INTRODUCTIONS
TO MATHEMATICAL LOGIC
(CREDIT : 3)
CODE : MAT 112
FIRST SEMESTER

Drs. Bayu Surarso, M.Sc Ph D
Bambang Irawanto, M.Si

Department of Mathematics
DIPONEGORO UNIVERSITY
TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 150 seconds
Meeting : 1

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of statement, variable, constant, value of statement with connective
2. SPECIFIC : 1 Student can give examples of statement, variable, constant.
2 Student can construct the table of logical statement truth value.

B. TOPIC : Sentences and statement
C.SUB TOPIC: 1. Statement, variable, constant
2. Connective

D.ACTIVITY

<table>
<thead>
<tr>
<th>STEP</th>
<th>LECTURE ACTIVITIES</th>
<th>STUDENT ACTIVITIES</th>
<th>MEDIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTIONS</td>
<td>1.Explaining the goals, relevancies and benefits</td>
<td>Listening</td>
<td>White board, Black Board,OHP</td>
</tr>
<tr>
<td>PRESENTATION</td>
<td>1.Explaining concept of logic, p Statement, variable, constant . 2 Explaining Connective and value of logical sentences</td>
<td>Listening</td>
<td>White board, Black Board,OHP</td>
</tr>
<tr>
<td>CLOSING</td>
<td>1.Summary 2. Home work</td>
<td>Learning</td>
<td>White board, Black Board,OHP</td>
</tr>
</tbody>
</table>

F REFERENCES:
1 RMJ Soehakso, Aljabar Abstrak (INTRODUCTION TO MATHEMATICAL LOGICMatematika Modern ), FMIPA UGM, 1980.
2 Theresia M, H Seputra, INTRODUCTION TO MATHEMATICAL LOGIC and Teori Himpunan, Erlangga, 1992
3 Yahya Kusuma, Logika Matematika Elementer, Bandung, Penerbit Tarsito
TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 300 seconds
Meeting : 2 and 3

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of argument validity and rule of inferences
2. SPECIFIC : 1. Student can decide the thruth of argument.
   2. Student can take conclusion correctly

B. TOPIC : Argumentation and Deduction Methode
C. SUB TOPIC: 1. Induction inferences and Deduction
   2. Rule of inferences

D. ACTIVITY

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>INTRODUCTIONS</td>
<td>1. Explaining the goals, relevancies and benefits 2. Reviewing class 1</td>
<td>Listening</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td>PRESENTATION</td>
<td>1. Explaining the concept of argument, deduction methode. 2. Explaining validity of argument and rule of inferences</td>
<td>Listening</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td>CLOSING</td>
<td>1. Summary 2. Home work</td>
<td>Learning</td>
<td>White board, Black Board, OHP</td>
</tr>
</tbody>
</table>

F REFERENCES:
4. RMJT Soehakso, Aljabar Abstrak (INTRODUCTION TO MATHEMATICAL LOGIC Matematika Modern), FMIPA UGM, 1980.
5. Theresia M, H Seputra, INTRODUCTION TO MATHEMATICAL LOGIC and Teori Himpunan, Erlangga, 1992
6. Yahya Kusuma, Logika Matematika Elementer, Bandung, Penerbit Tarsito
# TEACHING PROGRAM UNIT

**SUBJECT**: INTRODUCTION TO MATHEMATICAL LOGIC  
**CODE**: MAT 112  
**CREDITS**: 3  
**Class**: 150 seconds  
**Meeting**: 4

## A INSTRUCTIONAL GOAL
1. **GENERAL**: After the class the student understand the concept of argument validity and rule of inferences  
2. **SPECIFIC**:  
   1. Student can decide the truth of argument.  
   2. Student can take conclusion correctly

## B. TOPIC  
Argumentation and Deduction Methode

## C. SUB TOPIC: Discussion about Argumentation and Deduction Methode

## D. ACTIVITY

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>INTRODUCTIONS</td>
<td>Prepare the room, split the class to some groups, material of discussion to each group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRESENTATION</td>
<td>Supervising the discussion</td>
<td>Discuss</td>
<td>Paper, etc</td>
</tr>
<tr>
<td>CLOSING</td>
<td>Collecting the report of discussion from each group</td>
<td></td>
<td></td>
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</tbody>
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3. Yahya Kusuma, Logika Matematika Elementer, Bandung, Penerbit Tarsito
TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 450 seconds
Meeting : 5,6, and 7

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of Quantifier and the theory of quantification
2. SPECIFIC : 1 Student understand the concept of preposition function
2. Student can explain Quantifier
3. Student understand the statement containing relation, statement in traditional logic
4. Student can prove can take conclusion from quantifier argument

