



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

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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 th			
Module coordinator (s)	Dr. Harlita, S. Si, M. Si			
Lecturer (s)	Puguh Karyanto, S. Si, M. Si, Ph. D			
Language	Bahasa Indonesia (Indonesian Language)			
Classification within the curriculum	Elective			
Teaching format/class hours per week during the semester	Direct instruction/face to face/blended learning: 26.7 hours / Week / semester : lecture, small group discussion, 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-study Activity: 32 hours / Week / semester (Students learn various learning methods according to the demands of 21st century learning from various sources)			
Workload				
	Type	CSU	Face to Face	Structured Activities
	T	2	26.7h (0.88 ECTS)	32h (1.06 ECTS)
	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 <table><tr><td>CLO/ PLO</td><td>PL O1</td><td>PL O2</td><td>PL O3</td><td>PL O4</td><td>PL O5</td><td>PL O6</td><td>PL O7</td><td>PL O8</td><td>PL O9</td><td>P LO 10</td></tr><tr><td>CLO 1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td></tr><tr><td>CLO 2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td></tr><tr><td>CLO 3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td></tr><tr><td>CLO 4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*</td></tr></table>	CLO/ PLO	PL O1	PL O2	PL O3	PL O4	PL O5	PL O6	PL O7	PL O8	PL O9	P LO 10	CLO 1										*	CLO 2										*	CLO 3										*	CLO 4										*
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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	1. Able to think conceptually, analytically, and logically 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: <table><tr><th>Assessment</th><th>Proportion</th></tr><tr><td>Task/presentation/laboratorium activity</td><td>30%</td></tr><tr><td>Participation</td><td>10%</td></tr><tr><td>Mid-Term Test</td><td>30%</td></tr><tr><td>Final Exam</td><td>30%</td></tr><tr><td>Final Score</td><td>100%</td></tr></table>	Assessment	Proportion	Task/presentation/laboratorium activity	30%	Participation	10%	Mid-Term Test	30%	Final Exam	30%	Final Score	100%
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Final Score	100%												
Form of Media	Powerpoint slide, article												
Literature (primary references)	1. Hughey, L. F., Hein, A. M., Strandburg-Peshkin, A., & 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. 2. Stewart, P. S., Hill, R. A., Stephens, P. A., Whittingham, M. J., & Dawson, W. (2021). Impacts of invasive plants on animal behavior. <i>Ecology Letters</i>. 24(4), 891-907. 3. Wilson, M. W., Ridlon, A. D., Gaynor, K. M., Gaines, S. D., Stier, A. C., & Halpern, B. S. (2020). Ecological impacts of human-induced animal behavior change. <i>Ecology Letters</i>, 23(10), 1522-1536. 4. Chakravarty, P., Cozzi, G., Ozgul, A., & Aminian, K. (2019). A novel biomechanical approach for animal behavior recognition using accelerometers. <i>Methods in Ecology and Evolution</i>. 10(6), 802-814. 5. Ruland, F., & Jeschke, J. M. (2020). How biological invasions affect animal behavior: A global,												



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	cross-taxonomic analysis. <i>Journal of Animal Ecology</i>. 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. <i>Animal Behaviour</i>. 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. <i>Animal behavior</i>. 149, 7-22.
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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%		

DIMENSION	Scale				
	Very Good	Good	Sufficient	Deficient	Very Deficient
	≥85	71-84	60-70	40-59	<40
Organisation	Well organized by presenting facts that are supported by examples that have been analyzed according to the concept	well organized and present convincing facts to support conclusions.	The presentation has 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.	Contents are accurate and complete. Listeners get new insights about the topic.	Content is generally accurate, but incomplete. Listeners can learn some implied facts, but they don't add new insight into the topic	The content is less accurate, because there is no factual data, it does not add to the listener's understanding	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	The speaker is calm and uses proper intonation, speaks without relying on notes, and interacts intensively with the listener. The speaker always makes eye contact with the listener.	In general the speaker is calm, but with a flat tone and quite often relies on notes. Sometimes eye contact with the listener is ignored.	Based on 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:

