UNIVERSITAS SEBELAS MARET
FACULTY OF TEACHER TRAINING AND EDUCATION
BACHELOR OF BIOLOGY EDUCATION STUDY PROGRAM
Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Kentingan Surakarta 57126 Indonesia
E-mail: biologi@fkip.uns.ac.id; Website: https://biologi.fkip.uns.ac.id/en/

Classification and Biodiversity of Vertebrate

Undergraduate Programme in Biology Education **Module Handbook**

Module Name	Classification and Biodiversity of Vertebrate (Keanekaragaman dan Klasifikasi Vertebrata)
Module level	Undergraduate Programme
Course Code	02013143003
Abbreviation, if applicable	-
Courses included in the module, if applicable	-
Semester/Term	3rd
Module coordinator (s)	Dr. Muzzazinah, M. Si
Lecturer (s)	Puguh Karyanto, S. Si, M. Si, Ph. D Dr. Sri. Dwiastuti, M. Si
Language	Bahasa Indonesia (Indonesian Language)
Classification within the curriculum	Compulsory/~~Elective~~
Teaching format/class hours per week during the semester	**Direct instruction/face to face/blended learning: 26.7 hours/ Week:** lecture, discussion, field study **Structured Activity: 32 hours / Week** (Through the case method with analysis of journal articles, students learn Biology information about Vertebrate) **Self-study Activity: 32 hours / Week** (Students learn vertebrate classis from various sources) **Practicum in laboratory:** Laboratory activity: 10 topic/week x 170 minute = 1700 minutes Hour = 1700 minutes/60 minute = 28.3 h/week
Workload	
Credit Points	3 CSU (4.5 ECTS)
Requirements	Has taken courses in Diversity and Classification of Invertebrates

Type	**CSU**	**Face to Face**	**Structured Activities**	**Self-study**
T	2	26.7h (1.00 ECTS)	32h (1.21 ECTS)	32h (1.21 ECTS)
P	1	28.3 h(1.07 ECTS)		
Total	3	119 h (4.5 ECTS)		

UNIVERSITAS SEBELAS MARET
FACULTY OF TEACHER TRAINING AND EDUCATION
BACHELOR OF BIOLOGY EDUCATION STUDY PROGRAM
Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Kentingan Surakarta 57126 Indonesia
E-mail: biologi@fkip.uns.ac.id; Website: https://biologi.fkip.uns.ac.id/en/

<table>
<tr>
<td>Learning goals/competencies</td>
<td>
PLO They are able to apply the basic advance knowledge in biology to solve the problem in biology.
PLO They are able to demonstrate laboratory works, design and implement the experiment based on laboratory knowledge, skills, safety, environmental issue, and social ethics problem.
PLO They are able to communicate verbal and nonverbal effectively using the proper media.
PLO They are able to demonstrate creativity, accuracy, discipline, responsibility, adaptability, have an independent initiative, autonomous learning, and do lifelong learning.

CLO 1 Students are able to reconstruct the diversity and classification of Deuterostomes in Classis Chondrichthyes and Osteichthyes. (PLO 2, PLO 6, PLO 8, PLO 10)
CLO 2 Students are able to reconstruct the diversity and classification of Deuterostomata in herpetofauna group. (PLO 2, PLO 6, PLO 8, PLO 10)
CLO 3 Students are able to reconstruct the diversity and classification of Deuterostomes in Classis Aves. (PLO 2, PLO 6, PLO 8, PLO 10)
CLO 4 Students are able to reconstruct the diversity and classification of Deuterostomes in Classis Mammalia. (PLO 2, PLO 6, PLO 8, PLO 10)

