



# UNIVERSITY OF SOUTHERN MINDANAO

## COURSE SYLLABUS for CALCULUS 3



Course Number

Math 213b

Rev. No.

1

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UNCONTROLLED

EFFECTIVE DATE	REV. NO.	REVISION TYPE	CHANGE DESCRIPTION	PAGE AFFECTED	ORIGINATOR
July 25, 2022	1	Partial	Revision of course learning plan.	Course Learning Plan (pp 5-9)	Philip Lester P. Benjamin
August 16, 2021	Ø	New	Newly established compressed syllabus for BS Applied Mathematics program for use during COVID-19 Pandemic. Flexible mode of instruction is adapted.	ALL	Philip Lester P. Benjamin

ELECTRONICALLY RELEASED  
2025.07.09

Author:	Reviewer:	Verifier:	Validator:	Final Approver:	DCC USE ONLY
 PHILIP LESTER P. BENJAMIN, PhD Course Developer	 JEANETH R. LICAROS, PhD Dept Curriculum Coordinator	 LEONARD M. PALETA, PhD Department Head	 JONALD L. PIMENTEL, PhD CSM Dean	 GEOFFRAY R. ATOK, PhD Vice President for Academic Affairs	DOCUMENT CONTROL INDICATOR
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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 <sup>M2</sup> , promote harmony among the diverse cultures <sup>M2</sup> and improve quality of life <sup>M3</sup> 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	<p>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.</p> <ol style="list-style-type: none"><li>1. Establish key result areas and performance indicators across all mandated functions;</li><li>2. Implement quality educational programs;</li><li>3. Guarantee competent educational service providers;</li><li>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;</li><li>5. Facilitate transfer of technologies generated from research to the community for sustainable development;</li><li>6. Strengthen relationship with stakeholders;</li><li>7. Sustain good governance and culture, sensitivity; and</li><li>8. Comply with customer, regulatory and statutory requirements.</li></ol>
Goals of the College	<ol style="list-style-type: none"><li>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.</li><li>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.</li><li>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.</li><li>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.</li></ol>
Department Objectives	<p>The Department of Mathematics and Statistics aims to:</p> <ol style="list-style-type: none"><li>1. produce students with mastery in the core areas of mathematics and statistics, including algebra, analysis, and geometry;</li><li>2. develop students' skills in pattern recognition, generalization, abstraction, critical analysis, synthesis, problem-solving and rigorous argument;</li><li>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</li><li>4. develop students' skills in creating and evaluating mathematical conjectures and arguments, and in validating their own mathematical thinking.</li></ol>





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PROGRAM INFORMATION					
Degree Program	Bachelor of Science in Applied Mathematics	CHED CMO Reference	48 Series of 2017	BOR Approval	BOR Resolution no. 24 S. 2020

COURSE DETAILS					
Course Title	Calculus 3				
Course Number	MATH 213b	Curriculum Component		Core Subject	
Credit (--Unit)	3 Units	LECTURE (Unit-Hours)	3 Units - 3 Hours	LABORATORY (Unit-Hours)	0 Units - 0 Hours
Prerequisites	MATH 122b	Co-requisites	None	Year Level/Semester Offered	2nd Year - First Semester
Course Description	This course discusses application of integration, techniques of integration, sequences and series, and power series.				
Faculty in charge					
Consultation Hours			Contact Information		

PROGRAM EDUCATIONAL OBJECTIVES (PEO)		MISSION		
In 3-5 years, the BSAM graduates of USM shall:		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.





