



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																																																																																																															
Food Chemistry	4720102122	Study Program Elective Courses	T=2 P=0 ECTS=3.18	6	July 17, 2024																																																																																																															
AUTHORIZATION		SP Developer	Course Cluster Coordinator	Study Program Coordinator																																																																																																																
		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	Mastering concepts in the field of food chemistry related to structure, nutrition, properties, composition and chemical changes that occur during processing and storage.																																																																																																																		
	PO - 2	Able to apply the knowledge gained in the field of food chemistry, and have the initiative in resolving community issues in the food sector																																																																																																																		
	PO - 3	Apply logical, critical, systematic and innovative thinking in the context of food science development by paying attention to and applying humanities values in solving food chemistry problems that occur in society.																																																																																																																		
	PO - 4	Able to work together and have entrepreneurial abilities with an environmental perspective																																																																																																																		
	PLO-PO Matrix																																																																																																																			
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> <tr><td>PO-4</td></tr> </table>				P.O	PO-1	PO-2	PO-3	PO-4																																																																																																										
	P.O																																																																																																																			
	PO-1																																																																																																																			
PO-2																																																																																																																				
PO-3																																																																																																																				
PO-4																																																																																																																				
PO Matrix at the end of each learning stage (Sub-PO)																																																																																																																				
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>															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																
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	Learn about the structure, properties, composition and chemical changes that occur in food ingredients during the processing and storage of food ingredients which are related to the formation of flavor, color and nutritional value as well as learn about food additives and food safety.																																																																																																																			
References	Main :																																																																																																																			
	1. De Man, John M. 1990. Principle of Food Chemistry , 2nd ed. An AV1 book, Van Nostrang Reinhold, New York. 2. Fennemas Food Chemistry 2007, 4th Edition, edited by Srinivasan Damodaran. CRC Press 3. Freeland-Graves, Jeanne H, Gladys C. Peckham. 1987. Foundation of Food Preparation , 5th ed. Macmillan Publ. Comp, Canada.																																																																																																																			
	Supporters:																																																																																																																			
	1. Artikel jurnal terkait kimia pangan																																																																																																																			
Supporting lecturer	Dr. Prima Retno Wikandari, M.Si. Mirwa Adiprahara Anggarani, S.Si., M.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	Students are able to understand the scope of food chemistry.	<p>1.1. Students are able to explain the natural properties of food and chemical composition, as well as the function of each structure that makes up the macronutrients of food</p> <p>2.2. Explain the consequences of chemical changes that occur during cooking and storage.</p>	<p>Criteria:</p> <p>1.Score 4: very good</p> <p>2.Score 3: good</p> <p>3.Score 2: sufficient</p> <p>4.Score 1: Poor</p> <p>5.Test Assessment Criteria: refers to Unesa standards</p> <p>Form of Assessment : Participatory Activities</p>	<p>1x 50' lecture contract, group division, explanation of learning methods project base method 2x 50'; discussions and questions and answers explore students' knowledge about the components of food, their natural properties and the positive and negative impacts of food processing (1 1) 3 x 60; individual assignment to read review articles and create a resume containing identification and classification of food ingredients (source, type and benefits and impact of food processing 2 X 50</p>		<p>Material: a. Food ingredients and natural properties or functions b. Positive and negative impacts of food processing</p> <p>Bibliography: <i>De Man, John M. 1990. Principles of Food Chemistry, 2nd ed. An AV1 book, Van Nostrang Reinhold, New York.</i></p>	2%

2	Able to master concepts in the food sector related to structure, nutrition, properties, chemical changes in proteins during processing and storage as well as types of protein and bioactive proteins in food ingredients	Accuracy in classifying the types of proteins that make up animal and vegetable proteins and analyzing the types of bioactive peptides (how they are formed, types and functions)	Criteria: 1.4: Very good 2.3: OK 3.2: Enough 4.1: Less Form of Assessment : Test	Lecture, Cooperative Learning 2 X 50		Material: a. Structure of amino acids, peptides and proteins b. chemical, physical and functional properties of proteins (amphoteric properties, salting out, salting in, protein solubility, swelling, gelling, foaming, emulsifier) References: <i>De Man, John M. 1990. Principle of Food Chemistry, 2nd ed. An AV1 book, Van Nostrang Reinhold, New York.</i> Material: a. Structure of amino acids, peptides and proteins b. chemical, physical and functional properties of proteins (amphoteric properties, salting out, salting in, protein solubility, swelling, gelling, foaming, emulsifier) References: <i>Fennemas Food Chemistry 2007, 4th Edition, edited by Srinivasan Damodaran, CRC Press</i>	2%
3	Able to master concepts in the food sector related to structure, nutrition, properties, chemical changes in proteins during processing and storage as well as types of protein and bioactive proteins in food ingredients	Able to understand chemical changes in proteins during the processing process.	Criteria: 1.4: Very good 2.3: OK 3.2: Enough 4.1: Less 5. Test Assessment Criteria: refers to Unesa standards Form of Assessment : Participatory Activities	Lecture, Small Group Discussion Assignment: review a journal about bioactive peptide 2 X 50		Material: Types of proteins that make up animal and vegetable proteins Types of bioactive peptides (how to form, types and functions) References: <i>De Man, John M. 1990. Principle of Food Chemistry, 2nd ed. An AV1 book, Van Nostrang Reinhold, New York.</i> Material: Types of proteins that make up animal and vegetable proteins Types of bioactive peptides (how to form, types and functions) References: <i>Fennemas Food Chemistry 2007, 4th Edition, edited by Srinivasan Damodaran, CRC Press</i> Material: Types of proteins that make up animal and vegetable proteins Types of bioactive peptides (how to form, types and functions) References: <i>Journal articles related to food chemistry</i>	2%

