



## Course Specifications

<b>Course Title:</b>	NUMBER THEORY
<b>Course Code:</b>	<b>MTH 342</b>
<b>Program:</b>	<b>B.Sc in Mathematics</b>
<b>Department:</b>	<b>Mathematics Department</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Majmaah University</b>

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## A. Course Identification

<b>1. Credit hours:</b> 3(2+1)
<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 type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> N/A
<b>4. Pre-requisites for this course (if any):</b> MTH 231
<b>5. Co-requisites for this course (if any):</b> N/A

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

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	0	0 %
2	Blended	12	25 %
3	E-learning	36	75 %
4	Correspondence	-----	-----
5	Other	-----	-----

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

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	20
2	Laboratory/Studio	10
3	Tutorial	10
4	Others (specify) Seminars and presentations	8
	<b>Total</b>	48
<b>Other Learning Hours*</b>		
1	Study	20
2	Assignments	15
3	Library	10
4	Projects/Research Essays/Theses	15
5	Others (specify)	
	<b>Total</b>	60

\* 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

1. What is the main purpose for this course? Study of main concepts of Number Theory as follows: 1-First and second principle of Mathematical Induction- 2-Well-ordering principle – 3-Divisibility- Euclidean Algorithm. 4-Primary Numbers and their properties- 5-Linear Diophantine Equations- 6-Congruence's and their properties- 7-linear Congruence's- 8-The Chinese Remainder Theorem- 9-Fermat's little theorem- 10-Euler's theorem-Wilson's theorem- 11-Arithmetic functions- 12-Pythagorean triples

### 2. Course Main Objective

This course aims to give an introduction to number theory. The student enrolled in this course should have a back-ground in basic mathematics and Set Theory. This course covers basic points in theory of numbers.

1-First and second principle of Mathematical Induction-  
2-Well-ordering principle  
3-Divisibility- Euclidean Algorithm.  
4-Primary Numbers and their properties-  
5-Linear Diophantine Equations-  
6-Congruence's and their properties-  
7-linear Congruence's-  
8-The Chinese Remainder Theorem-  
9-Fermat's little theorem-  
10-Euler's theorem-Wilson's theorem-  
11-Arithmetic functions- 12-Pythagorean triples

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	The students should be able to <b>Reproduce</b> fundamentals and concepts of Mathematics and basic science of number theory and their properties, and the basic terminology of number theory and some manipulation operations on it.	K1
1.4	<b>Construct</b> mathematical arguments and proofs and <b>apply</b> the underlying structures of Mathematics	K4
2	<b>Skills :</b>	
3	<b>Competence:</b>	
3.4	<b>Analyze</b> a mathematical problem and <b>suggest</b> appropriate tools for studying it in depth	C4

## C. Course Content

No	List of Topics	Contact Hours
1	First and second principle of Mathematical Induction Well-ordering principle	12
2	Divisibility- Euclidean Algorithm. Prime Numbers and their properties- Linear Diophantine Equations	12
3	Congruence's and their properties-linear Congruence's	12

	The Chinese Remainder Theorem-Fermat's little theorem	
4	Euler's theorem-Wilson's theorem Arithmetic functions- Pythagorean triples.	12
<b>Total</b>		<b>48</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>		
1.3	The students should be able to Acquire and outline mathematical knowledge and skills in fundamental concepts of sets and relations on them and their properties, and the basic terminology of Boolean algebra and some manipulation operations on it.	<b>Direct teaching:</b> Inquiry-based instruction PowerPoints and discussions  <b>Aimed teaching:</b> Discovery and oral questions  <b>Indirect teaching:</b> Peer Learning.	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> <li>• E-exam</li> <li>• Oral Exam</li> </ul>
<b>2.0</b>	<b>Skills</b>		
2.2	The students should be able to Demonstrate the work independently and within a team via finding and designing, Euler circuits for example.	<b>Direct teaching:</b> Lectures <b>Aimed teaching:</b> Discovery and oral questions  <b>Indirect teaching:</b> Peer Learning	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> <li>• E-exam</li> <li>• Oral Exam</li> </ul>
<b>3.0</b>	<b>Competence</b>		
3.3	The students should be able to Critically interpret numerical and graphical data in graph theory.	<b>Direct teaching:</b> Lectures <b>Aimed teaching:</b> Discovery and oral questions  <b>Indirect teaching:</b> Cooperative Learning	<ul style="list-style-type: none"> <li>• Homework</li> <li>• Quiz</li> <li>• Midterms</li> <li>• Final Exams</li> </ul>
3.2			

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm 1	7th week	20 %
2	Midterm 2	12th week	20 %

#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Homework	Through of semester	5 %
4	Quizzes	Through of semester	5%
5	Electronic Test	13th week	5 %
6	Presentation	Through of semester	5%
7	Final exam	End of semester	40 %

\*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:

- 1- 4-office hours per week in the lecturer schedule.
  - Sunday 10-12.
  - Wednesday 10-12.
- 2- The contact with students by e-mail and website.
- 3- activation of the virtual classrooms and academic guidance via Black Board LMS.

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> <li>• Kenneth H. Rosen, <b>Number Theory</b>, McGraw-Hill. Inc, 2011.</li> </ul>
Essential References Materials	1. Elementary Number Theory. Gareth A. Jones and Josephine M. Jones. Springer., 1998., 3- 540-76197-7
Through of semester Electronic Materials	<a href="http://www.arxiv.org/">http://www.arxiv.org/</a> <a href="http://mathforum.org/advanced/numerical.html/">mathforum.org/advanced/numerical.html/</a> <a href="http://www.ingentaconnect.com/">http://www.ingentaconnect.com/</a>
Other Learning Materials	

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Classroom with capacity of 30-students. - Computer Lab of Mathematics Department
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Mathematical software packages like MATHEMATICA
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<a href="http://mathworld.wolfram.com/classroom/classes/CalculusII.html">http://mathworld.wolfram.com/classroom/classes/CalculusII.html</a>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Extent of achievement of course learning outcomes	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources.	Staff members (course coordinators)	Direct (Meeting between course coordinators and the tutors)

**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

Council / Committee	Mathematics Department
Reference No.	27
Date	8/8/1442 H-21/3/2021 G

Head of Department

Dr. Muqrin Almuqrin


