



DIFEQUA – Differential Equations
Prerequisite: MATH115

Prerequisite to:

Instructor: _____
Consultation Hours: _____

Contact details: _____
Class Schedule and Room: _____

Course Description

A course in the solution of first order differential equations and higher order differential equations, Laplace Transformations, power series method and boundary value problems.

Learning Outcomes

On completion of this course, the student is expected to present the following learning outcomes in line with the Expected Lasallian Graduate Attributes (ELGA)

ELGA	Learning Outcome
Critical and Creative Thinker Effective Communicator Lifelong Learner Service-Driven Citizen	Upon completing this course the student should be able to clearly discuss what this course is about, both in itself and relative to other courses taken.

Final Course Output

As evidence of attaining the above learning outcomes, the student is required to submit the following during the indicated dates of the term.

Learning Outcome	Required Output	Due Date
Upon completing this course the student should be able to clearly discuss what this course is about, both in itself and relative to other courses taken.	A written report based on group discussions with classmates on the nature of the course	Week 12

Rubric for assessment

CRITERIA	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Content and Organization (60%)	In-depth and insightful discussion in addition to score 3 performance	Logical sequencing of information throughout, Sufficient supporting details, Clear and effective concluding paragraph	Logical sequencing of information most of the time, Details are given but inadequate to support the topic, Clear concluding paragraph but lacks effectiveness	Information presented with little organization, Most of the details irrelevant, Concluding paragraph not clear
Grammar (30%)		No error	Between one and three errors	More than four errors
Bibliography (10%)		All resources cited	Some of the resources not cited	Majority of the resources not cited
Clarity and Organization of Written Report (10%)	Written report is organized logically and presented clearly with effective transitions.	Written report is organized logically and presented clearly.	Written report is organized and some discussions are not clear.	Written report is not organized.
Oral Presentation (15%)	Overall presentation is creative and well organized with innovative ideas.	Overall presentation is creative and well organized.	Overall presentation is organized	Overall presentation is not organized

Additional Requirements

- 3 quizzes
- Final Exam

Grading System			
		Scale: 95-100% 4.0 89-94% 3.5 83-88% 3.0 78-82% 2.5 72-77% 2.0 66-71% 1.5 60-65% 1.0 <60% 0.0	
	FOR EXEMPTED STUDENTS (w/out Final Exam)	FOR STUDENTS with FINAL EXAM	
		<i>with no missed quizzes</i>	<i>with one missed quiz</i>
Average of quizzes	90%/95%	60%/65%	50%/55%
Other requirements	10%/5%	10%/5%	10%/5%
Final exam		30 %	40%
<i>The final output is worth 5% and will be added to the final course grade</i>			

Learning Plan			
LEARNING OUTCOME	TOPIC	WEEK NO.	LEARNING ACTIVITIES
Upon completing this course the student should be able to clearly discuss what this course is about, both in itself and relative to other courses taken	Definitions of basic terms	1	Define differential equations and their solutions
	Families of solutions	1	
	Existence and uniqueness theorem	1	
	Separation of variables	2	Discuss separation of variables and its extension to equations with homogeneous coefficients.
	Homogeneous functions and equations with homogeneous coefficients	3	
	Exact equations	3	Discuss exact equations and its relation to linear equations.
	Linear equations	4	
	Quiz 1	4	
	Integrating factors	5	
	Substitution suggested by the equation	5	Discuss the reduction of new forms into previously solved forms by using appropriate substitutions.
	Bernoulli's equation	6	
	Coefficients linear in two variables	6	
	The general linear differential equation of order n	7	Discuss the theory behind the solution of homogeneous and nonhomogeneous linear differential equations.
	Llinear independence and the Wronskian	7	
	General solution of homogeneous and nonhomogeneous linear differential equations	7	
	Quiz 2	8	
	The differential operator and the exponential shift	8	
	Homogeneous linear equations with constant coefficients	8-9	Introduce the auxiliary equation and its 3 cases
	Construction of homogeneous equations from a specified solution	9	Discuss various techniques for solving nonhomogeneous linear equations.
	The method of undetermined coefficients	10	
	Solution by inspection	10	
	Reduction of order	10	
	Variation of parameters	11	
	Solution by exponential shift	11	
	Inverse differential operators	11	
	Quiz3	12	
	The Laplace transform	12	Define the Laplace transform and compute transforms of elementary functions.
	Sectionally continuous functions and functions of exponential order	12	Discuss sufficient conditions for the existence of Laplace transforms.

