Hashemite University		**Number Theory (110101343) 3 Credit Hours**
Faculty of Science		**Pre-requisite: 110101251**
Department of Mathematics	**Course Syllabus**	**2st Semester 2020 / 2021**

Course Information	
Lecture's Time	9-11:30
Lecture's Room	102 ر
Instructor	Prof. Dr. Nedal Tahat
Office Location	212ر
Office Hours	9:30-8 (Mon., Wed.)
Text Book : *Elementary Number Theory,* *by* D. M. Burton (7th ed. *2002*)	
References(s)	*1) Elementary Number Theory and its Applications, by K. H. Rosen.* *2) Elementary Number Theory, by G. A. Jones & M. Jones.* *3) Elementary Number Theory, by V. Eynden.*

Grading Policy:

First Exam 30%

Second Exam 30%

Final Exam 40 %

Course Objectives

To become familiar with the basic concepts and theorems in the course such as division algorithm, greatest common divisor, fundamental theorem of arithmetic, properties of congruence, Fermat's and Wilson's theorems and some arithmetic functions (τ, σ, μ and ϕ) and to employ this knowledge in solving problems and proving related facts. To get a simple idea about some still open problems.

Teaching and Learning Methods

Illustrating each introduced new concept by examples.

Proving the theorems which constitute the core of the course.

Solving some examples and assigning homework.

Discussing some of the student's solutions of some homework problems.

Making exams followed by a discussion of the problems of each exam.

Course Contents			
Week	*Topics*		**Cha. in Text**
	Some Preliminary Considerations		***1***
1	***1.1***	*Mathematical Induction*	
	1.2	*The Binomial Theorem*	
	Divisibility Theory in the Integers		***2***
2	***2.2***	*The Division Algorithm*	
3	***2.3***	*The Greatest Common Divisor*	
	2.4	*The Euclidean Algorithm*	
4	***2.5***	*The Diophantine Equation* $ax + by = c$	
	Primes and Their Distribution		***3***
5	***3.1***	*The Fundamental Theorem of Arithmetic*	
6	***3.2***	*The Sieve of Eratosthenes*	
	3.3	*The Goldbach Conjecture*	
	The Theory of Congruences		***4***
7	***4.2***	*Basic Theory of Congruence*	
8	***4.3***	*Special Divisibility Tests*	
9	***4.4***	*Linear Congruences*	
	Number–Theoretic Functions		***6***
10	***6.1***	*The Functions* τ *and* σ	
11	***6.2***	*The Möbius Inversion Formula*	
	6.3	*The Greatest Integer Function*	
	Euler's Generalization of Fermat's Theorem		***7***
12	***7.2***	*Euler's Phi-Function*	
	7.3	*Euler's Theorem*	
13	***7.4***	*Some Properties of the Phi-Function*	
	7.5	*An Application to Cryptography*	
14	***Fermat's Theorem***		
	5.2	*Fermat's Factorization Method*	
15	***5.3***	*The Little Theorem*	
	5.4	*The Greatest Integer Function*	

- **<u>Participation and Exams:</u>**

Attendance is absolutely mandatory. Missing 15% of the class sessions without a compelling excuse will qualify the student to be dismissal.