



MODULE HANDBOOK ANATOMY AND PHYSIOLOGY






**BACHELOR DEGREE PROGRAM
DEPARTMENT OF BIOMEDICAL ENGINEERING
FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS
TECHNOLOGY**

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

ENDORSEMENT PAGE



MODULE HANDBOOK
Anatomy and Physiology
DEPARTMENT OF BIOMEDICAL ENGINEERING
 INSTITUT TEKNOLOGI SEPULUH NOPEMBER
 Number : 6817/IT2.IX.5.1.2/B/PP.03.00.00/2023

Proses <i>Process</i>	Penanggung Jawab <i>Person in Charge</i>			Tanggal <i>Date</i>
	Nama <i>Name</i>	Jabatan <i>Position</i>	Tandatangan <i>Signature</i>	
Perumus <i>Preparation</i>	Dr. Awik Puji Dyah N., M. Si	Dosen <i>Lecturer</i>	TTD	November 18, 2022
Pemeriksa dan Pengendalian <i>Review and Control</i>	Dr. Norma Hermawan, S.T., M.Sc.	Tim kurikulum <i>Curriculum team</i>		November 20, 2022
Persetujuan <i>Approval</i>	Ir. Josaphat Pramudijanto, M.Eng.	Koordinator RMK <i>Course Cluster Coordinator</i>		April 13, 2023
Penetapan <i>Determination</i>	Dr. Achmad Arifin, S.T., M.Eng.	Kepala Departemen <i>Head of Department</i>		April 17, 2023

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MODULE HANDBOOK

ANATOMY AND PHYSIOLOGY

Module name	Anatomy and Physiology	
Module level	Undergraduate	
Code	EB234101	
Course (if applicable)	Anatomy and Physiology	
Semester	First Semester (Gasal)	
Person responsible for the module	Nada Fitriyatul Hikmah, S.T., M.T.	
Lecturer		
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, mandatory , 1 st semester.	
Type of teaching, contact hours	Lectures, <60 students	
Workload	1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 3 x 60 = 180 minutes per week. 3. Private learning : 3 x 60 = 180 minutes per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.	
Mandatory prerequisites	-	
Learning outcomes and their corresponding PLOs	Course Learning Outcome (CLO) after completing this module, CLO 1: Students understand and able to explain about human body and the definition of anatomy and physiology. CLO 2: Students understand and able to explain about organization level (chemical, cellular, tissue, organ, organ system, organism level of organization). CLO 3: Students are able to explain and analyze the structure of anatomy and physiology of integumentary system, skeletal system, and muscle system.	PLO-05 PLO-06 PLO-01

	<p>CLO 4: Students are able to explain and analyze the structure of anatomy and physiology of nervous system and glandular system.</p> <p>CLO 5: Students are able to explain and analyze the structure of anatomy and physiology of digestive system and urinary system.</p> <p>CLO 6: Students are able to explain and analyze the structure of anatomy and physiology of respiratory system.</p> <p>CLO 7: Students are able to explain and analyze the structure of anatomy and physiology of cardiovascular system.</p> <p>CLO 8: Students are able to explain and analyze the structure of anatomy and physiology of lymphoid system and reproduction system.</p> <p>CLO 9: Students understand and able to explain about applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</p>	<p>PLO-01</p> <p>PLO-01</p> <p>PLO-01</p> <p>PLO-01</p> <p>PLO-01</p> <p>PLO-08</p>
Content	<p>This course studies about fundamentals of anatomy and physiology of human body start from cells to organ system. This course purposed for students to understand the fundamental of anatomy and physiology of human body and able to use that understanding in Biomedical Engineering fields.</p>	
Study and examination requirements and forms of examination	<ul style="list-style-type: none"> ● Presentation 1, 2, 3, 4, 5 ● Assignment 1, 2, 3 ● Mid-term examination ● Final examination 	
Media employed	<p>LCD, whiteboard, websites (myITS Classroom and ShareITS), zoom.</p>	
Reading list	<p>Main :</p> <ol style="list-style-type: none"> 1. Frederic H Martini et. al., Fundamentals of Anatomy and Physiology, Prentice Hall Intl. Inc., USA, 5th Ed, 2001. 2. Wynn Kapit et. al., Anatomy Coloring Book, Benjamin Cumings Science Publishing, USA, 3rd Ed, 2002. 3. Wynn Kapit et. al., Physiology Coloring Book, Benjamin Cumings Science Publishing, USA, 2nd Ed, 2000. 	

