

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

Document Code

## SEMESTER LEARNING PLAN

Courses			CODE			Cou	rse Fa	amily			Credi	it Wei	ght	SEM	ESTER	2	Con Date	npilati e	on
Macronutrien	t Metabolism		132110202	21		Basi	c Scie	ence			T=0	P=0	ECTS=0		3		Aug 2022	ust 8, 2	
AUTHORIZAT	ΓΙΟΝ		SP Develo	per					Cou	rse C	luster	r Cool	rdinator	Stud	y Prog	ram Co			
			Satwika Ar		a, S.Gz	M.Sc	<u>.</u>		Dra. Siti Sulandjari, M.Si.				Amalia Ruhana, S.P., M.P.H.						
Learning model	Case Studies																		
Program	PLO study prog	gram t	hat is chard	ged to the	cours	e													
Learning Outcomes	PLO-8	Able t	to master the	scientific k	asis of	nutriti	on, fo	od, bic	medio	cine, ł	numan	nities a	and public	health	n scienc	es.			
(PLO)	PLO-9		to have an at it, and behav			ne Aln	nighty	God, I	oe eth	ical, c	liscipli	ned, a	aware of t	he law	, have a	a social	and c	ultural	
	Program Objec	tives (	(PO)																
	PO - 1	Have	knowledge a	bout energ	y metal	oolism	and r	nacror	nutrier	nts in 1	the bo	dy in	order to s	upport	good r	utrition	al statı	JS	
	PO - 2	Have	the ability to	analyze nu	tritiona	probl	ems u	ising k	nowle	dge o	f ener	gy me	etabolism	and m	acronu	trients			
	PO - 3	Have	a responsible	e attitude ir	n using	knowl	edge o	of mac	ronutr	ient n	netabo	olism t	o solve n	utrition	al prob	lems			
	PLO-PO Matrix																		
			P.O PO-1 PO-2 PO-3		O-8		PLC	D-9											
	PO Matrix at th	e end	of each lea	rning sta	ge (Su	b-PO	)												
																			-
			P.0	1 2	3	4	5	6	7	8	Wee 9	k 10	11	12	13	14	15	16	-
		PC	0-1		-	-	-	-	-	-	-								
			)-2																-
													_						
		PC	)-3																
Short Course Description	Discussion of the catabolism, carbo metabolism, issue problem solving,	ohydrat es relat	te anabolism ted to proteir	i, fat catab metabolis	olism,	fat ar	nabolis	sm, pr	otein	catab	olism,	prote	ein anabo	ólism, i	ssues	related	to ca	rbohyc	Irate
References	Main :																		
	<ol> <li>Gropper, Learning</li> <li>Stipanuk Elsevier/</li> <li>Bender, United SI</li> <li>Campbel Educatio</li> <li>Lanham- UK:Wiley</li> <li>Robert K EGC.</li> <li>Smith, J.</li> <li>8. Swans Aksara</li> </ol>	, M.H. Saunde D., Bot ates: M tates: M I, N. A n, Inc. New, S -Black Murra L., Gro	& Caudill, N ers ham, K. M., AcGraw-Hill E S.A.MacDona well ay, Darly K.	M.A.2013. I Weil, P. A Education. P. V., Reed Id, I.A., R Granner, N Carr, T. P.	Biochen ., Kenn ce, J. E oche, H /ictor W 2016. <i>A</i>	nical, elly, F 3., Cai 1.M. 2 1. Roc Advan	physic 2. J., F in, M. 2011. I Iwell. ced Ni	ologica Rodwe L., Ur Nutritic (2009) utrition	II, and II, V. V ry, L. on and . Biok and F	d mol W. 20 A., W d Met kimia Huma	ecular 18. Ha /asser :abolis Harpe n Meta	aspe arper' man, m, Se r Edis abolis	ects of hu s Illustrat S. A. 20: econd Ed si 27. (Wu m. Amerik	man r ed Bio L7. Bio ition. <sup>-</sup> ulanda :a Seri	nutrition chemis blogy. L The Nu ri dkk, kat: Ce	try Thir Inited S Inition S penerje ngage I	ed.St. ty-Firs States: Society emah).I	Louis, t Editio Pears /. Suss Indone	Mo.: on. son sex, esia:

