STUDY PLAN GUIDEBOOK



UNDERGRADUATE PROGRAM IN SCIENCE EDUCATION
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
UNIVERSITAS NEGERI SURABABAYA
2020

General Remarks

The Undergraduate Program in Science Education (UPSE), Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya is four-year bachelor program and designed to enable students to directly change over to a science education-oriented occupational field or to begin the Master program in science education. In particular, students are to acquaint themselves with the modern theoretical and experimental developments in the field of study in its entire breadth and moreover be enabled to develop strategies for solving complex issues individually and in teams and to act with scientific and social responsibility.

To make it easier for students to prepare their study plans, the UPSE 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 UPSE, Faculty of Mathematics and Natural Sciences, 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 UPSE, Faculty of Mathematics and Natural Sciences, 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 Science Education (UPSE) belongs to the Department of Natural Science at Faculty of Mathematics and Natural Sciences (FMNS) in Universitas Negeri Surabaya (Unesa). The UPSE was established on December 21st, 2006 based on the Decree of General Director of Higher Education of the Department of National Education of the Republic of Indonesia No. 4905/D/T/2006. The first stage of the implementation of the Outcomes based Education (OBE) requires the UPSE to formulate the objectives and outcomes. The UPSE 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

As a consequence of the vision and mission of the Unesa and FMNS in accordance with the Rector's Decree no. 466/UN38/HK/DT/2016 on Curriculum development based on the Indonesian National Qualification Framework (INQF) for the undergraduate program, the Program Educational Objectives (PEOs) of the UPSE focus on producing graduates who are capable of becoming science educators particularly at middle school level, researchers of science education, and entrepreneurs in the fields of applied science or science education. In detail, the PEOs of UPSE are as follows:

1. Mastering knowledge/skills in the field of pedagogical integrated science (physics, chemistry, and biology) to carry out their professional or entrepreneurial tasks (PEO 1);
2. Having responsibility in carrying out his professional duties based on professional ethics (PEO 2);
3. Having a strong and tough personality and be able to compete globally in carrying out the tasks of his profession or entrepreneurship (PEO 3);
4. Having capability to communicate and work together in carrying out professional tasks (PEO 4);
5. Having capability to do self-development and innovations sustainably based on the situation and challenges in their professional duties (PEO 5).

The PEOs were formulated by considering the input from alumni and science education experts, curriculum for middle school students, evaluation results of tracer studies, and National Science Education Standards (NSES) 1996. These PEOs also have significant relevancies with the INQF. Table 1 indicates the relationship between PEO(s) of the UPSE and the 6th level (the level for undergraduate program) of the INQF. Through these PEOs, the graduates of the UPSE are expected to have capability to compete locally and globally. The relationship between the PEOs of the UPSE and the INQF shown in Table 1.

Table 1 The relationship between PEOs of UPSE and the INQF

PEOs of the UPSE	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	M
PEO 2	S	S	S	S
PEO 3	S	S	S	S
PEO 4	M	S	M	S
PEO 5	S	S	S	S

Note: S = Strong; M = Moderate

Program Learning Objectives

Derived from the PEOs, the UPSE have 11 Program Learning Outcomes (PLOs). This PLOs consist of knowledge (cognitive), skills (psychomotor), and attitude (affective) as shown in Table 2.

Table 2 PLOs of the UPSE

ASPECTS	PLOs	DESCRIPTION
Knowledge (K)	PLO 1	Demonstrate basic knowledge of physics, chemistry, and biology.
	PLO 2	Demonstrate knowledge of integrated science (physics, chemistry, and biology).
	PLO 3	Demonstrate pedagogical knowledge of designing, implementing, and evaluating integrated science learning.
	PLO 4	Demonstrate knowledge related to science education research.
Special Skills (SS)	PLO 5	Design, implement, and evaluate science learning using ICT.
	PLO 6	Design and conduct research about learning of integrated science, and acquire, analyze, and interpret the research data.
General Skills (GS)	PLO 7	Communicate ideas and research results effectively both in oral and written forms.
	PLO 8	Make decisions based on data / information in order to complete tasks and evaluate the performance that has been done.
	PLO 9	Work effectively both individually and in groups, and have entrepreneurial spirits and environmental awareness.
Attitude (A)	PLO 10	Demonstrate scientific, critical, and innovative attitudes in integrated science learning, laboratory activities, and professional-related tasks.
	PLO 11	Demonstrate religious and cultural values as well as academic ethics in carrying out their professional-related duties.

