



**Universitas Negeri Surabaya
Faculty of Sports and Health Sciences,
Undergraduate Nutrition Study Program**

Document
Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																			
Macronutrient Metabolism	1321102021	Basic Science	T=0	P=0	ECTS=0	3	August 8, 2022																																																																																			
AUTHORIZATION		SP Developer	Course Cluster Coordinator			Study Program Coordinator																																																																																				
		Satwika Arya Pratama, S.Gz, M.Sc.	Dra. Siti Sulandjari, M.Si.			Amalia Ruhana, S.P., M.P.H.																																																																																				
Learning model	Case Studies																																																																																									
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																									
	PLO-8	Able to master the scientific basis of nutrition, food, biomedicine, humanities and public health sciences.																																																																																								
	PLO-9	Able to have an attitude of belief in the Almighty God, be ethical, disciplined, aware of the law, have a social and cultural insight, and behave professionally.																																																																																								
	Program Objectives (PO)																																																																																									
	PO - 1	Have knowledge about energy metabolism and macronutrients in the body in order to support good nutritional status																																																																																								
	PO - 2	Have the ability to analyze nutritional problems using knowledge of energy metabolism and macronutrients																																																																																								
	PO - 3	Have a responsible attitude in using knowledge of macronutrient metabolism to solve nutritional problems																																																																																								
	PLO-PO Matrix																																																																																									
		<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P.O</th> <th>PLO-8</th> <th>PLO-9</th> </tr> </thead> <tbody> <tr> <td>PO-1</td> <td></td> <td></td> </tr> <tr> <td>PO-2</td> <td></td> <td></td> </tr> <tr> <td>PO-3</td> <td></td> <td></td> </tr> </tbody> </table>						P.O	PLO-8	PLO-9	PO-1			PO-2			PO-3																																																																									
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																										
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Short Course Description	Discussion of the dynamic aspects of energy metabolism and macronutrients in the body, including energy formation, energy use, carbohydrate catabolism, carbohydrate anabolism, fat catabolism, fat anabolism, protein catabolism, protein anabolism, issues related to carbohydrate metabolism, issues related to protein metabolism, and macronutrient interactions. Student experience is gained through discussion activities, problem solving, and carrying out assignments																																																																																									
References	Main :																																																																																									
	<ol style="list-style-type: none"> 1. Gropper, S.A.S., & Smith, J.L . 2013. Advanced nutrition and human metabolism . Sixth edition. Belmont, CA: Wadsworth/Cengage Learning 2. Stipanuk, M .H.& Caudill, M.A.2013. Biochemical, physiological, and molecular aspects of human nutrition . 3rd ed.St. Louis,Mo.: Elsevier/Saunders 3. Bender, D., Botham, K. M., Weil, P. A., Kennelly, P. J., Rodwell, V. W. 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education. 4. Campbell, N. A., Minorsky, P. V., Reece, J. B., Cain, M. L., Urry, L. A., Wasserman, S. A. 2017. Biology. United States: Pearson Education, Inc. 5. Lanham-New, S.A,MacDonald, I.A., Roche, H.M. 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell 6. Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Biokimia Harper Edisi 27. (Wulandari dkk, penerjemah).Indonesia: EGC. 7. Smith, J. L., Gropper, S. S., Carr, T. P. 2016. Advanced Nutrition and Human Metabolism. Amerika Serikat: Cengage Learning 8. Swanson, T.A., Kim, S. I. & Gluksman, M.J. 2012. Essential Biokimia disertai Biologi Molekular dan Genetik. Pamulang: Binarupa Aksara 																																																																																									

		Supporters:					
		1. 3. Guyton & Hall. 2008. Fisiologi Kedokteran Edisi 11. (Luqman Yanuar Rahcman, Hariawati Hartanto, Andita Novrianti, Nanda Wulandari, penerjemah). Indonesia: EGC.(Buku asli diterbitkan 2006)					
Supporting lecturer		Dra. Hj. Siti Sulandjari, M.Si. Dr. Ir. Asrul Bahar, M.Pd. Satwika Arya Pratama, S.Gz., M.Sc.					
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 (<i>offline</i>)	Online (<i>online</i>)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Understand RPS and lecture contracts	1. Prepare a study contract	Criteria: Have drawn up a lecture contract	Online lecture Learning Model: Cooperative Lecture method: Discussion and assignment 3 X 50	Online lecture Learning Model: Cooperative Lecture method: Discussion and assignment 3 X 50		0%
2	Understand energy-producing compounds and energy formation processes	1.1. Describe the energy cycle in cells 2.2. Describe the ATP Cycle 3.3. Describe ATP Hydrolysis 4.4. Describe basal metabolism 5.5. Describe the Respiratory quotient	Criteria: It is declared successful in mastering the competency if the quality of assignments and tests as well as participation in discussion forums is at least 60%. Form of Assessment : Participatory Activities, Tests	Online lecture Learning Model: Case Based Learning Method: Discussion. Questions and answers, Assignment 3 X 50	Online lecture Learning Model: Case Based Learning Method: Discussion. Questions and answers, Assignment 3 X 50	Material: Energy-producing compounds and energy formation processes References: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i> Material: Energy-producing compounds and energy formation processes References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i> Material: Energy-producing compounds and energy formation processes References: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell</i> Material: Energy producing compounds and energy formation processes References: <i>Gropper, SAS, & Smith, JL . 2013. Advanced nutrition and human metabolism. Sixth edition. Belmont, CA: Wadsworth/Cengage Learning</i>	4%