I. Rencana Pembelajaran Semester / Semester Learning Plan

		INSTITUT TEKNOLOGI SEPULUH NOPEMBER (ITS) FACULTY OF INTELLIGENT ELECTRICAL AND INFORMATICS TECHNOLOGY DEPARTMENT OF BIOMEDICAL ENGINEERING				Document Code	
		SEMESTER LEARNING PLAN					
MATA KULIAH (MK) COURSE		KODE CODE	Rumpun MK Course Cluster	BOBOT (sks) Credits		SEMESTE R	Tgl Penyusunan Compilation Date
Anatomi dan Fisiologi Anatomy and Physiology		EB234101	Biocybernetics	T=3	P=0	I	Oct 30, 2023
OTORISASI / PENGESAHAN AUTHORIZATION / ENDORSEMENT		Dosen Pengembang RPS Developer Lecturer of Semester Learning Plan		Koordinator RMK Course Cluster Coordinator		Ka DEPARTEMEN Head of Department	
		(Nada Fitrieyatul Hikmah, S.T, M.T)		(Ir. Josaphat Pramudijanto, M.Eng.)		(Dr. Achmad Arifin, S.T., M.Eng.)	
Capaian Pembelajaran		CPL-PRODI yang dibebankan pada MK PLO Program Charged to The Course					
Learning Outcomes		CPL-01 PLO-01	Mampu menerapkan Ilmu Pengetahuan Alam dan Matematika pada bidang Teknik Biomedika. <i>Able to apply Natural Sciences and Mathematics in the field of Biomedical Engineering.</i>				
		CPL-05 PLO-05	Mampu mendesain komponen, sistem, dan proses dalam bidang Teknik Biomedika yang sistematis, logis, dan realistis sesuai dengan spesifikasi yang ditentukan dengan mempertimbangkan aspek keselamatan, sosial, budaya, lingkungan, dan ekonomi dengan mengenal/memanfaatkan sumber daya lokal dan nasional dengan wawasan global. <i>Able to design components, systems, and processes in the field of Biomedical Engineering that are systematic, logical, and realistic appropriate with specified specifications by considering aspects of safety, social, cultural, environmental, and economic by recognizing / utilizing local and national resources with global insight.</i>				

	CPL-06	Mampu menerapkan ilmu pengetahuan, keterampilan, dan metode terkini dalam menyelesaikan permasalahan di bidang Teknik Biomedika.
	PLO-06	<i>Able to apply the latest knowledge, skills and methods in solving problems in the field of Biomedical Engineering.</i>
	CPL-08	Mampu bekerja dalam tim lintas disiplin dan budaya serta bertanggung jawab kepada masyarakat dan mematuhi hukum dan etika profesi dalam menyelesaikan masalah Teknik Biomedika.
	PLO-08	<i>Able to work in interdisciplinary and intercultural teams and be responsible to the community and comply with legal and professional ethics in solving Biomedical Engineering problems.</i>
Capaian Pembelajaran Mata Kuliah (CPMK) Course Learning Outcome (CLO) - If CLO as description capability of each Learning Stage in the course, then CLO = LLO		
	CP MK 1 CLO 1	Mahasiswa memahami dan mampu menjelaskan tentang tubuh manusia serta definisi dari anatomi dan fisiologi. <i>Students understand and able to explain about human body and the definition of anatomy and physiology.</i>
	CP MK 2 CLO 2	Mahasiswa memahami dan mampu menjelaskan tentang level organisasi (<i>chemical, cellular, tissue, organ, organ system, organism levels of organization</i>). <i>Students understand and able to explain about organization level (chemical, cellular, tissue, organ, organ system, organism level of organization).</i>
	CP MK 3 CLO 3	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem integumentary, sistem rangka, dan sistem otot. <i>Students are able to explain and analyze the structure of anatomy and physiology of integumentary system, skeletal system, and muscle system.</i>
	CP MK 4 CLO 4	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem syaraf dan sistem kelenjar. <i>Students are able to explain and analyze the structure of anatomy and physiology of nervous system and glandular system.</i>
	CP MK 5 CLO 5	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem pencernaan dan sistem urinary. <i>Students are able to explain and analyze the structure of anatomy and physiology of digestive system and urinary system.</i>
	CP MK 6	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem pernafasan.

