STUDY PLAN OF UNDERGRADUATE PROGRAMME OF MATHEMATICS EDUCATION



UNDERGRADUATE PROGRAMME OF MATHEMATICS EDUCATION
FACULTY OF MATHEMATICS AND NATURAL SCIENCE
UNIVERSITAS NEGERI SURABAYA
2021

General Remarks

The Undergraduate Program of Mathematics Education (UPME), Faculty of Mathematics and Natural Mathematicss, Universitas Negeri Surabaya is four-year bachelor program and designed to enable students to directly change over to a Mathematics education-oriented occupational field or to begin the Master program of Mathematics Education. In particular, several theoretical mathematics education and mathematics content which is related to problem solving are given to students to enable them to increase the skills associated with analytic reasoning, complex problem solving and teamwork.

To make it easier for students to prepare their study plans, the UPME has developed a Study Plan Guidebook. This Study Plan (curricular map) include the compulsory courses, elective courses, internship, and the awarded Credit Semester Unit (in CU and ECTS).

Students can see the description of the Program Educational Objectives (PEOs) and Program Learning Outcomes (PLOs), that they will have after completing their undergraduate studies in the UPME, Faculty of Mathematics and Natural Mathematicss, Universitas Negeri Surabaya. Students can also see in detail about their workload each semester, both in Credit Units (*sks*) and in ECTS. In addition, this Study Plan Guidebook can also direct academic advisor in monitoring students' study progress and students' achievement index achievement while studying in the UPME, Faculty of Mathematics and Natural Mathematicss, Universitas Negeri Surabaya.

Hopefully this study plan can help students, especially in planning their studies as well as possible. In addition, it is hoped that this study plan will also help the improvement of the continuing higher education quality.

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Chapter I. Introduction

The Undergraduate Program of Mathematics Education (UPME) belongs to the Mathematics Department at Faculty of Mathematics and Natural Mathematics (FMNS) in Universitas Negeri Surabaya (Unesa). The UPME was established on September 14, 1965 based on the Decree of President no 269 on 1965. The first stage of the implementation of the Outcomes based Education (OBE) requires the UPME to formulate the objectives and outcomes. The UPME established the current Program Educational Objectives (PEOs) and developed PEO into Program Learning Outcomes (PLOs). PEOs are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve and are measured 3 to 5 years after graduation. PEOs are formulated based on inputs from various stake holders. PLOs are graduates attributes that students shall attain after completing the program.

Program Educational Objectives

The undergraduate program in mathematics education (UPME) at FMNS, UNESA held since 1984 base on SK of Ministry of Higher Education no 61/DIKTI/Kep/1984. This program focuses its objectives to produce graduates who can become professionals in the field of Mathematics education (Mathematics Educators, Mathematics Education Research Assistants, Edupreneur and Mathematics Education Writers) who have the following objectives.

1. Able to master knowledge in the field of mathematics and mathematics education, skills and their application in solving problems in the field of work that supports a professional career (PEO-1).
2. Responsible for understanding and applying professional ethics in carrying out duties and work (PEO-2).
3. Able to communicate and socialize in professional activities at the local, national and international level (PEO-3).
4. Able to improve self-development continuously (both formal and informal) and creatively, then become a reference in the related profession (PEO-4).

Specifically, PEO-1 supports both professional accomplishment and academic accomplishment, while PEO-2 is related to professional and social accomplishment. Likewise, PEO-3 is also related to professional and social accomplishment, while PEO-4, same with PEO-1, is related to professional and academic accomplishment. Table 1 indicates the relationship between the objectives of the undergraduate program in Mathematics and the 6th level (the level for bachelor education) of the National Qualification Framework.

Table 1 The relationship between PEOs of UPME and the INQF

PEOs of the UPME	INQF 6th Level Competences			
	Capable of apply science, technology, and art within his/her expertise and adaptable to various situations faced during solving a problem	Mastering in-depth general and specific theoretical concepts of certain knowledge and capable of formulating problem-solving procedure	Capable of taking strategic decision based on information and data analysis as well as providing direction in choosing several alternative solutions	Responsible for his/her own jobs and can be assigned to take responsibility of the attainment of organization's performances
PEO 1	S	S	S	S
PEO 2	S	S	S	S
PEO 3	S	S	M	S
PEO 4	S	S	S	S

Note: S = Strong; M = Moderate

Program Learning Objectives

The UPME of FMNS, Unesa sets the program learning outcomes for the graduates as presented in Table 2 as follows.

