



Universitas Negeri Surabaya
Faculty of Mathematics and Natural Sciences
Undergraduate Chemistry Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Pharmaceutical Chemistry	4720102082	Study Program Elective Courses	T=2 P=0 ECTS=3.18	6	July 10, 2023
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator	
	Dr. Mitarlis, S.Pd., M.Si.		Prof. Dr. Suyatno, M.Si.	Dr. Amaria, M.Si.	

Learning model Project Based Learning

Program Learning Outcomes (PLO) PLO study program that is charged to the course

Program Objectives (PO)

PO - 1	General Ability Achievement: Utilize information based on experiences and cases in daily life, other learning sources, and ICT to support understanding of pharmaceutical chemistry concepts with discussions, presentations, and collaboration to learn pharmaceutical chemistry.
PO - 2	Special Ability Achievement: Mastering the role of chemical concepts and their implementation in the pharmaceutical field and having the ability to relate chemical concepts and their role in studying the physicochemical properties of drugs and their relationship with the biological activity of drugs
PO - 3	Knowledge Ability Achievements: Mastering theoretical concepts (knowledge) about pharmaceutical science, the position of chemistry in pharmaceutical science, concepts about drugs, drug limitations, drug dosage forms and administration, as well as the phases of drug travel in the body. Have knowledge of vitamins, addictive substances, and pharmaceutical analysis.
PO - 4	Achievement of attitudinal competency: Having an honest and responsible attitude in applying understanding of pharmaceutical chemistry material in the context of daily life and being able to participate in society by implementing knowledge about pharmaceutical chemistry.

PLO-PO Matrix

	P.O
	PO-1
	PO-2
	PO-3
	PO-4

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

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

Short Course Description Study of the position of chemistry in pharmaceutical science, and the history of pharmacy. Definition and limitations of drugs, drug dosage forms and administration, routes and processes of drug travel in the body include; Biopharmaceutical phase, Pharmacokinetics (Absorption, Distribution, Metabolism and Excretion / ADME), and Pharmacodynamics, Structureactivity Relationship (HKSA) of drugs, as well as several classes of drugs such as analgesics and antipyretics, antihistamines and antitussives, and antibiotics, Study of vitamins, addictive substances and pharmaceutical analysis, through discussions, questions and answers, assignments, and presentations

References **Main :**

1. Nugroho, Nurfina Aznam. 2001. Materi Pokok Kimia Farmasi. Modul 1-6. Pusat Penerbitan Universitas Terbuka. Jakarta. (online) <http://repository.ut.ac.id/4684/1/PEKI4421-M1.pdf>
2. Schunack, Walter. Et al.1990. Senyawa Obat. Buku Pelajaran Kimia Farmasi. Gajah Mada University Pers. Yogyakarta
3. Azis, Hubeis, 1996. Ilmu Farmasetika dan Perkembangannya Masa Kini. Jurusan Farmasetika Universitas Airlangga. Surabaya.
4. Moh. Anief. 1997. Apa Yang Perlu Diketahui Tentang Obat. Gajah Mada University Press. Yogyakarta.
5. Siswandono dan Soekardjo, 2000. Kimia Medisinal. Airlangga University Press.
6. Artikel terkait bahan kajian yang bersumber dari internet

Supporters:

Supporting lecturer		Prof. Dr. Titik Taufikurohmah, S.Si., M.Si. Dr. Mitarlis, S.Pd., M.Si. Dr. First Ambar Wati, S.Si.					
Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Explain the position of chemistry in pharmaceutical science and the history of the development of pharmaceutical science	1. Explain the position of chemistry in Pharmaceutical Science 2. Briefly describe the development of pharmaceutical science 3. Distinguish between medical science and drug science	Criteria: 1.question number 1: total score 10 2.question number 2: total score 20 3.question number 3: total score 20 Form of Assessment : Participatory Activities	Constructivism / Think pair share strategy class discussion/ Question and answer Literature study 2 X 50		Material: Introduction: 1. The position of chemistry in pharmaceutical science 2. History of the development of pharmaceutical science. Reference: Azis, Hubeis, 1996. <i>Pharmaceutical science and its current development</i> . Department of Pharmacy, Airlangga University. Surabaya.	10%
2	Explain the limitations of drugs, classify the types of drugs, explain the routes of drug use based on their dosage form	1. Define several boundaries of drugs (traditional medicine, modern medicine, etc.) 2. Explain the route of drug use based on the dosage form	Criteria: attached Form of Assessment : Participatory Activities, Portfolio Assessment	Think pair share strategy class discussion/Question and answer 2 X 50		Material: Definition and Limitations of Drugs 1. Definition of drugs 2. Pharmaceutical terms 3. How to use drugs and drug dosage forms References: <i>Schunack, Walter. Et al. 1990. Medicinal Compounds. Pharmaceutical Chemistry Textbook. Gajah Mada University Press. Yogyakarta</i> Material: Definition and Limitations of Drugs 1. Definition of drugs 2. Terms in pharmacy 3. How to use drugs and dosage forms of drugs Library: <i>Articles related to study materials sourced from the internet</i>	5%
3	Explain the dosage forms of drugs and the routes through which drugs travel in the body	1. Mention the types of effects of using drugs. 2. Explain the effects of using drugs. 3. Explain the processes of absorption, distribution, metabolism and excretion of drugs in the body.	Criteria: attached Form of Assessment : Participatory Activities, Portfolio Assessment	Reading books 1 and 5 reading other sources 2 X 50		Material: Journey of Drugs in the Body: 1. Biopharmaceutical, pharmacokinetic and pharmacodynamic phases 2. Absorption, distribution, metabolism and excretion processes of drugs in the body. 3. Effects of drug use Library: <i>Nugroho, Nurfina Aznam. 2001. Basic Materials for Pharmaceutical Chemistry. Modules 1-6. Open University Publishing Center. Jakarta. (online) http://repository.ut.ac.id/...</i> Material: Journey of Drugs in the Body: 1. Biopharmaceutical, pharmacokinetic and pharmacodynamic phases 2. Absorption, distribution, metabolism and excretion processes of drugs in the body. 3. Effects of drug use Reference: <i>Moh. Anief. 1997. What You Need to Know About Drugs. Gajah Mada University Press. Yogyakarta.</i> Material: Journey of Drugs in the Body: 1. Biopharmaceutical, pharmacokinetic and pharmacodynamic phases 2. Absorption, distribution, metabolism and excretion processes of drugs in the body. 3. Effects of drug use Library: <i>Articles related to study materials sourced from the internet</i>	5%

4	Explain the relationship between molecular structure and the biological activity of drugs	1. Explain the relationship between solubility and the biological activity of drugs. 2. Explain the effect of pH on the activity of drug compounds in ionized and non-ionized forms	Criteria: attached Form of Assessment : Participatory Activities	Reading books 1 and 5 Discussion and Question and Answer 4 X 50		Material: Structure of Drug Molecules and Their Biological Activity: 1. Relationship between structure and biological activity of drugs 2. Stereochemical relationship and biological activity of drugs Library: <i>Siswandono and Soekardjo, 2000. Medicinal Chemistry. Airlangga University Press.</i> Material: Structure of drug molecules and their biological activity: 1. Relationship between structure and biological activity of drugs 2. Stereochemical relationship and biological activity of drugs Library: <i>Articles related to study materials sourced from the internet</i>	5%
5	Analyze the relationship between molecular structure and physicochemical properties with the biological activity of drugs	1. Explain the relationship between solubility and the biological activity of drugs 2. Explain the effect of pH on the activity of drug compounds in ionized and non-ionized forms 3. Explain the relationship between stereochemistry and drug activity 4. Explain the relationship between redox reactions and drug activity	Criteria: attached Form of Assessment : Participatory Activities	discussion, question and answer, presentation 2 X 50		Material: Structure of Drug Molecules and Their Biological Activity: 1. Relationship between structure and biological activity of drugs 2. Stereochemical relationship and biological activity of drugs Library: <i>Siswandono and Soekardjo, 2000. Medicinal Chemistry. Airlangga University Press.</i>	5%
6	Explain the meaning and provide several examples of drug classes based on their function	1. Explain the function, structure and manufacture of compounds classified as analgesics and antipyretics 2. Identify the existence of compounds classified as analgesics 3. Explain the function, structure and manufacture of compounds classified as antibiotics 4. Explain the function, structure and manufacture of compounds classified as antihistamines and antitussives	Criteria: attached Form of Assessment : Participatory Activities	Reading books 1 and 5 Discussion and Question and Answer 2 X 50		Material: Structure of drug molecules and their biological activity: 5. Relationship between structure and biological activity of drugs 6. Effect of pH on the activity of drug compounds in ionized and non-ionized forms 7. Stereochemical relationship and biological activity of drugs. 8. Explain the relationship between redox reactions and drug activity. Reference: <i>Moh. Anief. 1997. What You Need to Know About Drugs. Gajah Mada University Press. Yogyakarta.</i> Material: Structure of drug molecules and their biological activity: 5. Relationship between structure and biological activity of drugs 6. Effect of pH on the activity of drug compounds in ionized and non-ionized forms 7. Stereochemical relationship and biological activity of drugs. 8. Explain the relationship between redox reactions and drug activity Reference: <i>Siswandono and Soekardjo, 2000. Medicinal Chemistry. Airlangga University Press.</i>	5%