B. TOPIC : Quantifier and the theory of quantification
C. SUB TOPIC: 1. Quantifier ,Preposition function
2. Statement in traditional logic, the statement containing relation
3. The prove of quantifier validity

D. ACTIVITY

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<td>Listening</td>
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</tr>
<tr>
<td></td>
<td>2. Reviewing class 4</td>
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</tr>
<tr>
<td>PRESENTATION</td>
<td>1. Explaining the concept of quantifier.</td>
<td>Listening</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td></td>
<td>2. Explaining The prove of quantifier validity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLOSING</td>
<td>1. Summary</td>
<td>Learning</td>
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<td></td>
<td>2. Home work</td>
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TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE    : MAT 112
CREDITS : 3
Class    : 150 seconds
Meeting  : 8

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of Quantifier and the theory of quantification
2. SPECIFIC : 1. Student understand the concept of preposition function
              2. Student can explain Quantifier
              3. Student understand the statement containing relation, statement in traditional logic
              4. Student can prove can take conclusion from quantifier argument

B. TOPIC : Quantifier and the theory of quantification
C. SUB TOPIC: Discussion about:
              1. Quantifier, Preposition function
              2. Statement in traditional logic, the statement containing relation
              3. The prove of quantifier validity

D. ACTIVITY

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TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 150 seconds
Meeting : 9

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student know the procentage of the understanding the topics of introduction of mathematical logic course
2. SPECIFICS : After the class the student know the procentage of the understanding the topics of introduction of mathematical logic course

B. TOPIC : Midle Test
C. SUB TOPIC : Midle Test

D. ACTIVITY

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<tr>
<td>INTRODUCTIONS</td>
<td>Prepare the room, distribute the problem paper and the worksheet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRESENTATION</td>
<td>Supervising the test</td>
<td>Doing the test</td>
<td>Paper, etc</td>
</tr>
<tr>
<td>CLOSING</td>
<td>Collecting the answersheet of the test</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 150 seconds
Meeting : 10

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of set
2. SPECIFIC : 1 Student can write the notation of the set and its elemen correctly
2. Student can give some example of set

B. TOPIC : Set
C. SUB TOPIC: 1. The concept of set
2. The concept of element

D. ACTIVITY

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>INTRODUCTIONS</td>
<td>1. Explaining the goals, relevancies and benefits</td>
<td>Listening</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td>PRESENTATION</td>
<td>1. Explaining the concept of set, elemen and the notation . 2 Giving some example of set</td>
<td>Listening, writing</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td>CLOSING</td>
<td>1. Summary 2. Home work</td>
<td>Learning</td>
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TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 300 seconds
Meeting : 11 and 12

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of relation and the operation of set
2. SPECIFIC : 1 Student understand the concept of relation between set and able to give examples
   2. Student understand the concept of operation of the set and able to give examples

B. TOPIC : Set
C. SUB TOPIC: 1. Relation of between Set
   2. Operation between Set

D. ACTIVITY

<table>
<thead>
<tr>
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<th>MEDIA</th>
</tr>
</thead>
</table>
| INTRODUCTIONS     | 1. Explaining the goals, relevancies and benefits
   2. Reviewing class 10 | Listening, writing | White board, Black Board, OHP |
| PRESENTATION      | 1. Explaining the concept of Relation between set.
   2. Explaining the concept of Operation | Listening, writing | White board, Black Board, OHP |
| CLOSING           | 1. Summary
   2. Home work | Learning            | White board, Black Board, OHP |

F REFERENCES:
1. RMJT Soehakso, Aljabar Abstrak (INTRODUCTION TO MATHEMATICAL LOGIC, Matematika Modern), FMIPA UGM, 1980.
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TEACHING PROGRAM UNIT

SUBJECT: INTRODUCTION TO MATHEMATICAL LOGIC
CODE: MAT 112
CREDITS: 3
Class: 150 seconds
Meeting: 13

A INSTRUCTIONAL GOAL
1. GENERAL: After the class the student understand the concept of relation and the operation of set
2. SPECIFIC: 1. Student understand the concept of relation between set and able to give examples
2. Student understand the concept of operation of the set and able to give examples

B. TOPIC: Set
C. SUB TOPIC: Discuss about:
1. Relation of between Set
2. Operation between Set

D. ACTIVITY

<table>
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<th>MEDIA</th>
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<tbody>
<tr>
<td>INTRODUCTION</td>
<td>Prepare the room, split the class to some groups, material of discussion to each group</td>
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<tr>
<td>PRESENTATION</td>
<td>Supervising the discussion</td>
<td>Discuss</td>
<td>Paper, etc</td>
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<td>Collecting the report of discussion from each group</td>
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TEACHING PROGRAM UNIT

