COURSE DESCRIPTIONS

Faculty	**Science and Information Technology**				
Department	**Mathematics**			**NQF level**	
Course Title	**Number Theory**	**Code**	**505421**	**Prerequisite**	**Set Theory**
Credit Hours	**3**	**Theory**	**3**	**Practical**	**-**
Course Leader	**Dr. Belal Batiha**	**email**	**b.bateha@jadara.edu.jo**		
Lecturers	**Dr. Belal Batiha**	**emails**	**b.bateha@jadara.edu.jo**		
Lecture time	**11:30 -13**	**Classroom**	**D406**		
Semester	**First Semester**	**Production**		**Updated**	
Awards	**-**			**Attendance**	Fulltime

Short Description
Division algorithm; divisibility; greatest common divisor and least common multiple; Diophentine equations; prime numbers and their distribution; fundamental theorem of arithmetic; congruence; linear congruence equations; Chinese remainder theorem; tests of divisibility. Fermat little theorem; Wilson's theorem; arithmetic functions; cryptography as an application of number theory.

Course Objectives
1) The students prove theorems about integers. 2) Formulate conjectures and develop proofs through their investigations of number theoretic properties 3) The students explore the historical development of integer properties. 4) Inspire the students towards involvement in the subject by considering some famous unsolved problems of number theory and by exploring the connections that number theory has with other branches of mathematics.

Learning Outcomes
A. Knowledge - Theoretical Understanding
a1) Define and Identify the concepts of divisibility, congruence, greatest common divisor, prime, and prime factorization and Euclidean algorithm. a2) Solve various types of congruence problems and use theory of congruences in applications
B. Knowledge - Practical Application
a3) Apply techniques to solve linear Diophantine equations and the properties of multiplicative functions such as Euler's Phi function.
C. Skills - Generic Problem Solving and Analytical Skills

b1) Distinguish the concepts of divisibility, congruence, greatest common divisor, prime, prime factorization, and Euclidean algorithm.
D. Skills - Communication, ICT, and Numeracy
b2) Illustrate techniques for solving linear Diophantine equations and multiplicative functions such as Euler's Phi function.
E. Competence: Autonomy, Responsibility, and Context
c1) Construct mathematical proofs of statements using different mathematics proof techniques
Teaching and Learning Methods
In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class. - Class time will be spent on lecture as well as discussion of homework problems and some group work. - To actively participate in class, you need to prepare by reading the textbook and doing all assigned homework before class (homework will be assigned each class period, to be discussed the following period). - You should be prepared to discuss your homework (including presenting your solutions to the class) at each class meeting - your class participation grade will be determined by your participation in this. - You are encouraged to work together with other students and to ask questions and seek help from the professor, both in and out of class.
Assessment Methods
Assignments, Exams, Quizzes, Discussion and Interaction

Course Contents					
W	**Hours**	**CLOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1.	**3**	**a1**	Axioms for the natural numbers	Lecturing, examples, Discussion.	Discussion and Interaction
2.	**3**	**a1**	Integers and Numbering System	Lecturing, examples, Discussion.	Discussion and Interaction
3.	**3**	**a1,b1**	Divisibility	Lecturing, examples Discussion.	Participation
4.	**3**	**a1,b1**	Prime numbers	Lecturing, examples Discussion.	Participation
5.	**3**	**a1,b1**	Greatest common divisor.	Lecturing, examples Discussion.	Discussion and Interaction
6.	**3**	**a1,b2**	The Euclidean algorithm	Lecturing, examples Discussion.	Discussion and Interaction
7.	**3**	**a3,b2**	Factorization methods and Fermat numbers	Lecturing, oral discussion	Participation
8.	**3**	**a3,b2,c1**	Linear Diophantine equations	Lecturing, oral discussion	Participation
9.	**3**	**a2**, **b2**	Introduction to congruencies	Lecturing, examples	Discussion and Interaction
10.	**3**	**a2, a3, b2**	Linear congruencies	Lecturing, examples	Discussion and Interaction
11.	**3**	**a1, a3**	Some special congruencies	Lecturing, examples	Discussion and Interaction
12.	**3**	**a2**	Solving polynomial congruencies	Lecturing, oral discussion	Discussion and Interaction
13.	**3**	**a3, b2**	Multiplicative Functions	Lecturing, oral discussion	Discussion and Interaction
14.	**3**	**a3, b2**, **c1**	Euler's Phi function	Lecturing, examples	Cooperative learning

15.	**3**	**a3,b2, c1**	Chinese Remainder Theorem	Lecturing, examples	Cooperative learning

Infrastructure	
Textbook	Elementary Number Theory and Its Application, by Rosen, 6th Edition
References	1. Elementary Number Theory With Applications, by T. KOSHY . 2. Basic Number Theory, by S.B. MALIC.
Required reading	
Electronic materials	
Other	

Course Assessment Plan							
Assessment Method		**Grade**	**CLOs**				
			a1	**a2**	**b1**	**b2**	**c1**
First (Midterm)		**30%**	10	5	5	5	5
Second (if applicable)		**20%**					
Final Exam		**50%**	10	10	10	10	10
Coursework							
Coursework assessment methods	Assignments	**20%**	5	5	5	5	0
	Case study	-					
	Discussion and interaction	-					
	Group work activities	-					
	Lab tests and assignments	-					
	Presentations	-					
	Quizzes	-					
Total		**100%**	25	20	20	20	15

Chair of Mathematics Department: Dr. Ayman Hazaimeh

Course Leader: Dr. Belal Batiha

Plagiarism
Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code). Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.