4	Able to master concepts in the food sector related to structure, chemical and physical properties, functional properties of lipids and chemical changes in lipids during processing and storage as well as types of lipids and bioactive lipids in food ingredients	Able to explain the structure, nutrition, chemical, physical and functional properties of lipids	Criteria: 1.4: Very good 2.3: OK 3.2: Enough 4.1: Less Form of Assessment : Participatory Activities	Lecture 2 X 50		Material: Lipid structure: saponifiable lipids: triglycerides (composition of saturated and unsaturated fatty acids), non-saponifiable lipids (cerebrosides, sphingomilein, plasmogens, sterol esters) References: <i>De Man, John M. 1990. Principle of Food Chemistry, 2nd ed. An AV1 book, Van Nostrang Reinhold, New York.</i> Material: Chemical properties, physical and functional properties: visible fat, invisible fat, liquid fat, solid fat, boiling point, melting point, crystal structure, plastic properties, emulsifier Reference: <i>Fennemas Food Chemistry 2007, 4th Edition, edited by Srinivasan Damodaran , CRC Press</i>	3%
5	Able to master concepts in the food sector related to structure, nutrition, properties, chemical changes in lipids during processing and storage as well as types of lipids and bioactive lipids in food ingredients	Able to understand chemical and physical changes in lipids due to processing processes	Criteria: 1.Non Test: 2.4: Very good 3.3: OK 4.2: Enough 5.1: Less Form of Assessment : Test	Test 2 X 50		Material: Structural changes due to processing: autooxidation, hydrogenation, trans fatty acids, rancidity. Types of lipids in food ingredients and bioactive components of lipids in food ingredients or the results of processing food ingredients based on lipids (omega 3, omega 6, phytosterol) References: <i>Freeland-Graves, Jeanne H, Gladys C. Peckham. 1987. Foundations of Food Preparation, 5th ed. Macmillan Publ. Comp, Canada.</i>	3%
6	Able to master concepts in the food sector related to structure, nutrition, properties, chemical changes of carbohydrates during processing and storage as well as types of carbohydrates and bioactive carbohydrates in food ingredients	Able to understand chemical and physical changes in carbohydrates and functional properties due to processing processes	Criteria: 1.Non Test: 2.4: Very good 3.3: OK 4.2: Enough 5.1: Less Form of Assessment : Participatory Activities	Lecture 2 X 50			3%

7	Able to master concepts in the food sector related to structure, nutrition, properties, chemical changes of carbohydrates during processing and storage as well as types of carbohydrates and bioactive carbohydrates in food ingredients	Able to understand chemical and physical changes in carbohydrates and functional properties due to processing processes	Criteria: 1.Non Test: 2.4: Very good 3.3: OK 4.2: Enough 5.1: Less Form of Assessment : Test	Test 2 X 50		Material: Structural changes due to processing (hydrolysis reactions, dehydration, caramelization, Maillard, swelling) Types of carbohydrates in food ingredients and bioactive carbohydrate components of food ingredients or the results of carbohydrate-based food processing processes (FOS food fiber, inulin, glycosides) References: <i>De Man, John M. 1990. Principles of Food Chemistry, 2nd ed. An AV1 book, Van Nostrang Reinhold, New York.</i>	3%
8	UTS According to the final capabilities from meeting 1 to meeting 7	According to the indicators for meeting 1 to meeting 7	Criteria: According to Unesa standards for written tests Form of Assessment : Test	Corresponds to meeting 1 to meeting 7 2 X 50			15%
9	Able to master the concept of food additives and the positive and negative impacts resulting from their use	1. Students are able to identify and classify the types of lipids in food ingredients 2. Students are able to estimate the degree of crystallization (solidity) of a lipid from the lipid structure and explain its relevance for household and industrial purposes 3. Students are able to explain the reactions and chemical and physical changes that occur in foodstuffs containing lipids when they undergo processing 4. Students know which types of fatty foods are dangerous and which are beneficial for health	Criteria: 1.Non Test: 4 Very good 2.3 OK 3.2 Enough 4.1 Less 5.Test: According to UNE standards Form of Assessment : Participatory Activities	Reading textbooks, giving assignments, discussions. 2 X 50		Material: a Definition, types and functions of BTM (permitted and not permitted) b. Rules for using BTM Bibliography: <i>Freeland-Graves, Jeanne H, Gladys C. Peckham. 1987. Foundations of Food Preparation, 5th ed. Macmillan Publ. Comp, Canada.</i>	2%