		Supporters:						
			n & Hall. 2008. Fisiolo ri, penerjemah). Indone:			ar Rahcman, Hariawa	ti Hartanto, Andita No	vrianti, Nanda
Support lecturer		Dra. Hj. Siti Sular Dr. Ir. Asrul Baha Satwika Arya Pra						
Week-	eac sta		Evalu	ation	Learning Student A	_earning, g methods, ssignments, lated time]	Learning materials [ References ]	Assessment Weight (%)
	(Su	b-PO)	Indicator	Criteria & Form	Offline ( offline )	Online ( <i>online</i> )		
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	ar	nderstand RPS Id lecture Intracts	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	er co er	nderstand hergy-producing hergy formation ocesses	<ul> <li>1.1. Describe the energy cycle in cells</li> <li>2.2. Describe the ATP Cycle</li> <li>3.3. Describe ATP Hydrolysis</li> <li>4.4. Describe basal metabolism</li> <li>5.5. Describe the Respiratory quotient</li> </ul>	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 <b>References:</b> Bender, D., Botham, <i>KM</i> , Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty- First Edition. United States: McGraw-Hill Education. <b>Material:</b> Energy- producing compounds and energy formation processes <b>References:</b> Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning <b>Material:</b> Energy- producing compounds and energy formation processes <b>References:</b> Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell <b>Material:</b> Energy producing compounds and energy formation processes <b>References:</b> Gropper, SAS, & Smith, JL. 2013. Advanced nutrition and human metabolism. Sixth edition. Belmont, CA: Wadsworth/Cengage Learning	

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

			1	1		1	n
5	Able to decipher carbohydrate catabolism	<ol> <li>Describe the stages of glycolysis and calculate the ATP produced</li> <li>Describe the stages that occur in the Krebs cycle and the amount of energy produced</li> <li>Explain the efficiency of energy formation from carbohydrates</li> <li>Describe the stages that occur in the Krebs cycle and the amount of energy produced</li> </ol>	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. Forms of Assessment : Participatory Activities, Portfolio Assessment, Tests	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 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 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	Material: Carbohydrate catabolism References: Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc. Material: Carbohydrate catabolism Bibliography: Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC. Material: Carbohydrate catabolism References: Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy Material: Carbohydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolydrate Catabolism References: Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.	6%

7	Able to decipher fat catabolism	<ol> <li>Describe the structure of fat</li> <li>Classifying fats and fatty acids</li> <li>Shows ester bonds in fat</li> <li>Describes fat digestion</li> <li>Deciphering fat absorption</li> <li>Describes the formation of energy from fat</li> </ol>	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% Form of Assessment : Participatory Activities, Portfolio Assessment	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	Material: Fat catabolism Bibliography: Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC. Material: Fat catabolism References: Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy	6%
8		Indicators for the 1st meeting to the 7th meeting	Criteria: According to the answer key	3 X 50			20%
9	Able to decipher fat anabolism	<ol> <li>Explain fatty acid synthesis</li> <li>Describe blood triglyceride biosynthesis</li> <li>Describe cholesterol biosynthesis</li> <li>Explain the biosynthesis of Lipoproteins (chylomicrons, VLDL, LDL, HDL)</li> </ol>	Criteria: It is declared that you have mastered the competency if 60% of the answers and assignment reports are like the answer key	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	Material: Fat Anabolism Bibliography: Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell Material: Fat Anabolism References: Swanson, TA, Kim, SI & Gluksman, MJ 2012. Essential Biochemistry accompanied by Molecular Biology and Genetics. Pamulang: Binarupa Literacy	10%