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PROGRAM OUTCOMES (POs)										
Upon graduation, the University of Southern Mindanao BSAM students must be able to:										
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 understanding 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 and 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)

Upon passing this course, the students must be able to:

## Course Alignment to Program Outcomes

CO	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	POw	POx	POy	POz
CO 1	Discuss sequences and series.						E	E	E		E	E	E					E	E	E							
CO 2	Apply various tests for convergence and divergence of series.						E	E	E		E	E	E					E	E	E							
CO 3	Discuss power series.						E	E	E		E	E	E					E	E	E							
CO 4	Discuss taylor series.						E	E	E		E	E	E					E	E	E							

\* 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			
<ul style="list-style-type: none"> <li>Explain the vision, mission, UQPS of the University</li> <li>Explain the goals and objectives of the college.</li> <li>Explain the Program Educational Objectives, Students Outcomes, and Course Outcomes.</li> </ul>		1	<b>Orientation on Classroom and University Policies as well as Grading System</b> <ul style="list-style-type: none"> <li>Discussion on PEO, SO and CO</li> </ul>	Orientation Lecture/Discussion	Reading; Assignment USM VLE	Computer; Powerpoint presentation, Laptop/PC	Recitation	[1]

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formula for the term of a  the limit of a if it exists. the the nce or e of a given  e meaning of f an infinite  the sum of a series.	CO1	1-2	<b>Sequences and Series</b> <ul style="list-style-type: none"><li>Sequences</li><li>Infinite Series</li></ul>	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 660-667 [8] pp 690-714	
Increasing and sequences some example of g and sequence discuss s and s the theorems monotonic nd	CO1	3-4	<b>Monotonic and Bounded Sequences</b> Increasing and decreasing sequence -Lowerbound and upperbound -Some theorems on monotonic and convergence	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 667-673 [8] pp 696-699	
discuss an  discuss nd quences theorems e and series	CO2	5-6	<b>Infinite Series of Constant Terms</b> -Definition of infinite series -Convergent and divergent sequence -Some theorems on convergence/divergence	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 673-684 [8] pp 696-699	

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comparison test series for nce. mit comparison termine nce of a series.	CO2	7-8	Infinite Series of Positive Terms -Comparison test -Limit comparison test	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 684-694 [8] pp 722-727	
tegral test to the ce of a series	2 CO2	9 10-11	MIDTERM EXAM The integral test The integral test theorem	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 694-697 [8] pp 714-722	
rnating o determine ence of a  solutely series io test to e of a series	CO2	12-13	The infinite series of positive and negative terms -Definition of alternating series -The alternating series test -Absolutely convergent series -The ratio test	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 697-707 [8] pp 732-739	

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<ul style="list-style-type: none"><li>Define a power series</li><li>Provide some examples of a power series</li></ul>	CO3	14	<b>Power Series</b> <ul style="list-style-type: none"><li>-Definition of power series</li><li>-Some power series</li></ul>	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 707-713 [8] pp 741-746	
<ul style="list-style-type: none"><li>Determine the radius of convergence and interval of convergence of a power series.</li><li>Use a power series to represent a function.</li></ul>	CO3	15	<b>Differentiation of power series</b> <ul style="list-style-type: none"><li>-radius of convergence</li><li>-power series of some functions</li></ul>	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 713-722 [8] pp 746-751	
<ul style="list-style-type: none"><li>Evaluate the integral as a power series</li></ul>	CO3	16	<b>Integration of Power Series</b> <ul style="list-style-type: none"><li>-power series representation of some integrals</li><li>-integration of power series</li></ul>	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 722-729 [8] pp 746-751	
<ul style="list-style-type: none"><li>Describe the procedure for finding a Taylor polynomial of a given order for a function.</li><li>Explain the meaning and significance of Taylor's theorem with remainder.</li></ul>	CO4	17	<b>Taylor Series</b> <ul style="list-style-type: none"><li>-infinitely differentiable functions</li><li>-Taylor series and Maclaurin series</li></ul>	Lecture/ Video Presentation Zoom video conference Module MyOpenMath tasks	Discussion Seat work Group Reporting USM VLE tasks MyOpenMath	Whiteboard Book (in PDF) Workbook Projector Laptop/PC Powerpoint presentation	Quizzes Exams Seatworks Reports/ Reflective paper USM VLE Exercises MyOpenMath	[7] pp 729-738 [8] pp 753-777	

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• Estimate the remainder for a Taylor series approximation of a given function.										
All ILOs covered in the Course		4	18	FINAL EXAMINATION						