	CLO 6	<i>Students are able to explain and analyze the structure of anatomy and physiology of respiratory system.</i>																																																																																								
	CP MK 7 CLO 7	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem kardiovaskular. <i>Students are able to explain and analyze the structure of anatomy and physiology of cardiovascular system.</i>																																																																																								
	CP MK 8 CLO 8	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem limpa, sistem reproduksi. <i>Students are able to explain and analyze the structure of anatomy and physiology of lymphoid system and reproduction system.</i>																																																																																								
	CP MK 9 CLO 9	Mahasiswa mampu memahami dan menjelaskan tentang <i>applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i> <i>Students understand and able to explain about applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i>																																																																																								
Peta CPL – CP MK Map of PLO - CLO	<table border="1"> <thead> <tr> <th></th> <th>CPL-01</th> <th>CPL-02</th> <th>CPL-03</th> <th>CPL-04</th> <th>CPL-05</th> <th>CPL-06</th> <th>CPL-07</th> <th>CPL-08</th> <th>CPL-09</th> <th>CPL-10</th> <th>CPL-11</th> <th>CPL-12</th> </tr> </thead> <tbody> <tr> <td>CPMK 1 / SUB CPMK 1 <i>CLO 1 / LLO 1</i></td> <td></td> <td></td> <td></td> <td></td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CPMK 2 / SUB CPMK 2 <i>CLO 2 / LLO 2</i></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CPMK 3 / SUB CPMK 3 <i>CLO 3 / LLO 3</i></td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CPMK 4 / SUB CPMK 4 <i>CLO 4 / LLO 4</i></td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CPMK 5 / SUB CPMK 5</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>													CPL-01	CPL-02	CPL-03	CPL-04	CPL-05	CPL-06	CPL-07	CPL-08	CPL-09	CPL-10	CPL-11	CPL-12	CPMK 1 / SUB CPMK 1 <i>CLO 1 / LLO 1</i>					√								CPMK 2 / SUB CPMK 2 <i>CLO 2 / LLO 2</i>						√							CPMK 3 / SUB CPMK 3 <i>CLO 3 / LLO 3</i>	√												CPMK 4 / SUB CPMK 4 <i>CLO 4 / LLO 4</i>	√												CPMK 5 / SUB CPMK 5	√											
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	CPMK 7 / SUB CPMK 7 CLO 7 / LLO 7	√												
	CPMK 8 / SUB CPMK 8 CLO 8 / LLO 8	√												
	CPMK 9 / SUB CPMK 9 CLO 9 / LLO 9							√						
Diskripsi Singkat MK Short Description of Course	<p>Mata kuliah ini berisi tentang dasar-dasar anatomi dan fisiologi tubuh manusia mulai dari tingkatan sel hingga sistem organ. Mata kuliah ini bertujuan agar mahasiswa memahami dasar anatomi dan fisiologi tubuh manusia dan mampu memanfaatkan pemahaman tersebut dalam disiplin ilmu Teknik Biomedika.</p> <p><i>This course studies about fundamentals of anatomy and physiology of human body start from cells to organ system. This course purposed for students to understand the fundamental of anatomy and physiology of human body and able to use that understanding in Biomedical Engineering fields.</i></p>													
Bahan Kajian: Materi pembelajaran Course Materials:	<ol style="list-style-type: none"> 1. Pengantar studi tentang tubuh manusia / <i>Introduction to human body</i> 2. Level organisasi (<i>chemical, cellular, tissue, organ, organ system, organism levels of organization</i>) / <i>Organization level (chemical, cellular, tissue, organ, organ system, organism levels of organization)</i>. 3. Anatomi dan fisiologi dari 11 sistem organ (sistem integumentary, sistem rangka, sistem otot, sistem syaraf, sistem kelenjar, sistem pencernaan, sistem urinary, sistem pernafasan, sistem kardiovaskular, sistem limpa, sistem reproduksi) / <i>Anatomy and physiology of 11 organ system (integumentary system, skeletal system, muscle system, nervous system, glandular system, digestive system, urinary system, respiratory system, cardiovascular system, lymphoid system, reproduction system)</i>. 													

	<p>4. <i>Applied physiology</i></p> <p>5. <i>Medical ethics</i></p> <p>6. <i>Experiment with human subject</i></p> <p>7. <i>Special topics on medical anatomy and physiology</i></p>
<p>Pustaka</p> <p>References</p>	<p>Utama / Main:</p> <ol style="list-style-type: none"> 1. Frederic H Martini et. al., Fundamentals of Anatomy and Physiology, Prentice Hall Intl. Inc., USA, 5th Ed, 2001. 2. Wynn Kapit et. al., Anatomy Coloring Book, Benjamin Cumings Science Publishing, USA, 3rd Ed, 2002. 3. Wynn Kapit et. al., Physiology Coloring Book, Benjamin Cumings Science Publishing, USA, 2nd Ed, 2000. <p>Pendukung / Supporting:</p>
<p>Dosen Pengampu</p> <p>Lecturers</p>	
<p>Matakuliah</p> <p>syarat</p> <p>Prerequisite</p>	-

Mg ke/ Week	Kemampuan akhir tiap tahap belajar (Sub- CPMK) / <i>Final ability of each learning stage (LLO)</i>	Penilaian / <i>Assessment</i>		Bentuk Pembelajaran; Metode Pembelajaran; Penugasan Mahasiswa; <i>[Estimasi Waktu] / Form of Learning; Learning Method; Student Assignment; [Estimated Time]</i>		Materi Pembelajaran <i>[Pustaka] / Learning Material [Reference]</i>	Bobot Penilaian <i>/Assess- ment Load (%)</i>
		Indikator / <i>Indicator</i>	Kriteria & Teknik / <i>Criteria & Techniques</i>	Tatap Muka / <i>In-class (5)</i>	Daring / <i>Online (6)</i>		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Mahasiswa memahami dan mampu menjelaskan tentang tubuh manusia serta definisi dari anatomi dan fisiologi. <i>Students understand and able to explain about human body and the</i>	<ul style="list-style-type: none"> • Ketepatan waktu pengumpulan tugas. • Kebenaran jawaban tugas. • Keberhasilan menjelaskan tugas dengan baik. 	Non-tes : Tugas 1 : Mengerjakan soal tentang <ul style="list-style-type: none"> • Contoh anatomi dan fisiologi pada sistem organ tertentu. • Contoh homeostatis. 	<ul style="list-style-type: none"> • Kuliah dan brainstorming , tanya jawab. [TM : 3 x 50"] [BM : 3 x 50"] [PT : 3 x 50"] • <i>Presentation and brainstorming</i> 	<ul style="list-style-type: none"> • Chatting dan diskusi dalam forum platform ITS. • <i>Chat and discussion in ITS platform forum.</i> 	<ul style="list-style-type: none"> • Pengantar anatomi dan fisiologi • Definisi anatomi dan fisiologi • Homeostasis • Review 11 sistem organ [Link materi di MyITSClassroom]	7.5

