



DE LA SALLE UNIVERSITY
College of Science
Mathematics and Statistics Department



ABSTAL2– Abstract Algebra 2
Prerequisite: ABSTAL1

Instructor: _____
Consultation Hours: _____

Contact details: _____
Class Schedule and Room: _____

Course Description

ABSTAL2 is a major course for BS Mathematics students. It is a second course in Abstract Algebra which introduces students to other algebraic structures such as rings, integral domains and fields. It is designed to enhance the students' skills in logical reasoning and analysis.

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) and the outcomes prescribed by the CHED Memorandum Order for the BS Mathematics program.

ELGA	Learning Outcome	Program Outcome							
		1	2	3	4	5	6	7	8
Critical and Creative Thinker Effective Communicator Lifelong Learner	At the end of the course, the student will								
	be able to apply the appropriate mathematical concepts in Abstract Algebra, and well-known mathematical results, thinking processes, tools and technologies in solving various conceptual or real-life problems, whenever possible.	✓	✓	✓	✓	✓	✓		✓

Program Outcomes (BS Mathematics)

- A graduate of the program should be able to
1. Apply analytical, critical and problem solving skills using the scientific method.
 2. Carry out basic mathematical and/or statistical computations and use appropriate technologies in the analysis of data, and in pattern recognition, generalization, abstraction, critical analysis, and problem solving.
 3. Gain mastery in the core areas of mathematics: algebra, analysis and geometry
 4. Demonstrate skills in pattern recognition, generalization, abstraction, critical analysis, problem-solving and rigorous argument.
 5. Develop an enhanced perception of the vitality and importance of mathematics in the modern world, including the interrelationships within mathematics and its connection to other disciplines
 6. Appreciate the concept and role of proof and reasoning and demonstrate knowledge in reading and writing mathematical proofs.
 7. Make and evaluate mathematical conjectures and arguments and validate their own mathematical thinking
 8. Communicate mathematical ideas orally and in writing using clear and precise language

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
At the end of the course, the student will be able to apply the appropriate mathematical concepts, well-known results, thinking processes, tools and technologies in solving various conceptual or real-life problems, whenever possible.	A well-thought out solution to a problem set which requires the application of the various concepts discussed in the course, and the exercise of judgment on the part of the student.	Week 13
	• Construct a concept map to illustrate the inter-relationships among the various concepts and processes studied in the course	Week 12

Rubric for assessment

A. Problem Set

CRITERIA	Needs Improvement (1)	Satisfactory (2)	Good (3)	Excellent (4)
Understanding 30%	There is no solution, or the solution has no relationship to the task.	The solution is not complete indicating that parts of the problem are not understood.	The solution shows that student has a broad understanding of the problem and the major concepts necessary for its solution.	The solution shows a deep understanding of the problem including the ability to identify the appropriate mathematical concepts and information necessary for its solution.
Strategies and Procedures 20%	No evidence of a strategy or procedure uses strategy that does not help solve the problem.	Uses a strategy that is partially useful, leading some way toward a solution but not to a full solution of the problem. Some parts may be correct but a correct answer is not achieved.	Uses strategy that leads to a solution of the problem. All parts are correct and a correct answer is achieved.	Uses a very efficient strategy leading directly to a solution. Applies procedures accurately to correctly solve the problem and verifies the result.
Organization and Presentation 25%	There is no explanation or the solution cannot be understood or it is unrelated to the problem.	There is some use of appropriate mathematical representation but explanation is incomplete and not clearly presented.	There is a clear explanation and appropriate use of accurate mathematical representation.	There is a clear, effective explanation, detailing how the problem is solved. There is a precise and appropriate use of mathematical terminology and notation.
Appropriateness of Concepts and Results Used in the Solution 25%	Incorrect use of concepts and results and majors errors in computations	Some errors in the use of concepts and results as well as in the computations were noted.	A few errors in the use of concepts and results and in the computations were noted.	Computations and solutions are correct and concepts and results were correctly applied.

B. Concept Map

Rubric for assessment of concept map

CRITERIA	Excellent (4)	Very Good (3)	Satisfactory (2)	Needs Improvement (1)
Understanding of Mathematical Concepts	Shows complete mastery of the concepts and processes studied in the course as well as their inter-relationships with one another	Shows an almost complete mastery of the concepts and processes studied in the course as well as their inter-relationships with one another.	Shows a moderate degree of understanding of the concepts and processes studied in the course as well as their inter-relationships with one another.	Shows a limited degree of understanding of the concepts and processes studied in the course as well as their inter-relationships with one another.