3	Able to describe energy use based on activity	<p>1.Describes the use of energy in rest, training and competition</p> <p>2.Describes how to calculate energy during rest, training and competition</p>	<p>Criteria: It is stated that you have mastered competency if you correctly describe the use of energy and how to calculate it during rest, training and competition. minimum 60%</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Online lecture Model Case Based Learning Method: Discussion, Assignment 3 X 50	Online lecture Model Case Based Learning Method: Discussion, Assignment 3 X 50	<p>Material: Energy use based on activity References: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i></p> <hr/> <p>Material: Energy use based on activity References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i></p> <hr/> <p>Material: Energy use based on activity References: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society, Sussex, UK:Wiley-Blackwell</i></p> <hr/> <p>Material: Energy use based on activity References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i></p>	4%
4	Able to decipher carbohydrate catabolism	<p>1.1. Describe the structure of mono, di and poly saccharida with examples of each</p> <p>2.2. Describe glycosidic bonds</p> <p>3.3. Describe carbohydrate digestion</p> <p>4.4. Describe carbohydrate absorption</p> <p>5.5. Describe the factors that influence blood sugar levels</p>	<p>Criteria: It is declared that you have mastered the competency if at least 60% of the answers to the questions for the indicators match the correct answer criteria</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, question and answer, assignment 3 X 50	Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, question and answer, assignment 3 X 50	<p>Material: Digestion and absorption of carbohydrates References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Digestion and absorption of carbohydrates References: <i>Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC.</i></p> <hr/> <p>Material: Digestion and absorption of carbohydrates References: <i>Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy</i></p>	4%

5	Able to decipher carbohydrate catabolism	<ol style="list-style-type: none"> 1. Describe the stages of glycolysis and calculate the ATP produced 2. Describe the stages that occur in the Krebs cycle and the amount of energy produced 3. Explain the efficiency of energy formation from carbohydrates 4. Describe the stages that occur in the Krebs cycle and the amount of energy produced 	<p>Criteria: It is declared that you have mastered the competency if at least 60% of the answers and assignment reports comply with the criteria for answers and assignment reports that comply with the criteria in the rubric.</p> <p>Forms of Assessment : Participatory Activities, Portfolio Assessment, Tests</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a breathing activity Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of differences in energy in respiratory output. Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production. Develop and present the results. Under the supervision of the lecturer, students discuss to produce answers/ The solution to the problem of differences in energy yield and output is presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Material: Carbohydrate catabolism References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Carbohydrate catabolism Bibliography: <i>Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC.</i></p> <hr/> <p>Material: Carbohydrate catabolism References: <i>Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy</i></p> <hr/> <p>Material: Carbohydrate Catabolism References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p>	6%
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6	Able to explain carbohydrate anabolism	<ol style="list-style-type: none"> 1. Describe the stages of glycogenesis 2. Describe the stages of glyconeogenesis 3. Outlining the stages of the Cori cycle 4. Outlining the stages of the Embden-Meyerhof pathway 5. Describe the bond formation of KH compounds with other glycoproteins, glycolipids 6. Analyzing the fulfillment of energy needs during fasting 	<p>Criteria: It is declared that you have mastered the competency if at least 60% of the answers to questions and assignment reports comply with the correct answer criteria</p> <p>Form of Assessment : Participatory Activities, Tests</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding energy acquisition for someone who fasts based on the length of time Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of energy gain in someone who fasts based on length of time.</p> <p>Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the energy gain of someone who fasts based on length of time. Develop and present results. With monitoring, lecturers, students discuss to produce answers/solutions to the problem of obtaining energy for someone who fasts based on the length of time and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding energy acquisition for someone who fasts based on the length of time Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of energy gain in someone who fasts based on length of time.</p> <p>Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the energy gain of someone who fasts based on length of time. Develop and present results. With monitoring, lecturers, students discuss to produce answers/solutions to the problem of obtaining energy for someone who fasts based on the length of time and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Material: Carbohydrate Anabolism References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Carbohydrate anabolism Reader: <i>Guyton & Hall. 2008. Medical Physiology 11th Edition. (Luqman Yanuar Rahcman, Hariawati Hartanto, Andita Novrianti, Nanda Wulandari, translators). Indonesia: EGC. (Original book published 2006)</i></p> <hr/> <p>Material: Carbohydrate anabolism References: <i>Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy</i></p>	6%
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7	Able to decipher fat catabolism	<ol style="list-style-type: none"> 1. Describe the structure of fat 2. Classifying fats and fatty acids 3. Shows ester bonds in fat 4. Describes fat digestion 5. Deciphering fat absorption 6. Describes the formation of energy from fat 	<p>Criteria: It is declared that you have mastered the competency if the results of the assignment and answers to the questions meet the correct answer criteria of at least 60%</p> <p>Form of Assessment : Participatory Activities, Portfolio Assessment</p>	Online lecture Learning Model: Cooperative Method: Discussion, Question and Answer 3 X 50	Online lecture Learning Model: Cooperative Method: Discussion, Question and Answer 3 X 50	<p>Material: Fat catabolism Bibliography: <i>Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC.</i></p> <hr/> <p>Material: Fat catabolism References: <i>Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy</i></p>	6%
8		Indicators for the 1st meeting to the 7th meeting	<p>Criteria: According to the answer key</p>	3 X 50			20%
9	Able to decipher fat anabolism	<ol style="list-style-type: none"> 1. Explain fatty acid synthesis 2. Describe blood triglyceride biosynthesis 3. Describe cholesterol biosynthesis 4. Explain the biosynthesis of Lipoproteins (chylomicrons, VLDL, LDL, HDL) 	<p>Criteria: It is declared that you have mastered the competency if 60% of the answers and assignment reports are like the answer key</p>	Online lecture Scientific Approach Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50	Online lecture Scientific Approach Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50	<p>Material: Fat Anabolism Bibliography: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK: Wiley-Blackwell</i></p> <hr/> <p>Material: Fat Anabolism References: <i>Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy</i></p>	10%