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

Textbook/References
[1] USM Student Manual
[2] Anton, H., Bivens, I.C., and Davis, S., Calculus Early Transcendentals, 10 <sup>th</sup> Edition, Wiley, 2011.
[3] Anton, H., Bivens, I.C., and Davis, S., Calculus, 10 <sup>th</sup> Edition, Wiley, 2012.
[4] Edwards, Jr., C.H. and Davis, S., Calculus, Early Transcendentals, 7 <sup>th</sup> Edition, Prentice Hall, 2007.
[5] Etgen, G., S. Salas and E. Hille, Calculus: One and Several Variables, 9 <sup>th</sup> Edition, John Wiley and Sons, Inc., 2003.
[6] Leithold, Louis, The Calculus 7, Harper Collins, 1996.
[7] Leithold, Louis, The Calculus with Analytic Geometry, Harper Collins, 1990.
[8] Stewart, J., Calculus: Early Transcendentals, 7 <sup>th</sup> Edition, Brooks/Cole, 2011.
[9] Thomas, G.B, Weir, M.D. and Hass, J.L, Thomas' Calculus, 12 <sup>th</sup> Edition, Pearson, 2009.
[10] Thomas, G.B, Weir, M.D. and Hass, J.L, Thomas' Calculus Early Transcendentals, 1 <sup>st</sup> Edition, Pearson, 2006.
[11] Varberg, D., Purcell, E.J., and Rigdon, S.E., Calculus, 9 <sup>th</sup> Edition, Pearson, 2006.

**Life-long Learning Opportunity**

The most common practical use of calculus is when plotting graphs of certain formula or functions. Among the disciplines that utilize calculus include physics, engineering, economics, statistics, and medicine. It is used to create mathematical models in order to arrive into an optimal solution.

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Course Outcomes (CO)		Course Evaluation			
		Assessment Task Addressing CO	Weight (%)	Satisfactory Rating	Target Standard
CO 1: Solve problems involving areas of regions and volumes of solids of revolution.		Quizzes/Summative Exams	40	60	75% of the class obtained a satisfactory rating
		Major Exam	40		
		Assignments/Exercises	20		
		Quizzes/Summative Exams	60		
CO 2: Solve problems involving areas of regions, volumes of solids of revolution, arc lengths of curve and differential equations.		Major Exam	40	60	75% of the class obtained a satisfactory rating
		Assignments/Exercises	20		
		Quizzes/Summative Exams	60		
		Major Exam	40		
CO 3: Evaluate integrals using basic integration techniques.		Assignments/Exercises	20	60	75% of the class obtained a satisfactory rating
		Quizzes/Summative Exams	60		
		Major Exam	40		
		Assignments/Exercises	20		
CO 4: Apply various tests for convergence and divergence of series.		Quizzes/Summative Exams	60	60	75% of the class obtained a satisfactory rating
		Major Exam	40		
		Assignments/Exercises	20		
		Quizzes/Summative Exams	60		

Midterm Grade		Grading System	
Quizzes/Summative Exams-----	40%	Final Grade	
Midterm Exam/USM VLE Exam-----	20%	50% Midterm Grade+50% Final Term Grade	
Assignments/Exercises-----	20%		
Final Term Grade		Passing Grade	
Quizzes/Summative Exams-----	40%	60%	
Midterm Exam/USM VLE Exam-----	40%		
Assignments/Exercises-----	20%		

## 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 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.
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.

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4. During online class, students are expected to:
- Show up on a scheduled time and wait to be admitted into the class.
  - Be always respectful. If your video is on, avoid hand gestures or inappropriate language.
  - Stay on mute. Click a raise hand button if you have a question or something to share.
  - Stay focused and on task so you don't miss anything the speaker says.
  - Class participation is highly encouraged.
5. Consultation: You can approach your class mayor for your concerns s/he will relay them once to your professor
6. All information and queries regarding our class will be posted in our official group chat or facebook group. Refrain from posting unrelated topics in these platforms as these will take up space in the messenger box and will make it difficult to backread important messages.
7. Observe proper decorum when sending messages to your professors.
8. Avoid sending messages online outside office hours or during evening.
9. All submissions must be in USM VLE or MyOpenMath. Submissions made outside VLE or MyOpenMath will not be accepted.