7	Explain the meaning and provide several examples of drug classes based on their function	1. Explain the function, structure and manufacture of compounds classified as analgesics and antipyretics 2. Identify the existence of compounds classified as analgesics 3. Explain the function, structure and manufacture of compounds classified as antihistamines and antitussives 4. Explain the function, structure and manufacture of compounds classified as antibiotics	Criteria: attached Form of Assessment : Participatory Activities	Reading books 1 and 5 Discussion and Question and Answer 2 X 50		Material: Structure of drug molecules and their biological activity: 5. Relationship between structure and biological activity of drugs 6. Effect of pH on the activity of drug compounds in ionized and non-ionized forms 7. Stereochemical relationship and biological activity of drugs. 8. Explain the relationship between redox reactions and drug activity Reference: Siswandono and Soekardjo, 2000. Medicinal Chemistry. Airlangga University Press. Material: Addictive substances: narcotics, alcohol and illegal drugs Classification of psychotropics Prevention and control of addictive substance abuse Bibliography: Articles related to study materials sourced from the internet	5%
8	UTS1. Explain the position of chemistry in pharmaceutical science and the history of the development of pharmaceutical science 2. Explain the dosage forms of drugs and the routes through which drugs travel in the body 3. explain the relationship between molecular structure and biological activity of drugs 4. Explain the meaning and give several examples of drug classes based on their function	1. Explain the position of chemistry in Pharmaceutical Science 2. Explain the route of drug use based on the dosage form 3. Explain the effects of drug use 4. Explain the process of absorption, distribution, metabolism and excretion of drugs in the body 1. Explain the effect of pH on the activity of drug compounds in ionized form and non-ionized 1. Explain the function, structure and preparation of compounds classified as analgesics and antipyretics 2. Identify the existence of compounds classified as analgesics 3. Explain the function, structure and preparation of compounds classified as antihistamines and antitussives Explain the function, structure and preparation of compounds classified as as an antibiotic	Criteria: 1.maximum score 2.no.1 10 3.no. 2 10 4.no.3 10 5.no.4 15 6.no. 5 15 7.no. 6 15 8.no. 7 15 Form of Assessment : Test	2 X 50 test			10%

