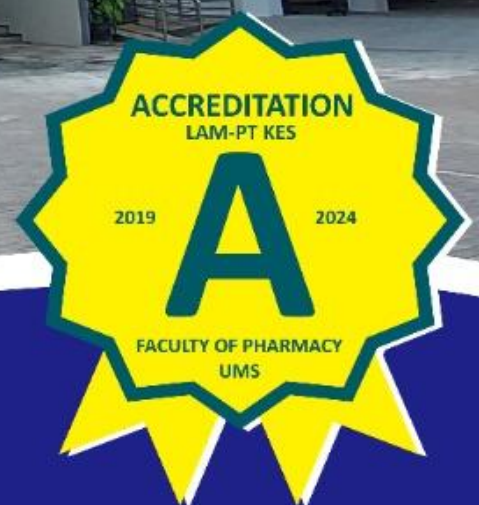


UNDERGRADUATE STUDY PROGRAM IN PHARMACY *Program Book*



FACULTY OF PHARMACY
UNIVERSITAS MUHAMMADIYAH SURAKARTA

**UNDERGRADUATE STUDY PROGRAM
IN PHARMACY**
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A. PROFILE

The Undergraduate Study Program in Pharmacy was established under the Faculty of Pharmacy, Universitas Muhammadiyah Surakarta (UMS) with Decree No.54/DIKTI/KEP/199 dated March 15, 1999 and began to organize the Undergraduate Pharmacy Program in August 1999.

The Undergraduate Study Program in Pharmacy has been accredited with an A grade since 2008. The last accreditation status, namely accredited with an A grade, is determined by the accreditation decree from LAMPTKes with Decree No 0036/LAM-PTKes/Akr/Sar/I/2019 for the 2019-2024 accreditation period.

B. VISION

By 2029, Faculty of Pharmacy is aspired to be a center of excellence and reference for education and development of pharmaceutical science based on Islamic values.

C. MISSION

1. To organize an excellent pharmacy education to anticipate the development of the future.
2. To organize resource management for students who possess academic competitive skills, entrepreneurial skills and Islamic personality.
3. To organize competitive and innovative research activities and community services in the field of pharmaceutical science and technology, pharmaceutical services and natural medicine.
4. To organize educational outcomes using the quadruple helix relationships between industry, government, society and university, and to build sustainable relations with alumni.

D. GOALS

1. To realize an accountable education governance.
2. To realize a student resource management system that develops academically and extra-curricularly.
3. To produce human resources (HR) with high academic qualifications and competent in teaching and research.
4. To create strategic alliances with industry, health facilities, and communities as well as good relations with alumni.

E. ADMINISTRATOR

Head of SP-Pharmacy

Name : Anita Sukmawati, Ph.D., Apt.
Lecturer Index No. : 0613077802
Expertise : Biopharmaceutics and Pharmaceutical Technology
Email : anita.sukmawati@ums.ac.id

Secretary of SP-Pharmacy I

Name : Setyo Nurwaini, M.Sc., Apt.
Lecturer Index No. : 0622017902
Expertise : Pharmaceutics
Email : setyo.nurwaini@ums.ac.id

Secretary of SP-Pharmacy II

Name : Gunawan Setiyadi, M.Sc., Apt.
Lecturer Index No. : 0605087301
Expertise : Pharmaceutics and Pharmaceutical Technology
Email : gunawan.setiyadi@ums.ac.id

Head of Pharmaceutics Laboratory

Name : Mariska Sri Harlianti, S.Farm., M.Farm., Apt.
Lecturer Index No. : 0605028101
Expertise : Pharmacoeconomy
Email : mariska@ums.ac.id

Head of Pharmacology and Clinical Pharmacy Laboratory

Name : Ambar Yunita Nugraheni, M.Sc., Apt.
Lecturer Index No. : 0628068701
Expertise : Clinical Pharmacy
Email : ambar.y.nugraheni@ums.ac.id

Head of Pharmaceutical Biology Laboratory

Name : Maryati, Ph.D., Apt.
Lecturer Index No. : 0626067601
Expertise : Pharmaceutical Biology
Email : maryati@ums.ac.id

Head of Pharmaceutical Chemistry Laboratory

Name : Wahyu Utami, Ph.D., Apt.
Lecturer Index No. : 0624087502
Expertise : Analytical Chemistry / Bioanalytics
Email : wahyu.utami@ums.ac.id

F. EXPECTED LEARNING OUTCOMES

1. A noble with personal and interpersonal manners by internalizing Islamic attitudes and values
2. An academic and professional who upholds Islamic attitudes and values
3. Ability to critically analyze pharmaceutical problems, compile information, design and conduct current issue based on research that supports the development of the health sector by utilizing information technology

4. Ability to disseminate the latest drugs/medication knowledge, both verbally, and in written form, as well as interdisciplinary and multidisciplinary.
5. Ability to evaluate themselves and manage self-learning in an effort to improve pharmacy technical skills
6. Ability to manage pharmacy tasks independently or under the supervision of pharmacists, lead and manage group work, and be responsible for the results of group work
7. Ability to apply theoretical concepts in pharmaceutics, pharmaceutical biology, pharmacology and clinical pharmacy, and pharmaceutical chemistry
8. Ability to apply theoretical concepts about pharmaceutical management, entrepreneurship, socio-pharmacy, pharmaceutical law and ethics, communication techniques, and basic principles of work safety
9. Ability to apply pharmaceutical science and technology in the phase of formulation and development, production, and quality assurance of pharmaceutical and traditional medicine, cosmetics and food preparations, including the application of halal haram principles
10. Ability to evaluate drug-related problems using an evidence-based approach to optimize therapeutic success
11. Ability to apply the concept of discovery and development of medicinal materials and natural medicine ingredients
12. Ability to do pharmaceutical tasks under the supervision of pharmacists in a responsible manner and in accordance with statutory provisions and applicable codes of ethics

G. CURRICULUM STRUCTURE

Total credit that must be taken : 144 credits

Elective courses offered : 14 credits

Elective courses taken : 2 credits

H. LECTURERS

No	Name	Lecturer Index No.	Phone No.	Address
1.	Ambar Yunita N., M.Sc., Apt.	0628068701	-	-
2.	Andi Suhendi, M.Sc., Apt.	0610087902	-	-
3.	Anita Sukmawati, Ph.D, Apt.	0613077802	-	-
4.	Arifah Sri Wahyuni, M.Sc., Apt.	0608127501	-	-
5.	Arini Fadhilah, M.Si, Apt.	0605069202	-	-
6.	Azis Saifudin, Ph.D, Apt.	0612017802	-	-
7.	Broto Santoso, M.Sc., Apt.	0614067703	-	-
8.	Cita H. Muflihah, M.Sc, Apt.	0621109201	-	-
9.	Dedi Hanwar, M.Si., Apt.	0607037401	-	-
10.	EM Sutrisna, Prof. Dr., M.Kes.	0620087001	-	-