10	Able to decipher protein catabolism	<ol style="list-style-type: none"> 1.Explain the formation of peptide bonds 2.Classifying amino acids 3.Describe protein digestion 4.Explain the absorption of amino acids 	Criteria: Declared mastery if at least 60% of the answers are correct according to the answer key	Online lecture Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50	Online lecture Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50	<p>Material: Protein digestion and absorption References: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i></p> <hr/> <p>Material: Protein digestion and absorption References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Protein digestion and absorption References: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell</i></p> <hr/> <p>Material: Protein digestion and absorption References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i></p>	5%
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11	Able to outline the energy production process pathway from amino acids	<p>1. Describe the entry pathway for amino acids into the Krebs cycle</p> <p>2. Give an example of calculating the energy of one type of amino acid</p>	<p>Criteria: You will be declared to have mastered competency if you decipher the entry path to the Krebs cycle and calculate the energy from amino acids correctly at least 60%</p>	<p>Online lecture Approach: Scientific Learning Model: Cooperative Method: Discussion, Question and Answer 3 X 50</p>	<p>Online lecture Approach: Scientific Learning Model: Cooperative Method: Discussion, Question and Answer 3 X 50</p>	<p>Material: Amino acid catabolism References: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i></p> <hr/> <p>Material: Amino acid catabolism References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Amino acid catabolism Reference: <i>Gropper, SAS, & Smith, JL . 2013. Advanced nutrition and human metabolism. Sixth edition. Belmont, CA: Wadsworth/Cengage Learning</i></p> <hr/> <p>Material: Amino acid catabolism Bibliography: <i>Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC.</i></p>	5%
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12	Able to decompose protein synthesis into other metabolic compounds	<ol style="list-style-type: none"> 1.Explain purine and pyrimidine metabolism 2.Explain protein biosynthesis 3.Explain the biosynthesis of amino acids 4.Explain enzyme biosynthesis 5.Explain hormone biosynthesis 	Criteria: Declared to have mastered if at least 60% of the answers are correct according to the criteria in the answer key	Online Lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50	Online Lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment 3 X 50	Material: Protein anabolism Bibliography: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i> <hr/> Material: Protein anabolism Bibliography: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i> <hr/> Material: Protein anabolism Bibliography: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell</i> <hr/> Material: Protein anabolism References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i>	10%
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13	Be able to describe fiber and its role	<ol style="list-style-type: none"> 1. Describe the concept of fiber 2. Describe the Classification of fibers 3. Describes the role of fiber in metabolism and health 4. Describe the impact of lack or excess fiber consumption 	<p>Criteria: Declared mastery if at least 60% of the answers are stated according to the answer key.</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Assignment Discussion, Presentation and Question and Answer</p> <p>Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a respiratory activity Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of differences in energy in respiratory output. Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production. Develop and present the results. Under the supervision of the lecturer, students discuss to produce answers. / solution to the problem of differences in energy yield and yield is presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Assignment Discussion, Presentation and Question and Answer</p> <p>Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a respiratory activity Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of differences in energy in respiratory output. Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production. Develop and present the results. Under the supervision of the lecturer, students discuss to produce answers. / solution to the problem of differences in energy yield and yield is presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Material: Health issues with fiber References: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i></p> <hr/> <p>Material: Health issues with fiber References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Health issues with fiber Reference: <i>Gropper, SAS, & Smith, JL . 2013. Advanced nutrition and human metabolism. Sixth edition. Belmont, CA: Wadsworth/Cengage Learning</i></p> <hr/> <p>Material: Health issues with fiber References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i></p>	5%
