



Lampiran-2

**LESSON PLAN**  
**(Lecture 1 dan 2)**

1. Faculty : Mathematics and Natural Sciences
2. Study Program : Mathematics Education
3. Course name/code : Number Theory & MAT312
4. UOC : Theory: 2 uoc ; Practicum: 0 uoc
5. Semester : 2; Time Allocation: 100 minutes/lecture
6. Basic of Competence : Understand of principle of mathematical induction and binomial theorem and related theorems and apply these to problem solving
7. Indicator of achievement :
  - Lecture 1.** Performing proof of mathematical statements using principal of induction
  - Lecture 2.**
    - a. Applying binomial theorem to determine coefficients within raised two-term algebraic forms
    - b. Performing proof of mathematical statements using binomial theorem
8. Topic/Section of topic : Principle of mathematical induction and binomial theorem
9. Lesson Activity :

**Lecture 1**

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Informing syllabus -Making an agreement of lecture contract	20 minutes	Discussion	worksheet	A: 3 - 17
Main activities	-Recalling how to solve problem by induction or trial and check -Discussing principle of mathematical induction -Solving proof problems using principle of induction	70 minutes	Discussion Excercise		
Summing	-Wrapping up the use	10 minutes	Ask		

up	of principle of mathematical induction -Informing problems to solve -Informing the next topic is binomial theorem				
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## Lecture 2

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Asking students' difficulty on solving problems related to induction principles -Recalling combination cases -Recalling a raised two-term algebraic expression	15 minutes	Discussion	worksheet	A: 18 – 31
Main activities	-Discussing the proof of binomial theorem and related theorems (5 theorems) -Giving examples how to use theorem into problem solution and giving some problems to discuss	80 minutes	Discussion Exercise		
Summing up	-Drawing conclusion on the use of binomial theorem -Informing the next topic	5 minutes	Ask		

10. In Class Assessment : Participation or activeness in discussion

Yogyakarta, 15 Agustus 2009  
Lecturer,

Endah Retnowati, M.Ed.  
NIP. 19801228 200212 2 003



Lampiran-2

**LESSON PLAN**  
 (Lecture 3, 4 and 5)

1. Faculty : Mathematics and Natural Sciences
2. Program : Mathematics Education
3. Course name/Code : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation:100 minutes/lecture
6. Basic of Competence : Explaining divisibility, GCD and LCM and calculating GCD and LCM of integers
7. Indicator of Achievement :  
**Lecture 3.** Using divisibility to solve problems  
**Lecture 4.** Detemining GCD  
**Lecture 5.** Determining LCM
8. Topic/Section Topic : Divisibility
9. Lecture Activity :

**Lecture 3**

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Asking students' difficulty on solving problems related to binomial theorem -Recalling the concept of division of integers, to go further to the concept of divisibility	15 minutes	Discussion	worksheet	A: 33 – 37
Main activities	-Exposing the definition of divisibility -Solving problems related to	80 minutes	Individual work & presentation Discussion Excercise		

	divisibility individually followed by classroom discussions				
Summing up	-Wrapping up theorems of divisibility -Informing the following topic, which is GCD	5 minutes	Ask		

#### Lecture 4

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling the use of GCD concept learned at primary school -Giving problems of GCD of hundred numbers	20 minutes	Discussion	worksheet	A: 38 – 49
Main activities	-Discussing the definition of GCD for -Discussing theorems related to GCD -Solving problems	75 minutes	Discussion Exercise		
Summing up	-Wrapping up the GCD theorems -Informing the following topic, which is LCM	5 minutes	Ask		

#### Lecture 5

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling the use of LCM concept learned at primary school -Giving problems of LCM of hundred numbers	15 minutes	Discussion	Worksheet	A: 49 – 54
Main activities	-Discussing the definition of LCM for	80 minutes	Discussion Exercise		

	-Discussing theorems related to LCM -Solving problems				
Summing up	-Wrapping up the LCM theorems -Informing the following topic, which is System of Numerical Basis	5 minutes	Ask		

10. In Class Assessment : Participation or activeness in discussion

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Lampiran-2

**LESSON PLAN**  
(Lecture 6)

1. Faculty : Mathematics and Natural Sciences
2. Program : Mathematics Education
3. Course/Kode : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Representing integer on its basis used in system of position and canonic form
7. Indicator of Achievement :
  - a. Changing representation of an integer on particular basis
  - b. Determining results of operations of integers with non-decimal basis
8. Topic/Section Topic : Numerical Basis
9. Lecture Activity :

