	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Bachelor of Mathematics Education Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Elementary Number Theory	8420202222	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	2	January 2, 2023

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Muhammad Jakfar, M.Si.	Dr. Agung Lukito M., M.S.	Dr. Endah Budi Rahaju, M.Pd.

Learning model: Case Studies

Program Learning Outcomes (PLO)

PLO study program which is charged to the course

PLO-7	Apply basic mathematical principles to solve simple mathematical problems

Program Objectives (PO)

PO - 1	Able to develop mathematical thinking starting from an understanding of divisibility, number bases, prime numbers, greatest common factor, Euclid's algorithm, least common multiple, congruence, and linear congruence
PO - 2	Able to formulate problems related to divisibility, number bases, prime numbers, greatest common factor, Euclid's algorithm, least common multiple, congruence, and linear congruence
PO - 3	Able to use solution search methods in solving mathematical problems related to divisibility, number bases, prime numbers, greatest common factor, Euclid's algorithm, least common multiple, congruence, and linear congruence

PLO-PO Matrix

P.O	PLO-7
PO-1	
PO-2	
PO-3	

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																
PO-3																

Short Course Description: This course examines divisibility, bases of numbers, prime numbers and their properties, greatest common factor (GCF) and its properties, Euclid's algorithm, least common multiple (LCM) and its properties, relationship between FPB and LCM, congruence and its properties. its nature, linear congruence and its properties through active learning with a combination of lecture, discussion, question and answer methods and IT-assisted assignments. The assessment is determined with proportional weights and is carried out during the learning process with active interactive participation, assignments, mid-semester exams and final semester exams.

References

Main :

1. Rosen, K. H. 2010. Elementary Number Theory and its Application (6th edition). New York: Addison – Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada.John Wiley & Sons, Inc.

Supporters:

1. Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada.John Wiley & Sons, Inc

Supporting lecturer	Rudianto Artiono, S.Pd., M.Si. Dwi Nur Yunianti, S.Si., M.Sc. Dr. Heri Purnomo, M.Pd. Shofan Fiangga, S.Pd., M.Sc. Muhammad Jakfar, S.Si., M.Si. Nina Rinda Prihartiwi, S.Pd., M.Pd. Yulia Izza El Milla, S.Pd., M.Pd. Dayat Hidayat, S.Pd., M.Pd., M.Si. Mukhtamilatus Sa'diyah, M.Pd.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	1. Explains the nature of integer operations, well ordering principle 2. Explain the definition of divisibility 3. Proving the properties of divisibility 4. Explain the proof of division algorithm 5. Solving mathematical problems with divisibility properties and division algorithms	1. Explains the nature of integer operations, well ordering principle 2. Explain the definition of divisibility 3. Explain the proof of divisibility properties 4. Explain the proof of division algorithm 5. Solving mathematical problems with divisibility properties and division algorithms	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Bibliography **:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%
2	1. Explains the nature of integer operations, well ordering principle 2. Explain the definition of divisibility 3. Proving the properties of divisibility 4. Explain the proof of division algorithm 5. Solving mathematical problems with divisibility properties and division algorithms	1. Explains the nature of integer operations, well ordering principle 2. Explain the definition of divisibility 3. Explain the proof of divisibility properties 4. Explain the proof of division algorithm 5. Solving mathematical problems with divisibility properties and division algorithms	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Bibliography **:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%

3	1.Representing a number in various bases and operations 2.Prove that numbers are divisible by 2^n,3,5,7,9,10,11 using number bases 3.Solving mathematical problems related to number bases	1.Representing a number in various bases and operations 2.Prove that numbers are divisible by 2^n,3,5,7,9,10,11 using number bases 3.Solving mathematical problems related to number bases	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Number Bases **References:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%
4	1.Explain the definition of prime numbers and composite numbers 2.Prove the properties of prime numbers 3.Solve math problems related to prime numbers	1.Explain the definition of prime numbers and composite numbers 2.Explain the proof of the properties of prime numbers 3.Solve math problems related to prime numbers	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Prime Numbers **Reference:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%
5	1.Explain the definition of FPB 2.Explain Euclid‘s algorithm 3.Applying the properties of FPB in solving problems 4.Applying Euclid‘s algorithm in solving problems	1.Explain the definition of FPB 2.Explain Euclid‘s algorithm 3.Applying the properties of FPB in solving problems 4.Applying Euclid‘s algorithm in solving problems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** FPB and Euclid‘s Algorithm **Reference:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%

