



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/>

Evolution

Undergraduate Programme in Biology Education

Module Handbook

Module Name:	Evolution (Evolusi)																		
Module Level:	Undergraduate Programme																		
Course Code:	02013242010																		
Abbreviation, if applicable:	-																		
Courses included in the module, if applicable:	-																		
Semester/Term:	4 th																		
Module coordinator(s)	Dr. Slamet Santosa																		
Lecturer(s)	Joko Ariyanto, M.Si.																		
Language	Bahasa Indonesia (Indonesian Language)																		
Classification within the curriculum:	Compulsory/ Elective																		
Teaching format/class hours per week during semester	Direct instruction/face to face/blended learning: 26.7 hours / Week / semester : lecture, discussion Structured Activity: 32 hours / Week / semester (Through the case method with analysis of journal articles, students learn living things evolution, genetic and molecular evolution, and natural selection) Self-study Activity: 32 hours / Week / semester (Students learn how does the evolution process run until nowadays from various sources)																		
Workload	<table><tr><th>Type</th><th>CSU</th><th>Face to Face</th><th>Structured Activities</th><th>Self-study</th></tr><tr><td>T</td><td>2</td><td>26.7h (0.88 ECTS)</td><td>32h (1.06 ECTS)</td><td>32h (1.06 ECTS)</td></tr><tr><td>Total</td><td>2</td><td colspan="3">90,7 h (3 ECTS)</td></tr></table>				Type	CSU	Face to Face	Structured Activities	Self-study	T	2	26.7h (0.88 ECTS)	32h (1.06 ECTS)	32h (1.06 ECTS)	Total	2	90,7 h (3 ECTS)		
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Credit Points:	2 CSU (3 ECTS)																																																							
Requirements:	-																																																							
Learning goals/competencies:	PLO 2: They are able to apply the basic advance knowledge in biology to solve the problem in biology. PLO10: They are able to demonstrate creativity, accuracy, discipline, responsibility, adaptability, have an independent initiative, autonomous learning, and do lifelong learning CLO 1 Through the study of literature, students are Able to communicate in writing the concept of evolution CLO 2 Through Team Based Project, students are able to communicate verbally and argumentatively sharing forms of organic evolution based on sangiran field studies and other sources CLO 3 Through discussion, students are able Able to communicate search results and analysis of genetic and molecular data information in evolutionary studies CLO 4 Through class presentations, students are able to communicate the concept of gene interaction of living things and the environment related to evolution <table><tr><th>CLO/ PLO</th><th>P L O 1</th><th>P L O 2</th><th>P L O 3</th><th>P L O 4</th><th>P L O 5</th><th>P L O 6</th><th>P L O 7</th><th>P L O 8</th><th>P L O 9</th><th>P L O 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>	CLO/ PLO	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10	CLO1		*									CLO2		*									CLO3		*									CLO4										*
CLO/ PLO	P L O 1	P L O 2	P L O 3	P L O 4	P L O 5	P L O 6	P L O 7	P L O 8	P L O 9	P L O 10																																														
CLO1		*																																																						
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CLO4										*																																														
Content	1. Understanding evolution, Modern theory of evolution, The Meaning of evolution,																																																							



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	2. Evolution: Theory, fact, path. Misconceptions in evolution, How to teach evolution 3. Evidence of evolution 4. Mechanism of Evolution 5. Plant Evolution 6. Animal Evolution 7. Microorganism Evolution 8. Genetic and Molecular Evolution 9. Natural selection and Adaptation 10. Evolution and environment												
Attribute Soft skill	Students are able to think conceptually, logically, critically, and analytically to examine various chemistry learning strategies. Students are able to collaborate and communicate well to present the resulting project. Students are able to conduct literature studies Students are able to produce products for evolutionary learning/teaching												
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: <table><tr><th>Aspect</th><th>(%)</th></tr><tr><td>Report of Case analysis</td><td>30</td></tr><tr><td>Participation and Project</td><td>30</td></tr><tr><td>Mid-Term Test</td><td>20</td></tr><tr><td>Final Exam</td><td>20</td></tr><tr><td>Final Score</td><td>100</td></tr></table>	Aspect	(%)	Report of Case analysis	30	Participation and Project	30	Mid-Term Test	20	Final Exam	20	Final Score	100
Aspect	(%)												
Report of Case analysis	30												
Participation and Project	30												
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Final Exam	20												
Final Score	100												
Forms of Media	Laptop, internet, PPT, LCD, SPADA												



