



P.O	PLO-8	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-15		
PO-16		

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

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

**Short Course Description**

This lecture examines the structure and development of each tissue and organ that makes up the body system of invertebrate animals, as well as the organs that make up the body system of vertebrate animals, the ontogeny of organs which include the skeletal, muscle, integumentary, digestive, respiratory, circulatory, endocrine, uroepotic, reproductive systems. , nerves and senses. This study This course is delivered theoretically and practically using lecture, discussion, question and answer, observation methods. And a simple project

**References**

**Main :**

1. Arey, Leslie Brainerd. 1961 . Developmental Anatomy : A Textbook and Laboratory manual of Embriology. Philadelphia. 6 th ed. . W.B.Saunders Co.
2. Flore, Mariano SH., DI. 1976. Atlas of Human Histology . 4 th ed. Philadelphia. Lea & Fibicer.
3. Hildebrand, Milton dan George Goslow. 2001. Analysis of Vertebrate Structure . 5 th ed New York : John Wiley & Sons. Inc.
4. Kardong V Kenneth.,2006. Vertebrate: Comparative Anatomy,Function,Evolution, New York : Mc Graw Hill.
5. Kent. George.C., 1987. Comperative Anatomy of the VERTEBRATA. Toronto : Times Mirror/Mosby.
6. Moment, Gairdner B. 1967. General Zoology . 2 th ed. Boston. Houghton Mifflin Company.
7. Parker, T.J. , Haswell. 1967. A Text Book of Zoology. London. 6 th ed. Macmillan & Co. Ltd.
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9. Alih bahasa Indriati. Editor Joko Suyono. Jakarta. Edisi
10. . EGC.

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Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [ Estimated time]		Learning materials [ References ]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline ( offline )	Online ( online )		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	a. Understand the principles of layout and direction of animal bodies, the basics of naming organs and the relationship between anatomy and the principles of other applied sciences a. Understand the basic tissues that make up organs b. Understand the basic tissues that make up organs	<ul style="list-style-type: none"> <li>- Differentiate the direction and layout of organs based on the principle of direction of movement</li> <li>- Identify the direction and layout of organs</li> <li>- Explain the basics of naming organs based on organ systems</li> <li>- Connect the role of anatomy in other applied sciences</li> </ul>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.correct analysis of the direction and layout of organs based on the principle of direction of movement</li> <li>2.correctness of image analysis by identifying the direction and layout of organs</li> <li>3.concludes the solution to the problem of naming Latin organs</li> </ol> <p><b>Forms of Assessment :</b> Participatory Activities, Project Results Assessment / Product Assessment</p>	observing cases, solving cases and concluding cases by presenting 4 X 50		<p><b>Material:</b> Basic principles of body layout and direction a) Invertebrate animals b) Vertebrate animals 2. Basics of naming organs based on organ systems 3. <b>Library science relationships:</b> Hildebrand, Milton and George Goslow. 2001. <i>Analysis of Vertebrate Structure. 5 th ed</i> New York : John Wiley &amp; Sons. Inc.</p>	5%
2	Understand the basic concepts of anatomy, physiology, and histology of the muscular system and muscle development in general	<ul style="list-style-type: none"> <li>- Explain the direction and layout of porifera, colenterata, and vermes</li> <li>- Identify the organs of porifera, colenterata, and vermes</li> <li>- Distinguish between organs and organ systems in porifera, colenterata, and vermes</li> <li>- Conclude the relationship between organ systems in porifera, colenterata, and vermes</li> </ul>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.make a table of direction and layout, organs and organ systems of porifera, colenterata, and vermes</li> <li>2.create articles on the theme of the problem being solved</li> </ol> <p><b>Form of Assessment :</b> Project Results Assessment / Product Assessment, Portfolio Assessment</p>	4 X 50	Presentation, Discussion and reflection Practical work to solve problems	<p><b>Material:</b> organs and organ systems of porifera, colenterata, and vermes <b>Reference:</b> Moment, Gairdner B. 1967. <i>General Zoology. 2nd ed.</i> Boston. Houghton Mifflin Company.</p>	5%
3	Understand the comparison and anatomical development of the Triploblastic group of invertebrate animal phylum	<ol style="list-style-type: none"> <li>1.Drawing observations</li> <li>2.Solve problems from development cases by telling them in an article</li> </ol>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1.the truth of the conceptual content of the image and image description</li> <li>2.the truth of problem solving</li> <li>3.article truth and problem solving innovation</li> </ol> <p><b>Forms of Assessment :</b> Project Results Assessment / Product Assessment, Practical Assessment</p>	Presentation discussion, practical work, problem solving 4 X 50			5%
4	Understand the comparative anatomy of the Triploblastic group of invertebrate animal phylum	<ul style="list-style-type: none"> <li>- Explain the direction and layout of Insects and Echinodermata</li> <li>- Identify the organs of Insects and Echinodermata</li> <li>- Distinguish between organs and organ systems in Insects and Echinodermata</li> <li>- Conclude the relationship between the organ systems of Insects and Echinodermata</li> </ul>	<p><b>Form of Assessment :</b> Participatory Activities</p>	discussion, problem solving, practical work, presentation 4 X 50			0%
5	USS-1 Material Structure and development of Invertebrates		<p><b>Form of Assessment :</b> Practical Assessment</p>	4 X 50			2%