11.	Erindyah Retno W., Ph.D., Apt.	0613027401	-	-
12.	Gunawan Setiyadi, M.Sc., Apt.	0605087301	-	-
13.	Haryoto, Dr., M.Sc.	0006066201	-	-
14.	Hidayah Karuniawati, M.Sc., Apt.	0622038101	-	-
15.	Ika Trisharyanti D.K., M.Farm., Apt.	0619037901	-	-
16.	Kun Harismah, Prof., M.Sc., Ph.D.	0606016101	-	-
17.	Mariska Sri Harlianti, M.Sc., Apt.	0605028101	-	-
18.	Maryati, Ph.D., Apt.	0626067601	-	-
19.	Muhammad Da'i, Prof. Dr., M.Si., Apt.	0617047401	-	-
20.	Muhtadi, Prof. Dr., M.Si.	0609096902	-	-
21.	Nurul Mutmainah, Dra., M.Si., Apt.	0616016901	-	-
22.	Peni Indrayudha, M Biotech, Ph.D., Apt.	0029077801	-	-
23.	Ratna Yuliani, M.Biotech.St.	0614027802	-	-
24.	Rima Munawaroh, M.Sc., Apt.	0601047702	-	-
25.	Setyo Nurwaini, M.Sc., Apt.	0622017902	-	-
26.	Suprpto, M.Sc., Apt.	0622067303	-	-
27.	Tanti Azizah Sujono, M.Sc., Apt.	0605087601	-	-
28.	Teguh Imanto, M.Farm., Apt.	0615118301	-	-
29.	Tri Yulianti, M.Si., Apt.	0607067801	-	-
30.	Wahyu Utami, Ph.D., M.Si., Apt.	0624087502	-	-
31.	Zakky Choliso, Ph.D., M.Clin.Pharm., Apt.	0630057601	-	-

I. DISTRIBUTION OF COURSES

Semester	No	Courses	Course Code	Credit	Prerequisite
1	1	Religious Education	UMS10112	2	
	2	Pancasila	UMS10212	2	
	3	English for Academic Purposes	UMS10312	2	
	4	Pharmaceutical Botany	FFA10422	2	
	5	Chemistry	FFA10522	2	
	6	Organic Chemistry I	FFA10622	2	
	7	Cell Biology	FFA10722	2	
	8	Pharmaceutics I Lab.	FFA08221	1	Co-Requisite: Pharmaceutics I
	9	Anatomy Human Physiology and Medical Terminology	FFA10922	2	
	10	Pharmaceutics I	FFA11022	2	
	11	Practice Basic Skills Lab.	FFA11121	1	Co-Requisite: Chemistry
		Total Credits		20	
2	1	Transcendental and Social Dimensions of Islam	UMS20112	2	AL-ISLAM I
	2	Civic Studies	UMS20212	2	
	3	Standardized Test Preparation	UMS20312	2	English for Academic Purposes
	4	Analytical Chemistry	FFA20423	3	Chemistry
	5	Organic Chemistry II	FFA20522	2	Organic Chemistry I

	6	Statistics	FFA20622	2	
	7	Pharmacology	FFA20722	2	Anatomy Human Physiology and Medical Terminology
	8	Physical Chemistry	FFA20822	2	Chemistry
	9	Physical Chemistry Lab.	FFA20921	1	
	10	Analytical Chemistry Lab.	FFA21021	1	
	11	Pharmacology Lab.	FFA21121	1	
		Total Credits		20	
3	1	Islam, Science and Technology	UMS30112	2	BTA pass certificate
	2	Instrumental Analysis	FFA30222	2	Analytical Chemistry
	3	Environmental Chemistry	FFA30322	2	Chemistry
	4	Chromatography	FFA30422	2	Analytical Chemistry
	5	Biochemistry	FFA30522	2	Organic Chemistry II
	6	Pharmaceutical Microbiology	FFA30622	2	Cell Biology
	7	Pharmacognosy I	FFA30722	2	Pharmaceutical Botany
	8	Physical Pharmacy	FFA30822	2	Physical Chemistry
	9	Introduction to GMP	FFA30921	1	
	10	Pharmaceutical Analysis Lab.	FFA31021	1	Co-Requisite: Instrumental Analysis dan Chromatography
	11	Pharmaceutical Microbiology Lab.	FFA31121	1	Co-Requisite: Pharmaceutical Microbiology
	12	Physical Pharmacy Lab.	FFA31221	1	Co-Requisite: Physical Pharmacy
		Total Credits		20	
4	1	Muhammadiyah Studies	UMS40112	2	Mentoring Certificate
	2	Indonesian Language	UMS40212	2	
	3	Pharmaceutical Analysis	FFA40322	2	Instrumental Analysis
	4	Molecular Biology	FFA40422	2	Cell Biology
	5	Pharmacognosy II	FFA40522	2	Pharmacognosy I
	6	Toxicology	FFA40622	2	Pharmacology
	7	Introduction to Pharmacokinetics	FFA40722	2	Pharmacology
	8	FORMULASI DAN TEKNOLOGI SEDIAAN SOLID	FFA40822	2	Introduction to GMP
	9	PRAKTIKUM FTS 1	FFA40921	1	Introduction to GMP. Co-Requisite: Solid Dosage Form Formulation and Technology
	10	PRAKTIKUM SINTESIS DAN ANALISIS OBAT	FFA41021	1	Co-Requisite: Pharmaceutical Analysis
	11	PRAKTIKUM BIOMOLEKULER	FFA41121	1	Co-Requisite: Molecular Biology
		Total Credits		19	
5	1	Clinical Data Interpretation	FFA50122	2	Co-Requisite: Introduction to Pharmacotherapy
	2	Medicinal Chemistry	FFA50223	3	Organic Chemistry II

	3	Purification and Standardization of Natural Materials	FFA50322	2	Chromatography	
	4	Introduction to Pharmacotherapy	FFA50422	2	Introduction to Pharmacokinetics	
	5	Applied Biopharmaceutics and Pharmacokinetics	FFA50522	2	Physical Pharmacy, Introduction to Pharmacokinetics	
	6	Non-Solid Dosage Form Formulation and Technology	FFA50622	2	Introduction to GMP	
	7	Sterile Dosage Form Formulation and Technology	FFA50722	2	Introduction to GMP	
	8	Drug Stability	FFA50822	2	Physical Pharmacy	
	9	Formulation and Technology II Lab.	FFA50921	1	Introduction to GMP, Co-Requisite: Non-Solid Dosage Form Formulation and Technology	
	10	Natural Materials Lab.	FFA51021	1	Pharmacognosy II	
	11	Diagnostic Clinic Lab.	FFA51121	1	Co-Requisite: Clinical Data Interpretation	
		Total Credits		20		
6	1	Research Metodology	FFA60122	2	≥ 99 credits including Statistics and meet the requirements for submission of titles	
	2	Introduction to Phytotherapy	FFA60222	2	Introduction to Pharmacotherapy	
	3	Pharmacotherapy I	FFA60322	2	Introduction to Pharmacotherapy	
	4	Entrepreneurship	FFA60422	2		
	5	Molecular Pharmacology	FA60522	2	Introduction to Pharmacotherapy	
	6	Drug Communication and Education	FFA60622	2	Introduction to Pharmacotherapy	
	7	Pharmaceutics II	FFA60722	2	Physical Pharmacy	
	8	Pharmaceutics II Lab.	FFA60821	1	Co-Requisite: Pharmaceutics II	
	9	Pharmacotherapy I Lab.	FFA60921	1	Co-Requisite: Pharmacotherapy I	
	10	Life Skills	UMS61012	2	-	
		11	Elective Courses*		2	
		*	Pharmaceutical Protein	FFA61242	2	Molecular Biology
	*	Radiopharmaceutical	FFA61342	2	Chemistry	

