

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

Document Code

SEMESTER LEARNING PLAN

Courses			CODE	Course Fami	ly	Cred	lit We	ight	SEMESTER	Compilation Date	
Nutrition and	Biomolecular		1321102022	Study Program Elective Cours		T=0	P=0	ECTS=0	4	February 1, 2024	
AUTHORIZAT	TION					Course Cluster Coordinator			Study Program Coordinator		
			Cleonara Yanuar Dini, S	.Gz., M.Sc., RD		nara Y ., M.So		Dini,	Amalia Ruhar	na, S.P., M.P.H.	
Learning model	Case Studies	ise Studies									
Program	PLO study program that is charged to the course										
Learning Outcomes	PLO-8	Able to	Able to master the scientific basis of nutrition, food, biomedicine, humanities and public health sciences.								
(PLO)	PLO-9	Able to cultura	to have an attitude of belief in the Almighty God, be ethical, disciplined, aware of the law, have a social and iral insight, and behave professionally.								
	PLO-11	Able to	Able to solve problems in the field of nutrition by applying scientific thinking concepts and cutting-edge approaches through research, scientific literacy and publications.								
	Program Object	ctives (F	20)								
	PO - 1		Students understand knowledge about nutrition and biomolecular science, omics science (genomic, epigenomic, transcriptomics, proteomics, metabolomics) and genetic variations related to diet								
	PO - 2		Students are able to mention the structure and function of cells, nucleus, genes, genome, central dogma, concepts of replication, transcription and translation								
	PO - 3	Studen	Students mentioned things that could cause DNA damage, gene mutations and polymorphism								
	PO - 4	Studen	udents are able to explain the role of diet in cell proliferation and apoptosis								
	PO - 5	Studen	ts are able to explain the	concepts of nutrige	nomics	, meta	bolom	ics and pe	rsonal nutrition		
	PO - 6	Studen	ts are able to explain the	technology and me	thods u	sed in	the fi	eld of mole	cular nutrition		
	PO - 7		ts are able to explain the body which influence ge		een nuti	rition i	n phys	siological a	and biochemical	processes in the	
	PO - 8	Studen	ts are able to analyze the	e role of functional f	ood in n	utritio	nal the	rapy and o	disease preventi	on	
	PO - 9	Studen	ts are able to explain gut	microbiota, diet and	d health	in mo	lecula	r studies			
	PO - 10	Studen	ts are able to explain car	ncer in the study of I	nolecul	ar nutr	ition				
	PO - 11	Studen	ts are able to explain the	relationship betwee	en obes	ity in n	nolecu	lar nutritio	nal studies		
	PO - 12	Studen	ts are able to explain fer	mented foods in the	study o	f mole	cular	nutrition			
	PO - 13		ts are able to explain t lar studies	the relationship bet	ween fe	etal pr	ogran	nming and	non-communic	able diseases in	
	PO - 14	Studen	ts are able to explain the	incidence of Diabe	tes Mell	itus in	Molec	ular Nutrit	ion Studies		

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

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

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

Short Course Description

Lectures that study interactions between nutrients and various intracellular and extracellular molecules, organism responses to nutrients at the molecular level such as signal transduction gene expression and protein modification

References

Main:

- Smith, J. L., Gropper, S. S., Carr, T. P. 2016.. Advanced Nutrition and Human Metabolism. Amerika Serikat: Cengage Learning.
- 2. Stansfield, WD, Colome JS, Cano RJ . 2006. Biologi Molekuler dan Sel . Jakarta: Erlangga
- 3. Swanson, T.A. Kim, S.I, & Glucksman, M.J. 2012. Essential Biokimia disertai Biologi Molekular dan Genetik . Alih Bahasa: Winarsi Rudiarso dan Andry Hartono. Tangerang Selatan: Binarupa Aksara Publisher.
- 4. Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Gizi Molekuler. Malang:UB Press
- 5. Muhammad , H.F.L., Sulistyoningrum , D.C., Kusuma , R.J. , Dewi , A.L., Permatasari , I.K. 2021. Buku Ajar Nutrigenomik dan Nutrigenetik Bagi Mahasiswa Gizii . Yogyakarta: UGM Press
- Martinez, J.A., Kohlmeier, M., De Caterina, R. 2019, Principles of Nutrigenetics and Nutrigenomics: Fundamentals of Individualized Nutrition. London: Elsevier Science.