	<p><i>definition of anatomy and physiology.</i></p>	<ul style="list-style-type: none"> ● Punctuality in assignment submission. ● The correctness of the answer to the task. ● The success of explaining the task well. 	<p>Non-test : Task 1: Answering the questions about:</p> <ul style="list-style-type: none"> • Example of the anatomy and physiology of certain organ system. • Example of homeostatic. 	<p>, ask and answer. [FF : 1 x 50"] [SA : 1 x 60"] [SS : 1 x 60"]</p>	<ul style="list-style-type: none"> ● Introduction of anatomy and physiology ● Definition of anatomy and physiology ● Homeostatic ● 11 Organ system review 	
2-3	<p>Mahasiswa memahami dan mampu menjelaskan tentang level organisasi (<i>chemical, cellular, tissue, organ, organ system, organism levels of organization</i>).</p> <p><i>Students understand and able to explain about organization level (chemical, cellular, tissue, organ, organ system, organism level of organization).</i></p>	<ul style="list-style-type: none"> ● Ketepatan waktu pengumpulan tugas. ● Kebenaran jawaban tugas. ● Keberhasilan menjelaskan tugas dengan baik. Able to calculate the central tendency of a group of data. ● Punctuality in assignment submission. 	<p>Non-tes : Tugas 2 : Mengerjakan soal tentang</p> <ul style="list-style-type: none"> • Contoh level organisasi pada sistem organ tertentu. • Contoh <i>chemical, cellular, dan tissue level.</i> <p>Non-test : Task 2 : Answering the questions about</p>	<ul style="list-style-type: none"> ● Kuliah, diskusi, tanya jawab. 2 x [TM : 3 x 50"] 2 x [BM : 3 x 50"] 2 x [PT : 3 x 50"] ● Presentation, discussion, ask and answer, 	<ul style="list-style-type: none"> ● Konsep level organisasi ● <i>Chemical level of organization</i> ● <i>Cellular level of organization</i> ● <i>Tissue level of organization</i> ● <i>Concept of organization level</i> ● <i>Chemical level of organization</i> ● <i>Cellular level of organization</i> 	5

		<ul style="list-style-type: none"> • <i>The correctness of the answer to the task.</i> • <i>The success of explaining the task well.</i> 	<ul style="list-style-type: none"> • <i>Example of organization level on certain system organ.</i> • <i>Example of chemical, cellular, and tissue level.</i> 	<i>exercise, assignment</i> 2 x [FF : 3 x 50"] 2 x [SA : 3 x 50"] 2 x [SS : 3 x 50"]		<ul style="list-style-type: none"> • <i>Tissue level of organization</i> 	
4 - 5	<p>Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem integumentary, sistem rangka, dan sistem otot.</p> <p><i>Students are able to explain and analyze the structure of integumentary system, skeletal system, and muscle system.</i></p>	<ul style="list-style-type: none"> • Ketepatan dalam menjelaskan pemahaman konsep. • Keberhasilan menjelaskan presentasi dengan baik. • Kelengkapan dan kerapian hasil laporan presentasi. • <i>The accuracy of explaining concept understanding.</i> • <i>The success of explaining the presentation well.</i> • The comprehensiveness and neatness of the 	<p>Non-test : Presentasi 1 : Presentasi tentang sistem integumentary, sistem rangka, dan sistem otot.</p> <p>Non-test : Presentation 1 : Presentation about integumentary system, skeletal system and muscle system.</p>	<ul style="list-style-type: none"> • Kuliah, diskusi, tanya jawab. 2 x [TM : 3 x 50"] 2 x [BM : 3 x 50"] 2 x [PT : 3 x 50"] • Presentation, discussion, ask and answer. 2 x [FF : 3 x 50"] 2 x [SA : 3 x 50"] 2 x [SS : 3 x 50"] 		<ul style="list-style-type: none"> • Sistem integumentary • Sistem rangka : jaringan <i>osseous</i>, struktur tulang, <i>axial skeleton</i>, <i>appendicular skeleton</i>, artikulasi. • Sistem otot : jaringan otot, sistem otot. • <i>Integumentary system</i> • <i>Skeletal system: osseous tissue, bone structure, axial skeleton, appendicular</i> 	5

