



UNIVERSITAS NEGERI YOGYAKARTA
 FACULTY OF MATHEMATICS AND NATURAL SCIENCES
 DEPARTMENT OF CHEMISTRY
 1 Colombo Street Yogyakarta 55281
 Phone (0274) 565411, Ext. 1398, Fax (0274)548203
 Website: <http://kimia.fmipa.uny.ac.id>, E-mail: kimia@uny.ac.id

Bachelor of Science in Chemistry

MODULE HANDBOOK

Module name:	Physical Biochemistry						
Module level, if applicable:	Undergraduate						
Code:	KMA 6214						
Sub-heading, if applicable:	-						
Classes, if applicable:	-						
Semester:	5 th						
Module coordinator:	Dr. Retno Arianingrum						
Lecturer(s):	1. Dr. Das Salirawati 2. Dr. Retno Arianingrum						
Language:	Bahasa Indonesia and English						
Classification within the curriculum:	Compulsory Subject						
Teaching format / class hours per week during the semester:	100 minutes lectures, 120 structured activities and 120 individual study per week						
Workload:	Total workload is 90,67 hours per semester which consists of 100 minutes lectures, 120 structured activities and 120 individual study per week for 16 weeks						
Credit points:	2 SKS (3 ECTS)						
Prerequisites course(s):	Biochemistry						
Course Outcomes	<p>After taking this course, the students are expected to be able to:</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 15%;">CO1</td> <td>Explain the sequence of energy metabolism in the body as an understanding of physical biochemical concepts</td> </tr> <tr> <td>CO2</td> <td>Analyze biochemical philosophy, life characteristics, living matter structure, energy transformation, and physical biochemical history.</td> </tr> <tr> <td>CO3</td> <td>Analyze the results of biochemical research innovations</td> </tr> </table>	CO1	Explain the sequence of energy metabolism in the body as an understanding of physical biochemical concepts	CO2	Analyze biochemical philosophy, life characteristics, living matter structure, energy transformation, and physical biochemical history.	CO3	Analyze the results of biochemical research innovations
CO1	Explain the sequence of energy metabolism in the body as an understanding of physical biochemical concepts						
CO2	Analyze biochemical philosophy, life characteristics, living matter structure, energy transformation, and physical biochemical history.						
CO3	Analyze the results of biochemical research innovations						
Content:	<p>Through this course students are expected to be able to master biochemical understanding and philosophy, life characteristics, living substance structure, energy transformation, and physical biochemical history, energy metabolism, high-energy phosphate compounds (ATP), and adenylate systems that control the body's metabolism, phosphorylation mechanism oxidative and the occurrence of a series of reactions in the body, structure of proteins, biomembranes and their properties, and various kinds of transport systems in the body of living things.</p> <ul style="list-style-type: none"> • Definition & Philosophy of Biochemistry • Characteristics of Life • Structure of the Substance of Life. 						

	<ul style="list-style-type: none"> • Energy Transformation. • History of Biochemistry • Physical • Energy Metabolism • Energy Cycle in Cells • ATP cycle • ATP hydrolysis • Adenylate System • Oxidative Phosphorylation & Reaction Series • Oxidative phosphorylation. • Reaction Series • Protein Molecular Structure • Protein Classification. • Organization of Protein Structures • Biomembrane • Definition of Bio membrane. • Biomembrane Characteristics & Functions • Biomembrane Models • Biosynthesis Biomembrane • Function of Phospholipids in Biomembranes • Biomembrane Properties • Membrane Fluidity • Transport Through Biomembran • Active Transport • Passive Transport • Transport Facilitated. • Energy in the Transport Process 															
Study / exam achievements:	<p>Attitude assessment is carried out at each meeting by observation and/or self-assessment techniques using the assumption that basically every student has a good attitude. The student is marked very good or not good attitude if they show it significantly compared to other students in general. The result of attitude assessment is not taken into account in the final grades, but as one of the requirements to pass the course. Students will pass from this course if at least have a good attitude. The final mark will be weight as follow:</p> <table border="1" data-bbox="644 1518 1431 1765"> <thead> <tr> <th>No</th> <th>CO</th> <th>Assessment Object</th> <th>Assessment Technique</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CO1, CO2, CO3.</td> <td>a. Participation b. Assignment c. Mid-term exam d. Final Exam</td> <td>Presentation / written test</td> <td>5% 25% 30% 40%</td> </tr> <tr> <td colspan="4" style="text-align: right;">Total</td> <td>100%</td> </tr> </tbody> </table>	No	CO	Assessment Object	Assessment Technique	Weight	1	CO1, CO2, CO3.	a. Participation b. Assignment c. Mid-term exam d. Final Exam	Presentation / written test	5% 25% 30% 40%	Total				100%
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1	CO1, CO2, CO3.	a. Participation b. Assignment c. Mid-term exam d. Final Exam	Presentation / written test	5% 25% 30% 40%												
Total				100%												
Forms of media:	Handout, Board, LCD Projector, Laptop/Computer, Module															
References:	<ol style="list-style-type: none"> 1. Spencer L. Seager, 2017, Chemistry for Today: General, Organic, and Biochemistry, 9th Ed, Cengage Learning 2. John Kuriyan, Boyana Konforti, et al., 2012, The Molecules of Life: Physical and Chemical Principles, 1st ed, Garland Science 3. Winzor, D.J., 2016, Six decades of research in physical biochemistry. <i>Biophys Rev</i> 8, 279–281 															

	<p>4. Sefater Gbashi, Oluwafemi Ayodeji Adebo, Lizelle Piater, Ntakadzeni Edwin Madala & Patrick Berka Njobeh, 2017, Subcritical Water Extraction of Biological Materials, <i>Separation & Purification Reviews</i>, 46:1, 21-34</p> <p>5. Das Salirawati. (2001). <i>Diktat Kuliah: Biokimia Fisik</i>. Yogyakarta; FMIPA – UNY</p> <p>6. Boyer, P.D., et. al. (1977). <i>Oxidative Phosphorylation and Photophosphorylation</i>. <i>Ann. Rev. of Biochemistry</i>. 46, 955 – 1026.</p> <p>7. Edsal and Wyman. (1977). <i>Biophysical Chemistry</i>. London: The Macmillan Co.</p> <p>8. West, E. S., et. al. (1970). <i>Textbook of Biochemistry</i>. London: The Macmillan Co., Colier-Macmillan Limited.</p> <p>9. Muhamad Wirahadikusumah. (1985). <i>Biokimia: Metabolisme energi, karbohidrat, dan Lipid</i>. Bandung: ITB.</p> <p>10. Muhamad Wirahadikusumah. (1989). <i>Biokimia: Protein, enzim, dan asam nukleat</i>. Bandung: ITB.</p>
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PLO and CO mapping

	PLO										
	Attitude	General Skill			Knowledge				Specific Skill		
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	
CO1					√						
CO2											
CO3							√			√	