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Module designation	Analysis Technique of Molecular Biology
Module level, if applicable	Undergraduate
Code, if applicable	NBIOUM6125
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	Odd semester
Person responsible for the module	Hendra Susanto, M.Kes., Ph.D
Lecturer	Hendra Susanto, M.Kes., Ph.D Dwi Listyorini, M.Si., D.Sc
Language	Bahasa Indonesia
Relation to curriculum	Undergraduate degree program, compulsory, 5th semester.
Type of teaching, contact hours	Undergraduate degree program: cooperative learning, presentation, laboratory work, 2 x 50 = 100 minutes and 1 x 170 minutes
Workload	1. Lectures: 2 x 50 = 100 minutes (1.67 hours) per week. 2. Exercises and Assignments: 2 x 60 = 120 minutes (2 hours) per week. 3. Laboratory work: 1 x 170 = 170 minutes (2.83 hours) per week. 4. Private study: 2 x 60 = 120 minutes (2 hours) per week.
Credit points	3 credit points (~5 ECTS-eq)
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to be eligible for the final examination.
Recommended prerequisites	NBIOUM6106 (*Laboratory Technique*) NBIOUM6107 (*Biochemistry*) NBIOUM6111 *(Cell Biology*) NBIOUM6122 (*Ecology*) NBIOUM6119 (*Plant Diversity*) NBIOUM6124 (*Biometry*)
Module objectives/intended learning outcomes	Students are able to: (LO4) Apply basic concepts, principles and procedures of biology to design investigations as an effort to solve problems in the health, food and environmental fields using technological applications.
Course learning outcomes	1. Explaining and understanding the basic concepts of molecular analysis techniques at the DNA, RNA and protein levels

<table>
<tr><td></td><td colspan="2">2. Analyzing and applying some basic molecular biology techniques in the further development of applied science</td></tr>
<tr><td>Content</td><td colspan="2">This course covers the following main topics:
● Development of Molecular Biology and the basic concepts of Molecular Analysis Techniques including Principles of DNA extraction, isolation and purification, PCR;
● Basic principle, utility, PCR-based molecular markers (RAPD, SSR, AFLP, ARDRA, ISR);
● The basic principle, the use of sequencing;
● Basic concepts of Protein Analysis Techniques;
● Protein Isolation and Purification, SDS PAGE and Western, Dot Blot;
● Basic principles and techniques of Immunohistochemistry;
● The practicum including basic techniques: safety, pipetting, sterilization;
● DNA isolation, DNA electrophoresis;
● Protein Isolation and Protein Content Measurement;
● Protein electrophoresis and protein BM calculation;
● Introduction to Molecular Data Analysis (software) for DNA band pattern analysis;
● Introduction to Molecular Data Analysis (software) for DNA band pattern analysis;
● Research design using molecular-based techniques.</td></tr>
<tr><td rowspan="17">Learning activity</td><td>Week 1</td><td>Classroom activity: Theory on Basic Techniques in Molecular Works</td></tr>
<tr><td>Week 2</td><td>Classroom activity: basic technique in molecular genetics</td></tr>
<tr><td>Week 3</td><td>Classroom activity: gene anatomy and regulation</td></tr>
<tr><td>Week 4</td><td>Student laboratory work: Total DNA isolation</td></tr>
<tr><td>Week 5</td><td>Student laboratory work: Total DNA isolation (PCR and gel electrophoresis)</td></tr>
<tr><td>Week 6</td><td>Student laboratory work: Total RNA isolation</td></tr>
<tr><td>Week 7</td><td>Student laboratory work: Total RNA isolation (DNA and RNA quantitation)</td></tr>
<tr><td>Week 8</td><td>MIDTERM EXAMINATION</td></tr>
<tr><td>Week 9</td><td>Student laboratory work: Total Protein Isolation</td></tr>
<tr><td>Week 10</td><td>Student laboratory work: Total Protein Isolation (Elisa and Microscopic Immunoblotting)</td></tr>
<tr><td>Week 11</td><td>Student laboratory work: Protein quantitation and Electrophoresis</td></tr>
<tr><td>Week 12</td><td>Student laboratory work: Gene Expression (Reverse Transcription)</td></tr>
<tr><td>Week 13</td><td>Student laboratory work: Gene Expression (Real Time quantitative PCR)</td></tr>
<tr><td>Week 14</td><td>Student laboratory work: Bioinformatics (basic molecular docking)</td></tr>
<tr><td>Week 15</td><td>Student laboratory work: Bioinformatics (drugs development and molecular prediction)</td></tr>
<tr><td>Week 16</td><td>FINAL EXAMINATION</td></tr>
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Study and examination requirements and forms of examination	Assignment (25%) : student project and paper report Quiz (10%) : paper test Performance (25%) : Student lab report and paper presentation Midterm examination (20%) : paper test Final examination (20%) : paper test and final project report
Media employed	LCD, power point, white board, video and moodle (Sipejar)
Reading list	1. Brown, T. A. 2001. *Genome*. 2nd. Ed. NY: John Wiley & Sons, Inc. 2. Freifelder, D. Latest Edition. *Essentials of Molecular Biology*. Boston: Jones and Bartlett Pub. Inc. 3. Watson, J.D., Tooze, J. & Kurtz, D.T. 1983. *Recombinant DNA: A Short Course*. NY: W.H. Freeman and Co. 4. Susanto, H., Listyorini, D., Winaris, N., Kartikasari, N., Prananingrum, P., Anggorowati, D., and Kharisma,V.D 2018. *Teknik Analisis Molekular: Genetik*. UM Press 5. Fatchiyah, dkk. 2012. *Teknik Analisis Biologi Molekular*. Penerbit Erlangga. 6. Victori, V. & Sembiring, L. 2015. Bioinformatika. 7. Gerstein, A.S. 2001. *Molecular Biology Problem Solver: A Laboratory Guide*. NY, USA. John Wiley and Sons, Inc. 8. Lorkowski, S. and Cullen, P. 2003. Analysing Gene Expression. Weinheim, UK. WILEY-VCH Verlag GmbH & Co KGaA 9. Reece, R.J. 2004. Analysis of Genes and Genomes. Manchester, UK. John Wiley & Sons, Ltd 10. Knowles, M. and Selby, P. 2005. Introduction to the Cellular and Molecular Biology of Cancer. UK. Oxford University Press 11. Baxevanis, A.D., and Ouelette, B.F.F. 2001. Bioinformatics: A Practical Guide to The Analysis of Genes and Proteins. NY, USA. John Wiley & Sons, Inc. 12. Orengo, C.A., Jones, D.T., and Thornton, J.M. 2003. Bioinformatics: Genes, Proteins & Computers. Cambridge, UK. BIOS Scientific Publisher 13. https://www.ncbi.nlm.nih.gov/pubmed/ 14. https://www.cell.com/cell-metabolism/home 15. http://www.targetscan.org/vert_71/ 16. https://pga.mgh.harvard.edu/primerbank/ 17. http://highwire.org/lists/browse.dtl 18. www.uniprot.org 19. www.swissmodel.expasy.org 20. www.pymol.org 21. www.bioinfo3d.cs.tau.ac.il/PatchDock 22. www.swissmodel.expasy.org 23. www.mordred.bioc.cam.ac.uk/~rapper/rampage

Date of last amendment made	January, 2022