

Building D 3rd Floor FTTE UNS Jl Ir. Sutami No. 36 A Kentingan Surakarta 57126 Indonesia E-mail: <a href="mailto:biologi@fkip.uns.ac.id">biologi@fkip.uns.ac.id</a>; Website: <a href="https://biologi.fkip.uns.ac.id/en/">https://biologi.fkip.uns.ac.id/en/</a>

# **Ethology Undergraduate Programme in Biology Education**

# **Module Handbook**

Module Name	Ethology (Ethologi)						
Module level	Undergraduate Programme						
Course Code	02013252021						
Abbreviation, if applicable	-						
Courses included in the	-						
module, if applicable							
Semester/Term	5 <sup>th</sup>	5 <sup>th</sup>					
Module coordinator (s)	Dr. Harli	ita, S. Si, N	M. Si				
Lecturer (s)	Puguh K	aryanto, S	. Si, M. Si, Ph.	D			
Language	Bahasa Indonesia (Indonesian Language)						
Classification within the	Elective						
curriculum							
Teaching format/class	Direct instruction/face to face/blended learning: 26.7						
hours per week during the	hours / Week / semester : lecture, small group discussion,						
semester	workshop						
	Structured Activity: 32 hours / Week / semester (Through						
	the case method with analysis of journal articles, students						
	learn innovative learning methods, through Team-based						
	projects students develop STEM-based chemistry learning,						
	and traditional and modern chemistry learning media)						
	Self-stud	dy Activit	<b>y:</b> 32 hours / W	eek / semester	(Students		
	learn var	rious learn	ing methods ac	cording to the	demands of		
	21st century learning from various sources)						
Workload							
	Type	CSU	Face to	Structured	Self-study		
			Face	Activities			
	T	2	26.7h (0.88	32h (1.06	32h (1.06		
		ECTS) ECTS) ECTS)					
	Total	Total 90.7h (3 ECTS)					



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Credit Points	2 CSU (3 ECTS)							
Requirements	Ecology							
Learning goals/competencies	PLO 10 They are able to demonstrate creativity, accuracy, discipline, responsibility, adaptability, have an independent initiative, autonomous learning, and do lifelong learning  CLO 2 Knowledge of the fundamentals of molecular, cell, and organismic biology  CLO 4 Acquisition of methodological competence in the life sciences, as well as the ability to apply this in other contexts. The capability of carrying out independent scientific work in labs and outdoors, as well as about handling organisms  CLO 6 Relevant knowledge of safety and environmental issues as well as the associated legal fundamentals							
	CLO/ PL							
	CLO *							
	CLO *							
	CLO 3 *							
	CLO 4 *							
Content	Ethology deals with the study of animal behavior, The development of behavior in animals, The details of behavior, the implementation of the theory of behavior in the daily cases.							



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Attribute Soft skill	Able to think conceptually, analytically, and logically					
Thursday Son Shin	2. Have good communication skill					
Study/exam achievements	Students are considered to complete the course and pass if					
	they obtain at least 60% of the maximum final score.					
	The final score (FS) is calculated based on the					
	following ratio:					
	Assessment Proportion					
	Task/presentation/laboratorium	30%				
	activity					
	Participation	10%				
	Mid-Term Test	30%				
	Final Exam	30%				
	Final Score	100%				
Form of Media	Powerpoint slide, article					
Literature (primary references)	<ol> <li>Hughey, L. F., Hein, A. M., Strandburg-Peshkin, A., &amp; Jensen, F. H. (2018). Challenges and solutions for studying collective animal behavior in the wild. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i>. 373(1746), 20170005.</li> <li>Stewart, P. S., Hill, R. A., Stephens, P. A., Whittingham, M. J., &amp; Dawson, W. (2021). Impacts of invasive plants on animal behavior. <i>Ecology Letters</i>. 24(4), 891-907.</li> <li>Wilson, M. W., Ridlon, A. D., Gaynor, K. M., Gaines, S. D., Stier, A. C., &amp; Halpern, B. S. (2020). Ecological impacts of human-induced animal behavior change. <i>Ecology Letters</i>, 23(10), 1522-1536.</li> <li>Chakravarty, P., Cozzi, G., Ozgul, A., &amp; Aminian, K. (2019). A novel biomechanical approach for animal behavior recognition using accelerometers. <i>Methods in Ecology and Evolution</i>. 10(6), 802-814.</li> </ol>					
	5. Ruland, F., & Jeschke, J. M. (2020). How biological invasions affect animal behavior: A global,					



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cross-taxonomic analysis. Journal of Animal
Ecology. 89(11), 2531-2541.
6. Valletta, J. J., Torney, C., Kings, M., Thornton, A., &
Madden, J. (2017). Applications of machine learning
in animal behavior studies. Animal Behaviour. 124.
203- 220.
7. Finn, K. R., Silk, M. J., Porter, M. A., & Pinter-
Wollman, N. (2019). The use of multilayer network
analysis in animal behavior. Animal behavior. 149,
7-22.

