ABSTAL1 – Abstract Algebra 1
Prerequisite: INTOSET
Prerequisite to: MODEGEO

Course Description
A course in sets and mappings, partitions and equivalence relations, properties of integers, groups and subgroups, normal subgroups and factor groups, fundamental homomorphisms theorems and Cayley’s theorem.

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</td>
</tr>
<tr>
<td>Effective Communicator</td>
<td>mathematical concepts, well-known results, thinking processes, tools and</td>
</tr>
<tr>
<td>Lifelong Learner</td>
<td>technologies in solving various conceptual or real-life problems, whenever</td>
</tr>
<tr>
<td>Service-Driven Citizen</td>
<td>possible.</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</td>
<td>• A well-thought out solution to a problem set which requires the</td>
<td>Week 13</td>
</tr>
<tr>
<td>able to apply the appropriate mathematical concepts, well-known results,</td>
<td>application of the various concepts discussed in the course.</td>
<td></td>
</tr>
<tr>
<td>thinking processes, tools and technologies in solving various conceptual or</td>
<td>• A write-up on a real-life application of group theoretic concepts to solve a</td>
<td></td>
</tr>
<tr>
<td>real-life problems, whenever possible.</td>
<td>specific problem in fields such as Chemistry, Physics, Engineering, Computer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Science and the like.</td>
<td></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 30%</td>
<td>The solution shows a deep understanding of the problem including the ability</td>
<td>The solution shows that student has a broad understanding of the problem</td>
<td>The solution is not complete indicating that parts of the problem are not</td>
<td>There is no solution, or the solution has no relationship to</td>
</tr>
<tr>
<td></td>
<td>to identify the appropriate mathematical concepts and information necessary</td>
<td>and the major concepts necessary for its solution.</td>
<td>understood.</td>
<td>the task.</td>
</tr>
<tr>
<td></td>
<td>for its solution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategies and Procedures 20%</td>
<td>Uses a very efficient strategy leading directly to a solution. Applies</td>
<td>Uses strategy that leads to a solution of the problem. All parts are</td>
<td>Uses a strategy that is partially useful, leading some way toward a solution</td>
<td>No evidence of a strategy or procedure uses strategy that does not</td>
</tr>
<tr>
<td></td>
<td>procedures accurately to correctly solve the problem and verifies the result.</td>
<td>correct and a correct answer is achieved.</td>
<td>but not to a full solution of the problem. Some parts may be correct but a</td>
<td>help solve the problem.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Content and Accuracy (55%)

**EXCELLENT**
- In-depth and insightful discussion was used throughout the report.
- Supporting details were provided whenever necessary and appropriate.
- Mathematical terms, concepts and results presented are correct throughout.

**VERY GOOD**
- Sufficient supporting details. Mathematical terms, concepts and results presented are correct in most parts of the report.

**SATISFACTORY**
- Details are given but inadequate to support the topic. Mathematical terms, concepts and results presented are correct in the majority of the report.

**NEEDS IMPROVEMENT**
- Most of the details irrelevant. Errors in the use of mathematical terms, concepts and results were noted in a major portion of the report.

### Organization and Presentation (35%)

**EXCELLENT**
- Logical sequencing of information throughout. Excellent choice of examples and illustrations to enhance and clarify the discussion. Clear and effective concluding paragraph. No grammatical error noted.

**VERY GOOD**
- Logical sequencing of information most of the time. Appropriate use of examples and illustrations. Clear and effective concluding paragraph with very minor errors. Between one and three errors were noted.

**SATISFACTORY**
- Logical sequencing of information in some parts of the output. Some of the examples and illustrations used are appropriate. Clear concluding paragraph but lacks effectiveness. Between four and seven errors were noted.

**NEEDS IMPROVEMENT**
- Improper sequencing of information in a substantial part of the report. Majority of the illustrations and examples used are inappropriate. Concluding paragraph not clear. More than seven errors were noted.

### Bibliography (15%)

**EXCELLENT**
- All resources cited and up-to-date

**VERY GOOD**
- Most of the resources were cited and up-to-date

**SATISFACTORY**
- Some of the resources were not cited and others are out-of-date

**NEEDS IMPROVEMENT**
- Majority of the resources not cited and some are out-of-date

### B. Application of Group Theory to Real-World Problems

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>EXCELLENT</th>
<th>VERY GOOD</th>
<th>SATISFACTORY</th>
<th>NEEDS IMPROVEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organization and Presentation</strong></td>
<td>Logical sequencing of information throughout. Excellent choice of examples and illustrations to enhance and clarify the discussion. Clear and effective concluding paragraph. No grammatical error noted.</td>
<td>Logical sequencing of information most of the time. Appropriate use of examples and illustrations. Clear and effective concluding paragraph with very minor errors. Between one and three errors were noted.</td>
<td>Logical sequencing of information in some parts of the output. Some of the examples and illustrations used are appropriate. Clear concluding paragraph but lacks effectiveness. Between four and seven errors were noted.</td>
<td>Improper sequencing of information in a substantial part of the report. Majority of the illustrations and examples used are inappropriate. Concluding paragraph not clear. More than seven errors were noted.</td>
</tr>
<tr>
<td><strong>Appropriateness of Concepts and Results Used in the Solution</strong></td>
<td>Computations and solutions are correct and concepts and results were correctly applied.</td>
<td>A few errors in the use of concepts and results and in the computations were noted.</td>
<td>Some errors in the use of concepts and results as well as in the computations were noted.</td>
<td>Incorrect use of concepts and results and majors errors in computations</td>
</tr>
</tbody>
</table>

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### Additional Requirements
• Seatworks
• Quizzes (at least three)
• Boardwork
• Recitation

**Grading System**

<table>
<thead>
<tr>
<th></th>
<th>FOR EXEMPTED STUDENTS (w/out Final Exam)</th>
<th>FOR STUDENTS with FINAL EXAM with no missed quizzes</th>
<th>with one missed quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of quizzes</td>
<td>95%</td>
<td>65%</td>
<td>50%</td>
</tr>
<tr>
<td>Other requirements</td>
<td>5%</td>
<td>5%</td>
<td>10%</td>
</tr>
<tr>
<td>Final exam</td>
<td>30%</td>
<td>40%</td>
<td></td>
</tr>
</tbody>
</table>

**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>WEEK NO.</th>
<th>LEARNING ACTIVITIES</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></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Factor Groups
G. Group Homomorphisms
   1. Definition and Examples
   2. Kinds of Homomorphisms
   3. Fundamental Theorem of Homomorphisms
   4. Other Isomorphism Theorems

FINAL EXAMINATION
2 hours

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