Regard to the aspects of connection between the PLO and PEO, Table 3 gives an overview how strong each of PLOs supports the PEOs.

Table 3 Correlation between the PEOs and PLOs of the UPSE

PLO	PEO				
	PEO 1	PEO 2	PEO 3	PEO 4	PEO 5
PLO 1	S	S	S	M	M
PLO 2	S	S	S	M	M
PLO 3	S	S	S	M	S
PLO 4	M	S	S	M	S
PLO 5	S	S	S	M	S
PLO 6	S	S	S	S	S
PLO 7	S	M	S	S	S
PLO 8	S	S	S	S	S
PLO 9	S	S	S	S	S
PLO 10	S	M	S	S	S
PLO 11	M	M	M	M	S

Note: S = Strong; M = Moderate

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

The subject-specific criteria (SSC) of ASIIN that similar to the PEOs and PLOs of the UPSE is the SSC-10 Life Sciences. For the quality assurance of degree programs, the SSC provide an orientation aid for the subject-specific design of degree programs in the respective area. In this way they contribute to the harmonization of similar study programs in a vertical and horizontal way. The result of the mapping of the SSC of ASIIN with PLOs of the UPSE shown in Table 4.

Table 4 Mapping of SSC of ASIIN with the PLOs

SSC 10 ASIIN for Life Sciences	PLOs										
	1	2	3	4	5	6	7	8	9	10	11
	K	K	K	K	SS	SS	GS	GS	GS	A	A
Specialist competences											
1 Have acquired sound fundamental biology-relevant knowledge of mathematics and the natural sciences	✓	✓									
2 Knowledge of the fundamentals of molecular, cell and organismic biology	✓	✓									
3 Have gained methodological competence in Life Sciences and are also able to apply this in other contexts				✓		✓					
4 Are capable of independent practical work in laboratories and in the field as well as handling organisms						✓					
5 Have relevant knowledge of safety and environmental issues as well as the associated legal fundamentals						✓					
6 Have acquired sound knowledge in at least one special area of Life Sciences			✓	✓	✓						

SSC 10 ASIIN for Life Sciences		PLOs										
		1	2	3	4	5	6	7	8	9	10	11
		K	K	K	K	SS	SS	GS	GS	GS	A	A
7	Are capable of recognizing and solving subject-specific problems			✓		✓	✓					
8	Are capable of solving Life Science problems and presenting the results	✓	✓				✓	✓				
Social Competences												
9	Have trained conceptual, analytical and logical thinking,								✓		✓	
10	Have an awareness of possible social, ethical and environment-related effects of their actions									✓	✓	✓
11	Have acquired communication skills–also in a foreign language–and can communicate scientific information to experts and laypersons in a suitable manner							✓				
12	Have a capacity for teamwork, also on an intercultural basis								✓			
13	have acquired lifelong learning strategies							✓	✓	✓	✓	✓

Note: K = Knowledge; SS = Specific Skill; GS = General Skill; and A = Attitude

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.

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 UPSE

Table 5 Compulsory and elective requisites courses

Requisite	Type of Requisite	Credit Unit (in *sks*)	ECTS	Percentage
University	Compulsory	23	36.57	15.97%
	Elective	-	-	-
FMNS	Compulsory (Common First Year)	12	19.08	8.33%
	Elective	-	-	-
UPSE	Compulsory	93	147.87	64.58%
	Elective	16	25.44	11.11%
Total		144	228.96	100%

The minimum workload of Undergraduate Program at Unesa, especially in the UPSE is 144 Credit Units (CU) which correspond to 5,712.48 hours or 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 UPSE 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 Courses) and Table 7 (Elective Courses).