10	Able to decipher protein catabolism	<ol> <li>Explain the formation of peptide bonds</li> <li>Classifying amino acids</li> <li>Describe protein digestion</li> <li>Explain the absorption of amino acids</li> </ol>	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 × 50	Material: Protein digestion and absorption References: Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty- First Edition. United States: McGraw-Hill Education. Material: Protein digestion and absorption References: Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc. Material: Protein digestion and absorption References: Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell Material: Protein digestion and absorption References: Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning	5%
----	--	--	--	--	--	--	----

11	Able to outline the energy production process pathway from amino acids	<ol> <li>Describe the entry pathway for amino acids into the Krebs cycle</li> <li>Give an example of calculating the energy of one type of amino acid</li> </ol>	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%	Online lecture Approach: Scientific Learning Model: Cooperative Method: Discussion, Question and Answer 3 X 50	Online lecture Approach: Scientific Learning Model: Cooperative Method: Discussion, Question and Answer 3 X 50	Material: Amino acid catabolism References: Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty- First Edition. United States: McGraw-Hill Education.	5%
						Material: Amino acid catabolism References: Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Urry, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc.	
						Material: Amino acid catabolism Reference: Gropper, SAS, & Smith, JL. 2013. Advanced nutrition and human metabolism. Sixth edition. Belmont, CA: Wadsworth/Cengage Learning	
						Material: Amino acid catabolism Bibliography: Robert K. Murray, Darly K. Granner, Victor W. Rodwell. (2009). Harper's Biochemistry Edition 27. (Wulandari et al, translator). Indonesia: EGC.	

12	Able to decompose protein synthesis into other metabolic compounds	<ol> <li>Explain purine and pyrimidine metabolism</li> <li>Explain protein biosynthesis</li> <li>Explain the biosynthesis of amino acids</li> <li>Explain enzyme biosynthesis</li> <li>Explain hormone biosynthesis</li> </ol>	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: Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty- First Edition. United States: McGraw-Hill Education. Material: Protein anabolism Bibliography: Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Ury, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc. Material: Protein anabolism Bibliography: Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell Material: Protein anabolism References: Smith, JL, Gropper, SS, Carr, TP 2016. Advanced Nutrition and Human Metabolism. United States: Cengage Learning	10%
----	---	--	---	---	--	---	-----

	1						
13	Be able to describe	1.Describe the	Criteria:	Online lecture	Online lecture	Material: Health	5%
	fiber and its role	concept of i fiber	Declared mastery if at least 60% of	Approach:	Approach: Scientific	issues with fiber	
		2.Describe the	the answers are	Scientific Learning Model:	Learning Model: Case Based	References: Bender, D., Botham,	
		Classification of fibers	stated according to the answer key.	Case Based	Learning	KM, Weil, PA,	
		3.Describes the	the answer key.	Learning	Method: Assignment		
		role of fiber in		Method: Assignment	Discussion, Presentation and	Rodwell, VW 2018. Harper's Illustrated	
		metabolism and		Discussion,	Question and	Biochemistry Thirty-	
		health 4.Describe the		Presentation and	Answer	First Edition. United	
		impact of lack or		Question and Answer	Problem orientation	States: McGraw-Hill Education.	
		excess fiber		Answei	Under the		
		consumption		Problem	supervision of the	Material: Health	
				orientation Under the	lecturer, students listen to the reading	issues with fiber	
				supervision of the	material provided by	References: Campbell, NA,	
				lecturer, students	the lecturer to find	Minorsky, PV,	
				listen to the reading material	problems regarding differences in the	Reece, JB, Cain,	
				provided by the	amount of energy	ML, Urry, LA, Wasserman, SA	
				lecturer to find	from a respiratory	2017. Biology.	
				problems regarding	activity Organizing learning	United States:	
				differences in the	Under the	Pearson Education, Inc.	
				amount of energy	supervision of the		
				from a respiratory activity	lecturer , students discuss and share	Material: Health	
				Organizing	tasks to find the	issues with fiber Reference:	
				learning	information/data	Gropper, SAS, &	
				Under the supervision of the	needed to explain the problem of	Smith, JL . 2013.	
				lecturer, students	differences in	Advanced nutrition and human	
				discuss and	energy in	metabolism. Sixth	
				share tasks to find the	respiratory output. Supervise the	edition. Belmont,	
				information/data	investigation.	CA: Wadsworth/Cengage	
				needed to explain the problem of	Under the supervision of the	Learning	
				differences in	lecturer, students		
				energy in	collect	Material: Health issues with fiber	
				respiratory output.	information/data that explains the causes	References: Smith,	
				Supervise the	of differences in	JL, Gropper, SS,	
				investigation.	energy production.	Carr, TP 2016. Advanced Nutrition	
				Under the supervision of the	Develop and present the results.	and Human	
				lecturer, students	Under the	Metabolism. United	
				collect	supervision of the	States: Cengage Learning	
				information/data that explains the	lecturer, students discuss to produce	Loannig	
				causes of	answers. / solution		
				differences in	to the problem of		
				energy production.	differences in energy yield and		
				Develop and	yield is presented in		
				present the	the form of work.		
				results. Under the	Analyze and evaluate the		
				supervision of the	solution process.		
				lecturer, students	With the guidance of		
				discuss to produce answers.	the lecturer, each student group		
				, solution to the	presents the results		
				problem of differences in	of their work, other groups give		
				energy yield and	appreciation, then		
				yield is presented	continue by		
				in the form of work.	summarizing or formulating		
				Analyze and	conclusions		
				evaluate the	according to the		
				solution process. With the	input. 3 X 50		
				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			
				3 × 30			