Supporters:

 Alberts, Bruce. 2017. Molecular Biology 	of the Celll . Amerika Serikat: W.W. Norton.
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- 2. Fatchiyah . 2018. Kajian Nutrigenomik dan Kesehatan: Nutrisi Berbasis Genomik dan Proteomik . Malang: Universitas Brawijaya Press.
- 3. Swanson, T.A. Kim, S.I, & Glucksman, M.J. 2012. Essential Biokimia disertai Biologi Molekular dan Genetik . Alih Bahasa: Winarsi Rudiarso dan Andry Hartono. Tangerang Selatan: Binarupa Aksara Publisher.
- Widyanto RM, Dini CY, Rahmawati IS, Putri SR, Rozana AN, Abida SH, Yunimar Y. Uji Deteksi Adulterasi Daging Babi (Sus scrofa domestica) pada Bakso Metode Loop-Mediated Isothermal Amplification. Indonesian Journal of Human Nutrition. 2021;8(1):76-87.
- CY Dini, RM Widiyanto, AR Cempaka, AR Maulidiana, I Sarita. Dietary Intake of Fat, Cholesterol, Vitamin A and E Increase Gen Expression of Firmicutes and Bacteriodetes in Elderly with Hypertension. Malaysian Journal of Medical Sciences (Under Review)

Supporting lecturer

Cleonara Yanuar Dini, S.Gz., Dietisien, M.Sc. Lini Anisfatus Sholihah, S.Gz., M.Sc. Raisya, S.TP., M.TP., M.Sc. Wildan Alfira Gusrianto, M.Gz. Satwika Arya Pratama, S.Gz., M.Sc.

Week-	Final abilities of each learning stage	Eval	uation	Learı Studer	lp Learning, ning methods, nt Assignments, timated time]	Learning materials [References]	Assessment Weight (%)
	(Sub-PO)	Indicator	Criteria & Form	Offline (offline)	Online (online)	[Kelerences]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	1.Understand the contents of course RPS and lecture contracts 2.Explain the meaning of molecular nutrition 3.Explain the principles and differences in omics science (genomics, epigenomics, transcriptomics, metabolomics) 4.Explains dietrelated genetic variations	1.Students can explain the relationship between nutrition and molecular processes in the body in the post test given at the end of the course 2.Students can explain the principles and differences in genomics, epigenomics, transcriptomics, metabolomics in the post test given at the end of the course 3.Students can explain how diet can influence human genetic variation in the post test given at the end of the course	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50		Material: Introduction to Molecular Nutrition Readers: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	7%

		T	I	1	T	I	
2	1.Explain cell structure 2.Explain the meaning, structure and function of the nucleus 3.Explain the concept of genes and genomes	1.Students can explain the relationship between nutrition and molecular processes in the body in the post test given at the end of the course 2.Students can explain the principles and differences in genomics, epigenomics, transcriptomics, proteomics, metabolomics in the post test given at the end of the course 3.Students can explain how diet can influence human genetic variation in the post test given at the end of the course	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50		Material: Nucleus, genes and genome Bibliography: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	7%
3	1.Explain the definition of DNA damage 2.Explain factors that can damage DNA 3.Explain the definition of DNA mutation 4.Explain the difference between point mutations and chromosomal mutations 5.Explain the meaning of DNA repair 6.Explain the difference between proofreading and mismatch repair 7.Explain the concept of genetic polymorphism	1.Students can explain DNA damage and the factors that contribute to DNA damage in the post test given at the end of the course 2.Students can explain DNA mutations and the differences between point mutations and chromosomal mutations in the post test given at the end of the course 3.Students can explain DNA repair, proofreading mechanisms and mismatch repair in the post test given at the end of the course 4.Students can explain the course 4.Students can explain the concept of genetic polymorphism	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50		Material: DNA damage, gene mutations and polymorphism References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press Material: DNA mutation and repair References: Stansfield, WD, Colome JS, Cano RJ. 2006. Molecular and Cell Biology. Jakarta: Erlangga	7%