Table 6 Mapping of the UPSE compulsory course into the PLOs

No	Code	Course Title	Work-load		CU	ECTS	PLO										
			L	P			1	2	3	4	5	6	7	8	9	10	11
Semester I																	
1	1000002020	Pancasila Education	2	-	2	3.18									√		√
2	8420103012	English	3	-	3	4.77							√				
3	8420103045	General Physics	2	1	3	4.77	√	√									
4	8420103074	General Chemistry	2	1	3	4.77	√	√									

No	Code	Course Title	Work-load		CU	ECTS	PLO										
			L	P			1	2	3	4	5	6	7	8	9	10	11
5	8420103023	General Biology	2	1	3	4.77	√	√									
6	1000002003	Indonesian Language	2	-	2	3.18							√				
7	8420103086	Basic Mathematics	2	1	3	4.77	√	√									
8	1000003006	Introductory of Education	2	1	3	4.77			√								
Semester II																	
9	1000002026	Religion Education	2	-	2	3.18											√
10	1000002033	Citizenship Education	2	-	2	3.18									√		√
11	8420102183	Digital Literacy	2	-	2	3.18					√						
12	8420103088	Mathematic for Science	2	1	3	4.77	√	√									
13	1000002039	Educational Psychology	2	-	2	3.18			√								
14	8420102028	Introductory of Natural Science	2	-	2	3.18	√	√									
15	8420103155	Learning Theory	3	-	3	4.77			√								
16	8420102032	Basic Computer	2	-	2	3.18				√							
17	8420103065	Biodiversity	2	1	3	4.77	√	√									
Semester III																	
18	8420102159	History and Philosophy of Science Education	2	-	2	3.18				√					√		
19	8420103154	Curriculum Review	3	-	3	4.77			√								
20	8420102176	Entrepreneur-ship	2	-	2	3.18									√		
21	8420102060	Social and Culture Study	2	-	2	3.18							√	√			√
22	8420103053	Biomechanics	2	1	3	4.77		√									
23	8420103162	Plant Anatomy and Physiology	2	1	3	4.77		√									
24	8420103158	Matter and Energy	2	1	3	4.77		√									
25	8420103161	Management and Work Safety in the Laboratory	2	1	3	4.77								√		√	
Semester IV																	
26	8420103107	Innovative Learning I	2	1	3	4.77			√		√						
27	8420103167	Animal Anatomy and Physiology	2	1	3	4.77		√									

No	Code	Course Title	Work-load		CU	ECTS	PLO										
			L	P			1	2	3	4	5	6	7	8	9	10	11
28	8420103048	Fluids	2	1	3	4.77		√									
29	8420102076	Conservation of Natural Resources and Environment	2	-	2	3.18	√							√			
30	8420103163	Introduction to Biochemistry	2	1	3	4.77		√									
31	8420103090	Learning Media	2	1	3	4.77			√		√						
32	8420103010	Assessment and Evaluation	3	-	3	4.77			√		√						
Semester V																	
33	8420103109	Innovative Learning II	2	1	3	4.77			√		√						
34	8420103138	SETS	2	1	3	4.77		√									
35	8420103033	Ecology	2	1	3	4.77		√									
36	8420103081	Solution	2	1	3	4.77	√										
37	8420103067	Live at Cellular Level	2	1	3	4.77		√									
38	8420103068	Electricity and Magnetism	2	1	3	4.77		√									
39	8420103094	Research Method	2	1	3	4.77			√		√	√					
Semester VI																	
40		Elective Course*)	2	-	2	3.18	√										
41	8420103168	Statistics of Education	2	1	3	4.77						√					
42	8420102005	Science School Analysis	2	-	2	3.18	√	√									
43	8420103049	Waves and Optics	2	1	3	4.77		√									
44		Elective Course*)	2	-	2	3.18		√									
45	8420102142	Seminar	2	-	2	3.18			√		√	√				√	√
Semester VII																	
46		Elective Course*)	2	-	2	3.18		√									
47	8420103178	Community Service (*KKN*)	3	-	3	4.77							√		√		
48		Elective Course*)	2	-	2	3.18	√										
49		Elective Course*)	3	-	3	4.77									√		√
50	8420104182	Internship	-	4	4	6.36		√		√	√			√		√	
Semester VIII																	
51	8420106146	Thesis	6	-	6	9.54			√		√	√				√	√