Table 2. PLO of Undergraduate Program of Mathematics Education

ASPECTS	PLO	CODE
KNOWLEDGE	Demonstrate mathematical knowledge and insight.	**KNO-1**
	Demonstrate pedagogical knowledge in designing, implementing and evaluating Mathematics' learning.	**KNO-2**
	Demonstrate knowledge related to mathematics education research	**KNO-3**
SKILL	Design, implement and evaluate mathematics' teaching and learning by using ICT	**SKI-1**
	Implement basic principle of Mathematics to solve simple Mathematics' problem	**SKI-2**
COMPETENCE	Communicate idea and research result effectively orally and literally.	**COM-1**
	Make decision based on data/information in solving task that become students' responsibility and evaluate the work that has been done.	**COM-2**
	Work effectively as individual as well as group, having enterpreneurhip spirit and environmental caring.	**COM-3**
ATTITUDES & SOCIAL	Demonstrate scientific attitude, critical and innovative in mathematics teaching and learning and professional task.	**SOC-1**
	Demonstrate religion values and cultures as well as academics etiquette in doing professional task.	**SOC 2**

In relation to how the aspects of PLO are connected with PEO, Table 3 gives an overview how strong each of PLOs supports the PEO.

Table 3. Correlation between the PEO and PLO of UPME Unesa

	PEO			
PLO	PEO 1	PEO 2	PEO 3	PEO 4
KNO-1	S	S	S	S
KNO-2	S	S	S	S
KNO-3	S	NS	S	NS
SKI-1	S	S	NS	NS
SKI-2	S	NS	NS	S
COM-1	NS	S	S	NS
COM-2	S	S	NS	S
COM-3	NS	NS	S	S
SOC-1	NS	S	S	S
SOC-2	NS	S	S	S

S-strong, NS-not strong

Mapping of Subject-Specific Criteria of ASIIN with PLOs of the UPME

The PLOs of UPME are closely related to specialist learning outcomes for Bachelor degree programmes created by ASIIN (SSC-12: iM). It can be seen in the following table.

Table 4. Specialist learning outcomes for Bachelor degree programmes created by ASIIN (SSC 12: iM) and UPME PLO

SSC-12: iM	PLO									
	KNO-1	KNO-2	KNO-3	SKI-1	SKI-2	COM-1	COM-2	COM-3	SOC-1	SOC-2
Able to formulate simple mathematical problems										
Able to solve simple practical problems by applying fundamental mathematical methods (where applicable only with software)										
Able to allocate practical problems to a mathematical category										
Master in fundamental strategies for										

transferring methods in selected areas of Mathematics, depending on the practical application										
Create simple, realistic mathematical problems under supervision										

Conversion Factor between Indonesian Credit Unit (sks) and ECTS

According to the Regulation from the Ministry of Education and Culture of the Republic of Indonesia on National Education Standards. 1 Credit Unit or 1 sks equal to the 170 minutes. *One semester consists of 14 weeks of lecturing activities and two weeks for mid-semester test and final semester test.* Total hours (workload) for 1 Credit Unit or sks equal to 14 weeks × 170 minutes = 2,380 minutes or 39.67 hours. In Unesa, based on the Rector's Decree 1 ECTS equal to 25 hours (The Decree of Rector Unesa No. 598/UN38/HK/AK/2019 dated June 6th, 2020). So, conversion factor from 1 Credit Unit (CU) or 1 *sks* = 1.59 ECTS. Therefore, the student learning load for 1 credit is equivalent to 1.59 ECTS. The maximum total number of credits can be taken by student is 160 credits or equivalent to 254.4 ECTS. In order to graduate from this study programmes, a student should meet a minimum of 144 credits or equivalent to 228.96 ECTS

Chapter II Study Plan Description

The curriculum lays the foundation for teaching and the planning (individual study plans) and implementation of studies. The objectives of degree programs and courses are defined as learning outcomes. The learning outcomes courses are based on the mission of a given degree program. Descriptions regarding instruction (e.g. Learning outcomes and number of ECTS credits) follow regulations and are realistic.