<table>
<tr><th>CLO/ PLO</th><th>PLO 1</th><th>PLO 2</th><th>PLO 3</th><th>PLO 4</th><th>PLO 5</th><th>PLO 6</th><th>PLO 7</th><th>PLO 8</th><th>PLO 9</th><th>PLO 10</th></tr>
<tr><td>CLO1</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td><td></td><td>*</td><td></td><td>*</td></tr>
<tr><td>CLO2</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td><td></td><td>*</td><td></td><td>*</td></tr>
<tr><td>CLO3</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td><td></td><td>*</td><td></td><td>*</td></tr>
<tr><td>CLO4</td><td></td><td>*</td><td></td><td></td><td></td><td>*</td><td></td><td>*</td><td></td><td>*</td></tr>
</table>
</td>
</tr>
</table>

<table>
<tr>
<td>Content</td>
<td>
To achieve the specified learning outcomes, the study materials discussed include:
1. Developmental trend towards Deuterostomes
2. Diagnostic characteristics of Classis Chondrichthyes, Osteichthyes, Amphibians, Reptiles, Aves and Mammalia
3. Biological information (morphological, physiological, molecular characteristics and distribution of several important taxa in the SubPhylum Vertebrates.
</td>
</tr>
</table>

	The study material in the practice of Diversity and Vertebrate Classification includes the practice of studying morphology and composing phenograms on representations of Classis Chondrichthyes, Osteichthyes, Amphibians, Reptiles, Aves and mammals.
Attribute Soft skill	1. Able to think conceptually, analytically, and logically 2. Have good communication skills Able to demonstrate laboratory works, design and implement the experiment based on laboratory knowledge

Study/exam achievements:	Students are required to attend the face-to-face lecture minimum 75% to be able to take the Mid and Final exam. It is considered to complete the course and pass if students obtain at least 60% of maximum final score. The final score (FS) is calculated based on the following ratio:

Aspect	(%)
Task/quiz/presentation / laboratory activity	30
Participation	10
Mid-Term Test	30
Final Exam	30
Final Score	100

Form of Media	Powerpoint slide, specimen

Literature (primary references)	1. Kardong, K., 2012. Vertebrate: Comparative Anatomy, Function and Evolution. Mc Graw Publishing, USA. 2. Heidrich, L., Bae, S., Levick, S., Seibold, S., Weisser, W., Krzystek, P., ... & Müller, J. (2020). Heterogeneity–diversity relationships differ between and within trophic levels in temperate forests. *Nature ecology & evolution*, *4*(9), 1204- 1212. 3. Chen, J., Glémin, S., & Lascoux, M. (2017). Genetic diversity and the efficacy of purifying selection across plant and animal species. Molecular Biology and Evolution, 34(6), 1417-1428. 4. Walter, J. (2018). Effects of changes in soil moisture and precipitation patterns on plant-

	mediated biotic interactions in terrestrial ecosystems. *Plant Ecology*, *219*(12), 1449-1462. 5. Qian, X., Gu, J., Sun, W., Wang, X. J., Su, J. Q., & Stedfeld, R. (2018). Diversity, abundance, and persistence of antibiotic resistance genes in various types of animal manure following industrial composting. *Journal of Hazardous materials*, *344*, 716-722. 6. Jiang, Z., Liu, S., Wu, Y., Jiang, X., & Zhou, K. (2017). China's mammal diversity. *Biodiversity Science*, *25*(8), 886. 7. Yusefi, G. H., Faizolahi, K., Darvish, J., Safi, K., & Brito, J. C. (2019). The species diversity, distribution, and conservation status of the terrestrial mammals of Iran. *Journal of Mammalogy*, *100*(1), 55-71.
	8. Sullivan, T. P., Sullivan, D. S., & Sullivan, J. H. R. (2017). Mammalian responses to windrows of woody debris on clearcuts: abundance and diversity of forest-floor small mammals and presence of small mustelids. *Forest ecology and management*, *399*, 143-154 9. Ahumada, J. A., Silva, C. E., Gajapersad, K., Hallam, C., Hurtado, J., Martin, E., ... & Andelman, S. J. (2011). Community structure and diversity of tropical forest mammals: data from a global camera trap network. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *366*(1578), 2703-2711. 10. Theodoridis, S., Fordham, D. A., Brown, S. C., Li, S., Rahbek, C., & Nogues-Bravo, D. (2020). Evolutionary history and past climate change shape the distribution of genetic diversity in terrestrial mammals. *Nature communications*, *11*(1), 1-11.