		result of presentation report.				<i>skeleton, and articulation.</i>	
6	<p>Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem syaraf dan sistem kelenjar</p> <p><i>Students are able to explain and analyze the structure of anatomy and physiology of nervous system and glandular system.</i></p>	<ul style="list-style-type: none"> ● Ketepatan dalam menjelaskan pemahaman konsep. ● Keberhasilan menjelaskan presentasi dengan baik. ● Kelengkapan dan kerapian hasil laporan presentasi. <ul style="list-style-type: none"> ● <i>The accuracy of explaining concept understanding.</i> ● <i>The success of explaining the presentation well.</i> ● <i>The comprehensiveness and neatness of the result of presentation report.</i> 	<p>Non-tes : Presentasi 2 : Presentasi tentang sistem saraf dan sistem kelenjar.</p> <p>Non-test : Presentasi 2 : Presentation about nervous system and glandular system.</p>	<ul style="list-style-type: none"> ● Kuliah, diskusi, tanya jawab. [TM : 3 x 50"] [BM : 3 x 50"] [PT : 3 x 50"] ● <i>Presentation, discussion, ask and answer.</i> [FF : 3 x 50"] [SA : 3 x 50"] [SS : 3 x 50"] 		<ul style="list-style-type: none"> ● Sistem syaraf : jaringan syaraf, <i>spinal cord, spinal nerves, spinal reflexes, brain and cranial nerves.</i> ● Sistem kelenjar endokrin. ● <i>Nervous system: nervous tissue, spinal cord, spinal nerves, spinal reflexes, brain and cranial nerves.</i> ● <i>Endocrine glandular system.</i> 	5
7	<p>Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari</p>	<ul style="list-style-type: none"> ● Ketepatan dalam menjelaskan pemahaman konsep. 	<p>Non-tes : Presentasi 3 : Presentasi tentang sistem</p>	<ul style="list-style-type: none"> ● Kuliah, diskusi, tanya jawab. [TM : 3 x 50"] 		<ul style="list-style-type: none"> ● Sistem pencernaan: organ pencernaan, 	5

	<p>sistem pencernaan dan sistem urinary.</p> <p><i>Students are able to explain and analyze the structure of anatomy and physiology of digestive system and urinary system.</i></p>	<ul style="list-style-type: none"> ● Keberhasilan menjelaskan presentasi dengan baik. ● Kelengkapan dan kerapian hasil laporan presentasi. ● <i>The accuracy of explaining concept understanding.</i> ● <i>The success of explaining the presentation well.</i> ● <i>The comprehensiveness and neatness of the result of presentation report.</i> 	<p>pencernaan dan sistem urinary.</p> <p>Non-test : Presentation 3 : <i>Presentation about digestive system and urinary system.</i></p>	<p>[BM : 3 x 50"] [PT : 3 x 50"]</p> <ul style="list-style-type: none"> ● <i>Presentation, discussion, ask and answer.</i> [FF : 3 x 50"] [SA : 3 x 50"] [SS : 3 x 50"] 	<p>saluran pencernaan, dsb.</p> <ul style="list-style-type: none"> ● Sistem urinary: jaringan dan organ pada sistem urinary, mekanisme urinary. ● Digestive system: digestive organ, digestive tract, etc. ● Urinary system: tissue and organ in urinary system, urinary mechanism. 	
8	EVALUASI TENGAH SEMESTER MID-SEMESTER EXAM					22.5
9	<p>Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem pernafasan dan sistem kardiovaskular.</p>	<ul style="list-style-type: none"> ● Ketepatan dalam menjelaskan pemahaman konsep. ● Keberhasilan menjelaskan 	<p>Non-tes : Presentasi 4 : Presentasi tentang sistem pernafasan dan</p>	<ul style="list-style-type: none"> ● Kuliah, diskusi, tanya jawab. [TM : 3 x 50"] [BM : 3 x 50"] [PT : 3 x 50"] 	<ul style="list-style-type: none"> ● Sistem pernafasan: organ pernafasan, saluran pernafasan, 	5

	<i>Students are able to explain and analyze the structure of anatomy and physiology of respiratory system and cardiovascular system.</i>	<p>presentasi dengan baik.</p> <ul style="list-style-type: none"> ● Kelengkapan dan kerapian hasil laporan presentasi. ● <i>The accuracy of explaining concept understanding.</i> ● <i>The success of explaining the presentation well.</i> ● <i>The comprehensiveness and neatness of the result of presentation report.</i> 	<p>sistem kardiovaskular.</p> <p>Non-test : Presentation 4 : <i>Presentation about respiratory system and cardiovascular system.</i></p>	<ul style="list-style-type: none"> ● <i>Presentation, discussion, ask and answer.</i> [FF : 3 x 50"] [SA : 3 x 50"] [SS : 3 x 50"] 		<p>mekanisme pernapasan.</p> <ul style="list-style-type: none"> ● Sistem kardiovaskular: darah, jantung, pembuluh darah, komponen pada sistem kardiovaskular. ● <i>Respiratory system: respiratory organ, respiratory tract, respiratory mechanism.</i> ● <i>Cardiovascular system: blood, heart, blood vessel, component on cardiocvascular system.</i> 	
10	Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari	<ul style="list-style-type: none"> ● Ketepatan dalam menjelaskan pemahaman konsep. 	Non-tes : Presentasi 5 : Presentasi tentang sistem	<ul style="list-style-type: none"> ● Kuliah, diskusi, tanya jawab. [TM : 3 x 50"] [BM : 3 x 50"] 		<ul style="list-style-type: none"> ● Sistem limpa: limpa, imunitas, dsb ● Sistem reproduksi: organ-organ 	5