# Assessment

# **Presentation Assessment Rubric**

Dimension	Weight	Score	WxS	Comments
Material mastery	30%			
The accuracy of solving the problem	30%			
Communication skills	20%			
Ability to deal with questions	10%			
Props/presentations	10%			
Final	Score 100%			

	Scale						
DIMENSION	Very Good Good		Sufficient	Deficient	Very Deficient		
	≥85	71-84	60-70	40-59	<40		
Organisation	l,	facts to support	focus and presents some evidence to support the conclusion	Sufficiently focused, but insufficient evidence to be used in drawing conclusions	There is no clear organization. Facts are not used to support statements.		
Content	Content can inspire listeners to develop their minds.	complete. Listeners get new insights about the topic.	accurate, but incomplete. Listeners can learn some implied facts, but they don't add new insight	because there is no factual data,	The content is inaccurate or too general. Listeners don't learn anything or are sometimes mislead.		
Presentation Style	Speak with passion, transmit enthusiasm and enthusiasm to listeners	and uses proper intonation, speaks without relying on notes, and interacts	relies on notes. Sometimes eye contact with the	notes, no ideas are developed outside the notes, the sound is monotonous	The speaker is anxious and uncomfortable, and reads notes rather than speaking. Listeners are often ignored. There is no eye contact because the speaker is looking more at the whiteboard or screen.		



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#### **PROJECT ASSESSMENT FORM**

Aspect	Item Indicator	Very Good	Good	Sufficient	Deficient	Very Deficient
		≥85	71-84	60-70	40-59	<40
Planning	Activity design					
	Fit the task					
Doing	Data/Information Source Accuracy					
	Data Source Quantity and quality					
	Data analysis					
	Conclusion					
Reporting	Report writing					
	Team performance					
	Presentation performances					

#### **UAS ETHOLOGY**

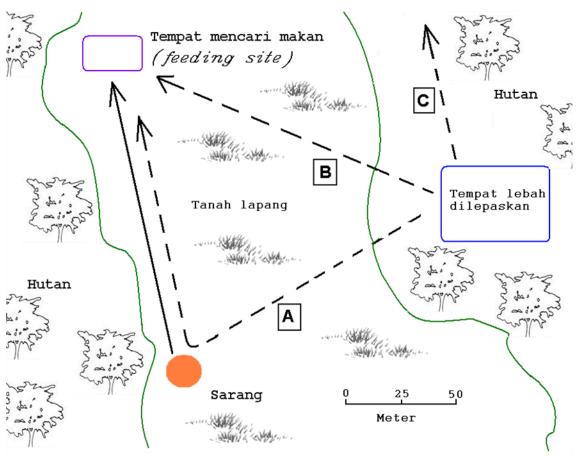
# **Question No.1-2 refers to the following information:**

A group of bees is trained to forage in a certain area (feeding site in the picture). A few days later, the bees were caught while flying from the hive to the feeding site and carried to other areas in a container that was closed from light. The bees are then released to look for a feeding site in the previously trained area.



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1. Which route did the bee group choose to find the feeding site in question? (Value 1)

### **Rubric:**

Analyzing the feeding site based on the information available (20)

- A. Route A
- B. B Route
- C. C route
- D. Routes A and B
- E. Routes B and C

#### Discussion

In animals, foraging behavior is largely determined by the amount of energy spent to obtain food and the remaining energy from food after consumption to meet their energy needs. This system is highly developed in social animals such as honey bees where the remaining energy is a determinant of their decisions in choosing food and the route to get food.



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Based on the above case, the bees will choose route B (although it takes time) compared to other routes because this route is the shortest.