	Transforms of derivatives	13	Setup the solution of initial value problems by Laplace transforms.
	Derivatives of transforms	13	
	Inverse transforms	13	
	Solution of initial value problems by Laplace transforms.	13	

References

Cengel, Yunus A.(2013), *Differential Equations for Engineers and Scientists*, New York : McGraw Hill

Bronson, Richard (2012), *Differential equations*, New York : McGraw-Hill

Logan, J. David(2011), *A First Course in Differential Equations*, New York, NY : Springer New York, 2011.

Zill, Dennis(2009), *A First Course in Differential Equations with Modeling Applications*, Belmont, CA : Brooks/Cole Cengage Learning

Ricardo, Henry J. (2009), *AModern Introduction to Differential Equations*, Burlington, MA : Elsevier/Academic Press

Zill, Dennis G. (2009), *Differential Equations with boundary- value problems*, Belmont, CA : Brooks/Cole, Cengage Learning

Nagle and Saff (2008), *Fundamentals of Differential Equations (7th edition)*. Boston: Pearson/Addison/ Wesley

Zill and Cullen (2005) *Differential Equations (4th edition)*.Belmont, CA: Brooks/Cole

Rainville and Bedient Philip (2002), *Elementary Differential Equations, (8th edition)*. Upper Saddle River N.J.: Prentice Hall

Ross,S.L.(1989). *Introduction to Ordinary Differential Equations, (4th Edition)*. New York: Wiley

Class Policies

1. The required minimum number of quizzes for a 3-unit course is 3, and 4 for 4-unit course. No part of the final exam may be considered as one quiz.
2. Cancellation of the lowest quiz is not allowed even if the number of quizzes exceeds the required minimum number of quizzes.
3. As a general policy, no special or make-up tests for missed exams other than the final examination will be given. However, a faculty member may give special exams for
 - A. approved absences (where the student concerned officially represented the University at some function or activity).
 - B. absences due to serious illness which require hospitalization, death in the family and other reasons which the faculty member deems meritorious.
4. If a student missed two (2) examinations, then he/she will be required to take a make up for the second missed examination.
5. If the student has no valid reason for missing an exam (for example, the student was not prepared to take the exam) then the student receives 0% for the missed quiz.
6. Students who get at least 89% in every quiz are exempted from taking the final examination. Their final grade will be based on the average of their quizzes and other prefinal course requirements. The final grade of exempted students who opt to take the final examination will be based on the prescribed computation of final grades inclusive of a final examination. Students who missed and/or took any special/make-up quiz will not be eligible for exemption.
7. Learning outputs are required and not optional to pass the course.
8. Mobile phones and other forms of communication devices should be on silent mode or turned off during class.
9. Students are expected to be attentive and exhibit the behavior of a mature and responsible individual during class. They are also expected to come to class on time and prepared.
10. Sleeping, bringing in food and drinks, and wearing a cap and sunglasses in class are not allowed.
11. Students who wish to go to the washroom must politely ask permission and, if given such, they should be back in class within 5 minutes. Only one student at a time may be allowed to leave the classroom for this purpose.
12. Students who are absent from the class for more than 5 meetings will get a final grade of 0.0 in the course.
13. Only students who are officially enrolled in the course are allowed to attend the class meetings.

Approved by:

DR. ARTURO Y. PACIFICADOR, JR.
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