6	Understanding the structure and ontogeny of bones and skeletal systems in the 5 phylum of vertebrate animals	<ul style="list-style-type: none"> <li>- Conclude the differences in the histological anatomy of hard bones and cartilage</li> <li>- Analyze the general ontogeny of vertebrate animal bones</li> <li>- Identify the differences in the bones of the upper limbs and lower limbs in 5 phylum of verteberata</li> <li>- Identify the differences in the bones of the axial skeleton (cranium) in 5 phylum of verteberata</li> <li>- Identify differences in bones axial (chest part) in 5 phylum vertebrates</li> </ul>	<b>Form of Assessment</b> : Practical Assessment	DiscussionPerformance PresentationProblem solving 4 X 50			2%
7	Understand the simple anatomy and ontogeny of the vertebrate muscular system	<ul style="list-style-type: none"> <li>- Explain the differences in structure of 3 types of muscles</li> <li>- Explain several terms related to muscle cells</li> <li>- Summarize the ontogeny of muscle cell tissue in vertebrate animals</li> <li>- Summarize the structure of striated muscle tissue starting from cells to form large bundles</li> <li>- Analyze the arrangement of myofibrils</li> <li>- Summarize the meaning of origo and insertion</li> <li>- Analyze examples of origo and insertion</li> <li>- Inferring the type of striated muscle tissue that is the main constituent of certain parts of the body</li> <li>- Identifying how to name striated muscles</li> <li>- Inferring the structure of skeletal muscles in fish</li> <li>- Inferring the characteristics of limb muscles in frogs</li> <li>- Inferring the characteristics of the arrangement of limb muscles in snakes</li> <li>- Inferring the characteristics of the arrangement of muscles extremities on aves</li> </ul>	<b>Form of Assessment</b> : Participatory Activities	DiscussionProblem solving Performance 4 X 50			5%
8	UTS		<b>Form of Assessment</b> : Participatory Activities	4 X 50			10%

9	Understand the anatomy and development of the digestive tract and digestive glands in the 5 phylum of vertebrate animals	<p>1. Summarizing the ontogeny of digestion in a simple way · Concluding the principles of differences in digestive tract and gland areas · Identifying differences in organs in the 5 phylum of verteberata · Identifying differences in organs in the 5 phylum of verteberata · Identifying differences in organs in the 5 phylum of verteberata · Identifying differences in organs in the defecation area in 5</p> <p>2. Summarizes the development of organs from simple to complex origins in vertebrate animals</p>	<p><b>Criteria:</b></p> <ol style="list-style-type: none"> <li>1. observing specimen media and being able to draw</li> <li>2. create a portfolio of observation discussion results</li> <li>3. present the results of observations</li> </ol> <p><b>Form of Assessment :</b> Portfolio Assessment, Practice / Performance</p>	<p>Problem solving Presentation Discussion 4 X 50</p>		<p><b>Material:</b> digestive system <b>Bibliography:</b> <i>Hildebrand, Milton and George Goslow. 2001. Analysis of Vertebrate Structure. 5 th ed New York : John Wiley &amp; Sons. Inc.</i></p> <hr/> <p><b>Material:</b> anatomy of the digestive glands <b>Reference:</b> <i>Kardong V Kenneth., 2006. Vertebrates: Comparative Anatomy, Function, Evolution, New York : Mc Graw Hill.</i></p> <hr/> <p><b>Material:</b> digestive tract <b>Reference:</b> <i>Kent. George.C., 1987. Comparative Anatomy of the VERTEBRATES. Toronto : Times Mirror/Mosby.</i></p>	14%
10	Understand the anatomy and development of the nervous system	<ul style="list-style-type: none"> <li>- Explain the basic structure of nerve cells</li> <li>- Explain the types of nerve cells</li> <li>- Make a conceptual map of the division of the nervous system</li> <li>- Identify the parts of the brain</li> <li>- Identify the cerebral region based on its function</li> <li>- Summarize the differences in brain anatomy in various vertebrate animals</li> <li>- Explain the types of brain protection</li> <li>- Identify the parts from the spinal cord</li> <li>- Explain the components of peripheral nerves</li> <li>- Relate the relationship between impulses- receptors- peripheral nerves</li> <li>- central nerves</li> </ul>	<p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Discussion Problem solving Presentation 4 X 50</p>			5%