4	1 = 1	1.05-4	Criteria:	Locturo	Material: The	7%
4	1.Explain the	1.Students can		Lecture, discussion.	role of diet in	7%
	meaning of cell	explain the	1.Participation	question	cell proliferation	
	proliferation	process of cell	activities are	and	and apoptosis	
	2.Explain the	proliferation	seen from	answer,	References:	
	difference	2.Students can	student	post test	Widyanto RM,	
	between	explain the	attendance and	2 X 50	Muslihah N.	
	interphase and	differences	student	27.00	Raras Tri YM.	
	mitosis	between	participation in		Rahmawati IS.	
	3.Explain the	interphase and	discussions and		Dini Cleonara Y.	
	relationship	mitosis	questions and		Maulidiana AR.	
	between diet	Students can	answers		2021. Molecular	
	and cell	explain the	2.The test at the		Nutrition.	
1	proliferation	relationship	end of the	[]	Malang: UB	
1	4.Explain the	between diet	course is in the	[]	Press	
1	relationship	and cell	form of a written			
	between diet	proliferation	test. Students			
1	and the cell	4.Students can	get the	[]		
	_ cycle	explain the	maximum score			
	5.Explain the	relationship	if they can			
	relationship	between diet	answer the test			
	between growth	and the cell	questions			
	hormone and	_ cycle	Fa af			
	cell proliferation	Students can	Form of Assessment :			
	6.Explain the	explain the	Participatory			
	meaning of	relationship	Activities, Tests			
	_ apoptosis	between growth	Activities, resis			
	7.Explain the	hormone and				
	reasons why	cell proliferation		[]		
1	cells undergo	6.Explain the		[]		
1	apoptosis	meaning of		[]		
1	8.Explain the role	apoptosis		[]		
1	of diet in the	7.Explain the		[]		
1	apoptosis	reasons why		[]		
1	process	cells undergo		[]		
1		apoptosis		[]		
1		8.Explain the role		[]		
		of diet in the		[]		
		apoptosis		[]		
		process		[

5 1.Explain the concept of nutritional genomics 2.Explain the concept and differences between nutrigenetics and nutrigenetics and nutrigenetics on health and disease 4.Explain the influence of nutrigenetics on health and disease 5.Explain the influence of nutrigenetics on health and disease 5.Explain the relationship between the concept of nutritional genomics in various disease 5.Explain the influence of nutrigenetics on health and disease 5.Explain the influence of nutrigenetics on health and disease 5.Explain the relationship between the concept of nutritional genomics in various disease 5.Explain the ethical, legal and social aspects of nutrigenetics and nutrigenetics and nutrigenetics on huttigenomics and genomics in various disease 5.Explain the ethical, legal and social aspects of nutrigenomics and nutrigenomics and nutrigenomics and nutrigenomics and nutrigenomics and genomics in various diseases 6.Explain the ethical, legal and social aspects of nutrigenomics and nutrigenomics a		1		T	1	T	1	1
Based Nutrition. Malang: Brawijaya University Press.	5	concept of nutritional genomics 2. Explain the concept and differences between nutrigenomics and nutrigenetics 3. Explain the influence of nutrigenetics on health and disease 4. Explain the influence of nutrigenomics on health and disease 5. Explain the relationship between the concept of nutritional genomics in various diseases 6. Explain the ethical, legal and social aspects of nutrigenomics and	explain the concept of nutritional genomics 2. Students can explain the concepts and differences between nutrigenomics and nutrigenetics 3. Students can explain the influence of nutrigenetics on health and disease 4. Students can explain the influence of nutrigenomics on health and disease 5. Students can explain the relationship between the concept of nutritional genomics in various diseases 6. Explain the ethical, legal and social aspects of nutrigenomics and	1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory	discussion, question and answer, post test		Nutrigenomics, metabolomics and personal nutrition Readers: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press Material: The concept of nutrigenomics and nutrigenetics. References: Muhammad, HFL, Sulistyoningrum, DC, Kusuma, RJ, Dewi, AL, Permatasari, IK 2021. Textbook of Nutrigenomics and Nutrigenomics, proteomics and health concepts. Reference: Fatchiyah. 2018. Nutrigenomics and Health Studies: Genomic and Proteomic Based Nutrition. Malang: Brawijaya University	7%