10	Able to apply food chemistry knowledge to help solve problems in society related to diet and the types of food consumed	Able to conduct outreach to the community regarding several food problems and their impact on health	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Non Test: 4 Very good 2.3 OK 3.2 Enough 4.1 Less 5. Test: According to UNE standards <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Community Service, Project Base Learning 2 X 50		<p>Material: 1. Study of protein malnutrition (lack of protein calories) 2. Study of the influence of diet and the processing of fatty foods on the dangers of free radical formation and degenerative diseases as well as the use of antioxidants 3. Study of the impact of consuming trans fatty acids 4. Study of the use of fiber food and glycosides as bioactive components in treating hyperglycemia and hypocholesterolemia 5. study of the unauthorized use of BTM</p> <p>Reference: <i>Journal articles related to food chemistry</i></p>	10%
11	Able to apply food chemistry knowledge to help solve problems in society related to diet and the types of food consumed	Able to conduct outreach to the community regarding several food problems and their impact on health	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Non Test: 4 Very good 2.3 OK 3.2 Enough 4.1 Less 5. Test: According to UNE standards <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Community Service, Project Base Learning 2 X 50		<p>Material: 1. Study of protein malnutrition (lack of protein calories) 2. Study of the influence of diet and the processing of fatty foods on the dangers of free radical formation and degenerative diseases as well as the use of antioxidants 3. Study of the impact of consuming trans fatty acids 4. Study of the use of fiber food and glycosides as bioactive components in treating hyperglycemia and hypocholesterolemia 5. study of the unauthorized use of BTM</p> <p>Reference: <i>Journal articles related to food chemistry</i></p>	10%
12	Able to be logical, critical and innovative in developing food chemistry in generating ideas for developing functional food products	Able to produce the development of functional food products	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Non test: 2.4. Very good 3.3. OK 4.2. Less 5.1. Less 6. Test: According to Unesa standards <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Community Service, Project Base Learning 2 X 50		<p>Material: Producing products, functional food products</p> <p>References: <i>Journal articles related to food chemistry</i></p>	5%
13	Able to be logical, critical and innovative in developing food chemistry in generating ideas for developing functional food products	Able to produce the development of functional food products	<p>Criteria:</p> <ol style="list-style-type: none"> 1. Non test: 2.4. Very good 3.3. OK 4.2. Less 5.1. Less 6. Test: According to Unesa standards <p>Form of Assessment : Project Results Assessment / Product Assessment</p>	Community Service, Project Base Learning 2 X 50		<p>Material: Producing products, functional food products</p> <p>References: <i>Journal articles related to food chemistry</i></p>	5%

14	Able to be logical, critical and innovative in developing food chemistry in generating ideas for developing functional food products	Able to produce the development of functional food products	Criteria: 1.Non test: 2.4. Very good 3.3. OK 4.2. Less 5.1. Less 6.Test: According to Unesa standards Form of Assessment : Project Results Assessment / Product Assessment	Community Service, Project Base Learning 2 X 50		Material: Producing products, functional food products References: <i>Journal articles related to food chemistry</i>	5%
15	Able to work together and have entrepreneurial skills with an environmental perspective	Able to design a business about functional food products	Criteria: 1.Non test: 2.4. Very good 3.3. OK 4.2. Enough 5.1. Less Form of Assessment : Project Results Assessment / Product Assessment	Community Service, Project Base Learning 2 X 50		Material: Functional Food Event held. Reference: <i>Journal articles related to food chemistry</i>	15%
16	UAS		Form of Assessment : Project Results Assessment / Product Assessment	Product Degree 2 X 50			0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	12%
2.	Project Results Assessment / Product Assessment	50%
3.	Test	23%
		85%

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.