	<p>sistem limpa, sistem reproduksi.</p> <p><i>Students are able to explain and analyze the structure of anatomy and physiology of lymphoid system and reproduction system.</i></p>	<ul style="list-style-type: none"> ● Keberhasilan menjelaskan presentasi dengan baik. ● Kelengkapan dan kerapian hasil laporan presentasi. ● <i>The accuracy of explaining concept understanding.</i> ● <i>The success of explaining the presentation well.</i> ● <i>The comprehensiveness and neatness of the result of presentation report.</i> 	<p>limpa dan sistem reproduksi.</p> <p>Non-test : Presentation 4 : <i>Presentation about lymphoid system and reproduction system.</i></p>	<p>[PT : 3 x 50"]</p> <ul style="list-style-type: none"> ● <i>Presentation, discussion, ask and answer.</i> [FF : 3 x 50"] [SA : 3 x 50"] [SS : 3 x 50"] 		<p>reproduksi, mekanisme pembentukan gamet.</p> <ul style="list-style-type: none"> ● <i>Lymphoid system: lymph, immunity, etc.</i> ● <i>Reproduction system: reproduction organs, gamete forming mechanism.</i> 	
11-14	<p>Mahasiswa mampu memahami dan menjelaskan tentang <i>applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p>	<ul style="list-style-type: none"> ● Kelengkapan dan kerapian hasil resume ● Ketepatan waktu pengumpulan tugas ● Kebenaran melaksanakan tugas 	<p>Non-tes : Tugas 3: Resume tentang <i>applied physiology, medical ethics, experiment with human subject,</i></p>	<ul style="list-style-type: none"> ● Kuliah, diskusi, tanya jawab. 4 x [TM : 3 x 50"] 4 x [BM : 3 x 50"] 		<ul style="list-style-type: none"> ● <i>Applied physiology</i> ● <i>Medical ethics</i> ● <i>Experiment with human subject</i> ● <i>Special topics on medical anatomy and physiology.</i> 	10

	<p><i>Students understand and able to explain about applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p>	<ul style="list-style-type: none"> ● Keberhasilan menjelaskan tugas ● <i>The comprehensiveness and neatness of the result of resume</i> ● <i>Punctuality in assignment submission</i> ● <i>The correctness while doing the task</i> ● <i>The success of explaining the task well.</i> 	<p><i>special topics on medical anatomy and physiology.</i></p> <p>Non-test :</p> <p>Task 3 :</p> <p><i>Make resume about applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p>	<p>4 x [PT : 3 x 50"]</p> <ul style="list-style-type: none"> ● <i>Presentation, discussion, ask and answer.</i> <p>4 x [FF : 3 x 50"]</p> <p>4 x [SA : 3 x 50"]</p> <p>4 x [SS : 3 x 50"]</p>			
15-16	EVALUASI AKHIR SEMESTER FINAL-SEMESTER EXAM						30

TM=Tatap Muka, **PT**=Penugasan Terstruktur, **BM**=Belajar Mandiri.

FF = Face to Face, **SA** = Structured Assignment, **SS** = Self Study.

II. Rencana Asesmen & Evaluasi (RAE) / *Assessment & Evaluation Plan*

	ASSESSMENT & EVALUATION PLAN BACHELOR DEGREE PROGRAM OF BIOMEDICAL ENGINEERING - FTEIC ITS Course : Anatomy and Physiology		RA&E
			Write Doc Code
Kode/code: EB234101	Bobot sks/credits (T/P): 3/0	Rumpun MK: Biocybernetics Course Cluster: Biocybernetics	Smt: I
OTORISASI AUTHORIZATION	Penyusun RA & E <i>Compiler A&EP</i> Nada Fitriyatul H, S.T, M.T	Koordinator RMK <i>Course Cluster Coordinator</i> Ir. Josaphat Pramudijanto, M.Eng.	Ka DEP <i>Head of DEP</i> Dr. Achmad Arifin, S.T., M.Eng.