	*	Pharmacogenomics	FFA61442	2	Introduction to Pharmacotherapy
	*	Genetic Engineering	FFA61542	2	Molecular Biology
	*	Cosmetology	FFA61642	2	Non-Solid Dosage Form Formulation & Technology
	*	Marine Natural Sources	FFA61742	2	Pharmacognosy II
	*	Nanotechnology	FFA61842	2	Non-Solid Dosage Form Formulation & Technology
		Total Credits		20	
7	1	Basic Management	FFA70122	2	
	2	Self-Medication System	FFA70222	2	Introduction to Pharmacotherapy
	3	Technical Data Processing And Submission Of Scientific Lab	FFA70321	1	Research Metodology
	Science & Natural Medicine Specialization				
	4	Food & Cosmetic Analysis	FFA70432	2	Pharmaceutical Analysis
	5	Structure Elucidation	FFA70532	2	Organic Chemistry II
	6	Drug Synthesis	FFA70631	1	Organic Chemistry II
	7	Clinical Phytotherapy	FFA70732	2	Introduction to Phytotherapy
	8	Natural Medicine Formulation & Technology	FFA70832	2	Purification and Standardization of Natural Materials
	9	Drug Delivery System	FFA70932	2	Applied Biopharmaceutics & Pharmacokinetics
	10	Food & Cosmetic Analysis Lab.	FFA71032	1	Co-Requisite: Food & Cosmetic Analysis
	Clinical Pharmacy Specialization				
	4	Pharmacotherapy II	FFA71132	2	Introduction to Pharmacotherapy
	5	Pharmacotherapy III	FFA71232	2	Introduction to Pharmacotherapy
	6	Pharmacotherapy IV	FFA71332	2	Introduction to Pharmacotherapy
	7	Immunology	FFA71432	2	Molecular Biology
	8	Pharmacoeconomics	FFA71532	2	Introduction to Pharmacotherapy
	9	Pharmacoepidemiology	FFA71632	1	TOKSIKOLOGI
	10	Pharmacotherapy II Lab.	FFA71731	1	Co-Requisite: Pharmacotherapy II
		Total Credits		17	
8	1	Thesis	FFA80124	4	Takes 121 credits including Research Methodology
	2	Clinical Pharmacy	FFA80232	2	Pharmacotherapy I
	Science & Natural Medicine Specialization				

	3	Drug Design	FFA80332	2	Medicinal Chemistry
	Clinical Pharmacy Specialization				
	3	Applied Pharmacotherapy	FFA80432	2	Pharmacotherapy I
		Total Credits		8	

J. SHORT DESCRIPTION OF ALL COURSES IN SP-PHARMACY

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
Semester 1			
UMS10112	Religious Education	2	Islamic Studies 1 (believe and morals) is a compulsory university course that teaches the basics of embracing Islam with a priority on <i>hablum minal allah</i> . The material taught is a combination of theory and practice with centralized learning or camp (<i>baitul arkom</i>). Students within 3 days are in the dormitory with lessons starting at 03.00 until evening or 22.00 hours. Deepening of faith and morality is the top priority in this course, such as Shahada, Prayer, Fasting, Zakat, and Hajj. The essence and application of the Five Pillars of Islam in a good relationship with Allah.
UMS10212	Pancasila	2	Pancasila is a compulsory subject for universities in Indonesia. The material taught in this course is (1) The history of Pancasila as a guide for the Indonesian citizen and (2) the application of the 5 precepts in everyday life.
UMS10312	English for Academic Purposes	2	English for academic purposes is a compulsory university course given to students in semester 1. This course provides a basis for students to learn English basics, such as structure and grammar in English so that students can practice in writing and conversation.
FFA10422	Pharmaceutical Botany	2	Pharmaceutical botany studies the morphology and anatomy of plants and their use for identification / determination of medicinal plants. Pharmaceutical botany also studies the nomenclature and taxonomy of medicinal plants, including the characteristics of the family of medicinal plants, species of plants, and the main ingredients in these plants.
FFA10522	Chemistry	2	Discussing the introduction to understanding the sciences above it such as analytical chemistry, physical chemistry, etc. This course will discuss the meaningful units and numbers and their rules, empirical and molecular formulas of chemical compounds, reaction stoichiometry, chemical bonds and intermolecular

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			forces, solubility solutions and products, acid-base theory, thermodynamic laws I and thermochemistry.
FFA10622	Organic Chemistry I	2	Organic chemistry 1 is the basis of further courses such as organic chemistry 2 and drug synthesis. Organic chemistry 1 discusses about the basic concepts of organic chemical bonds, nomenclature of organic compounds, stereochemistry, chirality, enantiomers, diastereomers, resonance and induction, free radicals. Also discusses about alkanes, alkyl halides, alcohols, ethers, alkenes, aromatic compounds and their derivatives, including nomenclature, properties, manufacture, and reactions. Organic Chemistry I began to be directed towards applied cases such as, the effect of chemical structure on the properties of medicinal substances, the basic reactions related to drug compounds and drug activity.
FFA10722	Cell Biology	2	Cell biology studies cell organization, metabolism, transportation within cells, cell communication, stem cells, and cancer cells.
FFA08221	Pharmaceutics I Lab.	1	Pharmaceutics I Lab. is a support of Pharmaceutics I. This practice studies the preparation of various pharmaceutical preparations, both solid preparations (powders, capsules, and pills), semisolid preparations (ointments and suppositories), liquid preparations (solutions, suspensions, and emulsions) and galenic preparations.
FFA10922	Anatomy Human Physiology and Medical Terminology	2	The Anatomy Human Physiology and Medical Terminology course explains medical terminology and physiology in general, covering: central and peripheral nervous system, cardiovascular physiology, blood and immune physiology, kidney physiology and body fluids, respiratory system, gastrointestinal physiology, metabolism and thermoregulation, endocrine and reproductive system.
FFA11022	Pharmaceutics I	2	Pharmaceutics 1 learns about the history of pharmaceutical development, general provisions in Indonesian Pharmacopoeia, recipes with Latin language and dosages in prescriptions, and pharmaceutical dosage forms including powders, capsules, pills, tablets, violet, suppositories, solutions, suspensions, emulsions, galenic preparations, injection, biological preparations, drops and aerosol preparations.

