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)

<table>
<thead>
<tr>
<th>ELGA</th>
<th>Learning Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical and Creative Thinker</td>
<td>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.</td>
</tr>
<tr>
<td>Effective Communicator</td>
<td></td>
</tr>
<tr>
<td>Lifelong Learner</td>
<td></td>
</tr>
<tr>
<td>Service-Driven Citizen</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Required Output</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>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.</td>
<td>Week 13</td>
</tr>
</tbody>
</table>

Rubric for assessment
A. Problem Set

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Excellent (4)</th>
<th>Good (3)</th>
<th>Satisfactory (2)</th>
<th>Needs Improvement (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td>There is no solution, or the solution has no relationship to the task.</td>
<td>The solution is not complete indicating that parts of the problem are not understood.</td>
<td>The solution shows that student has a broad understanding of the problem and the major concepts necessary for its solution.</td>
<td>The solution shows a deep understanding of the problem including the ability to identify the appropriate mathematical concepts and information necessary for its solution.</td>
</tr>
<tr>
<td>Strategies and Procedures</td>
<td>No evidence of a strategy or procedure uses strategy that does not help solve the problem.</td>
<td>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.</td>
<td>Uses strategy that leads to a solution of the problem. All parts are correct and a correct answer is achieved.</td>
<td>Uses a very efficient strategy leading directly to a solution. Applies procedures accurately to correctly solve the problem and verifies the result.</td>
</tr>
<tr>
<td>Organization and Presentation</td>
<td>There is no explanation or the solution</td>
<td>There is some use of appropriate mathematical representation but</td>
<td>There is a clear explanation and appropriate use of accurate</td>
<td>There is a clear, effective explanation, detailing how the problem is solved.</td>
</tr>
</tbody>
</table>
cannot be understood or it is unrelated to the problem. explanation is incomplete and not clearly presented. mathematical representation. 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. |

### Additional Requirements
- Skills Check (Seatwork/Quizzes/Assignment/Boardwork)

### Grading System

<table>
<thead>
<tr>
<th>Learning Output:</th>
<th>Skills Check:</th>
<th>Final Exam:</th>
<th>Total:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>60%</td>
<td>30%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Passing Grade: 60%

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

### Learning Plan

<table>
<thead>
<tr>
<th>LEARNING OUTCOME:</th>
<th>TOPIC</th>
<th>NO. OF HOURS/ WEEK NO.</th>
<th>LEARNING ACTIVITIES</th>
</tr>
</thead>
</table>
| 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. | II. IDEALS AND QUOTIENT RINGS  
1.Subrings  
2.Ideals  
3.Quotient Rings  
4.Prime and Maximal Ideals  
QUIZ 1 | 7 Hours (Weeks 1-3) | Review of concepts from Abstal1  
Library Work  
Class Discussions  
Skills Exercises |
| III. RING HOMOMORPHISMS  
1.Isomorphism Theorems  
2.Field of Quotients of an Integral Domain  
QUIZ 2 | 1.5 hours | Library Work  
Class Discussions  
Skills Exercises  
Group Work |
| IV. POLYNOMIAL RINGS  
1.Basic Concepts  
2.Division Algorithm  
3.Factor Theorem and Remainder Theorem  
4.Irreducible Polynomials and Eisenstein’s Criterion | 1.5 hours | |
| V. DIVISIBILITY IN INTEGRAL DOMAINS  
1.Some Concepts from Number Theory  
2.Primes, Irreducibles and Associates  
QUIZ 3 | 8 hours (Weeks 8-10) | |
| | 7 hours (Weeks 10-11) | | |
References

Online Resources

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.**
Chair, Department of Mathematics