SEMESTER LEARNING ACTIYITY PLAN

UNESA	**UNIVERSITAS NEGERI SURABAYA** **FACULTY OF MATHEMATICS AND NATURAL SCIENCE** **UNDERGRADUATE PROGRAMME OF CHEMISTRY**	**Document Code**

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COURSE	CODE	Course Group	Credit Unit (sks)		SEMESTER	Date
Metabolism and Pathways of Genetics Information	4720103015	Metabolism and Pathways of Genetics Information	**3**	**0**	6	23st June 2021

AUTHORIZATION CHEMISTRY	Compiler	Coordinator	Head of Study Programe
	Dr. Nuniek Herdyastuti, M.Si	Prof.Dr. Lenny Yuanita, M.Kes	**Dr. Amaria, M.Si**

Learning Outcomes	**Program Learning Outcomes (PLO)**	
	PLO 1	Mastering the concepts of structure, dynamics and energy, as well as the basic principles of separation, analysis, synthesis and characterization of micromolecular compounds and their application
	PLO 5	Able to apply logical, critical, systematic and innovative thinking in the context of development or application of science and technology by paying attention and applying humanities values in accordance with the field of chemistry in problem solving.
	Course Learning Outcome	
	CLO 1	Able to solve ipteks problems in the field of chemistry that is common and in simple scope such as identification, analysis, isolation, transformation, and synthesis of micromolecules, through the application of structure, properties, molecular changes, energy and kinetics.
	CLO 2	Able to solve science and technology problems in the field of biochemistry, especially related to metabolism and genetic information processing, based on the study of science and methods of analysis and synthesis, as well as the application of relevant technologies.
	CLO 3	Having knowledge of: a) metabolism and regulation of biomolecules carbohydrates, lipids, and proteins, b) the process of electron transfer in photosynthesis as well as c) the process of processing genetic information.
	CLO 4	Demonstrated a responsible attitude to his work in the study of Biochemistry II, independently.
	Sub CLO	
	Sub-CLO1	Understanding some aspects of metabolism and its role in living cells
	Sub-CLO2	Understanding the formation of ATP on various pathways of carbohydrate catabolism, regulation and its association
	Sub-CLO3	Understanding the process of atp formation through oxidative phosphorylation
	Sub-CLO4	Understanding the formation of ATP on various lines of carbohirat anabolism, regulation and its association

	Sub-CLO5	Understanding the process of photosynthesis
	Sub-CLO6	Understanding amino acid catabolism and its regulation
	Sub-CLO7	Understanding amino acid anabolism and its regulation
	Sub-CLO8	Understanding on metabolism purines and pyrimidin
	Sub-CLO9	Understanding the series of catabolism and anabolism processes of various major lipid compounds
	Sub-CLO10	Understand each stage of genetic information processing and its control
Brief Description of the Course	Study of catabolism and anabolism as well as regulation of biomolecules of carbohydrates, lipids, proteins, oxidative phosphorylation and electron transfer in photosynthesis, as well as the process of processing genetic information	
Study Materials: Learning Materials	Aspects of Metabolism in living things, Carbohydrate Metabolism, Oxidative Phosphorylation, Photosynthesis, Amino Acid Metabolism, Purine and Pyrimidin Metabolism, Lipid Metabolism, Flow of Genetic Information	
Reference	**Main :**	
	1. Ayala, F.J. and Kieger, J.A. 1984. *Modern Genetics*. California: The Benyamin Cummings Publishing Company Inc.. 2. Koolman, J. and Roehm, K.H. 2005. *Color Atlas of Biochemistry*. 2 nd edition. New York: Stutgard. 3. Lehninger. 1988. *Dasar-Dasar Biokimia* (I,II,III). Jakarta: Erlangga. 4. Mathew,C.K., van Holde, K.E., Ahern, K.G. 1999. *Biochemistry.* San Fransisco: Addison-Wesley Pub. Co. 5. Murray R.K., Granner R.K., Mayes P.A., and Rotwell V.W. 2003. *Harper's Ilustrated Biochemistry*, The McGraw-Hill Companies 6. Nelson, D.L. and Cox, M.M. 2003. *Lehninger Principle of Biochemistry*. 4th edition. Madison: University of Winconsin. 7. Styer, L., 1988. *Biochemistry.* New York: W.H. Freeman and Company	
	Supporting :	
	Recent journals related to each topic.	
Lecturer	1. Prof. Dr. Leny Yuanita, M.Kes 2. Prof. Dr. Rudiana Agustini, M.Pd 3. Dr. Prima Retno Wikandari, M.Si 4. Dr. Nuniek Herdyastuti, M.Si 5. Mirwa Adi Prahara, M.Si	
Prerequisite courses	The requirements courses have been courses in Biochemistry	