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
FFA11121	Practice Basic Skills Lab.	1	Practicum courses for basic laboratory skills aim to train students' abilities, provide understanding of the application of theory in the form of basic practice, and familiarize themselves with the procedures for self-safety in working in the laboratory.
Total Credit Semester 1		20	
Semester 2			
UMS20112	Transcendental and Social Dimensions of Islam	2	Trancendental and Social Dimensions of Islam is a compulsory university course that teaches about <i>hablum minan nas</i> or good relations with other humans. The material taught is a combination of theory and practice with centralized learning or camp (<i>baitul arkom</i>). Students within 3 days are in the dormitory with lessons starting at 03.00 until evening or 22.00 hours. Deepening the verses that lead to good deed such as respect for parents, neighbors, buying and selling and good deeds to others are the main priority in this course so that students can understand the dimensions of religion, not only good relations to God but also good relationships among humans in the world.
UMS20212	Civic Studies	2	Civic Studies is a compulsory subject for students as citizens or residents in Indonesia. This course teaches students about the responsibilities of being Indonesian citizens who are obliged to defend the Republic of Indonesia. The material taught is more about attitudes and behavior as Indonesian citizens.
UMS20312	Standardized Test Preparation	2	This subject is a compulsory university course taught in semester 2. The material taught is a priority on standardized English language skills that are tested for the purposes of graduation, work or further study. The material taught includes: (1). Listening, (2) Structure and grammar (3) Vocabulary (4) reading and (5) Writting. With this course, students are expected to be accustomed to using English for tests and daily life.
FFA20423	Analytical Chemistry	2	Students are able to explain qualitative and quantitative analyzes of drug compounds.
FFA20522	Organic Chemistry II	2	Organic chemistry 2 is the continuation of organic chemistry 1 and underlies other courses such as organic synthesis, drug design, structural elucidation and analytical chemistry. Organic chemistry 2 discusses carbonyl and amine compounds. The discussion was directed about the effect of structure on the drug's

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			physical chemical properties, reactivity and synthesis reactions, as well as the application of organic chemical reactions in drug manufacturing process and drug activity. The lecture also discusses carbohydrate compounds, amino acids and proteins and fats, the discussion is directed about classification, reactions and contextual studies in the Pharmaceutical field.
FFA20622	Statistics	2	Pharmacy Statistics discusses the application of statistics in the pharmaceutical field. This course covers statistic basic definitions, statistical terms, means estimation and proportions, hypothesis testing, differential testing, category correlation and regression, and also one-way analysis of variance for parametric and non-parametric data.
FFA20722	Pharmacology	2	This course discusses the fate (ADME = absorption, distribution, metabolism and excretion) of drugs in the body: the mechanisms and factors that influence ADME. Able to explain the mechanism of action and the target of drug action based on the therapeutic class and can distinguish ADME of the following drugs: analgesics, antidiabetic, antihypertensive, antiulcer, antibiotic, antifungal, antiviral, antiparasitic along with examples.
FFA20822	Physical Chemistry	2	Physical Chemistry course discusses the basic and theoretical concepts of physicochemical properties that support the design of pharmaceutical preparations, among others related to the form of substances, electrolyte solutions, non-electrolytes, buffer and isotonic solutions, solubility and stability of drugs; and able to apply these principles in the preformulation of preparations, and their relation to biological activity.
FFA20921	Physical Chemistry Lab.	1	Physical Chemistry Lab. course covers the analysis of the physicochemical properties of substances, namely the making of buffer solutions, intrinsic solubility, apparent solubility, partition coefficients, and drug stability.
FFA21021	Analytical Chemistry Lab.	1	Students are able to explain qualitative and quantitative analyzes of drug compounds.
FFA21121	Pharmacology Lab.	1	Pharmacology practice is proposed to support students to get deeper understanding of pharmacology courses. This practice provides an overview of animal handling procedures, factors that affect drug absorption and drug metabolism. Pharmacology practice leads students to

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			be able to apply testing protocols in order to assess efficacy and safety of the drug.
Total Credit Semester 2		20	
Semester 3			
UMS30112	Islam, Science and Technology	2	Islam, Science and Technology are compulsory courses followed by all students at the Muhammadiyah University of Surakarta. This course provides students with insight into integrating Islamic values towards science and technology according to their respective fields of the study program. This integration architecture is shown by the implementation of Islamic values in macro-mezzo and micro level planning.
FFA30222	Instrumental Analysis	2	Learn the philosophies, concepts, and work principles of various instrumental analysis methods and perform quantitative analysis of various chemical compounds using various instrumental analysis methods.
FFA30322	Environmental Chemistry	2	Environmental chemistry is a course that gives students knowledge about the environment, pollution, general and pharmaceutical waste treatment, water quality, air and soil and how they are analyzed. This course also provides the basics on how to develop an environmental research design with its methods and basic techniques for handling environmental samples.
FFA30422	Chromatography	2	Studying separation methods using paper chromatography, thin layer chromatography, densitometry, column chromatography, high performance liquid chromatography (HPLC), and gas chromatography (GC), and electrophoresis.
FFA30522	Biochemistry	2	Biochemistry courses discuss biochemical processes in the body, including carbohydrates, proteins, lipids, nucleic acids and their metabolism as well as enzymes and vitamins.
FFA30622	Pharmaceutical Microbiology	2	Pharmaceutical microbiology courses study bacteria, fungi, viruses, antimicrobials, and sterilization.
FFA30722	Pharmacognosy I	2	Pharmacognosy I studies simplicia and extraction methods. This course also studies biosynthesis pathways, isolation, and identification of secondary metabolites.
FFA30822	Physical Pharmacy	2	Physical Pharmacy course discusses the physicochemical properties of medicinal substances, including rheology, colloidal dispersion systems, hygroscopicity, micromeritics, interface phenomena,

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			diffusion and dissolution, their applications in the pharmaceutical field, and the methods and equipment used for their measurements.
FFA30921	Introduction to GMP	1	Discuss the history, background, importance, scope and application of CPOB in the pharmaceutical industry, discuss aspects of CPOB: Quality Management, Personnel, Buildings and Facilities, Equipment, Sanitation and Hygiene, Production, Quality Control, Self Inspection and Quality Audit , Complaints Handling for Products, Product Recalls and Returns, Documentation, Manufacturing and Analysis Based on Contract, Qualification and Validation.
FFA31021	Pharmaceutical Analysis Lab.	1	Pharmaceutical analysis practicum is a practical course on how to analyze using potentiometric methods, spectrophotometry, thin layer chromatography, densitometry, column chromatography, high performance liquid chromatography (HPLC), and gas chromatography (GC).
FFA31121	Pharmaceutical Microbiology Lab.	1	In Pharmaceutical Microbiology practice students learn about sterilization; microbes (bacteria and fungi) identification; bacteria sensitivity of antibiotics test; primary screening to obtain antibiotic-producing microorganisms; antibacterial activity test; kinetics of bacterial growth; determination of the total plate number; antiviral activity test as well as bioautographic test.
FFA31221	Physical Pharmacy Lab.	1	The Physical Pharmacy Lab. course covers the analysis of the physicochemical properties of substances, namely rheology, colloidal dispersion systems, micromeritics and surface tension, and specific gravity of substances.
Total Credit Semester 3		20	
Semester 4			
UMS40112	Muhammadiyah Studies	2	As a Study Program under the Muhammadiyah Foundation, Kemuhammadiyah is a compulsory university course. The material taught is (1) History of Muhammadiyah (2) Muhammadiyah objectives (4) Usama Muhammadiyah field (4) Autonomous Organization, and (5) provisions as members of Muhammadiyah.

