



**University of Gadjah Mada**  
 Faculty of Forestry  
 Study Program of Doctor in Forestry Science  
**Module Handbook**

|                                  |                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--|--|---------------------------------------------|------------|------------|------------------|
| <b>Name (Code)</b>               | : Wood Extractives and Color (KTDT22811)                                                                                                                                                                                                                                                                  |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| ECTS   Type   Status             | : 7.5   Class lecture   Elective                                                                                                                                                                                                                                                                          |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Semester   OfL:OnL Ratio   LMS   | : 1   60:40   elok.ugm.ac.id                                                                                                                                                                                                                                                                              |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Pre-Requisite                    | : -                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Description of content           | : This course discusses aspects of color in wood including measurement, formation, changes, and its application in wood products.                                                                                                                                                                         |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Course Outcomes and PLO mandated | Finishing this course, student will be able to identify the potential of wood from its color properties (CO1/PLO3), to differentiate the mechanisms of wood coloring and color change (CO2/PLO4), and to construct the application of color properties in wood products (CO3/PLO7).                       |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Lecturer(s)                      | 1. Prof. Dr. Ganis Lukmandaru<br>2. Dr. Rini Pujiarti                                                                                                                                                                                                                                                     |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Workload                         | : Total workload per semester is for 14 weeks, with weekly activities: 2*(50' lectures, 60' structured activities, 60' independent study), and 2 mid exam and final exam weeks.                                                                                                                           |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Learning Method                  | : Class Lecture and Discussion                                                                                                                                                                                                                                                                            |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Student Learning Experience      | : Actively discuss the class material and cases, structured assignment, group work, quiz, material reflection, review of literature in forestry sectors                                                                                                                                                   |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |
| Mapping CLO-syllabus             | CLO                                                                                                                                                                                                                                                                                                       | Syllabus                                                                                                                                                                        |                                |  |  | Learning form                               | Meetings   |            |                  |
|                                  | 1                                                                                                                                                                                                                                                                                                         | 1. Wood color and color measurement<br>2. Wood Pigments: Chromophores<br>3. Chemotaxonomy                                                                                       |                                |  |  | Class lecture, presentation, and discussion | 3          |            |                  |
|                                  | 2                                                                                                                                                                                                                                                                                                         | 4. Wood Extractive formation and transfer<br>5. Wood staining: Extractive and Phenolate content<br>6. Cell wall penetration<br>7. Polymerization of phenolics                   |                                |  |  | Class lecture, presentation, and discussion | 4          |            |                  |
|                                  | 2                                                                                                                                                                                                                                                                                                         | 8. Wood color change: Light, Iron,<br>9. Wood color change: Acid and Alkali<br>10. Wood color change: Microorganisms, Enzymes<br>11. Wood color change: Non-microbial oxidation |                                |  |  | Class lecture, presentation, and discussion | 4          |            |                  |
|                                  | 3                                                                                                                                                                                                                                                                                                         | 12. Paper discoloration: Mechanical and Chemical pulp<br>13. Wood extract dyes: Source of extract                                                                               |                                |  |  | Class lecture, presentation, and discussion | 3          |            |                  |
| Assessment method                | <b>Base of Evaluation</b>                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                 | <b>Component of Evaluation</b> |  |  | <b>CO1</b>                                  | <b>CO2</b> | <b>CO3</b> | <b>Total (%)</b> |
|                                  | Participative activity                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                 | Assignment, quiz               |  |  | √                                           | √          | √          | 30               |
|                                  | Cognitive & Psychomotoric                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                 | Mid exam                       |  |  | √                                           | √          |            | 35               |
|                                  | Case Study result                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                 | Final exam/ presentation       |  |  |                                             | √          | √          | 35               |
| References                       | 1. Harborne, J.B. dan B.L. Turner. 1984. Plant Chemosystematics. London: Academic Press.<br>2. Hon, D.N.S., N. Shiraishi (eds). 2001. Wood and Cellulosic Chemistry.. Marcel Dekker, New York.<br>3. Rowell, R.M (ed). 1984. The chemistry of solid wood. American Chemical Society, Seattle, Washington. |                                                                                                                                                                                 |                                |  |  |                                             |            |            |                  |