



**Universitas Negeri Surabaya**  
**Faculty of Mathematics and Natural Sciences**  
**Biology Education Undergraduate Study Program**

Document Code

**SEMESTER LEARNING PLAN**

| Courses              | CODE       | Course Family                     | Credit Weight                     |     |           | SEMESTER                             | Compilation Date |
|----------------------|------------|-----------------------------------|-----------------------------------|-----|-----------|--------------------------------------|------------------|
| Plant Systematics    | 8420504221 | Compulsory Study Program Subjects | T=4                               | P=0 | ECTS=6.36 | 4                                    | May 1, 2023      |
| <b>AUTHORIZATION</b> |            | <b>SP Developer</b>               | <b>Course Cluster Coordinator</b> |     |           | <b>Study Program Coordinator</b>     |                  |
|                      |            | Dr. Wisanti, M.S.                 | Dr. Wisanti, M.S.                 |     |           | Dr. Rinie Pratiwi Puspitawati, M.Si. |                  |

| <b>Learning model</b>                                       | <b>Case Studies</b>   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|--|---|-----|-------|--------|------|---|---|------|----|----|------|----|----|------|--|--|------|--|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| <b>Program Learning Outcomes (PLO)</b>                      | <b>PLO study program that is charged to the course</b>  |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PLO-7</b>  | Able to demonstrate knowledge of biology at the molecular, cell and organism levels and their interactions with the environment.   |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PLO-11</b>   | Able to demonstrate knowledge of biology at the molecular, cell and organism levels and their interactions with the environment  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>Program Objectives (PO)</b>  |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PO - 1</b>   | Mastering the diversity of plants with variations in their characters and life cycles; principles and components of systematics and taxonomy; and kinship                                |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PO - 2</b>   | Able to apply the concept of plant systematics with relevant technology in managing plant diversity  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PO - 3</b>   | Able to apply the concept of plant systematics with relevant technology in managing plant diversity  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PO - 4</b>   | Able to communicate ideas and monographic research results effectively, both orally and in writing   |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PO - 5</b>   | Able to make decisions based on data/information on taxonomic evidence in order to complete plant systematics monographs as part of their responsibilities in carrying out project tasks |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <b>PLO-PO Matrix</b>  |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P.O</th> <th>PLO-7</th> <th>PLO-11</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td></tr> <tr><td>PO-4</td><td></td><td></td></tr> <tr><td>PO-5</td><td></td><td></td></tr> </tbody> </table>  |  |   | P.O | PLO-7 | PLO-11 | PO-1 |   |   | PO-2 |    |    | PO-3 |    |    | PO-4 |  |  | PO-5 |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P.O   | PLO-7   | PLO-11   |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-1  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-2  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-3  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-4  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-5  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>PO Matrix at the end of each learning stage (Sub-PO)</b> |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> |  |   | P.O | Week  |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | PO-1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | PO-2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | PO-3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | PO-4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | PO-5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| P.O   | Week  |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | 1   | 2  | 3 | 4   | 5     | 6      | 7    | 8 | 9 | 10   | 11 | 12 | 13   | 14 | 15 | 16   |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-1  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-2  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-3  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-4  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PO-5  |   |  |   |     |       |        |      |   |   |      |    |    |      |    |    |      |  |  |      |  |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Short Course Description** Plant Systematics studies: basic principles of taxonomy and their relationship to the diversity of non-vascular plants and vascular plants. The basic principles of taxonomy include characters and character traits, characterization, description, taxonomic evidence, identification, nomenclature and classification systems. Kinship includes phenetic, phylogenetic, and primitive/advanced character traits. The diversity of non-vascular plants (bryophytes) and vascular plants (ferns and their relatives, as well as seed plants) discusses the sporophyte and gametophyte generations related to their characteristics, variations and life cycles. This material is not only discussed theoretically but also in practice, namely compiling descriptions, using identification tools, compiling classification systems, compiling and analyzing relationships. Lecture material is studied through discussions, field practicums and project assignments.