Mg ke/ Wee k (1)	Sub CP-MK / <i>Lesson Learning Outcomes (LLO)</i> (2)	Bentuk Asesmen (Penilaian) <i>Form of Assessment</i> (3)	Bobot / Load (%) (4)
1	Sub CP-MK 1: Mahasiswa memahami dan mampu menjelaskan tentang tubuh manusia serta definisi dari anatomi dan fisiologi. LLO 1: <i>Students understand and able to explain about human body and the definition of anatomy and physiology.</i>	Non-tes : Tugas 1 : Mengerjakan soal tentang <ul style="list-style-type: none"> • Contoh anatomi dan fisiologi pada sistem organ tertentu. • Contoh homeostatis. Tes: ETS Soal 1 dan Soal 2 (1.3% dari ETS 22.5%) Non-test : Task 1: <i>Answering the questions about:</i> <ul style="list-style-type: none"> • <i>Example of the anatomy and physiology of certain organ system.</i> • <i>Example of homeostatic.</i> Test: <i>Question 1 and Question 2 in Mid Exam (1.3% of Mid Exam 22.5%)</i>	7.5
2-3	Sub CP-MK 2: Mahasiswa memahami dan	Non-tes : Tugas 2 : Mengerjakan soal tentang	5

	<p>mampu menjelaskan tentang level organisasi (<i>chemical, cellular, tissue, organ, organ system, organism levels of organization</i>).</p> <p>LLO 2: <i>Students understand and able to explain about organization level (chemical, cellular, tissue, organ, organ system, organism level of organization).</i></p>	<ul style="list-style-type: none"> • Contoh level organisasi pada sistem organ tertentu. • Contoh <i>chemical, cellular, dan tissue level</i>. <p>Tes: ETS Soal 3 dan Soal 4 (1.2% dari ETS 22.5%)</p> <p>Non-test : Task 2 : <i>Answering the questions about</i></p> <ul style="list-style-type: none"> • <i>Example of organization level on certain system organ.</i> • <i>Example of chemical, cellular, and tissue level.</i> <p>Test: <i>Question 3 and Question 4 in Mid Exam (1.2% of Mid Exam 22.5%)</i></p>	
4-5	<p>Sub CP-MK 3: Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem integumentary, sistem rangka, dan sistem otot.</p> <p>LLO 3: <i>Students are able to explain and analyze the structure of anatomy and physiology of integumentary system, skeletal system, and muscle system.</i></p>	<p>Non-tes : Presentasi 1 : Presentasi tentang sistem integumentary, sistem rangka, dan sistem otot.</p> <p>Tes: ETS Soal 5 sampai dengan Soal 13 (5.4% dari ETS 22.5%) EAS Soal 1 sampai dengan Soal 9 (7.2% dari EAS 30%)</p> <p>Non-test : Presentation 1 : <i>Presentation about integumentary system, skeletal system and muscle system.</i></p> <p>Test: <i>Question 5 until Question 13 in Mid Exam (5.4% of Mid Exam 22.5%)</i> <i>Question 1 until Question 9 in Final Exam (7.2% of Final Exam 30%)</i></p>	5
6	<p>Sub CP-MK 4: Mahasiswa mampu</p>	<p>Non-tes : Presentasi 2 : Presentasi tentang sistem saraf dan sistem kelenjar.</p>	5

	<p>menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem syaraf dan sistem kelenjar</p> <p>LLO 4: <i>Students are able to explain and analyze the structure of anatomy and physiology of nervous system and glandular system.</i></p>	<p>Tes: ETS Soal 14 sampai dengan Soal 18 (3.6% dari ETS 22.5%) EAS Soal 10 sampai dengan Soal 15 (4.8% dari EAS 30%)</p> <p>Non-test : Presentation 2 : <i>Presentation about nervous system and glandular system.</i></p> <p>Test: <i>Question 14 until Question 18 in Mid Exam (3.6% of Mid Exam 22.5%) Question 10 until Question 15 in Final Exam (4.8% of Final Exam 30%)</i></p>	
7	<p>Sub CP-MK 5: Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem pencernaan dan sistem urinary.</p> <p>LLO 5: <i>Students are able to explain and analyze the structure of anatomy and physiology of digestive system and urinary system.</i></p>	<p>Non-tes : Presentasi 3 : Presentasi tentang sistem pencernaan dan sistem urinary.</p> <p>Tes: ETS Soal 18 sampai dengan Soal 23 (3.6% dari ETS 22.5%) EAS Soal 16 sampai dengan Soal 21 (4.8% dari EAS 30%)</p> <p>Non-test : Presentation 3 : <i>Presentation about digestive system and urinary system.</i></p> <p>Test: <i>Question 18 until Question 23 in Mid Exam (3.6% of Mid Exam 22.5%) Question 16 until Question 21 in Final Exam (4.8% of Final Exam 30%)</i></p>	5
8	<p>Evaluasi Tengah Semester</p> <p>Mid Exam</p>	<p>Tes: Ujian Tulis/Ujian Daring</p> <p>Test: <i>Writing Exams / Online Exams</i></p>	22.5