	1		T	1	ı	1	
6	1.Explain the basic principles of the PCR method and how it works 2.Explain the DNA electrophoresis method and its use 3.Explains the SDS-PAGE method and how it works 4.Explain the ELISA method and how it works 5.Explains the use of the latest technology and methods in molecular nutrition: halal food studies	1.Students can explain the basic principles of the PCR method and how it works 2.Students can explain the DNA electrophoresis method and its use 3.Students can explain the SDS-PAGE method and how it works 4.Students can explain ELISA and how it works 5.Students can explain the use of the latest technology and methods in molecular nutrition: halal food studies	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50		Material: Technology and methods used in the field of molecular nutrition. References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press Material: Latest technology and methods in molecular nutrition: halal food studies References: Widyanto RM, Dini CY, Rahmawati IS, Putri SR, Rozana AN, Abida SH, Yunimar Y. Pork (Sus scrofa domestica) Adulteration Detection Test in Meatballs with the Loop Method - Mediated Isothermal Amplification. Indonesian Journal of Human Nutrition. 2021;8(1):76-87.	7%

7	1.Explain the	1.Students can	Criteria:	Lecture,		Material:	7%
	composition of	explain the	1.Participation	discussion,		Nutrition in	
	organs and	composition of	activities are	question		physiological	
	functions of the	organs and	seen from	and		and biochemical	
	digestive tract	function of the	student	answer,		processes in the	
	2.Explain the	digestive tract	attendance and	post test		human body	
	process of	2.Students can	student	2 X 50		that influence	
	digestion,	explain the	participation in			gene	
	absorption and	processes of	discussions and			expression. References:	
	excretion of	digestion,	questions and			Widyanto RM,	
	nutrients	absorption and	answers			Muslihah N,	
	3.Explain the	excretion of	2.The test at the			Raras Tri YM,	
	work of	nutrients	end of the			Rahmawati IS.	
	digestive	3.Students can	course is in the			Dini Cleonara Y.	
	enzymes	explain the	form of a written			Maulidiana AR.	
	4.Explain the role	work of	test. Students			2021. Molecular	
	of the nervous	digestive	get the			Nutrition.	
	system and	enzymes	maximum score			Malang: UB	
	hormones in	4.Students can	if they can			Press	
	the regulation of	explain the role	answer the test				
	the digestive	of the nervous	guestions			Material:	
	process	system and	1			Metabolism and	
	5.Explain the	hormones in	Form of			Nutrition in	
	digestive	the regulation	Assessment :			Humans	
	process in each	of the digestive	Participatory			References:	
	organ of the	process	Activities, Tests			Smith, JL,	
	digestive tract	5.Students can				Gropper, SS,	
	6.Explain the	explain the				Carr, T. P.	
	process of	digestive				2016 Advanced	
	absorption and	process in each				Nutrition and	
	transportation of	organ of the				Human	
	nutrients	digestive tract				Metabolism.	
	7.Explain the	6.Explain the				United States:	
	process of	process of				Cengage	
	digestion and	absorption and				Learning.	
	absorption of	transportation					
	macro and	of nutrients					
	micro nutrients	7.Explain the					
	micro numents	•					
		process of					
		digestion and					
		absorption of					
		macro and					
		micro nutrients					
8	Students are able	Able to answer	Criteria:	Written		Material: TM	20%
	to explain in writing	questions correctly	Students get	test		Material 1-7	
	the concept of material during		maximum marks if	2 X 50		References:	
	face-to-face		they answer questions correctly			Widyanto RM,	
	meetings in weeks		questions contectly			Muslihah N,	
	1-7		Form of			Raras Tri YM,	
			Assessment :			Rahmawati IS,	
			Test			Dini Cleonara Y,	
						Maulidiana AR.	
						2021. Molecular	
						Nutrition.	
						Malang: UB	
						Press	
9	1.Students are	1.Students can	Criteria:	Lecture,		Material: The	5%
	able to explain	explain the	1.Participation	discussion,	2 X 50	role of functional	
	the definition of	definition of	activities are	question		food in	
	functional food	functional food	seen from	and		nutritional	
	2.Students are	2.Students can	student	answer,		therapy and	
	able to explain	explain the	attendance and	post test		disease	
	the	classification of	student	2 X 50		prevention	
	classification of	functional foods	participation in			References:	
1	บเผออกกบสแบบ Ul	3.Students can	discussions and			Widyanto RM,	
	functional foods			Ī		Muslihah N,	
	functional foods 3.Students are						
	3.Students are	explain the	questions and			Raras Tri YM,	
	3.Students are able to explain	explain the health benefits	questions and answers			Rahmawati IS,	
	3.Students are able to explain the health	explain the health benefits of functional	questions and answers 2.The test at the			Rahmawati IS, Dini Cleonara Y,	
	3.Students are able to explain the health benefits of	explain the health benefits of functional foods	questions and answers 2.The test at the end of the			Rahmawati IS, Dini Cleonara Y, Maulidiana AR.	
	3.Students are able to explain the health benefits of functional foods	explain the health benefits of functional foods 4.Students can	questions and answers 2.The test at the end of the course is in the			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular	
	3.Students are able to explain the health benefits of functional foods 4.Students are	explain the health benefits of functional foods 4.Students can explain the	questions and answers 2.The test at the end of the course is in the form of a written			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition.	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain	explain the health benefits of functional foods 4.Students can explain the mechanism of	questions and answers 2.The test at the end of the course is in the form of a written test. Students			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism	explain the health benefits of functional foods 4.Students can explain the mechanism of action of	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition.	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of	explain the health benefits of functional foods 4.Students can explain the mechanism of action of functional foods	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods	explain the health benefits of functional foods 4.Students can explain the mechanism of action of functional foods and analyze	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze their	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their relationship to	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze their relationship to	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their relationship to cardiovascular	questions and answers 2. The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze their relationship to cardiovascular	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their relationship to cardiovascular disease, T2DM,	questions and answers 2. The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze their relationship to cardiovascular disease, T2DM	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their relationship to cardiovascular	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment:			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze their relationship to cardiovascular	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their relationship to cardiovascular disease, T2DM,	questions and answers 2. The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	
	3.Students are able to explain the health benefits of functional foods 4.Students are able to explain the mechanism of action of functional foods and analyze their relationship to cardiovascular disease, T2DM	explain the health benefits of functional foods 4. Students can explain the mechanism of action of functional foods and analyze their relationship to cardiovascular disease, T2DM,	questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory			Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB	