Classification of Compulsory and Elective Requisites in the UPME

Table 5. Distribution of modules

Requisite	Type of Requisite	Credit Unit (in *sks*)	ECTS	Percentage
University	Compulsory	26	41.34	18.05%
	Elective	-	-	-
FMNS	Compulsory (Common First Year)	11	17.49	7.64%
	Elective	-	-	-
UPME	Compulsory	91	144.69	63.19%
	Elective	16	25.44	11.12%
Total		144	228.96	100%

The minimum workload of Undergraduate Program at Unesa, especially in the UPME is 144 Credit Units (CU) which correspond to 228.96 ECTS, and are generally distributed in 8 regular semesters. On average, the total hour per semester is 714.06 hours. According to the Higher Education National Standards, the maximum workload for each regular semester is limited to 952.08 hours, corresponds to 24 CU or 24 *sks* (38.16 ECTS).

The UPME Curriculum Structure

The student should successfully pass 144 Credit Unit (CU) before graduation and all the study plan courses are compulsory. This can be achieved through eight semesters distributed on the following levels in Table 6 (Compulsory and elective Courses).

Table 6 Mapping of the UPME compulsory course into the PLOs

No	Code	Module	C U	ECTS	KNO-1	KNO-2	KNO-3	SKI-1	SKI-2	COM-1	COM-2	COM-3	SOC-1	SOC-2
1st Semester														
1	8420203043	Foundations of Mathematics	3	4.77	√				√					
2	8420204079	Differential Calculus	4	6.36	√				√					

No	Code	Module	C U	ECTS	KNO-1	KNO-2	KNO-3	SKI-1	SKI-2	COM-1	COM-2	COM-3	SOC-1	SOC-2
3	1000002003	Indonesian	2	3.18						√				
4	8420203036	General Biology	3	4.77									√	
5	8420203061	General Physics	3	4.77									√	
6	8420203089	General Chemistry	3	4.77									√	
7	1000003006	Basic of Education	3	4.77		√								
8	1000002018	Pancasila	2	3.18										√
2nd Semester														
9	100000202x	Religion Education	2	3.18										√
10	1000002033	Citizenship Education	2	3.18										√
11	8420202004	Digital Literacy	2	3.18		√		√			√			
12	8420203064	Geometry	3	4.77	√				√					
13	8420204083	Integral Calculus	4	6.36	√				√					
14	8420203020	English	3	4.77						√			√	
15	8420202094	Conservation of Natural Resources and Environment	2	3.18								√		√
16	1000002039	Educational Psychology	2	3.18		√								
17	8420203219	Learning Theories	3	4.77		√								
3rd Semester														
18	8420203007	Elementary Linear Algebra	3	4.77	√				√					
19	8420203065	Analytical Geometry	3	4.77	√				√					
20	8420203127	Statistic Method	3	4.77	√				√					
21	8420202222	Elementary Number Theory	3	4.77	√				√					
22	8420203144	Innovative Learning I	3	4.77		√		√		√			√	
23		Physical Education	2	3.18										√
24	8420202110	Contextual Mathematics*)	2	3.18		√		√		√	√		√	
25	8420202197	History of Mathematics*)	2	3.18		√		√			√			
26	1000002011	Basic Social and Cultural Sciences	2	3.18										√
4th Semester														
27	8420203010	Abstract Algebra I	3	4.77	√				√					

No	Code	Module	C U	ECTS	KNO-1	KNO-2	KNO-3	SKI-1	SKI-2	COM-1	COM-2	COM-3	SOC-1	SOC-2
28	8420203013	Real Analysis I	3	4.77	√				√					
29	8420203107	Discrete Mathematics	3	4.77	√				√					
30	8420203193	Operation Research	3	4.77	√				√					
31	8420203018	Assessment	3	4.77		√		√		√				
32	8420202121	Learning Media	2	3.18		√		√			√		√	
33	8420203146	Innovative Learning II	3	4.77		√		√		√			√	
34	8420203152	Visual Programming*)	3	4.77		√		√			√			
35	8420202186	Psychology of Mathematics Learning*)	2	3.18		√		√			√			
5th Semester														
36	8420204085	Multivariable Calculus	4	6.36	√				√					
37	8420203111	School Mathematics	3	4.77		√		√		√	√		√	
38	8420203217	Curriculum Analysis	3	4.77		√		√		√	√		√	
39	8420203129	Education Research Methodology	3	4.77			√	√		√	√			
40	8420202142	Probability and Statistics	3	4.77	√				√					
41	8420202047	E-Learning*)	2	3.18		√		√					√	
42	8420202153	Reasoning and Proof*)	2	3.18	√	√			√					
43	8420203201	System of Geometry*)	3	4.77	√				√					
44	8420202004	Entrepreneurship *)	2	3.18				√		√	√	√	√	
6th Semester														
45	8420202057	Philosophy of Mathematics Education	2	3.18	√	√		√						
46	8420203123	Numerical Methods	3	4.77	√				√					
47	8420203173	Ordinary Differential Equation	3	4.77	√				√					
48	8420202200	Mathematics Education Seminar	2	3.18		√	√			√	√		√	√
49	8420202004	Microteaching	2	3.18				√		√	√		√	
50	8420203185	Teaching and Learning Program	3	4.77				√					√	
50	8420203067	Transformational	3	4.77	√				√					

