html
[10] https://www.tutorialspoint.com/discrete_mathematics/index.htm

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Life-long Learning Opportunity

Apply Discrete Mathematics to other fields of mathematics such as graph theory, set theory, probability theory, and in other fields of Computer Science.

Course Evaluation

Course Outcomes (CO)	Assessment Task Addressing CO	Weight (%)	Satisfactory Rating	Target Standard
CO1: Translate mathematical statements from common English to formal logic and vice-versa.	Quizzes/Assignments/Others	40	60	90% of the class obtained a satisfactory rating
	Major Exam	60		
CO1: Verify the validity of an argument using rules of inference.	Quizzes/Assignments/Others	40	60	90% of the class obtained a satisfactory rating
	Major Exam	60		
Identify the difference among various types of proof: direct proof, proof by contradiction, and proof by cases; and use an appropriate method in proving mathematical statements	Quizzes/Assignments/Others	40	60	90% of the class obtained a satisfactory rating
	Major Exam	60		
Use the proper notations on sets and functions and perform operations on them.	Quizzes/Assignments/Others	40	60	90% of the class obtained a satisfactory rating
	Major Exam	60		
Apply the basic and advanced counting techniques to solve counting problems.	Quizzes/Assignments/Others	40	60	90% of the class obtained a satisfactory rating
	Major Exam	60		
Solve problems involving recurrence relations, generating functions and inclusion-exclusion principle.	Quizzes/Assignments/Others	40	60	90% of the class obtained a satisfactory rating
	Major Exam	60		

Grading System

Midterm Grade

Quizzes/Problem Set------------------------------20%
Assignments/Others-------------------------------20%
Midterm Exam--------------------------------------60%

Final Term Grade

Quizzes/Problem Set------------------------------20%
Assignments/Others-------------------------------20%
Final Exam---60%
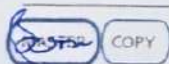
Final Grade

50% Midterm Grade+50% Final Term Grade

Passing Grade

60%

Classroom Policies

1. Come to class prepared for recitation, class discussions, or unannounced quizzes always. Demonstrate personal responsibility by obtaining notes and finding out any instructions/important announcements given on the class period missed.

2. Absence is not a student's right, nor a privilege. The University Code on absence and tardiness applies. 20% of the total class hours means you are DROPPED from the course. Absences can be excused only after presenting official documents due to sickness or other valid reasons.

3. All submissions must be your original work. Cite sources properly. Plagiarism and any form of academic cheating get a corresponding grade of 5.0 (Failed), and can be grounds for suspension or expulsion.

4. Class participation throughout the class duration is highly encouraged.

5. For class consultation, you may approach your class mayor for your concerns, and the class mayor will relay these concerns to the concerned professor. Students may also opt to personally approach their concerned professors for their concerns either in the classroom or in the professor's office.

6. Observe proper decorum inside and outside the classroom.

8. Observe CLAYGO (Clean As You Go) before leaving the classroom.

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