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
UMS40212	Indonesian Language	2	Indonesian is an obligatory university course for students. This course is more specific in studying Indonesian to do writing, especially for subjects that require writing reports. The materials taught are (1) rules in the use of Indonesian (the structure of the Indonesian language, (2) enriching the use of Indonesian, and (3) doing good writing using Indonesian.
FFA40322	Pharmaceutical Analysis	2	Pharmaceutical Analysis discusses about compound separation and compound assay using various methods.
FFA40422	Molecular Biology	2	Molecular biology courses learns about the structure and function of nucleic acids, replication, transcription, translation, gene expression settings, DNA mutations and DNA repair, DNA polymorphism, DNA recombinant technology and molecular cloning, gene cloning applications, molecular methods for genes analysis and genes activity, and pharmacogenomic
FFA40522	Pharmacognosy II	2	Pharmacognosy II studies therapeutic drugs from primary metabolites (carbohydrates, proteins, and fats); natural and biotechnological origin, means of purification, stability, biomimetic, and molecular modification; basic structure, chemical physics analysis and potential test; the principle of halal and haram natural sources of kabohhid, protein, and therapeutic fat / auxiliary as well as halal vision of the biotechnology process.
FFA40622	Toxicology	2	Toxicology is a basic course to understand, discuss history, definition, meaning and scope of toxicology, general principles and toxicology mindsets, toxicity benchmarks, factors that affect toxicity, to evaluate drugs the safe limit, antidotum therapy, as well as to discuss about poisoning case managements and antidotum therapy, in a various poisoning case of beverages, drugs, pesticides, alcohol, narcotics and psychotropics.
FFA40722	Introduction to Pharmacokinetics	2	This course is a continuation of Pharmacology, which emphasizes the kinetics of drugs in the body. The course explains the concept of ADME (Absorption, Distribution, Metabolism, Excretion), applies calculations for the determination of pharmacokinetic parameters of drugs, and also applies preclinical and clinical test concepts to

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			the discovery and development of drugs and natural drug ingredients.
FFA40822	Solid Dosage Form Formulation & Technology	2	Discussing the concept of Solid Formulation and Preparation Technology (FTS Solid) is a course that emphasizes more on solid dosage forms which include: flowability theory and powder / particle evaluation methods; drying process ; the mixing process; tablet formulation (formula, method, process, equipment and packaging), tablet manufacturing method (granulation and compression press), problems in the tableting process and quality control of tablet preparations; study of capsule formulation (formula, method, process, equipment and packaging), problems and quality control of capsules manufacturing process; study of coated tablet dosage form (theory and types of coating), sugar coated tablets manufacturing methods (dragee), problems and evaluation of sugar coated tablets; dissolution theory for solid preparations; as well as the optimization method of pharmaceutical preparations (design of experiment)
FFA40921	Formulation & Technology I Lab.	1	<p>Formulation and Preparation Technology 1 (FTS-1) Practice emphasizes the formulation of the solid dosage form which includes: preparation of ingredients (formula), granules manufacturing and quality control / evaluation of powders / particles; drying process, mixing process, tablet formulation including formula preparation, manufacturing methods using direct compression and wet granulation, sequence of manufacturing processes, and equipment used, as well as quality control of tablet preparations.(both physically and chemically), and observe the problems arised. In addition, sugar coated tablets (dragee) manufacturing process was introduced, which including sealing, sub coating, smoothing, coloring and polishing; observe the problems arised and evaluate the sugar coated tablets (physically and chemically).</p> <p>After understanding all the processes in FTS-1, at the end of the class, students are expected to be able to design and make a tablet dosage formula (complete with a comprehensive review about its physical and chemical properties), and bring it (formula and tablets) on a presentation.</p>

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
FFA41021	Synthesis and Analysis of Drug Lab	1	The practical course of drug synthesis and analysis is a course that applies the theory of pharmaceutical synthesis and analysis in the laboratory.
FFA41121	Molecular Biology Lab.	1	Molecular biology practice learns about the using of online databases and bioinformatics programs; basic molecular biology techniques including: transformation, isolation, digestion, DNA electrophoresis, and polymerase chain reaction (PCR).
Total Credit Semester 4		19	
Semester 5			
FFA50122	Clinical Data Interpretation	2	Clinical data interpretation courses discuss the importance of a pharmacist to find out the results of laboratory examinations and to study the normal range of values of various laboratory data. It must also be able to interpret clinical data on hematology lab data, blood gas analysis, electrolytes, renal function tests, liver function tests, cardiac marker enzymes, lab data on the endocrine and reproductive systems, tumor markers, lipid profiles and urinalysis.
FFA50223	Medicinal Chemistry	3	Medicinal Chemistry course discusses the interactions between several classes of drugs with their receptors and the relationship between structures and their biological activities, namely cardiovascular, diuretic, antibiotic, sulfonamide, anticancer, antimalarial, histamine and antihistamine, adrenergic and antiadrenergic groups, cholinergic and anticholinergic, stimulant and antihistamine drugs; CNS depressants, steroids.
FFA50322	Purification and Standardization of Natural Materials	2	Purification and standardization of natural medicinal substances studies the aspects of extraction, fractionation, purification, biological testing, and the basis for determining the structure of micro molecules. The contribution of secondary metabolites in the discovery of modern medicine both direct purification and derivatization, the choice of adsorption and exclusion chromatography techniques are the subject of discussion. Likewise, the normative and scientific standardization paradigm is the reason for implementation. Non-specific and specific parameters are the main part of standardization. The weaknesses of the classical standardization method that rely on 1-2

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			markers will be given broader insight by providing metabolomic content or analysis of total metabolites.
FFA50422	Introduction to Pharmacotherapy	2	Basic Pharmacotherapy is a course to understand the basics of rational pharmacotherapy in diseases that often occur, namely hypertension, hyperlipidemia, peptic ulcer, diabetes mellitus, pain, anemia, osteoarthritis, gout, the principle of infectious disease therapy and the use of antibiotics, and therapy lower respiratory tract infection (pneumonia) rationally.
FFA50522	Applied Biopharmaceutics & Pharmacokinetics	2	Applied Biopharmaceutics and Pharmacokinetics learns about the processes that occur before and after the drug is absorbed, including the mechanism of membrane crossing and the factors that influence it, including rate limiting steps. This course also teaches consideration in choosing dosage forms and route of administration based on the physicochemical properties of the drug, physiological factors, formulation factors and evaluation of bioavailability and bioequivalence of drug preparations. This course also teaches the calculation of dosage regimens by administering repeated intravenous, intravenous and oral infusions, antibiotic dosage regimens based on in vivo and in vitro correlation data. Based on the calculation of drug levels in the blood of students can member recommendations for further use rules if there are non-compliance with using the drug.
FFA50622	Non-Solid Dosage Form Formulation & Technology	2	This course discusses formulation theory which includes: formulas, methods, processes, equipment and packaging; and quality control of non-solid preparations consisting of liquid preparations (suspensions, emulsions, and solutions orally) and semi-solid preparations (ointments and suppositories). Suspension preparations discuss: Definition, advantages and disadvantages of suspension preparations; The basics of suspension theory; Stokes' Law, Deflocculation and Flocculation Systems, Suspended preparation formulations; Equipment for making suspensions; Problems in making suspension and its handling, and quality control & stability of suspension preparations. Suspension preparations include oral preparations, antacid suspensions and dry suspensions. Emulsion preparations discuss about: Definition, advantages and

