



YOGYAKARTA STATE UNIVERSITY  
FACULTY OF MATHEMATICS AND NATURAL SCIENCES

SYLLABUS

SIL/MAA 209/13  
18 Februari 2011

Faculty : Faculty of Mathematics and Natural Sciences  
Department : Department of Educational Mathematics  
Course Name/Code : Number Theory/MAA 209  
Credits : 2  
Semester : II  
Prerequisite : Logic and Sets  
Instructor : Kus Prihantoso Krisnawan, M.Si.  
Lecture Hour : Thursday, 07.00 – 08.50, D.07. 209.

**I. Course Description**

Number theory is the study of properties of numbers in particular the integers and rational numbers. Questions in elementary number theory include divisibility properties of integers (e.g. the Euclidean algorithm), properties of primes (e.g. there are infinitely many), congruencies, and integer solutions to basic equations (e.g. Diophantine equations). Even though number theory is one of the oldest disciplines in mathematics, it has recently contributed to many practical problems such as coding theory, cryptography, or other tools in modern information technology. These applications will also be part of this class!

**II. Course Competencies**

Student understanding on some properties of integers and on the application of number theory.

**III. Weekly Outline**

Week	Competencies	Topic	Strategy	Textbook
1.	Understand and be able to construct proofs by inductual mathematics.	Some Preliminary Considerations 1. Basic Axiom for $Z$ 2. Proof by Induction 3. The Binomial Theorem	interactive lecture, question and answer.	A.1.1-1.3
2		Recursion Concept	discussion	A.2.1-2.2
3	Be able to use the Euclidean algorithm to find the solution of Bezout and Diophantine, and able to write a rational number in the form of continued fractions.	Divisibility 1. Elementary Divisibility Properties 2. Floor and ceiling 3. Division Algorithm	interactive lecture, question and answer.	A.3.1-3.3
4		Euclidean Algorithm 1. GCD 2. LCM 3. Euclidean algorithm	interactive lecture, question and answer.	A.4.1-4.3



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5		Applications of Euclidean Algorithm 1. Bezout Identity 2. Diophantine 3. Continued Fractions	Discussion	A.4.4
6	<b>Midterm 1</b>			
7-8	Understand how to count in a different base.	Counting in Arbitrary Base 1. Positional Notation of Numbers 2. Base 2 and Its Operations 3. Base 8 4. Base 16	Discussion	5.1-5.3
9	Understand the properties of primes.	Primes 1. Prime Number 2. Prime Factorization	interactive lecture, question and answer.	A.6.1-6.2
10	Understand the properties of congruencies.	Congruencies 1. Basic Properties 2. Linear Congruencies	interactive lecture, question and answer.	A.7.1-7.2
11	Understand the properties of some special functions.	Number-Theoretic Functions	Discussion	A.8.1-8.3
12	Understand the properties of roots and indices.	Primitive Roots and Indices	interactive lecture, question and answer.	A.9.1-9.3
13	<b>Midterm 2</b>			
14-16	Knowing and understanding the application of number theory.	Additional topic 1. Nonlinear Diophantine 2. Cryptography 3. Elliptic Curve	Discussion	A.10-12
<b>Final Exam</b>				

IV Textbook and References

A. Textbook

Krisnawan, K.P. *Handout of Number Theory*. Yogyakarta State University.

B. References

- Baldoni, M.W., Ciliberto, C., and Cattaneo, G.M.P. 2009. *Elementary Number Theory, Cryptography, and Codes*. Springer-Verlag Berlin Heidelberg.
- Burton, D.M. 1998. *Elementary Number Theory*. Fourth edition. The McGraw-Hill Companies, Inc.
- Clark, W.E. 2002. *Elementary Number Theory*.



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V Grades will be calculated according to the following rubric:

1	Class Participation	5%
2	Homework	15%
3	Midterm 1	25%
4	Midterm 2	25%
5	Final Exam	30%
<b>Total</b>		<b>100%</b>

Academic dishonesty, including cheating and plagiarism, will not be tolerated.

Yogyakarta, February 2012

Instructor

Kus Prihantoso K., M.Si

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