9	Explain the meaning and provide several examples of drug classes based on their function	1. Explain the function and structure of compounds classified as antibiotics and sulfonamides. Explain how to use and classify antibiotics	Criteria: late Form of Assessment : Participatory Activities	Reading books 1 and 5 Discussion and Question and Answer Presentation 2 X 50		Material: Several types of drugs: 1. Analgesics and Antipyretics 1. Antihistamines and Antitussives Reference: Moh. Anief. 1997. <i>What You Need to Know About Drugs</i> . Gajah Mada University Press. Yogyakarta. Material: Several types of drugs: 1. Analgesics and Antipyretics 1. Antihistamines and Antitussives Literature: <i>Articles related to study materials sourced from the internet</i>	5%
10	Explain the types of water-soluble and water-insoluble vitamins based on their function, deficiencies, how they work and their sources	1. Distinguish between water-soluble and water-insoluble vitamin groups. 2. Mention the uses of each vitamin 3. Mention the sources of each vitamin 4. Explain the consequences of deficiency of each vitamin	Criteria: -according to the presentation assessment criteria Form of Assessment : Participatory Activities	presentation 2 X 50		Material: Vitamins 1. Water-soluble, water-insoluble vitamins 2. Sources of vitamins 3. Functions of vitamins 4. Consequences of vitamin deficiencies References: <i>Schunack, Walter. Et al. 1990. Medicinal Compounds. Pharmaceutical Chemistry Textbook. Gajah Mada University Press. Yogyakarta</i>	5%
11	Explain several classes of addictive substances based on their chemical properties and effects on body health	1. Mention the compounds that are classified as addictive substances 2. Explain the effects of misuse of addictive substances 3. Explain how to overcome the misuse of addictive substances	Criteria: according to the assessment criteria for the clipping task Form of Assessment : Participatory Activities	question and answer discussion 2 X 50		Material: Addictive substances: narcotics, alcohol and illegal drugs Classification of psychotropics Prevention and control of addictive substance abuse Bibliography: <i>Articles related to study materials sourced from the internet</i>	5%
12	Explain several classes of addictive substances based on their chemical properties and effects on body health	1. Mention the compounds that are classified as addictive substances 2. Explain the effects of misuse of addictive substances 3. Explain how to overcome the misuse of addictive substances	Criteria: attached Form of Assessment : Participatory Activities	presentation and assignment 2 X 50		Material: Vitamins 1. Water-soluble, water-insoluble vitamins 2. Sources of vitamins 3. Functions of vitamins 4. Consequences of vitamin deficiencies References: <i>Schunack, Walter. Et al. 1990. Medicinal Compounds. Pharmaceutical Chemistry Textbook. Gajah Mada University Press. Yogyakarta</i>	5%
13	Explain the procedures for sample preparation and analysis from pharmaceutical preparations using appropriate methods	1. Explain sample preparation procedures. 2. Apply various analytical techniques for pharmaceutical preparations	Criteria: according to the assignment assessment criteria Form of Assessment : Participatory Activities, Portfolio Assessment	Discussion, Question and answer, assignment 2 X 50			5%
14	Explain the procedures for sample preparation and analysis from pharmaceutical preparations using appropriate methods	1. Explain sample preparation procedures. 2. Apply various analytical techniques for pharmaceutical preparations	Criteria: attached Form of Assessment : Participatory Activities, Portfolio Assessment	Discussion, Q&A, assignments, presentations 2 X 50			5%
15	Explain the procedures for sample preparation and analysis from pharmaceutical preparations using appropriate methods	1. Explain sample preparation procedures. 2. Apply various analytical techniques for pharmaceutical preparations	Criteria: in accordance with the pr observation criteria	Discussion, Question and answer, practice, presentation assignment 2 X 50			0%

16	<p>UAS Explains the meaning and provides several examples of drug classes based on their function. Explains the types of water-soluble and water-insoluble vitamins based on their function, deficiency, mode of action and source. Explains the procedure for sample preparation and analysis from pharmaceutical preparations using appropriate methods. Explains several classes of addictive substances based on chemical properties and its effect on body health</p>	<p>1. Explain the function, structure and manufacture of compounds classified as analgesics and antipyretics 2. Identify the existence of compounds classified as analgesics 3. Explain the function, structure and manufacture of compounds classified as antihistamine and antitussive 4. Explain the function and structure of compounds classified as antibiotics and sulfonamides 5. Explain how to use and classify antibiotics 6. Name compounds that are classified as addictive substances 7. Explain the effects of addictive substance abuse explain how to overcome addictive substance abuse 8. Explain sample preparation procedures for analysis 9. Apply various analytical techniques pharmaceutical preparations</p>	<p>Criteria: attached</p> <p>Form of Assessment : Test</p>	2 X 50 test method			20%
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Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	60%
2.	Portfolio Assessment	10%
3.	Test	30%
		100%

Notes

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