No	Code	Course Title	Work-load		CU	ECTS	PLO										
			L	P			1	2	3	4	5	6	7	8	9	10	11
52		Elective Course*)	2	1	2	3.18	√										√
53		Elective Course*)	2	-	2	3.18	√										

Note: L = Theory; P = Practicum/experiment

Table 7 Mapping of the UPSE elective course into the PLOs

No	Code	Course Title	Work-load		CU	ECTS	PLO										
			L	P			1	2	3	4	5	6	7	8	9	10	11
List of Elective Courses																	
1	8420102029	Introductory of Biotechnology	2	-	2	3.18	√										
2	8420103038	Ethno-science	2	1	3	4.77		√									
3	8420102073	Household Chemistry	2	-	2	3.18	√										
4	8420103171	Atom and Radioactivity	2	-	2	3.18		√									
5	8420103064	Review of Science Research Findings	2	-	2	3.18	√	√									
6	8420103170	Introductory of Electronics	2	-	2	3.18	√										
7	8420103123	Earth and Planetary Science	2	1	3	4.77		√									

Note: L = Theory; P = Practicum/experiment

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 the Junior High 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 UPSE for Each Semester

The UPSE 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

No	Requisite	Code	Course Title	CU	ECTS
1	University	1000002020	Pancasila Education *Pendidikan Pancasila*	2	3.18
2	UPSE	8420103012	English *Bahasa Inggris*	3	4.77
3	FMNS	8420103045	General Physics *Fisika Umum*	3	4.77
4	FMNS	8420103074	General Chemistry *Kimia Umum*	3	4.77
5	FMNS	8420103023	General Biology *Biologi Umum*	3	4.77
6	University	1000002003	Indonesian Language *Bahasa Indonesia*	2	3.18
7	FMNS	8420103086	Basic Mathematics *Matematika Dasar*	3	4.77
8	University	1000003006	Introductory of Education *Dasar-dasar Pendidikan*	3	4.77
Total				22	34.98

Table 9 Study Plan in the Semester II

No	Requisite	Code	Course Title	CU	ECTS
1	University	1000002026	Religion Education *Pendidikan Agama*	2	3.18
2	University	1000002033	Citizenship Education *Pendidikan Kewarganegaraan*	2	3.18
3	University	8420102183	Digital Literacy *Literasi Digital*	2	3.18
4	UPSE	8420103088	Mathematic for Science *Matematika IPA*	3	4.77
5	University	1000002039	Educational Psychology *Psikologi Pendidikan*	2	3.18
6	UPSE	8420102028	Introductory of Natural Science *Dasar-dasar IPA*	2	3.18
7	UPSE	8420103155	Learning Theory *Teori Belajar*	3	4.77
8	UPSE	8420102032	Basic Computer *Dasar-dasar Komputer*	2	3.18
9	UPSE	8420103065	Biodiversity *Keanekaragaman Hayati*	3	4.77
Total				21	33.39

Table 10 Study Plan in the Semester III

No	Requisite	Code	Course Title	CU	ECTS
1	UPSE	8420102159	History and Philosophy of Science Education *Sejarah dan Filsafat Pendidikan Sains*	2	3.18
2	UPSE	8420103154	Curriculum Review *Telaah Kurikulum*	3	4.77
3	UPSE	8420102176	Entrepreneurship *Kewirausahaan*	2	3.18
4	UPSE	8420102060	Social and Culture Study *Ilmu Sosial Budaya Dasar*	2	3.18
5	UPSE	8420103053	Biomechanics *Gerak dan Perubahan*	3	4.77
6	UPSE	8420103162	Plant Anatomy and Physiology *Anatomi dan Fisiologi Tumbuhan*	3	4.77
7	UPSE	8420103158	Matter and Energy *Zat dan Energi*	3	4.77
8	UPSE	8420103161	Management and Work Safety in the Laboratory *Pengelolaan Laboratorium dan K3*	3	4.77
Total				21	33.39