9	<p>Sub CP-MK 6-7: Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem pernafasan dan sistem kardiovaskular.</p> <p>LLO 6-7: <i>Students are able to explain and analyze the structure of anatomy and physiology of respiratory system and cardiovascular system.</i></p>	<p>Non-tes : Presentasi 4 : Presentasi tentang sistem pernafasan dan sistem kardiovaskular. Tes: ETS Soal 24 sampai dengan Soal 29 (3.8% dari ETS 22.5%) EAS Soal 22 sampai dengan Soal 27 (4.8% dari EAS 30%)</p> <p>Non-test : Presentation 4 : <i>Presentation about respiratory system and cardiovascular system.</i> Test: <i>Question 24 until Question 29 in Mid Exam (3.8% of Mid Exam 22.5%)</i> <i>Question 22 until Question 27 in Final Exam (4.8% of Final Exam 30%)</i></p>	5
10	<p>Sub CP-MK 8: Mahasiswa mampu menjelaskan dan menganalisa susunan anatomi dan fisiologi dari sistem limpa, sistem reproduksi.</p> <p>LLO 8: <i>Students are able to explain and analyze the structure of anatomy and physiology of lymphoid system and reproduction system.</i></p>	<p>Non-tes : Presentasi 5 : Presentasi tentang sistem limpa dan sistem reproduksi. Tes: ETS Soal 30 sampai dengan Soal 35 (3.6% dari ETS 22.5%) EAS Soal 28 sampai dengan Soal 33 (4.8% dari EAS 30%)</p> <p>Non-test : Presentation 4 : <i>Presentation about lymphoid system and reproduction system.</i> Test: <i>Question 30 until Question 35 in Mid Exam (3.6% of Mid Exam 22.5%)</i> <i>Question 28 until Question 33 in Final Exam (4.8% of Final Exam 30%)</i></p>	5
11-14	<p>Sub CP-MK 9: Mahasiswa mampu memahami dan</p>	<p>Non-tes : Tugas 3:</p>	10

	<p>menjelaskan tentang <i>applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p> <p>LLO 9: Students understand and able to explain about <i>applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p>	<p>Resume tentang <i>applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p> <p>Tes: EAS Soal 34 sampai dengan Soal 37 (3.6% dari EAS 30%)</p> <p>Non-test : Task 3 : <i>Make resume about applied physiology, medical ethics, experiment with human subject, special topics on medical anatomy and physiology.</i></p> <p>Test: <i>Question 34 until Question 37 in Final Exam (3.6% of Final Exam 30%)</i></p>	
15-16	<p>Evaluasi Akhir</p> <p>Final Exam</p>	<p>Tes: Ujian Tulis/Ujian Daring</p> <p>Test: <i>Writing Exams / Online Exams</i></p>	30
Total bobot penilaian Total assessment load			100%

● **Indikator Pencapaian CPL Pada MK / Indicator of PLO achievement charged to the course**

CPL yang dibebankan pada MK / PLO charged to the course	CPMK / Course Learning Outcome (CLO)	Minggu ke / Week	Bentuk Asesmen / Form of Assessment	Bobot / Load (%)
CPL-01 / PLO-01	CPMK 3 / CLO 3	Week- 4-5	Presentation 1	5
		Week- 8	Mid Exam Question 5-13	5.4
		Week- 16	Final Exam Question 1-9	7.2
	CPMK 4 / CLO 4	Week- 6	Presentation 2	5
		Week- 8	Mid Exam Question 14-18	3.6
		Week- 16	Final Exam Question 10-15	4.8
	CPMK 5 / CLO 5	Week- 7	Presentation 3	5
		Week- 8	Mid Exam Question 18-23	3.6
		Week- 16	Final Exam Question 16-21	4.8
	CPMK 6-7 / CLO 6-7	Week- 9	Presentation 4	5
		Week- 8	Mid Exam Question 24-29	3.8
		Week- 16	Final Exam Question 22-27	4.8
	CPMK 8 / CLO 8	Week- 10	Presentation 5	5
		Week- 8	Mid Exam Question 30-35	3.6
		Week- 16	Final Exam Question 28-33	4.8
CPL-05 / PLO-05	CPMK 1 / CLO 1	Week- 1	Task 1	7.5
		Week- 8	Mid Exam Question 1 and 2	1.3
CPL-06 / PLO-06	CPMK 2 / CLO 2	Week- 2-3	Task 2	5
		Week- 8	Mid Exam Question 3 and 4	1.2
CPL-08 / PLO-08	CPMK 9 / CLO 9	Week- 11-14	Task 3	10
		Week- 16	Final Exam Question 34-37	3.6
				Σ = 100%

No	Form of Assessment	PLO-01	PLO-02	PLO-03	PLO-04	PLO-05	PLO-06	PLO-07	PLO-08	PLO-09	PLO-10	PLO-11	PLO-12	Total
1	Task 1					0.075								0.075
2	Task 2						0.05							0.05
3	Task 3								0.1					0.1
4	Presentation 1	0.05												0.05
5	Presentation 2	0.05												0.05
6	Presentation 3	0.05												0.05
7	Presentation 4	0.05												0.05
8	Presentation 5	0.05												0.05
9	Mid Exam	0.2				0.013	0.012							0.225
10	Final Exam	0.264							0.036					0.3
	Total	0.714				0.088	0.062		0.136					1