				_			
10	1.Students are able to explain the factors that influence the diversity of gut microbiota 2.Students are able to explain the influence of nutrients and diet on the diversity of gut microbiota 3.Students are able to explain the mechanisms of gut microbiota on health 4.Students are able to explain the mechanisms of gut microbiota on health 4.Students are able to explain the mechanism of gut microbiota on the incidence of cardiovascular disease, T2DM and cancer	1.Students can explain the factors that influence the diversity of gut microbiota 2.Students can explain the influence of nutrients and diet on the diversity of gut microbiota 3.Students can explain the mechanisms of gut microbiota on health 4.Students can explain the mechanism of gut microbiota on the incidence of cardiovascular disease, T2DM and cancer	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50	2 X 50	Material: Gut microbiota, diet and health in molecular studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati Iz, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	5%
11	1.Students are able to explain the meaning of cancer 2.Students are able to analyze the differences between normal cells and cancer cells 3.Students are able to explain the process of normal cells becoming cancerous 4.Students are able to explain the relationship between diet and cancer in the DNA methylation process 5.Students are able to explain the relationship between diet and cancer in the DNA methylation process 5.Students are able to explain the relationship between diet and cancer in the histone modification process 6.Students are able to explain the relationship between diet and cancer using the MiRNA process	1.Students can explain the meaning of cancer 2.Students can analyze the differences between normal cells and cancer cells 3.Students can explain the process of normal cells becoming cancerous 4.Students can explain the relationship between diet and cancer in the DNA methylation process 5.Students can explain the relationship between diet and cancer in the histone modification process 6.Students are able to explain the relationship between diet and cancer in the histone modification process 6.Students are able to explain the relationship between diet and cancer using the MiRNA process	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50	2 X 50	Material: Cancer in molecular nutrition studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	5%