Meeting	**The final ability of each activity**	**Assessment**		**The final ability of each activity**		**Reference**	**Rating Weight (%)**
		Indicator	**Criteria and Form**	**Luring (*offline*)**	**Daring (*online*)**		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1	Understanding some aspects of metabolism and its role in living cells	1. To explain CO2 and N2 ycles 2. Explaining heterotrophic and	Non test	Lectures, FAQ	-	Macro and micro aspects of metabolism,	

		autotrophic relationships 3. Explaining the difference between catabolism and anabolism 4. Explaining the ATP, NADH/NAD+, FADH2/FAD cycles				energy cycle (Book 3,4, 6)	
2	Understanding carbohydrate catabolism : Formation of ATP and Glycolysis	1. Describe the link between catabolism and carbohydrate anabolism 2. Interpreting the sequence of stages of glycolysis reaction 3. Explaining the role of enzymes at each stage of glycolysis 4. Distinguishing the stages of aerobic and anaerobic pathways	Test	Interactive lectures and discussions	-	Carbohydrate catabolism : glycolysis, anaerobic reactions (book 3,4,6, journal)	
3	Understanding catabolism in disaccharides and polysaccharides as well as mechanism of entry in the Glycolysis pathway	1. Explaining enzymatic degradation of disaccharides and polysaccharides 2. Understanding the mechanism of entry of disaccharides and polysaccharides in the glycolysis pathway 3. Explaining the enzymes that play a role in glycogenolysis in	Non test	Interactive lectures and discussions	-	Catabolism in disaccharides and polysaccharides; the entry path on glycolysis (book 3,4,5,6,7 journal)	

		the liver as well as extra hepatic					
4	Understanding the aerob pathways in carbohydrate catabolism	1. Explaining the role of citric acid cycles 2. Explain each stage of the citric acid cycle 3. Explaining the regulation of citric acid cycles 4. Calculate the energy of citric acid cycle results 5. 5. Explaining the peculiarities of HMP shunt alternative lines	Test	Interactive lectures and discussions	-	Citric acid cycle (book 3,4,6, journal)	
5	Understanding the process of atp formation through oxidative phosphorylation	1. Explaining the meaning of phosphorylation, oxidative phosphorylation 2. Explaining the ATP and NADPH/ NADH cycles 3. Mentioning various inhibitor compounds and the location of obstacles 4. Distinguishing the glyphosate and malat aspartate shuttle systems 5. Calculate the ATP produced in the carbohydrate catabolism process 6. Regulation on glycolysis	Test	Interactive lectures and discussions	-	Oxidative phosphorylation, space reprocessing, ATP calculations, regulation on carbohydrate catabolism (book 2,3,4,5,6,7 journal)	

6	Understanding the use of ATP on various karbohirat anabolism pathways, regulations and associations	1. Explaining the differences in catabolism and anabolism pathways in carbohydrates 2. Explaining the stages of gluconeogenesis and glycogenesis reactions 3. Explaining the control of catabolism and carbohydrate anabolism by the hormone insulin, glucagon	Non test	Interactive lectures and discussions	-	Pathways carbohydrate anabolism, gluconeogenesis, glycogeneogenesis, control of carbohydrate anabolism (book 2,3,4,5,6,7 journal)	
7	Understanding the process photosynthesis	1. Explaining photochemical reaction systems 2. Mention the stages of bright reaction 3. Mention the reaction stage of Calvin's cycle 4. Explaining the usefulness of the Hatch-slack cycle 5. Mention the Hatch-Slack cycle reaction stage	Non test	Interactive lectures and discussions	-	Dark – light reactions, Calvin Cycle, Hatch Cycle – Slack (book 2,3,4,5,6 journal)	
8	**Midterm Exams**						
9	Understanding amino acid catabolism and its regulation	1. Explaining the main functions of amino acid catabolism and the role of amino acids as an energy source 2. Explaining the Intermediate	Test	Interactive lectures and discussions	-	Intermediate pathways of amino acid catabolism, transaminase reactions, nitrogen secretion pathways in ammonotelik, oreotelic, and	17