No	Code	Module	C U	ECTS	KNO-1	KNO-2	KNO-3	SKI-1	SKI-2	COM-1	COM-2	COM-3	SOC-1	SOC-2
		Geometry*)												
51	8420202148	Problem Solving*)	2	3.18	√	√					√			
52	8420202169	Academic Writing*)	2	3.18				√		√	√		√	
7th Semester														
53	8420206202	Thesis	6	9.54	√	√	√	√		√	√		√	√
54	8420203004	Teaching Internship	4	6.36				√					√	
55	8420203096	Community Service	3	4.77				√		√	√		√	√
56	8420203149	Mathematical Modelling	3	4.77	√				√					
57	8420202093	Public Communication*)	2	3.18						√				
58	8420203221	Number Theory*)	3	4.77	√				√					
59	8420203224	Graph Theory*)	3	4.77	√				√					
60	8420203223	Fuzzy Theory*)	3	4.77	√				√					
8th Semester														
61	8420202105	Management and Leadership*)	2	3.18								√	√	
62	8420203005	Abstract Algebra II*)	3	4.77	√			√						
63	8420203006	Linear Algebra*)	3	4.77	√			√						
64	8420202056	Philosophy of Mathematics*)	2	3.18	√					√				
65	8420203012	Real Analysis II*)	3	4.77	√				√					
66	8420202052	Ethnomathematics*)	2	3.18		√		√		√			√	
67	8420203206	Mathematical Statistics*)	3	4.77	√				√					

Table 7. List of Elective Modules

Odd Semester					**Even Semester**				
No	Code	Module	CU	ECTS	No	Code	Module Title	CU	ECTS
1	8420202093	Public Communication	2	3.18	1	8420202105	Management and Leadership	2	3.18
2	8420202047	E-Learning	2	3.18	2	8420203005	Abstract Algebra II	3	4.77
3	8420202110	Contextual Mathematics	2	3.18	3	8420203006	Linear Algebra	3	4.77
4	8420202153	Reasoning and Proof	2	3.18	4	8420202056	Philosophy of Mathematics	2	3.18
5	8420202197	History of Mathematics	2	3.18	5	8420203067	Transformational Geometry	3	4.77

6	8420203201	System of Geometry	3	4.77	6	8420203152	Visual Programing	3	4.77
7	8420203221	Number Theory	3	4.77	7	8420202169	Academic Writing	2	3.18
8	8420203224	Graph Theory	3	4.77	8	8420202186	Psychology of Mathematics Learning	2	3.18
9	8420203012	Real Analysis II	3	4.77	9	8420202052	Ethnomathematics	2	3.18
10	8420203223	Fuzzy Theory	3	4.77	10	8420203206	Mathematical Statistics	3	4.77
11	8420202004	Entrepreneurship	2	3.18	11	8420202148	Problem Solving	2	3.18

Students can choose the Elective Courses from the list in Table 7. In addition, students can take Internship Course in the Semester VII. The internship process takes place in Secondary School. The students also mandatory to involve in the community service projects that initiated and implemented by the students with the supervision from the Institute of Research and Community Service (LPPM) Unesa (Community Service or *KKN* Course).

The Detailed Study Plan in the UPME for Each Semester

The UPME students can programming their course based on the current study plan. This detailed study plan also provided a guided for the students' academic advisor to monitor the student's study and achievement to meet the PLOs indicators. The detailed study plan shown in tables below.