**References**

**Main :**

- Simpson, M.G. 2010. Plant Systematics . Amsterdam: Elsevier.
- Van Steenis, C.G.G.J. 1993. Flora untuk Sekolah di Indonesia. Jakarta : PT Pradnya Paramita.
- Wisanti, Kurniawan, A. & Indah, N.K. Website Botanical Clearinghouse Unesa, <http://bch.unesa.ac.id>.
- Wisanti, Indah, N.K. & Putri, E.K. 2016. Taksonomi Tumbuhan 1: Ruang Lingkup Taksonomi, Bryophyta . Surabaya: Unesa University Press.
- Wisanti, Indah, N.K. & Putri, E.K. 2018. Buku Panduan Praktikum Sistematika Tumbuhan . Surabaya: Unesa University Press.

**Supporters:**

1. Backer & Bakhuizen van Den Brink. 1965. Flora of Java. Netherlands: N. V.P. Noordhoff Groningen.
2. Keng, H. 1978. Order and Families of Malayan Seed Plants. Singapore: Singapore University Press
3. Eddy, A. 1988. A handbook of Malesian mosses. Volume 1,2,3. London: British Museum (Natural History)
4. Min, B-C &, Chew, SYJ & Yong, JWH. 2014. Plants in Tropical Cities. Singapore: Uvaria Tide

**Supporting lecturer**  
Dr. Wisanti, M.S.  
Dr. Novita Kartika Indah, S.Pd., M.Si.

| Week | Final abilities of each learning stage (Sub-PO)   | Evaluation  |  | Help Learning, Learning methods, Student Assignments, [ Estimated time ] |                   | Learning materials [ References ]  | Assessment Weight (%) |
|------|---|---|--|--|-------------------|--|-----------------------|
|      |   | Indicator   | Criteria & Form  | Offline ( offline )  | Online ( online ) |  |                       |
| (1)  | (2)   | (3)   | (4)  | (5)  | (6)               | (7)  | (8)                   |
| 1    | 1.Understanding the scope of Taxonomy and Systematics<br>Understanding the objectives and main activities of taxonomy: classification<br>2. Understand the objectives and main activities of classification | 1.Explain the difference between Systematics and Taxonomy<br>2.Explain the systematic approach<br>3.Explain the stages of development of taxonomy in Indonesia<br>4.Explains that taxonomy is basic and culminating<br>5.Explain the differences between description, identification and classification.<br>6.Explain the factors causing the emergence of various classification systems<br>7.Compare the basis of several classification systems<br>8.Develop an artificial classification system | <b>Criteria:</b><br>Quantitative (C2 and C4); test<br><br><b>Form of Assessment :</b><br>Participatory Activities  | Lectures, questions and answers and assignments<br>6 X 50                |                   | <b>Material:</b> Principles of systematics and classification<br><b>Reference:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i><br><br><b>Material:</b> Scope of systematics<br><b>Reader:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2018. Plant Systematics Practical Handbook. Surabaya: Unesa University Press.</i> | 0%                    |
| 2    | Apply understanding of the concept of variation in morphological and anatomical characteristics in Bryophyta diversity  | 1.Explain the general characteristics of Bryophyta<br>2.Describe the comparative anatomical and morphological characteristics of liverworts, hornworts and leaf mosses<br>3.Explain the characteristics of field identification for liverworts, hornworts and leaf mosses<br>4.Examining the phylogenetic relationships of liverworts, leaf mosses and hornworts<br>5.Explain the classification and characteristics of divisions   | <b>Criteria:</b><br>Quantitative (C2 and C4); test and non-test<br><br><b>Forms of Assessment :</b><br>Project Results Assessment / Product Assessment, Practical Assessment | Lecture, question and answer, practical<br>6 X 50                        |                   | <b>Material:</b> Bryophyta<br><b>Reference:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i><br><br><b>Material:</b> Bryophyta<br><b>References:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2016. Plant Taxonomy 1: Scope of Taxonomy, Bryophyta . Surabaya: Unesa University Press.</i>                                | 10%                   |

