



ABSTAL1– *Abstract Algebra 1*
Prerequisite: INTOSET

Prerequisite to:MODEGEO

Instructor: _____
Consultation Hours: _____

Contact details: _____
Class Schedule and Room: _____

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)

ELGA	Learning Outcome
Critical and Creative Thinker Effective Communicator Lifelong Learner Service-Driven Citizen	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.

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. - A write-up on a real-life application of group theoretic concepts to solve a specific problem in fields such as Chemistry, Physics, Engineering, Computer Science and the like.	Week 13

Rubric for assessment

A. Problem Set

CRITERIA	Excellent (4)	Good (3)	Satisfactory (2)	Needs Improvement (1)
Understanding 30%	The solution shows a deep understanding of the problem including the ability to identify the appropriate mathematical concepts and information necessary for its solution.	The solution shows that student has a broad understanding of the problem and the major concepts necessary for its solution.	The solution is not complete indicating that parts of the problem are not understood.	There is no solution, or the solution has no relationship to the task.
Strategies and Procedures 20%	Uses a very efficient strategy leading directly to a solution. Applies procedures accurately to correctly solve the problem and verifies the result.	Uses strategy that leads to a solution of the problem. All parts are correct and a correct answer is achieved.	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	No evidence of a strategy or procedure uses strategy that does not help solve the problem.

			correct answer is not achieved.	
Organization and Presentation 25%	There is a clear, effective explanation, detailing how the problem is solved. There is a precise and appropriate use of mathematical terminology and notation.	There is a clear explanation and appropriate use of accurate mathematical representation.	There is some use of appropriate mathematical representation but explanation is incomplete and not clearly presented.	There is no explanation or the solution cannot be understood or it is unrelated to the problem.
Appropriateness of Concepts and Results Used in the Solution 25%	Computations and solutions are correct and concepts and results were correctly applied.	A few errors in the use of concepts and results and in the computations were noted.	Some errors in the use of concepts and results as well as in the computations were noted.	Incorrect use of concepts and results and majors errors in computations

B. Application of Group Theory to Real-World Problems

CRITERIA	EXCELLENT	VERY GOOD	SATISFACTORY	NEEDS IMPROVEMENT
Content and Accuracy (55%)	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	Sufficient supporting details. Mathematical terms, concepts and results presented are correct in most parts of the report.	Details are given but inadequate to support the topic. Mathematical terms, concepts and results presented are correct in the majority of the report	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%)	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	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	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	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%)	All resources cited and up-to-date	Most of the resources were cited and up-to-date	Some of the resources were not cited and others are out-of-date	Majority of the resources not cited and some are out-of-date

• Seatworks • Quizzes (at least three) • Boardwork • Recitation
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Grading System			
	FOR EXEMPTED STUDENTS (w/out Final Exam)	FOR STUDENTS with FINAL EXAM	
		with no missed quizzes	with one missed quiz
Average of quizzes	95%	65%	50%
Other requirements	5%	5%	10%
Final exam		30 %	40%

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			
LEARNING OUTCOME	TOPIC	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.FUNDAMENTAL CONCEPTS 1. The Integers, Divisibility, GCD and LCM 2. Relations and Mappings 3. Equivalence Relations, Partitions and Equivalence Classes 4. The Integers Modulo n	Weeks 1-3	Preparatory exercises Review of concepts from Intoset Library Work Class Discussions Skills Exercises
	II. GROUP THEORY A. Binary Operations B. Groups 1. Definitions and Examples 2. Group Tables 3. Order of a Group/of an Element	Weeks 4-7	Library Work Class Discussions Skills Exercises Group Work
	C. Subgroups 1. Definition and examples 2. One-Step and Two-Step tests 3.Center of a Group 4. Centralizer of an Element D. Abelian and Cyclic Groups 1. Definition and Examples 2. Generators 3. Subgroups of Cyclic Groups 4. Lattice Diagrams	Weeks 8-11	Library Work Class Discussions Skills Exercises Group Work
	E. Non-Abelian Groups 1. Dihedral Groups 2. Permutation Groups, Symmetric Groups 3. Orbits, Cycles,Transpositions 4. Even and Odd Permutations, Alternating Group F. Cosets and Normal Subgroups 1. Cosets and the Theorem of Largrange 2. Normal Subgroups	Weeks 12-13	Library Work Class Discussions Skills Exercises Group Work

	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

- 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:

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