Table 8 Study Plan in the Semester I and II

1st Semester					**2nd Semester**				
	Code	**Course Name**	**CU**	**ECTS**		**Code**	**Course Name**	**CU**	**ECTS**
1	8420203043	Foundations of Mathematics	3	4.77	1	100000202x	Religion Education	2	3.18
2	8420204079	Differential Calculus	4	6.36	2	1000002033	Citizenship Education	2	3.18
3	1000002003	Indonesian	2	3.18	3	8420202004	Digital Literacy	2	3.18
4	8420203036	General Biology	3	4.77	4	8420203064	Geometry	3	4.77
5	8420203061	General Physics	3	4.77	5	8420204083	Integral Calculus	4	6.36
6	8420203089	General Chemistry	3	4.77	6	8420203020	English	3	4.77
7	1000003006	Basic of Education	3	4.77	7	8420202094	Conservation of Natural Resources and Environment	2	3.18
8	1000002018	Pancasila	2	3.18	8	1000002039	Educational Psychology	2	3.18
						8420203219	Learning Theories	3	4.77
TOTAL			23	36.57	TOTAL			23	36.57

Table 9 Study Plan in the Semester III and IV

3rd Semester	**4th Semester**

	Code	Course Name	CU	ECTS		Code	Course Name	CU	ECTS
1	8420203007	ElementaryLinear Algebra	3	4.77	1	8420203010	Abstract Algebra I	3	4.77
2	8420203065	Analytical Geometry	3	4.77	2	8420203013	Real Analysis I	3	4.77
3	8420203127	Statistic Method	3	4.77	3	8420203107	Discrete Mathematics	3	4.77
4	8420202222	ElementaryNumber Theory	2	4.77	4	8420203193	Operation Research	3	4.77
5	8420203144	Innovative Learning I	3	4.77	5	8420203018	Assessment	3	4.77
6	8420202004	Physical Education	2	3.18	6	8420202121	Learning Media	2	3.18
7	1000002011	Basic Social and Cultural Sciences	2	3.18	7	8420203146	Innovative Learning II	3	4.77
8		Elective Course	2	3.18	8		Elective Course	3	4.77
9		Elective Course	2	3.18	9		Elective Course	2	3.18
TOTAL			22	36.57		TOTAL		25	39.75

Table 10 Study Plan in the Semester V and VI

5th Semester					6th Semester				
	Code	Course Name	CU	ECTS		Code	Course Name	CU	ECTS
1	8420204085	Multivariable Calculus	4	6.36	1	8420202057	Philosophy of Mathematics Education	2	3.18
2	8420203111	School Mathematics	3	4.77	2	8420203123	Numerical Methods	3	4.77
3	8420203217	Curriculum Analysis	3	4.77	3	8420203173	Ordinary Differential Equation	3	4.77
4	8420203129	Education Research Methodology	3	4.77	4	8420202200	Mathematics Education Seminar	2	3.18
5	8420202142	Probability and Statistics	3	4.77	5	8420202004	Microteaching	2	3.18
6		Elective Course	2	3.18	6	8420203185		3	4.77
7		Elective Course	2	3.18	7		Elective Course	2	3.18
8		Elective Course	3	4.77	8		Elective Course	2	3.18
9		Elective Course	2	3.18			Elective Course	3	4.77
TOTAL			25	39.75	TOTAL			22	34.98

Table 11 Study Plan in the Semester VII and VIII

7th Semester					8th Semester				
	Code	Course Name	CU	ECTS		Code	Course Name	CU	ECTS
1	8420206202	Thesis	6	9.54	1		Elective Course	2	3.18
2	8420203004	Teaching Internship	4	6.36	2		Elective Course	3	4.77
3	8420203096	Community Service	3	4.77	3		Elective Course	3	4.77
4	8420203149	Mathematical Modelling	3	4.77	4		Elective Course	2	3.18

7th Semester					8th Semester				
	Code	**Course Name**	**CU**	**ECTS**		**Code**	**Course Name**	**CU**	**ECTS**
5		Elective Course	2	3.18	5		Elective Course	3	4.77
6		Elective Course	3	4.77	6		Elective Course	2	3.18
7		Elective Course	3	4.77	7		Elective Course	3	4.77
8		Elective Course	3	4.77					
TOTAL			27	42.93	TOTAL			18	28.62

For more information about the courses each semester (compulsory and elective), please visit the webpage: https://pendidikan-matematika.fmipa.unesa.ac.id/page/module-handbook