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|---|--|--|--|---|--|--|-----|
| 3 | Applying an understanding of variations in morphological and anatomical characteristics in the diversity of ferns  | <ol style="list-style-type: none"> <li>1.Explain the characteristics of ferns based on observations and descriptions of herbarium specimens</li> <li>2.Explain the characteristics of the fern division as identification characters</li> <li>3.Prepare parallel keys as a means of identifying ferns in accordance with the requirements for making identification keys.</li> <li>4.Identify ferns at the division level</li> </ol>   | <p><b>Criteria:</b><br/>Quantitative (C2 and C4)</p> <p><b>Forms of Assessment :</b><br/>Project Results Assessment / Product Assessment, Practical Assessment</p> | Lecture, question and answer, practical<br>6 X 50   |  | <p><b>Material:</b> Diversity of ferns<br/><b>Reference:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p> <hr/> <p><b>Material:</b> Identification of ferns<br/><b>References:</b> <i>Min, BC &amp;, Chew, SYJ &amp; Yong, JWH. 2014. Plants in Tropical Cities. Singapore: Uvaria Tide</i></p>  | 10% |
| 4 | <ol style="list-style-type: none"> <li>1.Understand the life cycle of moss</li> <li>2.Understanding the life cycle of ferns</li> </ol>   | <ol style="list-style-type: none"> <li>1.Explain the types of moss life cycles</li> <li>2.Differentiate the ploidy of each stage of the moss life cycle</li> <li>3.Describe the structural characteristics of the sporophytes of liverworts, hornworts and leaf mosses</li> <li>4.Explain the types of life cycles of ferns</li> <li>5.Differentiate the ploidy of each stage of the fern life cycle</li> <li>6.Explain the causes of high diversity in certain groups of ferns</li> </ol> | <p><b>Criteria:</b><br/>Quantitative (C2 , C3 and C4)</p> <p><b>Form of Assessment :</b><br/>Participatory Activities</p>  | Discussion and practicum<br>6 X 50  |  | <p><b>Material:</b> Plant life cycle<br/><b>Reference:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p> <hr/> <p><b>Material:</b> Bryophyta<br/><b>References:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2016. Plant Taxonomy 1: Scope of Taxonomy, Bryophyta . Surabaya: Unesa University Press.</i></p>  | 0%  |
| 5 | <ol style="list-style-type: none"> <li>1.Understanding the main goals and activities of taxonomy: taxonomic description and evidence</li> <li>2.Apply understanding and skills of identification, description, classification in preparing monographs</li> </ol> | <ol style="list-style-type: none"> <li>1.Applying phytographic terms in descriptions</li> <li>2.Compile a description of the plants in the surrounding environment</li> <li>3.Explain the importance of evidence in taxonomic research</li> <li>4.Determining appropriate evidence from a taxonomic study</li> <li>5.Determine the object, sampling location and time line of minimonographic research</li> </ol>  | <p><b>Criteria:</b><br/>Quantitative (C2, C3 and C4)</p> <p><b>Form of Assessment :</b><br/>Project Results Assessment / Product Assessment</p>                    | Discussion, practicum, minimonography project guidance (Phase 1): determining the object of minimonography research<br>6 X 50; independently outside of face-to-face lectures |  | <p><b>Material:</b> Description and taxonomic evidence<br/><b>References:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p> <hr/> <p><b>Material:</b> Taxonomic description and evidence<br/><b>Bibliography:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2016. Plant Taxonomy 1: Scope of Taxonomy, Bryophyta. Surabaya: Unesa University Press.</i></p> <hr/> <p><b>Material:</b> Plant descriptions<br/><b>References:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2018. Plant Systematics Practical Handbook. Surabaya: Unesa University Press.</i></p> | 5%  |