6	1. Explain the definition of FPB 2. Explain Euclid's algorithm 3. Applying the properties of FPB in solving problems 4. Applying Euclid's algorithm in solving problems	1. Explain the definition of FPB 2. Explain Euclid's algorithm 3. Applying the properties of FPB in solving problems 4. Applying Euclid's algorithm in solving problems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** FPB and Euclid's Algorithm **Reference:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%
7	1. Explain the definition of KPK 2. Proving the properties of the Corruption Eradication Committee 3. Resolving problems related to the Corruption Eradication Commission 4. Explain the relationship between FPB and KPK 5. Resolving problems related to the relationship between FPB and KPK	1. Explain the definition of KPK 2. Explain the evidence of the nature of the Corruption Eradication Commission 3. Resolving problems related to the Corruption Eradication Commission 4. Explain the relationship between FPB and KPK 5. Resolving problems related to the relationship between FPB and KPK	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** KPK, relationship between FPB and KPK **Reference:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%

8	UTS	All indicators before UTS	**Criteria:** Attached **Form of Assessment** : Test	UTS 100		**Material:** All material before UTS **Reader:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	20%
9	1. Explain the definition of number congruence 2. Proving the properties of number congruence 3. Uses congruence properties to solve specified problems	1. Explain the definition of number congruence 2. Explain the proof of the congruence properties of numbers 3. Uses congruence properties to solve specified problems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Congruence **Literature:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	7%
10	1. Explain the definition of number congruence 2. Proving the properties of number congruence 3. Uses congruence properties to solve specified problems	1. Explain the definition of number congruence 2. Explain the proof of the congruence properties of numbers 3. Uses congruence properties to solve specified problems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Congruence **Literature:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	7%

11	1. Explain the definition of complete and reduced residue systems 2. Explain the definition of the Euler function 3. Solve mathematical problems related to residue systems	1. Explain the definition of complete and reduced residue systems 2. Explain the definition of the Euler function 3. Solve mathematical problems related to residue systems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Residue System **References:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	7%
12	1. Explain Euler's theorem 2. Explain Fermat's little theorem 3. Explain Wilson's theorem 4. Solve mathematical problems related to Euler's theorem	1. Explain Euler's theorem 2. Explain Fermat's little theorem 3. Explain Wilson's theorem 4. Solve mathematical problems related to Euler's theorem	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Euler's Theorem **Reference:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	6%
13	1. Explaining the linear congruence of one variable 2. Explain the properties of linear congruence 3. Solve mathematical problems related to linear congruence	1. Explaining the linear congruence of one variable 2. Explain the properties of linear congruence 3. Solve mathematical problems related to linear congruence	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Linear Congruence **Reference:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%

14	1. Explains the simultaneous linear congruence system of one variable 2. Solve mathematical problems related to systems of simultaneous linear congruence 3. Explain the Chinese remainder theorem 4. Using the Chinese remainder theorem in finding solutions to simultaneous linear congruence systems	1. Explains the simultaneous linear congruence system of one variable 2. Solve mathematical problems related to systems of simultaneous linear congruence 3. Explain the Chinese remainder theorem 4. Using the Chinese remainder theorem in finding solutions to simultaneous linear congruence systems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Simultaneous Linear Congruence Systems **References:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	2%

15	1.Explain the linear congruence system 2.Determine the solution of mathematical problems related to linear congruence systems	1.Explain the linear congruence system 2.Determine the solution of mathematical problems related to linear congruence systems	**Criteria:** Attached **Form of Assessment** : Participatory Activities	Lectures, Responses and Tutorials 100		**Material:** Simultaneous Linear Congruence Systems **References:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.* **Material:** Linear Congruence Systems **References:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	5%

16	UAS	All indicators before UAS	**Criteria:** Attached **Form of Assessment** : Test	UAS 100		**Material:** All material before UAS **Library:** *Rosen, KH 2010. Elementary Number Theory and its Application (6th edition). New York: Addison–Wesley Publishing Company. [2] Niven, Ivan, Herbert S. Zuckerman, Hugh L. Montgomery. An Introduction to The Theory of Numbers. Canada. John Wiley & Sons, Inc.*	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Test	50%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.