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			<p>disadvantages of emulsion preparations, emulsion formation theory, the role of surfactants in emulsion formation, formulations and critical factors in emulsion formulations, equipment for making emulsions, problems in making emulsions and their limitations, quality control of emulsion preparations.</p> <p>Oral preparations discuss about: Definition, types, advantages and disadvantages of oral preparations (solutions, syrups, and elixirs), The basics of the solubility theory and types of solvents for oral solution preparations, Formulations of oral solution preparations (solutions, syrups, elixirs), Problems in making oral solution preparations and their handling, and quality control & stability of oral solution preparations.</p> <p>Ointment preparations discuss about: Definition, advantages and disadvantages of semi-solid preparations (ointments, gels, creams and pastes), Decision tree to differentiate types of ointment based on consistency, Basic ingredients of ointment, gels, creams and pastes, Critical factors in dosage formulations ointment, Equipment for making ointments, Problems and causes of incompatibility in ointment preparations and their remedies, and Quality control of ointment preparations.</p> <p>Suppository preparations discuss about: Definition, advantages and disadvantages of suppository preparations, factors that influence absorption of drugs from rectal suppositories, solubility of drugs in water-lipids, formulas and selection of suppository bases, adjuvants in suppository preparations, how to use suppository preparations, formulations and parameters of water-lipids, formulas and selection of suppositoria bases, adjuvants in suppositorial preparations, how to use suppository preparations, formulations and parameters critical suppository preparations, Suppositoria dose / exchange rate replacement factors, and quality control and stability of suppository preparations</p>
FFA50722	Sterile Dosage Form Formulation & Technology	2	This lecture aims to equip students with basic knowledge of formulation and sterile preparation technology. The lecture contained material about the scope of sterile preparations, especially parenteral

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			preparations and ophthalmic preparations, the reasons for making parenteral preparations and the biopharmaceutical aspects of parenteral preparations. The formulation and technological aspects discussed in this lecture include the calculation of tonicity, water treatment for parenteral preparations, filtration theory, packaging and others. Microbiological aspects that are mentioned include the definition of sterility and sterilization, sterilization methods, kinetics of bacterial death, validation of sterilization methods, environmental microbiological control, aseptic processes and others. This lecture is related to Practicum Formulation and Technology II in which there are practical material for making sterile and parenteral preparations.
FFA50822	Drug Stability	2	Discuss the concept of drug degradation and / or drug preparation in physical, chemical, and microbiological terms; the chemical reaction speed / kinetics and the degradation reaction order determination; determination of half-life ($t_{1/2}$) and expiry time (T_{90}); the effect of temperature on drug degradation; Q10 price calculation, interpretation of kinetic data including the theory of the transition state and the kinetic equivalence; medium effect on drug degradation; catalysis, the effect of pH on stability and the use of pH-velocity profiles and activation energy on drug stability and complex reactions. Also discuss routes of drug degradation and / or drug preparations: hydrolysis and other acyl transfer, oxidation and photolysis, structure and reactivity relationships, solid drug stability, and a description of drug stability testing.
FFA50921	Formulation & Technology II Lab.	1	This FT-II Lab. is a supporting ability in aspects of technical skills to the theories presented in lectures of Non-Solid and Sterile Formulation Technology and other related subjects. The material presented in this practicum includes: manufacture and quality control of liquid preparations: suspensions, emulsions, and syrups; semi-solid preparations: ointments and suppositories; and sterile preparations. At the end, students are expected to be able to form and design non-solid and / or sterile preparations. The material presented in this

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			practicum is expected to equip students as a foundation in the field of pharmaceutical technology, especially for non-solid (liquid and semi-solid) preparations and sterile preparations especially when working in production installations in hospitals, the pharmaceutical industry, and other workplaces related later.
FFA51021	Natural Materials Lab.	1	Natural material lab. studies microscopic and macroscopic identification of natural materials, phytochemical screening, and isolation of secondary metabolites (piperine and routine).
FFA51121	Diagnostic Clinic Lab	1	This course studies specimen examination (urine and blood) in order to disease diagnosis, sample preparation and selection of appropriate examination methods, conducts the specimen examination and interprets its laboratory datas.
Total Credit Semester 5		20	
Semester 6			
FFA60122	Research Metodology	2	This subject discusses the research code of ethics (including fraud in research), and types of research. This subject also teaches how to make a research proposal, proposal preparation steps: hypothesis formulation, variables determination, population and sample, research design, data types and analysis. This subject also introduces the writing style in proposal drafting, research reports (theses), thesis papers and posters. This course also introduces the selection of appropriate references and how to organize related references.
FFA60222	Introduction to Phytotherapy	2	The introduction to phytotherapy course discusses the limitations of therapeutic materials in clinics and conventional actions, the limitations of the scientific and clinical paradigms of medicine, weaknesses of reductionism paradigms, modern analytical methods, single entity, and the loss of the concept of complementary-synergistic mechanisms, and plausible effects, behavior (behavior) society (patients, families, and colleagues) and choices when deadlocked conventional treatment in diseases that have relatively no cure: cancer, diabetes, hypertension, obesity. Lectures will be based on the molecular pathophysiology paradigm of the disease, herbal

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			selection, preparation, dosage, and incompatibility. It will also be given restrictions on the legal aspects of personal or medical use.
FFA60322	Pharmacotherapy I	2	Pharmacotherapy I is a course to understand the basics of rational pharmacotherapy in diseases that often occur, namely Acute Coronary Syndrome, asthma, COPD, Diarrhea, nausea-vomiting, Anxiety-depression-schizophrenia, tuberculosis, UTI, gastrointestinal
FFA60422	Entrepreneurship	2	The Entrepreneurship course contains subjects on entrepreneurship concepts, entrepreneurial characteristics, entrepreneurial channels, business plans, marketing management, pricing strategies, business opportunities in pharmaceuticals, online business, and business risk.
FFA60522	Molecular Pharmacology	2	The molecular pharmacology course discusses the mechanism of action of drugs at the molecular level, so that students can understand how the actions of a drug arise and the aftereffects of drugs. This course will discuss the target action of drugs at the molecular, cellular, tissue and systemic levels in sequence. At the molecular level, studies are focused on interactions between drugs (ligand) - their receptors, signal transduction mechanisms, and opportunities for developing new drugs based on drug action on their receptors
FFA60622	Drug Communication and Education	2	The drug communication and education course studies various sources of information, how to find and assess information sources that come from the internet. Evidence based medicine is one of the subjects studied in depth so that the information conveyed is accurate and can be justified. To ensure the availability of information needed by the community, it is learned about the design and procedures for implementing the Drug Information Center. Various forms of communication and obstacles that occur in the process of providing information are studied in several subjects, namely: the basics of communication in general, the strategy for conducting therapeutic communication, compliance & adherence, counseling and academic detailing.
FFA60722	Pharmaceutics II	2	Pharmaceutics II learns about drug interactions and their handling methods, which may occur in the process

