



## Course Specifications

<b>Course Title:</b>	Group theory
<b>Course Code:</b>	2023106-3
<b>Program:</b>	Bachelor in Mathematics.
<b>Department:</b>	Department of Mathematics and Statistics
<b>College:</b>	Faculty of science
<b>Institution:</b>	Taif university

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Group theory TU

## A. Course Identification

<b>1. Credit hours:</b> (3)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> 7 <sup>th</sup> level, 3 <sup>rd</sup> year
<b>4. Pre-requisites for this course (if any):</b> Set Theory (2022106-3)
<b>5. Co-requisites for this course (if any):</b> None

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4Hr /Week	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	40
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>40</b>

\* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

### 1. Course Description

The main objective of this course is studying: Groups, Subgroup, Permutation groups, Cyclic groups. Order of elements in groups. Cosets, Lagrange's theorem, Normal subgroup, Factor Groups. Homomorphism of groups. Fundamental isomorphism theorems, and Automorphisms.

### 2. Course Main Objective

The student will be taught as follows:

1. Introducing some more sophisticated concepts and results of group theory as an essential part of general mathematical culture and as a basis for further study of more

advanced mathematics.

2. Demonstrating comprehension and understanding in the topic of foundations of Group Theory.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
1.1	Recognize fundamentals of algebraic systems with one operation like semigroups, monoids and group.	K2
1.2	Identify the mathematical properties of cyclic groups, permutation group and subgroups.	K2
<b>2</b>	<b>Skills:</b>	
2.1	Apply appropriate properties of the group theory to prove some principles, theorems and some formulas on finite groups.	S2
2.2	Plan some properties of finite groups and order of an element in a group in solving various problems related to mathematical sciences or in postgraduate studies.	S2
2.3	Explain the type of given groups (abelian or not).	S2
<b>3</b>	<b>Values:</b>	
3.1	Work effectively within groups and independently	V1

### C. Course Content

No	List of Topics	Contact Hours
1,2	Mathematical systems with one operation (algebraic system, semigroup, monoid, group), basic properties of a group, examples and theorems	8
3	Subgroups, properties of subgroups, examples and theorems.	4
4	Permutation groups.	4
5,6	<b>Midterm exam,</b> Cyclic groups, order of an element in a group, order of a group, examples and theorems.	8
7	Cosets, Lagrange's theorem, normal subgroup, factor group,	4
8,9	Homomorphism and isomorphism of groups.	8
10	Fundamental isomorphism theorems, Automorphisms.	4
<b>Total</b>		<b>40</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge:</b>		
1.1	Recognize fundamentals of algebraic systems with one operation like semigroups, monoids and group.	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Assignments</li> </ul>
1.2	Identify the mathematical properties of cyclic groups, permutation group and subgroups.	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Exams</li> <li>• Assignments</li> </ul>

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	<b>Skills:</b>		
2.1	Apply appropriate properties of the group theory to prove some principles, theorems and some formulas on finite groups.	<ul style="list-style-type: none"> <li>Interactive classes</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
2.2	Plan some properties of finite groups and order of an element in a group in solving various problems related to mathematical sciences or in postgraduate studies.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> </ul>
2.3	Explain the type of given groups (abelian or not).	<ul style="list-style-type: none"> <li>Lectures</li> <li>Self-learning through the website</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> <li>Assignments</li> </ul>
3.0	<b>Values:</b>		
3.1	<u>Show</u> the responsibility for their own learning and continuing personal and professional development.	Projects.	Through the oral presentation of the projects.

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes + Home works	Continues	10 %
2	Midterm exam	5 <sup>th</sup> -6 <sup>th</sup>	30 %
3	Class Work (Homework- report- class test....)	8 <sup>th</sup>	10 %
4	Final exam	11 <sup>th</sup>	50 %

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:  
6 hours per week (as defined in the teaching schedule of the faculty member) for academic advice and consultations.  
Teaching staff is also available using Blackboard web site and Taif University “Edugate” System.

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	W. Keith Nicholson, Introduction to Abstract Algebra, 4th Edition, John Wiley & Sons., 2012.
Essential References Materials	1- John B. Fraleigh, A first course in abstract algebra, 7th Edition, Reading, Mass.: Addison-Wesley Pub. Co., c2015. 2- M. Samhaan and F. El-Zakeer, Theory of Group, 1427H. (Arabic Book).

<b>Electronic Materials</b>	<a href="https://www.youtube.com/watch?v=OzNfAQYstyE&amp;list=PLp5QO1iuiUkNtvLwjssJYyQ3WbS9S8s2V">https://www.youtube.com/watch?v=OzNfAQYstyE&amp;list=PLp5QO1iuiUkNtvLwjssJYyQ3WbS9S8s2V</a>
<b>Other Learning Materials</b>	<b>Presentations sent to students via</b>

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<b>Lecture halls, containing white boards, and electronic monitors - The seats fit the number of students - Laboratories equipped with suitable numbers of computers</b>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Data Show</b>
<b>Other Resources</b> (Specify, e.g., if specific laboratory equipment is required, list requirements or attach a list)	<b>Wi-Fi internet connections</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students	Indirect
Quality of learning resources	Peer Reviewer Students	Direct Indirect
Extent of achieving the course learning outcomes	Peer Reviewer Students	Direct Indirect

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	<b>Department of Mathematics and Statistics</b>
<b>Reference No.</b>	11
<b>Date</b>	12/7/1443 H

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Mathematics and Statistics  
Department

