



Course Module

Improvement of Wood Quality

Faculty of Forestry

Mulawarman University

Module name	Improvement of Wood Quality
Modul level, if applicable	Doctoral
Code, if applicable	220401902P041
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	The course is available in all active teaching semesters
Person responsible for the module	Prof. Dr. Ir. Edy Budiarmo
Lecturer	Prof. Dr. Ir. Edy Budiarmo Dr. Ir. Enih Rosamah, M.Sc. Dr. Ir. Isna Yuniar Wardhani, M.P.
Language	Indonesia
Relation to curriculum	Elective Course
Type of teaching, contact hours	Direct instruction, discussion, and assignment
Workload	Number of meetings per semester 16 meetings (14 meetings for learning activity, 1 meeting for mid-semester, 1 meeting for final examination) For this course, students are required to meet a minimum of 79.3 hours per semester, which consist of : - 23.33 hours for lecture - 28 hours for structured assignments - 28 hours for individual study
Credit points	Credit points: 2 SKS / 3.2 ECTS Details: 1 Credit = 170 min / week 1 Credit = 170 min x 14 week = 2380 min / semester 1 Credit = 39.7 h / semester 1 ECTS = 25 h/ Semester 1 Credit = 1.59 » 1.6 2 Credit = 1.6 x 2 = 3.2 ECTS
Requirements according to the examination regulations	-

Recommended prerequisites	-
Module objectives/intended learning outcomes	Intended Learning Outcome (ILO) Attitude (A) 1. ILO1 (A1) - Internalize scientific values, norms, and ethics Knowledge (K) 2. ILO2 (K1) - Able to synthesize knowledge acquired from research findings with novelty and its implementation 3. ILO3 (K2) - Able to discover and develop scientific conceptions with novelty value, and able to develop scientific arguments as science solutions General Skills (GS) 4. ILO4 (GS1) - Able to criticize the philosophy, theory, and methodology of research in forestry and moist tropical environment studies through interdisciplinary, multidisciplinary, and transdisciplinary approaches Content Learning Outcome (CLO) 1. CLO1: Students will internalize and apply ethical standards and principles in conducting research on wood quality improvement, ensuring that all experiments and methodologies uphold the highest ethical standards. ILO1 (A1) 2. CLO2: Students will synthesize and integrate new research findings on wood properties and improvement techniques to innovate and enhance the practical applications of wood products. ILO2 (K1) 3. CLO3: Students will develop and defend new scientific concepts and arguments concerning wood quality, based on their research and experiments, contributing to the body of knowledge in wood science. ILO3 (K2) 4. CLO4: Students will critically analyze and evaluate various research methodologies in wood quality improvement, applying an interdisciplinary approach to assess and refine these methods. ILO4 (GS1)
Content	The Improvement of Wood Quality course provides advanced knowledge and skills for enhancing wood quality through innovative research and modern technology. It emphasizes ethical research

	applications, integration of new scientific findings, and critical analysis of methodologies in wood science. This course is ideal for those specializing in wood technology or forest management and benefits industry professionals seeking advanced expertise in wood improvement practices. The complete topic of each meeting is mentioned below: 1. Contract and Understanding Basic Concepts of Wood Quality Improvement (1st session) → CLO1 2. Analyzing Factors Influencing Wood Properties and Quality (2nd session) → CLO1 3. Applying Wood Modification Techniques in Field and Laboratory Practice (3rd-4th sessions) → CLO2 4. Assessing Understanding and Application of Taught Concepts in Wood Quality Research (5th session) → CLO1, CLO2 5. Implementing Wood Preservation and Protection Strategies to Enhance Durability (6th-7th sessions) → CLO2 6. Midterm Exam (8th session) → Assessment 7. Integrating Information Technology in Wood Quality Monitoring and Management (9th-10th sessions) → CLO3 8. Explaining the Balance Between Wood Utilization, Sustainability, and Quality Enhancement (11th session) → CLO1, CLO2 9. Analyzing the Impact of Climate Change on Wood Quality and Long-Term Performance (12th-13th sessions) → CLO1, CLO3 10. Developing Adaptation and Mitigation Strategies for Sustainable Wood Quality Improvement (14th-15th sessions) → CLO2, CLO3 11. Final Exam (16th session) → Assessment																												
Study and examination requirements and forms of examination	Evaluation and assessment of learning achievement based on scheme 1 in the Academic Regulations of Mulawarman University: <table><tr><td>N o</td><td>Objects of Evaluation/Assessment:</td><td>Forms of E/A</td><td>Quantity (%)</td></tr><tr><td>1</td><td>Affective</td><td>Participation</td><td>10</td></tr><tr><td>2</td><td>Assignments/Case Study</td><td>Group Presentation</td><td>25</td></tr><tr><td>3</td><td>Project</td><td>Presentation</td><td>25</td></tr><tr><td>4</td><td>Mid-Semester Test</td><td>Written test</td><td>15</td></tr><tr><td>5</td><td>Final Examination</td><td>Written test</td><td>25</td></tr><tr><td colspan="3">Total</td><td>100</td></tr></table>	N o	Objects of Evaluation/Assessment:	Forms of E/A	Quantity (%)	1	Affective	Participation	10	2	Assignments/Case Study	Group Presentation	25	3	Project	Presentation	25	4	Mid-Semester Test	Written test	15	5	Final Examination	Written test	25	Total			100
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Total			100																										
Media employed	Class, Ms. Powerpoint, Ms. Word, Computer, LCD, STAR																												
Reading list	1. Hill, C. A. S. (2006). <i>Wood modification: Chemical, thermal, and other processes</i>. John Wiley & Sons.																												

	2. Rowell, R. M. (2012). <i>Handbook of wood chemistry and wood composites</i>. CRC Press. 3. Shmulsky, R., & Jones, P. D. (2019). <i>Forest products and wood science: An introduction</i>. Wiley. 4. Bowyer, J. L., Shmulsky, R., & Haygreen, J. G. (2012). <i>Forest products and wood science</i>. John Wiley & Sons. 5. Esteves, B., & Pereira, H. (2009). Wood modification by heat treatment: A review. <i>BioResources</i>, 4(1), 370-404. 6. Singh, T., Dawson, B. S., & Waghorn, R. (2018). Advances in wood preservation technologies. <i>Forests</i>, 9(8), 471. 7. Hein, P. R. G. (2015). Applications of near-infrared spectroscopy (NIRS) in wood science and technology. <i>Wood Science and Technology</i>, 49(5), 849-878. 8. Ramage, M. H., Burrige, H. C., Busse-Wicher, M., Fereday, G., Reynolds, T., Shah, D. U., & Scherman, O. (2017). The wood from the trees: The use of timber in construction. <i>Renewable and Sustainable Energy Reviews</i>, 68, 333-359. 9. Sohngen, B., & Sedjo, R. (2021). Impacts of climate change on forest product markets: Implications for wood quality. <i>Forest Policy and Economics</i>, 124, 102395. 10. Lindner, M., Maroschek, M., Netherer, S., Kremer, A., Barbati, A., Garcia-Gonzalo, J., & Lexer, M. J. (2010). Climate change impacts, adaptive capacity, and vulnerability of European forest ecosystems. <i>Forest Ecology and Management</i>, 259(4), 698-709.
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