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| 6 | <p>1.Understand the objectives and main activities of taxonomy: identification, taxonomic work and plant nomenclature</p> <p>2.Apply understanding and skills of identification, description, classification in minimonography projects</p> | <p>1.Analyze unqualified identification key errors</p> <p>2.Identify the scientific names of plants around campus with an identification key</p> <p>3.Develop identification keys for 3 -5 plant taxa from selected families</p> <p>4.Explain the main differences between monograph, flora, revision and manual.</p> <p>5.Explain the principles of plant nomenclature</p> <p>6.Write the authorship of the scientific name of the plant correctly</p> <p>7.Explain the noun conservanda with examples</p> <p>8.Analyze the history of the nomenclature of five plant taxa by accessing the scientific name index of plants using relevant technology</p> <p>9.Prepare a monographic research design for selected plants</p> | <p><b>Criteria:</b><br/>Quantitative (C2, C3 and C4)</p> <p><b>Form of Assessment :</b><br/>Project Results Assessment / Product Assessment</p> | <p>Discussion, practicum and project assignments (2nd phase): determining the topic of minimonography; (3rd phase): develop a timeline for planning 6 X 50 minimonography and independent research activities outside of face-to-face lectures</p> |  | <p><b>Material:</b> Identification and nomenclature<br/><b>References:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2016. Plant Taxonomy 1: Scope of Taxonomy, Bryophyta. Surabaya: Unesa University Press.</i></p> <hr/> <p><b>Material:</b> flora on the Unesa Ketintang campus<br/><b>Reader:</b> <i>Wisanti, Kurniawan, A. &amp; Indah, NK Unesa Botanical Clearinghouse Website, <a href="http://bch.unesa.ac.id/">http://bch.unesa.ac.id/...</a></i></p> <hr/> <p><b>Material:</b> Key to family level identification<br/><b>References:</b> <i>Van Steenis, CGGJ 1993. Flora for Schools in Indonesia. Jakarta : PT Pradnya Paramita.</i></p> | 5%  |
| 7 | <p>Explore and inventory the diversity of mosses and ferns at the field practicum location</p>  | <p>1.Identifying collections of moss and ferns, exploration results</p> <p>2.Create documentation of exploration results</p> <p>3.Making preserved moss from exploration results</p>  | <p><b>Criteria:</b><br/>Quantitative, non-test</p> <p><b>Form of Assessment :</b><br/>Project Results Assessment / Product Assessment</p>       | <p>8 X 50 field practicum</p>  |  | <p><b>Material:</b> Moss identification<br/><b>Reference:</b> <i>Eddy, A. 1988. A handbook of Malesian mosses. Volumes 1,2,3. London: British Museum (Natural History)</i></p> <hr/> <p><b>Material:</b> Identification of ferns<br/><b>References:</b> <i>Min, BC &amp;, Chew, SYJ &amp; Yong, JWH. 2014. Plants in Tropical Cities. Singapore: Uvaria Tide</i></p>  | 5%  |
| 8 |   | <p>UTS</p>  | <p><b>Form of Assessment :</b><br/>Participatory Activities</p>   | <p>2 X 50</p>  |  |   | 10% |

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| 9  | Applying understanding of morphological trait variation in gymnosperm diversity  | <ol style="list-style-type: none"> <li>1.Explain the general characteristics of gymnosperms</li> <li>2.Explain the reason that the diversity of gymnosperms is limited compared to angiosperms</li> <li>3.Describe the morphological characteristics of the vegetative and generative organs of pine, cycad and melinjo</li> <li>4.Determine the characteristics of cycads, pines and melinjo</li> <li>5.Explain the characters that support cycads, including primitive plants in the gymnosperm group</li> <li>6.Explain the characters that support melinjo as the most advanced plant among members of the gymnospermae</li> </ol> | <p><b>Criteria:</b><br/>Quantitative (C2 and C4). test and non-test</p> <p><b>Forms of Assessment :</b><br/>Project Results Assessment / Product Assessment, Practical Assessment</p>        | Discussion and practicum; completed minimonography project assignments (Phase 4): collection of 6 X 50 taxonomic evidence data; independently outside of face-to-face lectures   |  | <p><b>Material:</b> Gymnosperms<br/><b>Reference:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p> <p><b>Material:</b> Gymnosperms<br/><b>References:</b> <i>Keng, H. 1978. Order and Families of Malayan Seed Plants. Singapore: Singapore University Press</i></p>   | 10% |
| 10 | Applying understanding of morphological trait variation in angiosperm diversity  | <ol style="list-style-type: none"> <li>1.Explain the general characteristics of angiosperms</li> <li>2.Distinguishing characteristics of selected families of angiosperms</li> <li>3.Explain the APG classification system</li> </ol>  | <p><b>Criteria:</b><br/>Quantitative (C2 and C3)</p> <p><b>Forms of Assessment :</b><br/>Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment</p> | Lectures, practicums, project assignment guidance (4th Phase): collection of taxonomic evidence data 6 X 50; independently outside of face-to-face lectures                      |  | <p><b>Material:</b> Angiosperms and the APG classification system<br/><b>References:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p>  | 10% |
| 11 | <ol style="list-style-type: none"> <li>1.Apply understanding and skills of identification, description, classification in preparing minimonographies</li> <li>2.Communicate ideas and monographic research designs in group discussions</li> </ol> | <ol style="list-style-type: none"> <li>1.Presents taxonomic evidence data from a minimonography project</li> <li>2.Able to identify plants through Tropicos, Kew: Data &amp; Digital Resources</li> <li>3.Able to trace the nomenclature of plant taxa using the IPNI website, Tropicos</li> <li>4.Honestly present taxonomic evidence data and identification results</li> </ol>  | <p><b>Criteria:</b><br/>Quantitative, qualitative; non-test</p> <p><b>Form of Assessment :</b><br/>Project Results Assessment / Product Assessment</p>                                       | Discussion and presentation of the minimonography project assignment (Phase 4): presenting the results of the collection of taxonomic evidence and identification results 6 X 50 |  | <p><b>Material:</b> Plant identification<br/><b>Reference:</b> <i>Backer &amp; Bakhuizen van Den Brink. 1965. Flora of Java. Netherlands: NVP Noordhoff Groningen.</i></p> <p><b>Material:</b> Plant identification<br/><b>Reference:</b> <i>Keng, H. 1978. Order and Families of Malayan Seed Plants. Singapore: Singapore University Press</i></p> | 5%  |