11	Understand the anatomy and development of the senses in vertebrates	<ul style="list-style-type: none"> <li>· Explain the structure of receptors</li> <li>· Identify the parts of the eye</li> <li>· Explain the cells that make up the retina</li> <li>· Explain the parts of the eye through which light enters the eye in sequence</li> <li>· Identify the structure of the pupil</li> <li>· Summarize the structural characteristics of the eye in various vertebrate animals</li> <li>· Identify the parts of the sense of hearing</li> <li>· Write down the regional divisions of the sense of hearing</li> <li>· Write down the areas that contain balance control and the auditory nerve</li> <li>· Explain the differences in the characteristics of the sense of hearing organ in various vertebrates</li> <li>· Identify the parts of the sense of smell</li> </ul>	<b>Form of Assessment</b> : Participatory Activities	Receptor senses Sense of sight Sense of hearing Sense of smell Sense of taste 4 X 50			0%
12	Understand the anatomy and development of the endocrine system in vertebrates	<ul style="list-style-type: none"> <li>· Identify the basic structure of the endocrine glands</li> <li>· Summarize the parts of the liver and relate them to their functions</li> <li>· Identify the parts of the pancreas and relate them to their functions</li> <li>· Summarize the different characteristics of the pancreas in vertebrates</li> <li>· Identify the structure of the thyroid gland</li> <li>· Summarize the different characteristics of the thyroid gland in vertebrates</li> <li>· Identify the parts of the hypothalamus gland</li> <li>· Describe the parts of the pituitary gland</li> </ul>	<b>Form of Assessment</b> : Participatory Activities	DiscussionPresentation Performance 4 X 50			2%
13	Understand the anatomy and development of the excretory system (urinary)	<ul style="list-style-type: none"> <li>· Explain the basic shape of the kidney</li> <li>· Identify the parts of the kidney</li> <li>· Explain the structure of the glomerulus and relate it to its function</li> <li>· Write down the types of tubules that make up the kidney</li> <li>· Explain the types of kidneys in various vertebrate animals</li> <li>· Identify the excretory ducts</li> <li>· Explain the different characteristics of the excretory ducts in vertebrates</li> </ul>	<b>Form of Assessment</b> : Participatory Activities	Discussion Presentation Study of 4 X 50 articles			0%

14	<p>1. Understand and identify the topography, anatomy, physiology of the Pisces animal organ system</p> <p>2. Understand and identify topography, anatomy, physiology of amphibian animal organ systems</p> <p>3. Understand and identify topography, anatomy, physiology of reptilian organ systems</p>	<p>1. Identify the developmental structures of vertebrate animals (pisces, amphibians, reptiles)</p> <p>2. Determine and differentiate the organ systems of vertebrate animals (pisces, amphibians, reptiles)</p>	<p><b>Forms of Assessment :</b> Participatory Activities, Portfolio Assessment, Practical Assessment, Practical / Performance, Tests</p>	<p>- Conduct discussions on topography, anatomy, physiology of organ systems of vertebrate animals (pisces, amphibians, reptiles)</p> <p>- Conduct dissections of vertebrate animals (pisces, amphibians, reptiles)</p> <p>- Identify the developmental structures of vertebrate animals (pisces, amphibians, reptiles)</p> <p>4 X 50</p>			50%
15	<p>1. Understand and identify topography, anatomy, physiology of aves animal organ systems</p> <p>2. Understand and identify topography, anatomy, physiology of mammalian animal organ systems</p>	<p>Identify the developmental structures of vertebrate animals (pisces, amphibians, reptiles)</p>	<p><b>Forms of Assessment :</b> Participatory Activities, Portfolio Assessment, Practical Assessment, Tests</p>	<p>- Conduct discussions on topography, anatomy, physiology of organ systems of vertebrate animals (aves and mammals)</p> <p>- Conduct dissections of vertebrate animals (aves and mammals)</p> <p>- Identify the developmental structures of vertebrate animals (aves and mammals)</p> <p>4 X 50</p>			50%
16			<p><b>Form of Assessment :</b> Test</p>				30%

#### Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	47%
2.	Project Results Assessment / Product Assessment	7.5%
3.	Portfolio Assessment	32%
4.	Practical Assessment	29%
5.	Practice / Performance	17%
6.	Test	52.5%
		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.
- 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.
- Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- Forms of assessment:** test and non-test.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.