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling numerical systems commonly use in daily life -Recalling numerical bases learned at secondary schools	20 minutes	Discussion	Worksheet	A: 55 – 68
Main activities	-Students discuss numerical bases and how to convert numerics into different base as well as how to do operation on non-decimal basis	75 minutes	Discussion Excercise		
Summing up	-Wrapping up - Informing the next topic	5 minutes	Ask		

10. In Class Assessment : Participation or activeness in discussion

Yogyakarta, 15 Agustus 2009

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Lampiran-2

**LESSON PLAN**  
 (Pertemuan 7)

1. Faculty : Mathematics and Natural Sciences
2. Program Studi : Mathematics Education
3. Course/Kode : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Understanding prime numbers and unique factorization
7. Indicator of Achievement :
  - a. Testing prime number
  - b. Determining prime factors and applying in problem solving
8. Topic/Section Topic : Prime factorisation
9. Lecture Activity :
- 10.

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling the meaning of factor -Asking the factors of an integer -Recalling first prime numbers and composit numbers	10 minutes	Discussion	Worksheet	A: 69 – 86
Main activities	-Discussing prime factors of an integer -Discussion the use of prime factorisation to determine LCM and GCD -Discussion on Euclides Theorem -Solving proof problems related to prime number	85 minutes	Discussion Excercise		
Summing up	-Wrapping up about prime number and prime	5 minutes	Ask		

	factorisation -Informing the next topic is congruences				
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11. In Class Assessment : Participation or activeness in discussion

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Lampiran-2

**LESSON PLAN**  
**(Lecture 8 dan 9)**

1. Faculty : Mathematics and Natural Sciences
2. Program : Mathematics Education
3. Course/Kode : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Explaining congruence concept and applying the concept to linier congruency, Diophantine equation and related problems
7. Indicator of Achievement :  
**Lecture 8.** Explain definition and properties of congruences and implement these to problem solving and Diophantine equation  
**Lecture 9.** Solving linier congruences and linier congruence systems
8. Topic/Section Topic : Congruences
9. Lecture Activity :

**Lecture 8**

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling the concept of divisibility of an integer	15 minutes	Discussion	Worksheet	A: 87 – 123
Main activities	-Explaining the definition of congruence -Students individually solving congruence problems and problem solving on number operation with congruency, and the show it up in the front	80 minutes	Discussion Excercise		
Summing up	-Wrapping up the notation and definition of congruence -Informing the next	5 minutes	Ask		

	topic is linier congruency				
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### Lecture 9

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Asking the solution of a two congruency problems	10 minutes	Discussion	Worksheet	A: 123 – 135
Main activities	-Explaining linier congruences -Discussion on how to solve linier congruences -Discussion on Diophantine's equation -Explaining system of linier congruences -Discussion on how to solve system of linier congruences	85 minutes	Discussion Excercise		
Summing up	-Drawing conclusion on the general procedure to solve congruences -Informing the next meeting is a written examination	5 minutes	Ask		

10. In Class Assessment : Participation or activeness in discussion

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Lampiran-2

**LESSON PLAN**  
(Week 10)

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| 1. Faculty   | : Mathematics and Natural Sciences               |
| 2. Program   | : Mathematics Education                          |
| 3. Course/Kode                                       | : Number Theory & MAT312                         |
| 4. Unit of Credit                                    | : Teori: 2 uoc, Praktik: 0 uoc                   |
| 5. Semester dan Time Allocation                      | : Sem: 2, Time Allocation : 100 minutes/lecture  |
| 6. Basic of Competence                               | :  |
| 7. Indicator of Achievement                          | :  |
| 8. Topic/Section Topic<br>to Lecture 9 (Congruences) | : Lecture 1(Principle of Mathematical Induction) |
| 9. Lecture Activity                                  | : Mid-Term Exam (No Lecture)                     |
| 10. Assessment                                       | : Exam Score                                     |

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Lampiran-2

**LESSON PLAN**  
(Lecture 11)

1. Faculty : Mathematics and Natural Sciences
2. Program : Mathematics Education
3. Course/Kode : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Explaining fermat's theorem, wilson's theorem and apply to problem solving
7. Indicator of Achievement :
  - a. Performing proof of fermat's theorem and apply the theorem in problem solving
  - b. Performing proof of wilson's theorem and apply the theorem in problem solving
  - c. Testing prime numbers using these theorems
8. Topic/Section Topic : Fermat's dan Wilson's Theorem
9. Lecture Activity :

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling number sequence of modulo $m$ and least resydu sequence modulo $m$	15 minutes	Discussion	Work sheet	A: 136 – 153
Main activities	-Discussion on: The proof of Fermat's theorem The use of the theorem to determine compsite numbers and related problems -Discussion on: The proof of wilson's theorem The use of the theorem to solve congruences and other problems	80 minutes	Discussion Excercise		
Summing up	-Drawing the use of the theorems -Informing the next topic is arithmetic functions	5 minutes	Ask		