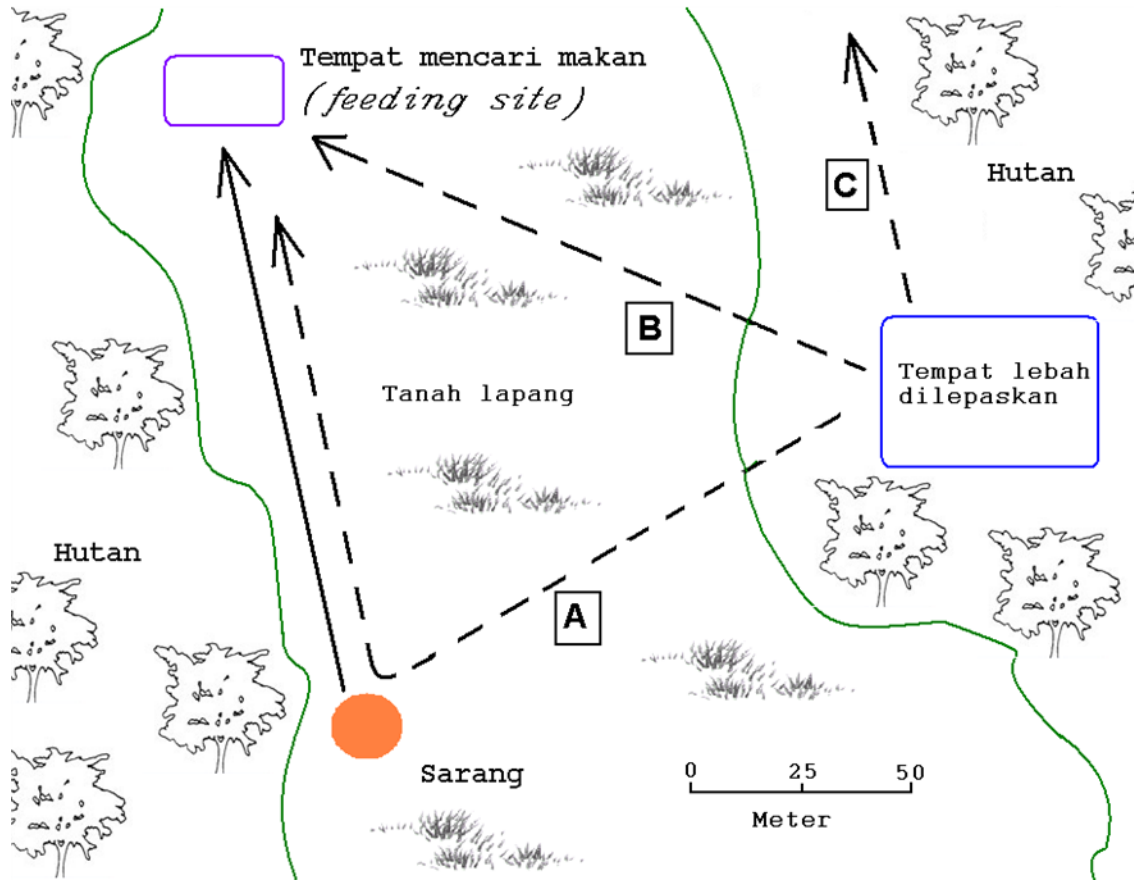
A group of bees is trained to forage in a certain area (feeding site in the picture). A few days later, the bees were caught while flying from the hive to the feeding site and carried to other areas in a container that was closed from light. The bees are then released to look for a feeding site in the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

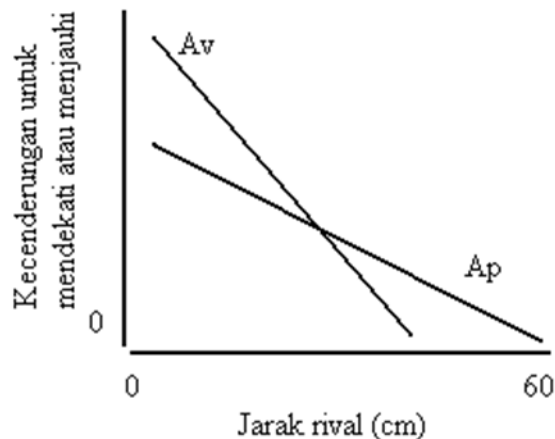


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3. Territorial behavior and courtship behavior are carried out based on the results of decision-making after a motivational conflict occurs. The three-spined stickleback fish (*Gasterosteus aculeatus*) tries to defend its nest from the disturbance 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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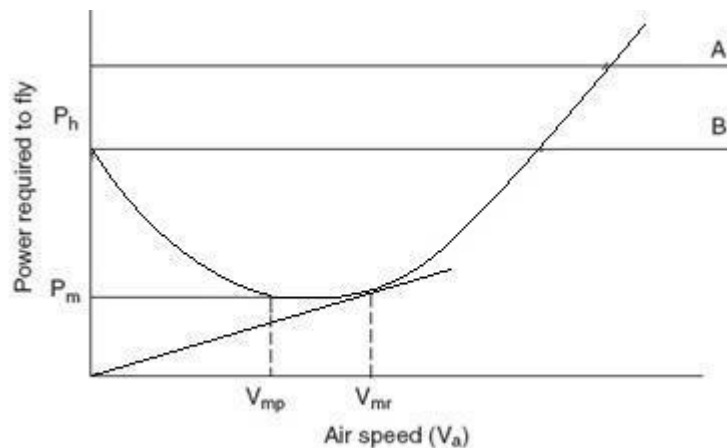
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the more often this behavior is carried out. The same is also found in approaching behavior. The difference lies in the distance that causes the behavior. When observed at a distance of 10 cm the performed behavior is to stay away. When the distance 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 V_{mp} (the speed with minimal energy/minimum power) over long distances
- D. Flying speed is closely related to energy requirements
- E. The flying speed at V_{mr} (maximum energy range speed) allows birds to fly the farthest distance on the same energy source as V_{mp}

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 V_{mr} 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 V_{mr} 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 V_{mr} value, although with a greater risk of energy loss.