		Pathways of Amino Acid Catabolism 3. Explaining the reaction of transaminases in amino acids to form other amino acids 4. Explaining the mechanism of transport of ammonia in the body 5. Explaining the differences in nitrogen secretion pathways in ammonotelic, oreotelic, and uricotelic. 6. Explaining the Urea Cycle				uricotelic, urea cycle (book 2,3,4,5,6,7 journal)	
10	Understanding amino acid anabolism and its regulation	1. Explaining the synthesis of amino acids from ammonium through 3 enzymatic reactions: glutamate dehydrogenase, glutamine synthetase and carbamoil-phosphate synthetase and its regulation 2. Explaining the synthesis of amino acids from glutamate transaminase reactions with α-keto acid	NonTest	Interactive lectures and discussions	-	Synthesis of amino acids from ammonium through 3 enzymatic reactions and their regulation, amino acid synthesis from glutamate transaminase reactions with α-keto acid (book 2,3,4,5,6,7)	17

	Understanding to metabolism of purines and pyrimidin	1. Explaining the degradation of purines 2. Explaining Purine Catabolism into uric acid 3. Explaining the degradation of pyrimidin 4. Explaining the synthesis of AMP and GMP from IMP 5. Explaining the role of carbamoil phosphate and aspartate as a pyrimidin base precursor 6. Explaining multienzyme systems in pyrimidin base synthesis	NonTes	Interactive lectures and discussions		Degradation and synthesis Purine – Pyrimidine (book 2,3,4,5,6,7)	
11	Understanding the catabolism process of various major lipid compounds	1. Briefly describe the stages of β-oxidation 2. Calculates the energy generated from complete oxidation of fatty acids 3. Explaining additional steps for the odd fatty acid oxitic. 4. Decompose of compact phase-2 oxidation of unsaturated fatty acids 5. Explaining the difference in energy	Tes	Interactive lectures and discussions		Katabolisme asam lemak jenuh, Katabolisme asam lemak tak jenuh, α dan ϖ oksidasi, ketogenesis dan pengendalian (book 2,3,4,5,6,7 journal)	

		oxish with saturated fatty acids 6. Explaining the meaning of α and ϖ oxidation 7. Describe how ketone formation and it's effects					
12	Understanding the anabolism process of various major lipid compounds	1. Describe of fatty acid anabolism starting from mitochondrial acetyl coA 2. Explaining the differences in anabolism of saturated and unsaturated fatty acids 3. Describe of stage-2 TG anabolism 4. Explaining the principle of phosphoglyceride anabolism 5. Mention hormones, enzymes and metabolites that play a role in lipid regulation 6. Explaining the regulation of lipolysis and lipogenesis (everyday cases). 7. Mentioning various substances between the main biosynthesis of skualen, cholesterol	NonTes	Interactive lectures and discussions	-	Lipogenesis, anabolism in special fats, regulation (book 2,3,4,5,6,7 journal)	

		8. Explaining the reaction of biosynthesis regulation 9. Explaining the relationship of cholesterol with atherosclerosis.					
13	Understand each stage of genetic information processing and its regulation	1. Explaining the replication model 2. Explaining DNA polymerase 3. Explaining the replication mechanism	Test	Interactive lectures and discussions	-	Replication (book 1,2,3,4,5,6,7 journal)	
14		1. Explaining the initiation stage 2. Explain the elongation stage 3. Explaining the termination stage 4. Explaining negative control (Lacperon)	Test	Interactive lectures and discussions	-	Transcription (book 1,2,3,4,5,6,7 journal)	
15		1. Explaining the initiation stage 2. Explain the elongation stage 3. Explaining the termination stage	Test	Interactive lectures and discussions	-	Translation (book 1,2,3,4,5,6,7 journal)	
16	**Final Exams**						