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE : MAT 112
CREDITS : 3
Class : 300 seconds
Meeting : 14 and 15

A INSTRUCTIONAL GOAL
1. GENERAL : After the class the student understand the concept of Function
2. SPECIFIC : 1 Student understand the concept of relation
   2. Student understand the concept of Function

B. TOPIC : Function
C.SUB TOPIC: 1. Relation
   2. Function

D.ACTIVITY

<table>
<thead>
<tr>
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<tr>
<td>INTRODUCTIONS</td>
<td>1. Explaining the goals, relevancies and benefits</td>
<td>Listening, writing</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td></td>
<td>2. Reviewing class 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRESENTATION</td>
<td>1. Explaining the concept of Relation</td>
<td>Listening, writing</td>
<td>White board, Black Board, OHP</td>
</tr>
<tr>
<td></td>
<td>2. Explaining the concept of Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLOSING</td>
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<td>White board, Black Board, OHP</td>
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<td></td>
<td>2. Home work</td>
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TEACHING PROGRAM UNIT

SUBJECT: INTRODUCTION TO MATHEMATICAL LOGIC
CODE: MAT 112
CREDITS: 3
Class: 150 seconds
Meeting: 9

A INSTRUCTIONAL GOAL
1. GENERAL: After the class the student know the percentage of the understanding the topics of introduction of mathematical logic course
2. SPECIFICS: After the class the student know the percentage of the understanding the topics of introduction of mathematical logic course

B. TOPIC: Final Test
C. SUB TOPIC: Final Test

D. ACTIVITY

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<thead>
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<td>Supervising the test</td>
<td>Doing the test</td>
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<tr>
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<td>Collecting the answersheet of the test</td>
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<td></td>
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</table>
TEACHING PROGRAM OUTLINE

SUBJECT : INTRODUCTION TO MATHEMATICAL LOGIC
CODE/CREDITS : MAT112/3
DESCRIPTION :
INTRODUCTION TO MATHEMATICAL LOGIC is the part of Mathematics containing some methods and techniques for taking conclusion of argument correctly. It help student develop their logical ability to solve more complex problems. The subject studying some methods and techniques for taking conclusion of argument correctly and precise logical thinking. The discussion of the topics beginning from the concept of statement, argument, variable, constant, deduction method, induction, quantifier sentence statement and validity of quantifier argument, the concept of set and function.

GENERAL INSTRUCTIONAL GOAL:
After the course the student understand the concept of argument validity and rule of inference appropriate to the methods given and understand the concept of quantifier, the theory of quantification, the concept of set and function.

<table>
<thead>
<tr>
<th>no</th>
<th>SPECIFIC INSTRUCTIONAL GOAL</th>
<th>TOPIC</th>
<th>Sub TOPIC</th>
<th>TIME</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Student is able to give example of statements, variable and constants, construct the table of logical truth and state the truth of argument</td>
<td>Sentence and Statement</td>
<td>Statement .Variable,constant Connective,Induction and deduction inference</td>
<td>150’</td>
<td>Ref 1, Ref 2 and Ref 3</td>
</tr>
<tr>
<td>2.</td>
<td>Student is able to take conclusions correctly</td>
<td>Argument and Methods of Deduction</td>
<td>Rule of argument inference</td>
<td>450’</td>
<td>Ref 1, Ref 2 and Ref 3</td>
</tr>
<tr>
<td></td>
<td>Student is able to prove and take conclusions from quantifier</td>
<td>Quantifier and Theory of Quantification</td>
<td>Proposition function, quantifier Statement in traditional logic, Proof of quantifier validity</td>
<td>600’</td>
<td>Ref 1, Ref 2 and Ref 3</td>
</tr>
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</tr>
<tr>
<td>4</td>
<td>Student is able to write sets and its element by the correct notation.</td>
<td>Sets</td>
<td>Concept of Set</td>
<td>150’</td>
<td>Ref 1, Ref 2 and Ref 3</td>
</tr>
<tr>
<td>5</td>
<td>Student is able to do operation between sets</td>
<td>Sets</td>
<td>Operation between sets</td>
<td>300’</td>
<td>Ref 1, Ref 2 and Ref 3</td>
</tr>
<tr>
<td>6</td>
<td>Student is able to give example of relations and to explain their property</td>
<td>Relation</td>
<td>Relation and Function</td>
<td>450’</td>
<td>Ref 1, Ref 2 and Ref 3</td>
</tr>
</tbody>
</table>