Literature:	1. Pierre J. Lena, 2009. The Teaching of Evolution, Scientific Insights into the Evolution of the Universe and of Life 2. 2012, The University of California Museum of Paleontology, Berkeley, and the Regents of the University of California 3. Kristin Cook, Gayle Buck and Meredith Park Rogers, 2012. Preparing Biology Teachers to Teach Evolution in a Project-Based Approach, Science Educator. Winter 2012 Vol. 21, No. 2 4. Stephen C. Meyer and Michael Newton Keas, 2011. The Meanings of Evolution, https://www.researchgate.net/publication/238529368 5. Ulrich Kutschera · Karl J. Niklas, 2004. The modern theory of biological evolution: an expanded synthesis, Naturwissenschaften (2004) 91:255–276 6. James R Hofmannni and Bruce H Weber, 2003. The Fact of Evolution: Implications for Science Education, Science & Education 12: 729–760, Kluwer Academic Publishers 7. Alice Robert, 2011, Evolution: The Human Story, DK Publishing, 375 Hudson Street, New York. 8. Susan Middleton and Mary Ellen hannibal, 2009, Evidence of Evolution, www.abramsbook.com 9. Valentine, J.W, and Thompson Keith, S. 2020. Animal Evolution. Mc. Graw Hills. 10. Song, A. N. (2012). Evolusi fotosintesis pada tumbuhan. Jurnal Ilmiah Sains, 12(1), 28-34. DOI:https://doi.org/10.35799/jis.12.1.2012.398 11. Taufik, L. M. (2019). Teori Evolusi Darwin: Dulu, Kini, Dan Nanti. Jurnal Filsafat Indonesia, 2(3), 98-102. DOI: http://dx.doi.org/10.23887/jfi.v2i3.22150 12. Heslop-Harrison, J. P. (2012). Genome evolution: extinction, continuation or explosion?. Current opinion 13. in plant biology, 15(2), 115-121. DOI:10.1016/j.pbi.2012.03.006. 14. Dong, Y., et.al. (2019). Natural selection and repeated 15. patterns of molecular evolution following allopatric 16. divergence. Elife, 8, e45199. DOI:https://doi.org/10.7554/eLife.45199 17. Mulyanto, D. (2011). Engels tentang Evolusi Manusia: Catatan Pendahuluan atas Gagasan Friedrich
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	Engels(1820-1895) tentang Alur Evolusi Manusia dan Peran Kerja di Dalamnya. Antropologi Indonesia, 32(1). DOI:10.7454/ai.v32i1.2112 18. H. Allen Orr, 2005. THE GENETIC THEORY OF ADAPTATION: A BRIEF HISTORY, Nature Publishing Group, FEBRUARY 2005 VOLUME 6
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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%			

DIMENSI ON	Scale				
	Very Good ≥85	Good 71-84	Sufficient 60-70	Deficient 40-59	Very Deficient <40
Organisati on	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 misled.
Presentation n 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	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



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		speaker always makes eye contact with the listener.			the speaker is looking more at the whiteboard or screen.
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Rubric for Review Article

No	Assessment Aspect	Article 1		Article 2		Article 3	
	Score	High 6-10	Low 1-5	High 6-10	Low 1-5	High 6-10	Low 1-5
1.	Articles come from the indexed journals in the last 3 years.						
2.	Articles related to the theme of evolution						
3.	The number of articles at least discusses evolution						
4.	Accuracy in summarizing the important parts of the abstract of the article						
5.	Accuracy of summarizing important thought concepts in the article						
6.	Accuracy of summarizing the methodology used in the article						
7.	The accuracy of summarizing the research results in the article						
8.	The accuracy of summarizing the discussion of research results in the article						
9.	The accuracy of summarizing the conclusions of the research results in the article						
10.	The accuracy of commenting on selected journal articles						
Total score for each article summary							
Average score obtained							

ASSESSMENT

Rubric



CLO	Question	Answer (Key point)
CLO1 Through the study of literature, students are Able to communicate in writing the concept of evolution	What is the meaning of evolution and what are the benefits of understanding evolution? (CLO1) Case Based (CLO1) Evolution is a discussion that is not always easy for students to accept, there is a different understanding among people including students of evolutionary material. A correct understanding of evolution is needed and as a teacher candidate, how you need to have the skills to teach evolution.	Change over time; history of nature; any sequence of events in nature Changes in the frequencies of alleles in the gene pool of a population Limited common descent: the idea that particular groups of organisms have descended from a common ancestor. The mechanisms responsible for the change required to produce limited descent with modification; chiefly natural selection acting on random variations or mutations Universal common descent: the idea that all organisms have descended from a single common ancestor. Blind watchmaker thesis: the idea that all organisms have descended from common ancestors through unguided, unintelligent, purposeless, material processes such as natural selection acting on random variations or mutations; the idea that the Darwinian mechanism of natural selection acting on random variation, and other similarly naturalistic mechanisms, completely suffice to explain The answer must contain: - Students identify some misconceptions and how to make corrections, - Giving way how to teach evolution in many learning model in which student centered learning such as project based, case method etc, mention and explain



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	A. Identify various misconception about evolution B. How to teach evolution to students? C. How is evolution viewed from the aspect of theory, fact, and path	some learning source and media/tools C. Explaining about theory and fact about evolution
CLO 2 Through Team Based Project, students are able to communicate verbally and argumentatively sharing forms of organic evolution based on sangiran field studies and other sources	Team Project: Make the design of evolutionary learning instruments with evolutionary material in different groups of organisms (CLO2)	Look for a variety of valid and actual learning resources about plant evolution, animal evolution, and microorganism evolution then present it in the form of web tutorials, pocketbooks, or other learning products.
CLO 3 Through discussion, students are able Able to communicate search results and analysis of genetic and molecular data information in evolutionary studies	Search articles / other sources of various genetic and molecular data and then analyze the various data to obtain a phylogenetic grouping. (CLO3)	Present molecular data from various organisms and apply analytical-related equipment to create phylogenic trees



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CLO 4 Through class presentations, students are able to communicate the concept of gene interaction of living things and the environment related to evolution	What are the benefits of genetic, evolutionary and environmental relationships? (CLO4)	The answer must contain Presents benefits to organisms and the environment both directly and indirectly from various aspects
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