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14	Understand essential amino acids and their roles	<p>1.Explain the concept of essential amino acids</p> <p>2.Describe the grouping of essential amino acids</p> <p>3.Outlines the role of amino acids in metabolism, health and fitness</p> <p>4.Applying the use of amino acids in solving health problems</p>	<p>Criteria: Declared mastery if at least 60% of the answers and assignment reports are in accordance with the answer key</p>	<p>Online lectures Scientific Approach Learning Model: Cooperative Method: Discussion and Question and Answer</p> <p>Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a breathing activity Organizing learning Under the supervision of the lecturer, students discuss and share assignments to find the information/data needed to explain the problem of differences in energy in respiratory output. Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production. Develop and present the results. Under the supervision of the lecturer, students discuss to produce answers/solutions to the problem of differences in energy output. and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Online lectures Scientific Approach Learning Model: Cooperative Method: Discussion and Question and Answer</p> <p>Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a breathing activity Organizing learning Under the supervision of the lecturer, students discuss and share assignments to find the information/data needed to explain the problem of differences in energy in respiratory output. Supervise the investigation. Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production. Develop and present the results. Under the supervision of the lecturer, students discuss to produce answers/solutions to the problem of differences in energy output. and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Material: Health issues with essential amino acids References: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i></p> <hr/> <p>Material: Health issues with essential amino acids References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Health issues with essential amino acids References: <i>Guyton & Hall. 2008. Medical Physiology 11th Edition. (Luqman Yanuar Rahcman, Hariawati Hartanto, Andita Novrianti, Nanda Wulandari, translators). Indonesia: EGC. (Original book published 2006)</i></p> <hr/> <p>Material: Health issues with essential amino acids References: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell</i></p>	10%
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15	Understanding metabolic interactions between macronutrients	<p>1.Describes the interaction of carbohydrate, lipid and protein metabolism under normal conditions</p> <p>2.Describe the interaction of carbohydrate, lipid and protein metabolism in fasting conditions</p> <p>3.Describe the interaction of carbohydrate, lipid and protein metabolism in obesity conditions</p> <p>4.Describe the interaction of carbohydrate, lipid and protein metabolism in diabetes mellitus</p>	<p>Criteria: Declared mastery if at least 60% of the answers match the assignment answer key according to the assignment rubric</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment Lecture Discussion Assignment Presentation</p> <p>Problem Base Learning: Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a breathing activities Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of energy differences in respiratory output Supervising investigations Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production Develop and present results Under supervision lecturers, students discuss to produce answers/solutions to the problem of differences in energy results and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Online lecture Approach: Scientific Learning Model: Case Based Learning Method: Discussion, Question and Answer, Assignment Lecture Discussion Assignment Presentation</p> <p>Problem Base Learning: Problem orientation Under the supervision of the lecturer, students listen to the reading material provided by the lecturer to find problems regarding differences in the amount of energy from a breathing activities Organizing learning Under the supervision of the lecturer, students discuss and share tasks to find the information/data needed to explain the problem of energy differences in respiratory output Supervising investigations Under the supervision of the lecturer, students collect information/data that explains the causes of differences in energy production Develop and present results Under supervision lecturers, students discuss to produce answers/solutions to the problem of differences in energy results and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the lecturer, each student group presents the results of their work, other groups give appreciation, then continue by summarizing or formulating conclusions according to the input. 3 X 50</p>	<p>Material: Macronutrient Metabolism Interactions Bibliography: <i>Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty-First Edition. United States: McGraw-Hill Education.</i></p> <hr/> <p>Material: Macronutrient Metabolism Interactions References: <i>Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.</i></p> <hr/> <p>Material: Macronutrient Metabolism Interactions References: <i>Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell</i></p> <hr/> <p>Material: Macronutrient Metabolism Interactions References: <i>Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning</i></p>	5%
16	UAS			3 X 50			30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	14%
2.	Portfolio Assessment	5%
3.	Test	11%
		30%

Notes

1. **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.
2. **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.
3. **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.
4. **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.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **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.
7. **Forms of assessment:** test and non-test.
8. **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.
9. **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.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **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%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.