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			of preparing pharmaceutical preparations (compounding and dispensing) including sterile preparations, including pharmaceutical interactions (incompatibility), pharmacological interactions and drug-food interactions. It is also taught how to calculate the material requirements in preparing preparations and reviewing doses based on recipes received by patients.
FFA60821	Pharmaceutics II Lab.	1	Pharmaceutics II Lab. learns about how to evaluate a prescription including completing administrative requirements, evaluating dose accuracy, potential pharmaceutical interactions in preparation of preparations and potential pharmacological interactions that can occur in prescribing. This course also teaches how the selection and calculation of ingredients in preparation of preparations, preparation techniques for various forms of preparation, making etiquette and copy of recipes and what information needs to be conveyed to patients, which are related to drug use.
FFA60921	Pharmacotherapy I Lab.	1	Pharmacotherapy I Lab. course evaluates cases or problems related to medicine and recommends therapy using an evidence-based approach based on the principles of rational therapy and planning monitoring parameters and compiling drug information related to cardiovascular, gastrointestinal, respiratory, respiratory, infectious, nephro-urological, rheumatology and endocrine diseases.
UMS61012	Life Skills	2	This subject is a compulsory subject aimed at understanding and fostering responsible entrepreneurship as a provision for soft skills that will complement students' skills in community life. This course provides understanding and understanding of ethical professions in communication, the formation of an independent personality, and the introduction of self-potential by eagerly serving society's needs in a simple and structured architecture. In its development, this course collects the certificate of activities that have been participated and then validated by an academic supervisor in the STAR UMS system.
Elective Courses		2	

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
FFA61242	Pharmaceutical Protein	2	Pharmaceutical Protein studies about the use of protein-based drugs and their formulations in various dosage forms (dry powder, solution and suspension) for various administration routes (parenteral, oral, pulmonary). This subject also describes various analytical methods that can be used to characterize proteins, both pure proteins and in a dosage form, including quality control and stability of protein-based drugs.
FFA61342	Radiopharmaceutical	2	The radiopharmaceutical course is a course that studies radiopharmaceutical preparations.
FFA61442	Pharmacogenomics	2	This course studies about how genes or offspring affect the body's response to drugs. This course provides the basis for the human genome and its application, and the epigenetic basis including its diversity in Indonesia. This course also studies the application of pharmacogenomics in drug discovery and development, as well as clinical trials. This subject also discusses the application of pharmacogenomics in the treatment of diseases including cardiovascular disease, cancer, anesthesia and pain management, immunosuppressants, respiratory diseases, antiretroviral, and psychiatric disorders.
FFA61542	Genetic Engineering	2	The Genetic Engineering course studies basic techniques for gene manipulation and matters related to cloning, gene transfer, and the application of recombinant DNA technology.
FFA61642	Cosmetology	2	Cosmetology studies the general definition of cosmetic preparations and the differences between cosmetic preparations with drugs and also the physiology of skin and hair physiology as a place for application of cosmetic preparations. This course also teaches the principles of halal haram cosmetics, the safety testing of cosmetics and the surfactant concept used in cosmetics. In this course, various forms of cosmetics for skin and hair are described, including the components of the preparation, the selection of ingredients, evaluation of preparations and also regulations regarding ingredients that may or may not be used in cosmetic preparations.
FFA61742	Marine Natural Sources	2	Marine Chemistry discusses therapeutic drugs and drug candidates that have been explored and used clinically. Prospects and advantages of marine materials as a

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			source of new drugs based on / derived from primary macromolecular / metabolite groups: carbohydrates, proteins and fats of natural origin and biotechnology products. Methods of purification, stability, biomimetics, and molecular modification are the subject of discussion.
FFA61842	Nanotechnology	2	Nanotechnology (NT) is a relatively new discipline, but has very broad implications in various fields. It is estimated that the NT will change lives and society beyond computer and electronic technology. The NT course will give students an introduction to nanotechnology, the basics of nanotechnology, and its applications in biomedicine and pharmacy.
Total Credit Semester 6		20	
Semester 7			
FFA70122	Basic Management	2	Basic Management course learns about the basic concepts and the importance of organizational management, human resources management, operational management, financial management, marketing management, pharmaceutical management, inventory management, and drug distribution cycle management.
FFA70222	Self-Medication System	2	This course discusses the scope of rational self-medication therapy, the introduction of drugs according to their classes, how to use drugs correctly. This course also discusses how to recognize and how to do self-medication both with and without drugs for some minor complaints such as: fever, pain (headache and menstrual pain), respiratory disorders (colds / colds and coughs), gastrointestinal disorders (indigestion, diarrhea, constipation, helminthiasis and skin disorders (Prickly sweat, dermatitis, acne, fungal infections, dandruff).
FFA70321	Technical Data Processing And Submission Of Scientific Lab	1	This course introduces students to various softwares, like MS Office for writing, data processing and presentation, Mendeley for references organizations and scientific citation, and SPSS for data processing. Students are expected to be able to apply those softwares in their scientific writing, so their writing capability can be increased. At the end of the course, students are expected to be able to present scientific papers sourced from oral journals and posters.

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
Science & Natural Medicine Specialization		12	
FFA70432	Food & Cosmetic Analysis	2	Students are able to explain and carry out the preparation procedures and analysis of the components in food and cosmetics according to standard procedures (pharmacopoeia, cosmetic codex, AOAC and journals) and regulations.
FFA70532	Structure Elucidation	2	Learn about the analysis, interpretation, and determination of the structure of organic compounds using the basics of the interaction phenomena that occur between organic compounds and electromagnetic waves (spectroscopy).
FFA70631	Drug Synthesis	2	The drug synthesis course is a continuation of organic chemistry I and II. This course provides a basic chemistry application for the synthesis of an organic compound. The organic synthesis course discusses the concept of synthesis of simple compounds with a single functional group and two functional groups. The synthesis strategy is carried out by retrosynthetic analysis (disconnection analysis) and functional group interconversion (IGF), as the basis for the analysis to determine the best synthesis pathway for a compound. The course is developed for the synthesis of compounds with alcohol groups, alkene groups, carbonyl groups, amine groups and 1,3-difunctional compounds and , -unsaturated carbonyl compounds.
FFA70732	Clinical Phytotherapy	2	Clinical phytotherapy discusses the limitations of therapeutic materials in the clinic and conventional measurements, the limitations of the scientific and clinical paradigms, the weaknesses of the reductionism paradigm, modern analytical methods, single entities, and the loss of the concept of synergism-complementary mechanisms, and plausible effects, community ((patient) behavior, family, and colleagues) and options when conventional treatments for relatively unresolved diseases (cancer, diabetes, hypertension, obesity) are deadlocked. Lectures will be based on the molecular pathophysiology of disease paradigm, selection of herbs, preparation, dosage, and their incompatibilities. In addition, there will also be limitations on the legality aspects of personal use or medical treatment.