12	1.Students are able to explain the definition and etiology of obesity 2.Students are able to explain the types of obesity 3.Students are able to explain the types of obesity 3.Students are able to explain the molecular mechanisms of leptin hormone regulation 4.Students are able to explain the types and how genes work that influence obesity 5.Students are able to explain the management of obesity in a review of molecular nutrition	1.Students can explain the definition and etiology of obesity 2.Students can explain the types of obesity 3.Students can explain the molecular mechanisms of leptin hormone regulation 4.Students can explain the types and how genes work that influence obesity 5.Students can explain the management of obesity in a review of molecular nutrition	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50	2 X 50	Material: Obesity in molecular nutrition studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	5%
13	1.Students are able to explain the meaning of food, objectives, principles, requirements and types of fermented food 2.Students are able to explain the factors and types of microbes that influence the fermentation process 3.Students are able to explain the effect of food fermentation on nutrients, sensory substances, spoilage microorganisms and pathogens 4.Students are able to explain the advantages of fermented products in nutritional and molecular terms 5.Students are able to explain the meaning of bioactive peptides and their benefits in molecular studies 6.Students are able to explain the potential of local Indonesian fermented food and its benefits in molecular studies	1.Students can explain the meaning of food, objectives, principles, requirements and types of fermented food 2.Students can explain the factors and types of microbes that influence the fermentation process 3.Students can explain the effect of food fermentation on nutrients, sensory substances, spoilage microorganisms and pathogens 4.Students can explain the advantages of fermented products in nutritional and molecular terms 5.Students can explain the meaning of bioactive peptides and their benefits in molecular studies 6.Students can explain the potential of local Indonesian fermented food and its benefits in molecular studies	Criteria: 1.Participation activities are seen from student attendance and student participation in discussions and questions and answers 2.The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 x 50	2 X 50	Material: Fermented foods in molecular nutrition studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	5%

14	1.Students are able to explain the concept of fetal programming 2.Students are able to explain the factors that influence fetal programming 3.Students are able to explain hypotheses on the topic of fetal programming 4.Students are able to explain the mechanism of fetal programming on obesity, DM and cardiovascular events in adulthood 5.Students are able to explain various molecular mechanisms and fetal programming	1.Students can explain the concept of fetal programming 2.Students can explain the factors that influence fetal programming 3.Students can explain hypotheses on the topic of fetal programming 4.Students can explain the mechanism of fetal programming on obesity, DM and cardiovascular events in adulthood 5.Students can explain various molecular mechanisms and fetal programming	Criteria: 1. Participation activities are seen from student attendance and student participation in discussions and questions and answers 2. The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50	2 X 50	Material: Fetal programming and non-communicable diseases in molecular studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	5%
15	1.Students are able to explain the definition and etiology of DM 2.Students are able to explain the different types of DM 3.Students are able to explain the molecular mechanism of action of the insulin hormone 4.Students are able to explain the genes that influence DMT1 and DMT2 5.Students are able to explain the management of DM in molecular nutrition studies	1.Students can explain the definition and etiology of DM 2.Students can explain the different types of DM 3.Students can explain the genes that influence DMT1 and DMT2 4.Students can explain the molecular mechanism of action of the insulin hormone 5.Students can explain the management of DM in molecular nutrition studies	Criteria: 1. Participation activities are seen from student attendance and student participation in discussions and questions and answers 2. The test at the end of the course is in the form of a written test. Students get the maximum score if they can answer the test questions Form of Assessment: Participatory Activities, Tests	Lecture, discussion, question and answer, post test 2 X 50	2 X 50	Material: Fetal programming and non-communicable diseases in molecular studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press Material: Diabetes Mellitus in Molecular Nutrition Studies References: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	5%
16	Students are able to explain in writing the concept of material during face-to-face meetings weeks 9- 15	Able to answer questions correctly	Criteria: Students get maximum marks if they answer questions correctly Form of Assessment: Test	Written test 2 X 50		Material: TM 9- 15 Material Reader: Widyanto RM, Muslihah N, Raras Tri YM, Rahmawati IS, Dini Cleonara Y, Maulidiana AR. 2021. Molecular Nutrition. Malang: UB Press	30%

Evaluation Percentage Recap: Case Study

Evaluation i crocintage recoup. Oase c					
No	Evaluation	Percentage			
1.	Participatory Activities	42%			
2.	Test	92%			

100%

Notes

- Learning Outcomes of Study Program Graduates (PLO Study Program) are the abilities possessed by each Study
 Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their
 study program obtained through the learning process.
- The PLO imposed on courses are several learning outcomes of study program graduates (CPL-Study Program) which
 are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and
 knowledge.
- 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.
- 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** 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.
- 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.
- 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.