Table 11 Study Plan in the Semester IV

No	Requisite	Code	Course Title	CU	ECTS
1	UPSE	8420103107	Innovative Learning I *Pembelajaran Inovatif I*	3	4.77
2	UPSE	8420103167	Animal Anatomy and Physiology *Anatomi dan Fisiologi Hewan*	3	4.77
3	UPSE	8420103048	Fluids *Fluida*	3	4.77
4	UPSE	8420102076	Conservation of Natural Resources and Environment *Konservasi SDA dan Lingkungan*	2	3.18
5	UPSE	8420103163	Introduction to Biochemistry *Dasar-dasar Biokimia*	3	4.77
6	UPSE	8420103090	Learning Media *Media Pembelajaran*	3	4.77
7	UPSE	8420103010	Assessment and Evaluation *Asesmen dan Evaluasi*	3	4.77
Total				20	31.80

Table 12 Study Plan in the Semester V

No	Requisite	Code	Course Title	CU	ECTS
1	UPSE	8420103109	Innovative Learning II *Pembelajaran Inovatif II*	3	4.77
2	UPSE	8420103138	Science, Environment, Technology, and	3	4.77

No	Requisite	Code	Course Title	CU	ECTS
			Society (SETS) *Sains, Lingkungan, Teknologi, dan Masyarakat*		
3	UPSE	8420103033	Ecology *Ekologi*	3	4.77
4	UPSE	8420103081	Solution *Larutan*	3	4.77
5	UPSE	8420103067	Live at Cellular Level *Kehidupan tingkat Sel*	3	4.77
6	UPSE	8420103068	Electricity and Magnetism *Kelistrikan dan Kemagnetan*	3	4.77
7	UPSE	8420103094	Research Method *Metode Penelitian*	3	4.77
Total				21	33.39

Table 13 Study Plan in the Semester VI

No	Requisite	Code	Course Title	CU	ECTS
1	UPSE		Elective Course*) *Mata Kuliah Pilihan*	2	3.18
2	UPSE	8420103168	Statistics of Education *Statistik Pendidikan*	3	4.77
3	UPSE	8420102005	Science School Analysis *Analisis IPA Sekolah*	2	3.18
4	UPSE	8420103049	Waves and Optics *Gelombang dan Optik*	3	4.77
5	UPSE		Elective Course*) *Mata Kuliah Pilihan*	2	6.36
6	UPSE	8420102142	Seminar *Seminar*	2	3.18
Total				14	22.26

Table 14 Study Plan in the Semester VII

No	Requisite	Code	Course Title	CU	ECTS
1	UPSE		Elective Course*) *Mata Kuliah Pilihan*	2	3.18
2	University	8420103178	Community Service *Kuliah Kerja Nyata (KKN)*	3	4.77
3	UPSE		Elective Course*) *Mata Kuliah Pilihan*	2	3.18
4	UPSE		Elective Course*) *Mata Kuliah Pilihan*	3	4.77
5	University	8420104182	Internship *Praktik Lapangan Persekolahan (PLP)*	4	6.36
Total				14	22.26

Table 15 Study Plan in the Semester VIII

No	Requisite	Code	Course Title	CU	ECTS
1	UPSE	8420106146	Thesis *Skripsi*	6	9.54
2	UPSE		Elective Course*) *Mata Kuliah Pilihan*	3	4.77
3	UPSE		Elective Course*) *Mata Kuliah Pilihan*	2	3.18
Total				11	17.49

Table 16 Summary of credit unit (CU) and ECTS of each semester in the UPSE

No	Year	Semester	CU	ECTS
1	First Year (Freshman)	I	22	34.98
		II	21	33.39
2	Second Year (Sophomore)	III	21	33.39
		IV	20	31.80
3	Third Year (Junior)	V	21	33.39
		VI	14	22.26
4	Fourth Year (Senior)	VII	14	22.26
		VIII	11	17.49
Total			**144**	**228.96**

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