Assessment

UNIVERSITAS SEBELAS MARET
FACULTY OF TEACHER TRAINING AND EDUCATION
BACHELOR OF BIOLOGY EDUCATION STUDY PROGRAM
Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Kentingan Surakarta 57126 Indonesia
E-mail: biologi@fkip.uns.ac.id; Website: https://biologi.fkip.uns.ac.id/en/

Test Evaluation Grid

No	Indicators	Aspect						Total of number
		C1	C2	C3	C4	C5	C 6	
1.	Ability to analyze trends in the development of living things towards Deuterostomes / Deuterostomia in the Chordata group				√			Tentative
2.	Ability to analyze information regarding biological characteristics and information in Deuterostomes/Deuterostomia in the low-level Chordata group		√	√	√	√	√	Tentative
3.	Ability to analyze biological characteristics and information in Pisces Superclassists		√	√	√	√	√	Tentative
4.	Ability to analyze biological characteristics and information in the Amphibia group and able to apply it in the classification of Amphibia		√	√	√	√	√	Tentative
5.	The ability to analyze and understand the characteristics and biological information in the Reptilian group is able to apply it in the classification of Reptiles		√	√	√	√	√	Tentative
6.	The ability to analyze and understand biological characteristics and information in the Aves group is able to apply it in the Aves classification		√	√	√	√	√	Tentative
7.	Ability to analyze and understand biological characteristics and information in the Mammalia group and be able to apply it in mammalia classification		√	√	√	√	√	Tentative
8.	Ability to use molecular approaches in vertebrate taxonomy					√	√	Tentative

MID TEST
Diversity and Classification of Vertebrate

Type : Open Book
Time : 120 minute

1. Look at these pictures!


a


b



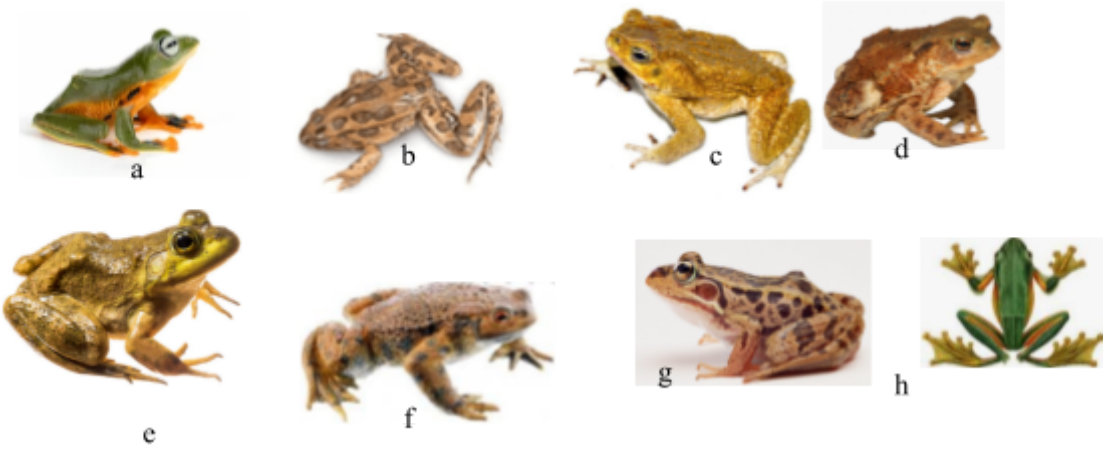


a. Create a description that can serve as distinguish characters of a-d fish specimens!
b. Classificationally, make an interpretation of the a-d fish specimens!
c. Show phenograms for 4 types of fish above!

