



Course Specifications

Course Title:	NUMBER THEORY
Course Code:	MATH 3270
Program:	BACHELOR OF SCIENCE IN MATHEMATICS
Department:	MATHEMATICS
College:	COLLEGE OF SCIENCE AND HUMANITIES ALKHARJ
Institution:	PRINCE SATTAM BIN ABDULAZIZ UNIVERSITY

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A. Course Identification

1. Credit hours: 4(4,0,0)
2. Course type
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"/>
3. Level/year at which this course is offered: LEVEL: Elective
4. Pre-requisites for this course (if any): Math 2240
5. Co-requisites for this course (if any): Nil

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	Weekly 5 hours	%100
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	48
2	Laboratory/Studio	0
3	Tutorial	0
4	Others (specify) - Office Hours	60
	Total	108

B. Course Objectives and Learning Outcomes

1. Course Description

Divisibility – Greatest Common Divisor – Division Algorithm – Prime Factorization and Binomial – Binomial Theorem and Congruencies – Congruencies – Residue Systems – Fermat's Little Theorem – Euler's Theorem – Wilson's Theorem – Diophantine Equations – Chinese Remainder Theorem – RSA Cryptography – Solving Equations Modulo Primes – Quadratic Residue Symbol – Quadratic Reciprocity – Continued Fractions – Arithmetic Functions- Introduction to Torsion points and Elliptic Curves.

2. Course Main Objective

To make the students familiar with different types of numbers such as prime, composite, pseudo-primes etc., and help the students acquire skill to perform mathematical calculations using modulo arithmetic and their elementary applications.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Be familiar with the different types of numbers such as prime numbers, composite numbers and associated theorems	K1
1.2	Able to recall division algorithm and congruence	K4
1.3	Learn and reproduce some elementary theorems such as fundamental theorem of arithmetic, Chinese remainder theorem, Euler's theorem, Fermat's theorem	K2
2	Skills :	
2.1	Able to check whether a given number is prime or composite using division algorithm	S2
2.2	Solve congruence system using Chinese remainder theorem	S2
2.3	Able to find continued fractions	S3

C. Course Content

No	List of Topics	Contact Hours
1	Divisibility, Greatest Common Divisor, Division Algorithm, Prime factorization	6
2	Binomial Theorem, Congruencies, residue system	4
3	Fermat's Little Theorem, Euler's Theorem, Wilsons Theorem	6
4	Linear Diophantine Equations	4
5	Chinese Remainder Theorem	6
6	RSA Cryptography	3
7	Solving Equations using modulo primes	6
8	Quadratic Residue Symbol	3
9	Continued Fractions	3
10	Arithmetic Functions	4
11	Torsion Points and Elliptic Curves	3
Total		48

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Be familiar with the different types of numbers such as prime numbers, composite numbers and associated theorems	1.E-learning	1. Two Internal Exams 2. At least two Quiz 3. End Semester Exam
1.2	Able to recall division algorithm and congruence	2.Interactive sessions	
1.3	Learn and reproduce some elementary theorems such as fundamental theorem of arithmetic, Chinese remainder theorem, Euler's theorem, Fermat's theorem	3.Exclusive Office Hours for clearing doubts in small groups	
2.0	Skills		
2.1	Able to check whether a given number is prime or composite using division algorithm	1. Application oriented exercises during tutorial session.	1. Homework 2. Assignments 3. Quiz
2.2	Solve congruence system using Chinese remainder theorem	2. Homework to improve the analytical skills	
2.3	Able to find continued fractions		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid Term Exam I	6	20%
2	Quiz	4 & 10	5%
3	Mid Term Exam II	13	20%
4	Continuous Assessment – Homework, Assignment, Attendance etc.	--	5%
5	End Semester Exam	15	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 :

Exclusive office hours – 5 hours a week

Academic advising -1 hour per week

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	1-Niven Ivan, Herbert S. Zuckerman and Hugh L. Montgomery, "An Introduction to the Theory of Numbers". New York: Wiley Text Books, ISBN: 0471625469. 2-Introduction to Modern Number Theory, Fundamental Problems, Ideas and Theories, Yuri Ivanovic Manin. 3- Number Theory for Mathematical Contests, David A. SANTOS
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Essential References Materials	NIL
Electronic Materials	Introductory Number Theory – M Stoll
Other Learning Materials	Lecture Notes Prepared by the Department of Mathematics

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	1. Classrooms with Smart boards with seating facilities for at least 30 students
Technology Resources (AV, data show, Smart Board, software, etc.)	Smartboard, Internet Connection for Blackboard
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	NIL

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	Students, Graduates	Course Evaluation and Program Evaluation Survey (Indirect)
	Program Leaders	Peer Review (Direct)
Achievement of CLOs	Faculty and Quality Personnel	Direct (Tests and Quiz) and Review of Course Report
Quality of Learning Resources	Students	Course Evaluation (Indirect)
	Graduates	Program Evaluation (Indirect)
Facilities	Students / Graduates	Course and Program Evaluation (Indirect)
	Faculty	Faculty Survey (Indirect), Course Reports (Direct)

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	
Reference No.	
Date	