10. In Class Assessment

: Participation or activeness in discussion

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Lampiran-2

**LESSON PLAN**  
 (Lecture **12 dan 13**)

1. Faculty : Mathematics and Natural Sciences
2. Program : Mathematics Education
3. Course/Kode : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Explaining arithmetic functions and solve these to solve problems
7. Indicator of Achievement :

**Lecture 12**

- a. Giving example of  $\tau$  (tau) function and applying the theorem in problem solving
- b. Giving example of  $\sigma$  (sigma) function and applying the theorem in problem solving

**Lecture 13**

- c. Giving example of Mobius ( $\mu = \text{mu}$ ) and applying the theorem in problem solving
- d. Giving example of greatest integer function and applying the theorem in problem solving

8. Topic/Section Topic : Arithmetical Functions
9. Lecture Activity :

**Lecture 12**

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling divisibility	10 minutes	Discussion	Worksheet	A: 154 – 169
Main activities	-Describing the definitiona of tau function and related theorem -Discussion on function of sigma, double function and giving examples as well as solving problems	85 minutes	Discussion Excercise		
Summing up	-Drawing the kinds of arithmetic functions	5 minutes	Ask		

	-Informing the next topic is other arithmetic functions				
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### Lecture 13

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling square numbers and unsquared numbers	10 minutes	Discussion	Worksheet	A: 169 – 184
Main activities	-Explaining the definition of function of mobius -Discussion on formula of inverse of mobius, function of greatest integer and applying arithmetic functions on problem solving	85 minutes	Discussion Excercise		
Summing up	-Drawing conclusion of function of mobius and greatest integer -Informing the next topic is Euler's theorem	5 minutes	Ask		

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Lampiran-2

**LESSON PLAN**  
 (Lecture 14)

1. Faculty : Mathematics and Natural Sciences
2. Program Studi : Mathematics Education
3. Course/Kode : Number Theory & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Explain phi function and Euler theorem and apply in problem solving
7. Indicator of Achievement :
  - a. Solving problems related to phi function
  - b. Prove Euler function and apply the theorem in problem solving
8. Topic/Section Topic : Phi Function and Euler's Theorem
9. Lecture Activity :

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling least resydu of modulo m of an integer	5 minutes	Discussion	Worksheet	A: 185 – 206
Main activities	-Menjelaskan definisi sistem residu sederhana -Describing the definition of function of phi euler -Discussion on the proof of Euler's theorem -Solving related problems	90 minutes	Discussion Excercise		
Summing up	-Drawing the application of Euler's theorem	5 minutes	Ask		



	-Informing the next topic is primitive roots				
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10. In Class Assessment

: Participation or activeness in discussion

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Lampiran-2

**LESSON PLAN**  
 (Lecture 15 dan 16)

1. Faculty : Mathematics and Natural Sciences
2. Program : Mathematics Education
3. Course/Kode : Teori Bilangan & MAT312
4. Unit of Credit : Teori: 2 uoc, Praktik: 0 uoc
5. Semester dan Time Allocation : Sem: 2, Time Allocation : 100 minutes/lecture
6. Basic of Competence : Determine primitive root and index and apply in problem solving
7. Indicator of Achievement :

**Lecture 15**

- a. Determine order of an integer modulo  $m$
- b. Solving problems related to primitive roots

**Lecture 16**

- c. Determine indices of integers and solve related problems
8. Topic/Section Topic : Primitive Roots and Indices
9. Lecture Activity :

**Lecture 15**

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Recalling Euler's theorem	15 minutes	Discussion	Worksheet	A: 207 – 227
Main activities	-Describing the definition of order and related theorem -Describing the definition of primitive root -Discussion on the proof of Lagrange's theorem -Determining the primitive roots or the number of primitive roots of an integer	80 minutes	Discussion Excercise		

Summing up	-Wrapping up the concept of primitive roots -Informing the next topic is indices	5 minutes	Ask		
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### Lecture 16

Steps	Description	Time Allocation	Method	Media	Reference
Introduction	-Asking the primitive roots of an integer	5 minutes	Discussion	Worksheet	A: 228 – 237
Main activities	-Describing the definition and properties of index -Creating a table of indices -Using indices to solve congruence problems	90 minutes	Discussion Excercise		
Summing up	-Wrapping up the concept of index -Informing the material cover in the final examination	5 minutes	Ask		

10. In Class Assessment : Participation or activeness in discussion

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