Clarity of Presentation	The ideas presented are easily understood and the existing inter-relationships among the concepts and processes are clearly indicated.	Except for a few minor details, the ideas presented are easily understood and the existing inter-relationships among the concepts and processes are clearly indicated.	Some ideas are not clearly presented and some inter-relationships are either lacking or not correctly presented,	Many of the ideas presented and inter-relationships among concepts and processes are incorrect or lacking.
Creativity and Completeness	The objects in the concept map are aesthetically organized and includes all the important concepts included in the course.	A few objects in the map are not properly organized and a few concepts were not included.	Some major concepts and processes and their inter-relationships are either misplaced or not included	Majority of the concepts, processes and inter-relationships are incorrectly placed or described, or are missing from the concept map.

Additional Requirements

- Quizzes/Seatwork
- Homework
- Final Exam

Grading System

Learning Output: 10%		Scale:	
Skills Check: 60%		95-100%	4.0
Final Exam: 30%		89-94%	3.5
Total: 100%		83-88%	3.0
Passing Grade: 60%		78-82%	2.5
		72-77%	2.0
		66-71%	1.5
		60-65%	1.0
		<60%	0.0

Learning Plan

LEARNING OUTCOME:	TOPIC	NO. OF HOURS/ WEEK NO.	LEARNING ACTIVITIES
At the end of the course, the student will be able to apply the appropriate mathematical concepts, well-known results, thinking processes, tools and technologies in solving various conceptual or real-life problems, whenever possible.	I. INTRODUCTION TO RINGS 1. Definitions and Examples 2. Other Properties of Rings 3. Some Special Classes of Rings 4. The Characteristic of a Ring II. IDEALS AND QUOTIENT RINGS 1. Subrings 2. Ideals 3. Quotient Rings 4. Prime and Maximal Ideals	11 Hours (Weeks 1-4)	Review of concepts from Abstal1 Library Work Class Discussions Skills Exercises Problem Set*
	QUIZ 1	1.5 hours	
	III. RING HOMOMORPHISMS 1. Isomorphism Theorems 2. Field of Quotients of an Integral Domain	7 Hours (Weeks 5-7)	Library Work Class Discussions Skills Exercises Group Work Problem Set*

	QUIZ 2	1.5 hours	
	IV.POLYNOMIAL RINGS 1.Basic Concepts 2.Division Algorithm 3.Factor Theorem and Remainder Theorem 4.Irreducible Polynomials and Eisenstein's Criterion V.DIVISIBILITY IN INTEGRAL DOMAINS 1.Some Concepts from Number Theory 2.Primes, Irreducibles and Associates	9 hours (Weeks 8-10) 7 hours (Weeks 11-13)	Class Discussions Practice Exercises Group Discussion Library Work Problem Set*
	QUIZ 3	1.5 hours	
	3.Principal Ideal Domains 4.Unique Factorization Domains 5.Euclidean Domains		
	FINAL EXAMINATION	2 hours (Week 14)	

***Every week, the professor will give a problem set whose solution will be turned over in the following week. The professor will return the corrected work, and the students will then write a corrected solution to the problems and will compile them into the course output. The students are expected to spend at least one hour each week on the problem set as the fourth hour component of their course work.**

References

- Fraleigh, J.B. (2002) *A First Course in Abstract Algebra* (7th edition), Addison-Wesley Publishing Co.
- Gallian, J. (2010), *Contemporary Abstract Algebra* (7th edition), Brooks/Cole CENGAGE Learning
- Herstein, I.N. (1986) *Abstract Algebra* (3rd edition), Prentice-Hall, Inc.

Online Resources

- Wah, A. and H. Picciotto, *Algebra: Themes, Tools and Concepts*. Accessed October 22, 2012 from www.mathedpage.org/abs-alg/abs-alg.pdf
- *Abstract Algebra Online: Lessons, Tutorials and Lecture Notes*. Accessed October 22, 2012 from archives.math.utk.edu/tutorials.html

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. JOSE TRISTAN F. REYES

Chair, Mathematics and Statistics