- 2. The following are statements related to the image above:
  - I. Bees have a cognitive map (cognitive map)
  - II. Bees use markers around their nests and feeding sites
  - III. Bees do not use markers around the nest and feeding site
  - IV. The route the bees learn during training will still be followed
  - V. Cognitive map formation is an innate process in learning bees

Which statement is true about the learning process in bees above? (Score 20)

- A. I and II
- B. III and IV
- C. II and IV
- D. I, II, and V
- E. II, IV, and V

### Rubric:

Analyze the variables that determine the ability of feed orientation in bees (20)

#### Discussion

Statement I. Cognitive map is a form of mental representation (memory) that allows individuals to obtain, encode, store, recall, and parse information related to the relative location and properties of the environment related to certain activities. Based on the picture above, it can be concluded that bees have this because they can find the location of their food without getting lost. Statement I is true

Statement II. One of the important things for animals in constructing cognitive maps is that they use markers found in nature such as a position relative to certain plants or other landforms. If these animals can form cognitive maps then they also use landscape markers. Statement II is true

Statement III is wrong because it contradicts statement II

Statement IV is wrong because when the bees are still with their colony in the hive, the route they learn to get food is route A (see picture). However, when they are relocated they choose route B because it has a shorter distance and is more profitable in terms of the amount of energy required.

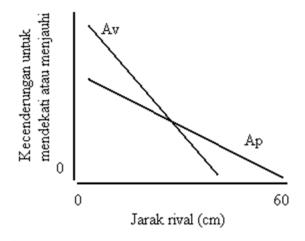
Statement V is true because cognitive maps are a basic ability of every species and not something that is learned.



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3. Territorial behavior and courtship behavior are carried out based on the results of decision-making after a motivational conflict occurs. The three-spined stickleback fish (Gasterosteus aculeatus) tries to defend its nest from the disturbance of male individuals (rivals) as a form of territorial behavior. Animal responses generally follow the concept of approach-avoidance conflict, as illustrated in the following graph:



Note: Av (gradient of movement away), Ap (gradient of movement toward)

Determine what the individual fish will do when the rival is at a distance: 10 cm - 30 cm - 60 cm. (Score 20)

- A. Approaching approaching approaching
- B. away from approaching away from
- C. away from away from/closer to approach
- D. Approaching approaching away
- E. Approaching away from away from

# Rubric:

Analyzing territorial behavior with interspecific variables (20)

#### Discussion

The solution to this problem is to observe the resulting graph. Based on the graph, the away behavior is inversely proportional to the rival's distance. This means that the closer the rivals are,



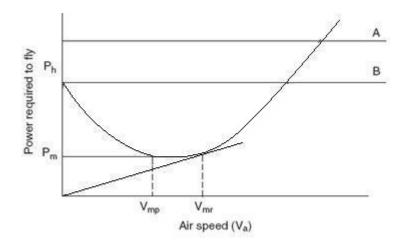
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the more often this behavior is carried out. The same is also found in approaching behavior. The difference lies in the distance that causes the behavior. When observed at a distance of 10 cm the performed behavior is to stay away. When the distance between rivals is 30 cm (approximately of the length of the X-axis) the values for the away and approaching behavior are the same and at a distance of 60 cm, the dominant behavior is approaching behavior.

# **Questions No.4-5 refer to the following information:**

Look at the following picture:



# **4.** The following statements are true, except ... (Score 20)

- A. All birds with small body mass fly faster than large ones
- B. Many bird species can vary their flight speed (airspeed).
- C. Birds choose to migrate with a flight speed of Vmp (the speed with minimal energy/minimum power) over long distances
- D. Flying speed is closely related to energy requirements
- E. The flying speed at Vmr (maximum energy range speed) allows birds to fly the farthest distance on the same energy source as Vmp

# Rubric:

Analyzing rivalry in intraspecific competition (20)

#### Discussion

From the graph above, it can be seen that birds vary their flight speed depending on the amount of energy needed to reach that speed. Birds that travel long distances, will save energy by keeping the



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speed of flight with minimal energy use. The thing that is not true about the statement above is body mass because the data about this is not on the graph.

- 5. When facing the wind in the opposite direction of flight, migratory birds do ... (Score 20)
  - A. Fly in a circle and fly in the direction the wind is moving
  - B. Fly faster than Vmr against the incoming wind
  - C. Hovering(fly flapping wings in one position in the air, as hummingbirds do)
  - D. Answers A, B, and C are correct
  - E. Answers A, B, and C are wrong

### Rubric:

Analyzing the effect of environmental variables on the migratory behavior of birds (20)

# Discussion

Migratory birds must maintain a sufficient amount of energy in their bodies to fly to the final migration point. Based on this, the bird will fly at the speed of Vmr because the distance given will be further with the minimum energy spent. Another thing that is always a consideration for birds in migrating is the time at which they must reach the final location of the migration process within a predetermined time. This is related to the physiological processes (usually reproduction) that they will carry out in the final migration area which has a limited period. With this in mind, when migratory birds face the wind against them, they will increase their flight speed so that it exceeds the Vmr value, although with a greater risk of energy loss.