KINGDOM OF SAUDI ARABIA
AL-IMAM MOHAMMAD BIN SAUD
ISLAMIC UNIVERSITY
FACULTY OF SCIENCES
DEPARTMENT OF MATHEMATICS

المملكة العربية السعودية
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الرياضيات والإحصاء

Introduction to Number Theory

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	٢٢٢	Introduction to Number Theory	3	3	0	1	MAT 220

Objectives:

- To expose students to the fascinating subject of number theory.
- To let students gain basic knowledge in number theory which is essential for subsequent courses in mathematics and computer science.
- To prepare student for abstract mathematics courses like " Modern Algebra".

Syllabus:

- **Basics:** Classical and strong mathematics inductions, well-order principal, binomial theorem.
- **Divisibility and factorizations**: Divisibility properties, the division algorithm, representation of a number relative to arbitrary base, the binary digit system, Fundamental theorem of arithmetic, infinitude of prime numbers, greatest common divisors and least common multiple, Euclidean algorithm and Bezout's identity.
- **Congruences**: Congruence and modular arithmetic, Diophantine linear equation, Chinese Remainder Theorem and system of linear Diophantine equations. Wilson's Theorem, Little Fermat's Theorem, Euler phi function and Euler Theorem .
- **Applications**: divisibility tests, round-robin tournaments, pseudo primes, pseudorandom numbers, linear codes, Pythagorean triples and sum of two squares.

References:

- **Elementary Number Theory,**K. Rosen, ddison Wesley; 5th ed. (2004).
- **An Introduction to Mathematical Reasoning : Numbers, Sets and Functions,**P. Eccles, Academic Express, (1997).
- **Elementary Theory of Numbers,** W. Le Veque, Dover Publications (1990).