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
FFA70832	Natural Medicine Formulation & Technology	2	The natural medicine FT course includes: definition and scope of Natural Medicines Formulation and Preparation Technology. Indonesia's natural potential is a potential source of natural medicine. Standardization of the natural medicine simplicia, Standardization of natural medicine extracts, formulations and technology of traditional medicines (natural medicines), methods of traditional medicines good manufacturing product, Schemes of natural medicine manufacturing process, formulations and manufacturing problems of natural medicine ingredients, natural medicine stability test, and reviewing natural medicine journals.
FFA70932	Drug Delivery System	2	Drug delivery system (DDS) courses study the concept of drug delivery using new technologies (novel drug delivery systems) using various modifications, such as controlled drug delivery (controlled release DDS), targeted drug delivery (targeted DDS), delivery drug using particles (nanoparticles, microparticles, liposomes), delivery of protein-based and prodrug drugs, delivery of drugs retained in the gastrointestinal tract (gastro retentive DDS), delivery of drugs through non-oral routes (nasal-pulmonary, ocular and transdermal) and delivery of drugs retained in the digestive tract (gastro retentive DDS), delivery of drugs through non-oral routes (nasal-pulmonary, ocular and transdermal) and delivery of drugs to the digestive tract (gastro retentive DDS) . In this course, the strengths and weaknesses of each system are explained, what parameters affect the kinetics of drug release and what obstacles might occur related to the physiology of drug administration and physicochemistry. The current application of each drug delivery system is also explained in this course.
FFA71032	Food & Cosmetic Analysis Lab.	1	Students are able to explain and carry out preparation procedures and analysis of food and cosmetics components, according to standard procedures (pharmacopoeia, cosmetic codex, AOAC and journals) and their regulations.
Clinical Pharmacy Specialization		12	
FFA71132	Pharmacotherapy II	2	Pharmacotherapy II is a course to determine problems and decide drug-related problems using an evidence-based approach, determine monitoring parameters and

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			determine points for providing drug information on ischemic heart disease, arrhythmia, heart failure, Transient Ischemic Attack (TIA), stroke ischemic, Deep Vein Thrombosis (DVT), coagulant disorder, shock, drug-induced renal disease, dialysis and critical care therapy.
FFA71232	Pharmacotherapy III	2	Pharmacotherapy III is a course to understand rational pharmacotherapy in diseases that often occur including GERD, constipation, viral hepatitis, liver disease, epilepsy and epilepticus status, parkinsonism, dementia and alzheimer's disease, contraception, osteoporosis, HRT, thyroid, rheumatoid arthritis, glaucoma
FFA71332	Pharmacotherapy IV	2	Pharmacotherapy IV is a course to determine problems and decide drug-related problems using an evidence-based approach, determine monitoring parameters and determine points for drug information on upper respiratory infection (otitis, pharyngitis), lower respiratory infection (bronchitis), oncology cancer treatment and chemotherapy, Benign Prostate Hyperplasia (BPH), Leptospirosis, Malaria, Sexually Transmitted Disease (STD), HIV AIDS, Meningitis, Superficial fungal infection.
FFA71432	Immunology	2	The course studies the principles of immunology including anatomy of the immune system (innate and adaptive immune systems). This course also studies the development of the immune system, including the structure of antibodies, antibody antigen reactions, MHC (major histocompatibility complex) reactions and antigen presentation, lymphocyte cell activation and effector function, allergy and apoptosis, cytokines, phagocytic cell function. This course will also study immune responses to infectious organisms and tumors, autoimmune diseases, allergies, transplants and vaccinations.
FFA71532	Pharmacoeconomics	2	Pharmacoeconomics course explains about the definition, scope and relationship of pharmacoeconomics with other subjects. Pharmacoeconomics identifies, measures and compares the costs and consequences (outcomes) of pharmaceutical products and services. Pharmacoeconomics evaluation can be done using several methods, namely: cost analysis, cost

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			minimization analysis, cost effectiveness analysis, decision analysis, cost effectiveness analysis, cost benefit analysis, and cost utility analysis. For outcomes in the form of quality of life, can use several instruments in the measurement.
FFA71632	Pharmacoepidemiology	2	The pharmacoepidemiology course explains the scope and perspective of pharmacoepidemiology and the use and effects of drugs (pharmacodynamic and pharmacokinetic aspects) on the variability of drug responses in populations using epidemiological methods. Applying pharmacoepidemiology applications in prescribing, side effects of treatment and economic data on drug use. This course material also explains the basics of epidemiology, terms related to epidemiology, variability of drug use responses in populations, measures of health status and how they are calculated, design of study designs used for pharmacoepidemiological research, and the application, development and assessment of pharmacoepidemiological studies from the point of view industrial, academic and regulatory bodies
FFA71731	Pharmacotherapy II Lab.	1	The Pharmacotherapy II Lab course teaches students to evaluates cases or problems related to drugs then make therapy recommendations by evidence-based approach based on the rational therapy principles, make monitoring plan parameters, and compiling drug information (IEC) related to cardiovascular, gastrointestinal, respiratory, infection, oncology, reproductive and endocrine diseases
Total Credit Semester 7		17	
Semester 8			
FFA80124	Thesis	4	The thesis is one of the most important concepts in college expository writing. A thesis sentence focuses the ideas for the paper; it's the argument or insight or viewpoint crystallized into a sentence or two that gives the reader the main idea. It's not only useful for the reading audience to understand the purpose of the essay, it's also useful for writer, as it indicates the type of support or experiment that will follow in the paper

Course Code	Courses	Credit	Course Description
(1)	(2)	(3)	(4)
			and it may indicate a logical structure or order for that support or experiment.
FFA80232	Clinical Pharmacy	2	This course studies the concept of Pharmaceutical care, clinical pharmacy service activities (prescription services & studies, medication history interviews, drug reconciliation, therapeutic monitoring, therapeutic drug monitoring, dispensing sterile preparations, visite, evaluation of drug use, Drug Information Center, Counseling), treatment of adverse drug reactions, clinical pharmacy case approach using SOAP, FARM and PAM methods, the use of drugs in special patients (kidney, liver, pediatric, geriatric, pregnant-breastfeeding patients).
Science & Natural Medicine Specialization		2	
FFA80332	Drug Design	2	Drug design is a course that studies the basic concepts of drug design and designs simple drug designs with classic and non-classical techniques (in silico).
Clinical Pharmacy Specialization		2	
FFA80432	Applied Pharmacotherapy	2	Applied Pharmacotherapy is a course for understanding rational pharmacotherapy and managing therapy in diseases that often occur including cardiovascular system disorders, respiratory disorders, gastrointestinal disorders, disorders of the gastrointestinal, psychiatric disorders, nerve disorders, endocrine disorders, bone and joint disorders, Infection, Oncology Disorders Cancer treatment and chemotherapy, Kidney Disorders and being able to collaborate with other health professions (doctors) in overcoming health problems in the community.
Total Credit Semester 8		8	
Total Credit		144	

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