14	Understand essential amino acids and their roles	<ol> <li>Explain the concept of essential amino acids</li> <li>Describe the grouping of essential amino acids</li> <li>Outlines the role of amino acids in metabolism, health and fitness</li> <li>Applying the use of mino acids in solving health problems</li> </ol>	Criteria: Declared mastery if at least 60% of the answers and assignment reports are in accordance with the answer key	Online lectures         Scientific         Approach         Learning Model:         Cooperative         Method:         Discussion and         Question and         Answer         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.         Supervision of the         lecturer, students         collect	Online lectures Scientific Approach Learning Model: Cooperative Method: Discussion and Question and Answer 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 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	Material: Health issues with essential amino acids References: Bender, D., Botham, KM, Weil, PA, Kennelly, PJ, Rodwell, VW 2018. Harper's Illustrated Biochemistry Thirty- First Edition. United States: McGraw-Hill Education. Material: Health issues with essential amino acids References: Campbell, NA, Minorsky, PV, Reece, JB, Cain, ML, Ury, LA, Wasserman, SA 2017. Biology. United States: Pearson Education, Inc. Material: Health issues with essential amino acids References: Guyton & Hall. 2008. Medical Physiology 11th Edition. (Luqman Yanuar Rahcman, Hariawati Hartanto, Andita Novrianti, Nanda Wulandari, translators). Indonesia: EGC. (Original book published 2006) Material: Health issues with essential amino acids References: Lanham-New, SA, MacDonald, IA, Roche, HM 2011. Nutrition and Metabolism, Second Edition. The Nutrition Society. Sussex, UK:Wiley-Blackwell	10%