Rubric :

a. Compile a character description based on the characteristic shape and length of the head, color pattern, dorsal fin shape seen in the image (20)
b. Create a phenogram based on the described character (20)

2. Reconstruct how Classis Amphibia is grouped towards ordo catalyphs!
   Rubric:
   a. Analyzing the order's breakdown to Anura, Gymnophiona and Caudata based on evolutionary relationship (10)
   b. Analyzing the breakdown of the Order towards Anura, Gymnophiona and Caudata based on morphological character (10)
3. Look at this pictures!



a. Create a description which can distinguish a-h amphibia above!
b. Classificationally, make an interpretation of the a-h amphibia above!
c. Show fenograms for 8 types of amphibia above!

Rubric:

a. Compile character descriptions based on morphological traits, colors, and extremities seen in the image (20)
b. Create a phenogram based on the described character (20)

PRACTICE COMPETENCY TEST

Name :
ID Number :

UNIVERSITAS SEBELAS MARET
FACULTY OF TEACHER TRAINING AND EDUCATION
BACHELOR OF BIOLOGY EDUCATION STUDY PROGRAM
Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Kentingan Surakarta 57126 Indonesia
E-mail: biologi@fkip.uns.ac.id; Website: https://biologi.fkip.uns.ac.id/en/

No.	Question points	1	2	3	4
1.	Determine the fin formula of true bone fingers on Pinnae Dorsalis				
		Error in identification of pinnae dorsalia	Errors in the identification of the hard fingers of the fins	Errors are only in the formulation of fins, but can identify the dorsalis pinnae and hard fingers and immediately carry out the calculation quickly and precisely	Determine the dorsalis pinnae quickly and precisely and can immediately identify the hard fin fingers quickly and precisely and count the number of hard fin fingers, Make the formula correctly
	Determine the fin formula of true bone fingers on Pinnae Dorsalis				
		Error in identification of pinnae dorsalia	Errors in the identification of soft fingers of fins	Errors only in fin formulation, however can identify pinnae dorsalis and soft fingers and immediately carry out calculations with fast and precise	Determine the dorsalis pinnae quickly and precisely and can immediately identify the soft fin fingers quickly and precisely and count the number of fin fingers
	Determine the formula of true bone fingers on Pinna Pectoralis				

		Error in identification of pinnae Pectoralia	Errors in the identification of soft fingers of fins	Errors only in fin formulation, however can identify pinnae Pectoralis and soft fingers and immediately carry out calculations with fast and precise	Determine the pectoralis pinnae quickly and precisely and can immediately identify the soft fin fingers quickly and precisely and count the number of fin fingers
	Determine the formula of true bone fingers on Pinna Ventralis				
		Error in identification of pinnae Ventralis	Errors in the identification of soft fingers of fins	Errors only in fin formulation, however can identify pinnae Ventralis and soft fingers and immediately carry out calculations with fast and precise	Determine the ventralis pinnae quickly and precisely and can immediately identify the soft fin fingers quickly and precisely and count the number of fin fingers
	Measure total length				
		Incorrect in identifying total length		Positioning incorrectly and measuring the total length according to knowledge obtained	Position the fish correctly and measure the total length spontaneously according to the knowledge gained

	Measure standard length				
		Incorrect in identifying standard length		Positioning incorrectly and measuring the standard length according to knowledge obtained	Position the fish correctly and measure the standard length spontaneously according to thenowledge gained
	Measure tail length				
		Incorrect in identifying tail length		Positioning incorrectly and measuring the tail length according to knowledge obtained	Position the fish correctly and measure the tail length spontaneously according to the knowledge gained
	Describe the arborescent	Not knowing where the arborescent is so that there is no step to the section properly	Doing section in the right location but not being able to identify arborescent structure		Perform the surgery leads directly to arborescent, showing the arborescent structure correctly and describing it

Final Score : Mid test (40%)+ Quiz and Laboratory activity (10%) + Final test (40%) + Quiz and Laboratory Activity (10%)