COURSE: NUMBER THEORY (MT 305)

Objective: Students understand the divisibility properties of integers and other related topics as a basis for studying more advanced topics in Number Theory, (Modern) Algebra, or other related courses.

Course Description: In this course students will learn System of integers, which includes two global topics: Divisibility of integers and the theory of Congruences. The first topic covers: Divisibility, Prime Numbers, Greatest Common Divisors, the Euclidean Algorithm, and the Fundamental Theorem of Arithmetic. And the second topic covers: Congruences, Linear Congruences in One Variable, the Chinese Remainder Theorem, Wilson's Theorem, Fermat's Little Theorem, Euler's Theorem, and Linear Diophantine Equation. In addition, as a little preliminary before studying the two big topics above, students learn several proving methods, at glance, such as Mathematical Induction, Direct and Indirect proving methods.

Prerequisite(s): None

Credits: 2

Compulsory/Elective/Others: Compulsory

Evaluation Methods: 35% Exam 1, 40% Exam 2, 10% Presence, and 15% Task(s).

Lecturers:

(1) Drs. Turmudi, M.Ed., M.Sc., Ph.D.,

(2) Al Jupri, S.Pd., M.Sc.

References:

1. Burton, D.M. (1998). *Elementary Number Theory.* The McGraw-Hill Companies, Inc.
2. Rosen, K.H. (1992). *Elementary Number Theory and Its Application.* Addison-Wesley Publishing Company.
3. Sembiring, S. (2002). *Olimpiade Matematika untuk SMU.* Bandung: Yrama Widya.
4. Strayer, J.K. (1994). *Elementary Number Theory.* Boston: PWS Publishing Company.
5. Suherman, E., Turmudi. (1992). *Pengantar Teori Bilangan untuk Guru dan Calon Guru di SD, SMTP, dan SMTA.* Bandung: Alpha Omega.
6. Sukirman. (2006). *Pengantar Teori Bilangan.* Yogyakarta: Hanggar Kreator.
7. Tung, K.Y. (2008). *Memahami Teori Bilangan dengan Mudah dan Menarik.* Jakarta: Grasindo.

Schedule of the course:

Week	Toipc/ Sub-topic	Activities	References
1^{st}	Introduction, proving methods (direct, indirect, and mathematical Induction)	Lecture, discussion, and exercises.	Books 1, 4, 6
2^{nd}	Divisibility: definition and several its properties (theorems).	Lecture, discussion, exercises, and task.	Books 1, 4.
3^{rd}	Division algorithm and related theorems.	Lecture, discussion, and exercises.	Books 1, 4.
4^{th}	Prime numbers: definition, several theorems, several conjectures about prime numbers.	Lecture, discussion, exercises, and task.	Books 1, 4.
5^{th}	Greatest Common Divisors (GCD): definition, and its theorems	Lecture, discussion, and exercises.	Books 1, 4.
6^{th}	The Euclidean Algorithm as a tool to find GCD and related theorems.	Lecture, discussion, and exercises.	Books 1, 4.
7^{th}	The Fundamental Theorem of Arithmetic	Lecture, discussion, exercises, and task.	Books 1, 4.
8^{th}	Exercises before Exam 1.	Lecture and discussion	Books 1, 2, 3, 4, 5, 6, and 7.
9^{th}	Sub-topics from 1^{st} to 8^{th} week	Exam 1	-
10^{th}	Congruences: definition and its theorems	Lecture, discussion, and exercises.	Books 1, 4.
11^{th}	Linear Congruences	Lecture, discussion, exercises, and task.	Books 1, 4.

12^{th}	The Chinese Remainder Theorem	Lecture, discussion, exercises.	Books 1, 4.
13^{th}	Wilson, Euler, and Fermat's Little Theorems	Lecture, discussion, exercises, and task	Books 1, 4.
14^{th}	Linear Diophantine Equation	Lecture, discussion, exercises, and task.	Books 1, 4.
15^{th}	Exercises before Exam 2 and review of the course	Lecture and discussion	Books 1, 2, 3, 4, 5, 6, and 7.
16^{th}	Sub-topics from 10^{th} to 15^{th} week	Exam 2	-

Notes:

Task(s): Solving mathematical problems, reading and re-writing theorem and its proofs.