	1	[			[		
15	Understanding metabolic	1.Describes the	Criteria:	Online lecture	Online lecture	Material:	5%
	interactions	interaction of	Declared mastery if at least 60% of	Approach: Scientific	Approach: Scientific Learning Model:	Macronutrient Metabolism	
	between macronutrients	carbohydrate, lipid and protein	the answers match	Learning Model:	Case Based	Interactions	
	macronuments	metabolism	the assignment answer key	Case Based	Learning	Bibliography:	
		under normal	according to the	Learning Method:	Method: Discussion, Question and	Bender, D., Botham, KM, Weil, PA,	
		conditions	assignment rubric	Discussion,	Answer, Assignment	км, weii, PA, Kennelly, PJ,	
		2.Describe the		Question and	Lecture	Rodwell, VW 2018.	
		interaction of carbohydrate,		Answer,	Discussion	Harper's Illustrated	
		lipid and protein		Assignment Lecture	Assignment Presentation	Biochemistry Thirty- First Edition. United	
		metabolism in		Discussion	resentation	States: McGraw-Hill	
		fasting		Assignment	Problem Base	Education.	
		conditions		Presentation	Learning:		
		3.Describe the		Problem Base	Problem orientation Under the	Material:	
		interaction of carbohydrate,		Learning:	supervision of the	Macronutrient Metabolism	
		lipid and protein		Problem	lecturer, students	Interactions	
		metabolism in		orientation	listen to the reading	References:	
		obesity		Under the supervision of the	material provided by the lecturer to find	Campbell, NA,	
		conditions		lecturer, students	problems regarding	Minorsky, PV, Reece, JB, Cain,	
		4.Describe the interaction of		listen to the	differences in the	ML, Urry, LA,	
		carbohydrate,		reading material	amount of energy	Wasserman, SA	
		lipid and protein		provided by the lecturer to find	from a breathing activities	2017. Biology. United States:	
		metabolism in		problems	Organizing learning	Pearson Education,	
		diabetes mellitus		regarding	Under the	Inc.	
				differences in the amount of energy	supervision of the lecturer, students		
				from a breathing	discuss and share	Material:	
				activities	tasks to find the	Macronutrient Metabolism	
				Organizing	information/data	Interactions	
				learning Under the	needed to explain the problem of	References:	
				supervision of the	energy differences	Lanham-New, SA, MacDonald, IA,	
				lecturer, students	in respiratory output	Roche, HM 2011.	
				discuss and share tasks to	Supervising investigations	Nutrition and	
				share tasks to find the	Under the	Metabolism, Second	
				information/data	supervision of the	Edition. The Nutrition Society. Sussex,	
				needed to explain	lecturer, students	UK:Wiley-Blackwell	
				the problem of	collect information/data that	.,	
				energy differences in	explains the causes	Material:	
				respiratory output	of differences in	Macronutrient	
				Supervising	energy production	Metabolism Interactions	
				investigations Under the	Develop and	References: Smith,	
				supervision of the	present results Under supervision	JL, Gropper, SS,	
				lecturer, students	lecturers, students	Carr, TP 2016. Advanced Nutrition	
				collect	discuss to produce	Advanced Nutrition and Human	
				information/data that explains the	answers/solutions to the problem of	Metabolism. United	
				causes of	differences in	States: Cengage	
				differences in	energy results and	Learning	
				energy	the results are		
				production Develop and	presented in the form of work.		
				present results	Analyze and		
				Under	evaluate the		
				supervision	solution process. With the guidance of		
				lecturers, students discuss	the lecturer, each		
				to produce	student group		
				answers/solutions	presents the results		
				to the problem of differences in	of their work, other groups give		
				unicicii.co III			
1				energy results	appreciation, then		
1				energy results and the results	appreciation, then continue by		
				and the results are presented in	continue by summarizing or		
				and the results are presented in the form of work.	continue by summarizing or formulating		
				and the results are presented in	continue by summarizing or		
				and the results are presented in the form of work. Analyze and evaluate the solution process.	continue by summarizing or formulating conclusions according to the input.		
				and the results are presented in the form of work. Analyze and evaluate the solution process. With the	continue by summarizing or formulating conclusions according to the		
				and the results are presented in the form of work. Analyze and evaluate the solution process. With the guidance of the	continue by summarizing or formulating conclusions according to the input.		
				and the results are presented in the form of work. Analyze and evaluate the solution process. With the	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
				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.	continue by summarizing or formulating conclusions according to the input.		
				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	continue by summarizing or formulating conclusions according to the input.		
16	UAS			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.	continue by summarizing or formulating conclusions according to the input.		30%

Evaluation Percentage Recap: Case Study

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

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.
- 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.
- 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 subtopics.
- 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.