

Module designation	Feed Biotechnology
Semester(s) in which the module is taught	Odd and even semesters
Person responsible for the module	Prof. Dr. Ir. Zaenal Bachruddin, M.Sc., IPU., ASEAN Eng. Prof. Dr. Ir. Zuprizal, DEA., IPU., ASEAN Eng. Ir. Nafiatul Umami, S.Pt., M.P., Ph.D., IPM., ASEAN Eng. Ir. Andriyani Astuti, S.Pt., M.Sc., Ph.D., IPM.
Language	Bahasa and English
Relation to curriculum	Specialization's Compulsory
Teaching methods	Classical lecture and discussion
Workload (incl. contact hours, self-study hours)	Total workload: 79 hours Contact hours: - Lecture: 23 hours - Academic activity: 28 hours Private study: 28 hours
Credit points	2/0
Required and recommended prerequisites for joining the module	None
Module objectives/intended learning outcomes	<p>Course Outcomes (CO):</p> <ol style="list-style-type: none"> <li>1. Students are able to comprehend and explain about the concept of biotechnology and its relationship with feed quality and animal performance</li> <li>2. Students are able to comprehend and explain about biomolecular manipulation for feed quality improvement and quality of microbes of gastrointestinal tract</li> <li>3. Students are able to comprehend and explain about the nutrient mechanism in affecting the cell metabolism and gene expression related to production, reproduction, and immune system</li> </ol> <p>Expected Learning Outcomes:</p> <ul style="list-style-type: none"> <li>- Attitudes and Behaviors:             <ol style="list-style-type: none"> <li>1. Be accountable for professional practices that consist of accepting sue for any professional decision and action according to their area's scope and according to the law/regulations. (CO1, CO3)</li> </ol> </li> <li>- Mastery in Sciences:             <ol style="list-style-type: none"> <li>1. Able to master scientific philosophy and develop new science and technology in animal science is useful, competitive, and environmentally sound research with a multidisciplinary approach. (CO1)</li> <li>2. Able to develop new science and technology concepts to solve problems in the field of animal husbandry through research with multidisciplinary and transdisciplinary approaches. (CO1, CO2, CO3)</li> </ol> </li> <li>- Special skills:             <ol style="list-style-type: none"> <li>1. Able to develop science and technology through creative, original, and novelty research. (CO1, CO2, CO3)</li> </ol> </li> <li>- General skills:             <ol style="list-style-type: none"> <li>1. Able to find or develop new theories/concepts/ideas and contribute to the development and practice of science and/or</li> </ol> </li> </ul>

	<p>technology by producing scientific research based on scientific methodology, logical, critical, systematic, and creative thinking through interdisciplinary, multidisciplinary, or transdisciplinary approaches, pay attention to and apply human values in their field of expertise. (CO2, CO3)</p> <p>2. Able to develop a research roadmap to compile scientific, technological, or artistic arguments and solutions based on a critical view of facts, concepts, principles, or theories with an interdisciplinary, multidisciplinary, or transdisciplinary approach, based on a study of the main objectives of the research and their constellation on broader targets. (CO2, CO3)</p>																				
<p>Content</p>	<p>Biotechnology is technology application like recombinant DNA technique, biochemistry, molecular, biological cell, genetic, cell fusion, and genetic manipulation in certain fields. The application of biotechnology in feed field can be performed because the materials of feed majority are from living cells. The quality improvement of feed materials from living cells absolutely derived from the optimization of biological process that involves genetic material, biochemistry process, and biomolecular synthesis in the cells that will be expressed in the feed product.</p> <p>The main point of animal feeding is the stimulation and the repression to gene expression, and biochemistry process in the animal cells and microbes in the gastrointestinal tract which affects to the productivity and immune systems of animals. Biotechnology application on the right level of feed production and animals is expected for optimizing the genetic potency for the optimum, efficient, and eco-friendly productivity.</p> <p>Feed Biotechnology course consists of learning materials including learning about molecular manipulation about biological reaction in feed and its role i.e.: 1) feed components such as water, organic and inorganic compound; 2) Fibre source feed, energy source, protein source, mineral and vitamin source; 3) feed as feed basal, feed supplement, and feed additive. This course also learns about the application of molecular manipulation in feed productivity increasement, nutritious value of feed, digestibility value of feed, and feed detoxification so from these can be produced superior feed and or functional feed, thus can increase the animal reproduction, performance, and production of animals like meat, milk, egg, skin, and create eco-friendly environment.</p>																				
<p>Exams and assessment formats</p>	<table border="1"> <thead> <tr> <th data-bbox="568 1713 940 1787">Assessment Components</th> <th data-bbox="940 1713 1230 1787">Course Outcomes (CO)</th> <th data-bbox="1230 1713 1394 1787">Percentage (%)</th> </tr> </thead> <tbody> <tr> <td data-bbox="568 1787 940 1856">1. Midterm exam (written test, paper assignment)</td> <td data-bbox="940 1787 1230 1856">CO 1 &amp; CO 2</td> <td data-bbox="1230 1787 1394 1856">35</td> </tr> <tr> <td data-bbox="568 1856 940 1926">2. Final exam (written test, paper assignment)</td> <td data-bbox="940 1856 1230 1926">CO 1, CO 2 &amp; CO 3</td> <td data-bbox="1230 1856 1394 1926">35</td> </tr> <tr> <td data-bbox="568 1926 940 1964">3. Short quizzes</td> <td data-bbox="940 1926 1230 1964">CO 1 &amp; CO 2</td> <td data-bbox="1230 1926 1394 1964">5</td> </tr> <tr> <td data-bbox="568 1964 940 2002">4. Presentation</td> <td data-bbox="940 1964 1230 2002">CO 1, CO 2 &amp; CO 3</td> <td data-bbox="1230 1964 1394 2002">10</td> </tr> <tr> <td data-bbox="568 2002 940 2069">5. Take-home written assignments</td> <td data-bbox="940 2002 1230 2069">CO 1, CO 2 &amp; CO 3</td> <td data-bbox="1230 2002 1394 2069">15</td> </tr> </tbody> </table>	Assessment Components	Course Outcomes (CO)	Percentage (%)	1. Midterm exam (written test, paper assignment)	CO 1 & CO 2	35	2. Final exam (written test, paper assignment)	CO 1, CO 2 & CO 3	35	3. Short quizzes	CO 1 & CO 2	5	4. Presentation	CO 1, CO 2 & CO 3	10	5. Take-home written assignments	CO 1, CO 2 & CO 3	15		
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	<b>Grade and Score</b>			
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	A	≥80	C+	45-49,9
	A-	75-79,9	C	40-44,9
	A/B	70-74,9	C-	35-39,9
	B+	65-69,9	C/D	30-34,9
	B	60-64,9	D+	25-29,9
	B-	55-59,9	D	20-24,9
	B/C	50-54,9	E	0-19,9
Study and examination requirements	The final grade in the module is composed of 35% performance on Midterm exam, 35% final exam, 5% quiz, 10% presentation, and 15% take-home written assignment. Students must have a final grade of 70% or higher to pass			
Reading list	Learning books and articles related to the topics.			