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| 12 | Understand the life cycle and change of generations of seed plants  | <ol style="list-style-type: none"> <li>1.Explain the types of life cycles of seed plants</li> <li>2.Distinguish the ploidy of each stage of the life cycle of gymnosperms and angiosperms</li> <li>3.Explain the differences in the life cycle stages of gymnosperms and angiosperms in terms of gametophyte, sporophyte, pollination and fertilization structures.</li> </ol>  | <p><b>Criteria:</b><br/>Quantitative (C2 and C4), test</p> <p><b>Forms of Assessment :</b><br/>Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment</p> | Discussion and practicum; project tasks (4th Phase): finishing, revision of data presentation and identification results<br>6 X 50; independently outside of face-to-face lectures               |  | <p><b>Material:</b> Life cycle of seed plants<br/><b>References:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p> <p><b>Material:</b> Pine life cycle<br/><b>Reference:</b> <i>Wisanti, Indah, NK &amp; Putri, EK 2018. Plant Systematics Practical Guidebook. Surabaya: Unesa University Press.</i></p> | 10% |
| 13 | Understanding the evolution of seed plants  | <ol style="list-style-type: none"> <li>1.Explain the forms of adaptation of seed plants to terrestrial conditions.</li> <li>2.Explaining seeds and fruit as the key to the success of seed plants in dominating land life</li> <li>3.Explain how to pollinate seed plants effectively to expand the distribution area.</li> <li>4.Analyze the flower status of certain species based on primitive and advanced characteristics</li> </ol> | <p><b>Criteria:</b><br/>Quantitative (C2 and C4), test</p> <p><b>Form of Assessment :</b><br/>Practical Assessment</p>   | Lectures and questions and answers; practice; project assignments (4th phase): drafting a minimonography project report and 6 X 50 poster design; independently outside of face-to-face lectures |  | <p><b>Material:</b> Evolution of seed plants<br/><b>References:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p>   | 5%  |
| 14 | Understanding the relationships between seed plants   | <ol style="list-style-type: none"> <li>1.Analyze kinship trees from selected examples of families/clans</li> <li>2.Compile a kinship tree based on data collected from taxonomic evidence with selected software programs.</li> </ol>   | <p><b>Form of Assessment :</b><br/>Project Results Assessment / Product Assessment</p>   | Discussion and practicum; project tasks (Phase 5): finishing, data analysis of 6 X 50 taxonomic evidence; independent outside of face-to-face lectures   |  | <p><b>Material:</b> Relationship Analysis<br/><b>Bibliography:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p>  | 5%  |
| 15 | <ol style="list-style-type: none"> <li>1.Communicate the results of taxonomic work orally and in writing</li> <li>2.Able to make decisions based on data/information on taxonomic evidence in order to complete plant systematics monographs as part of their responsibilities in carrying out project tasks</li> </ol> | <ol style="list-style-type: none"> <li>1.Presenting posters of monographic research results on selected plants in seminar activities</li> <li>2.a. Present the results of minimonographic research in the form of a written report</li> </ol>   | <p><b>Criteria:</b><br/>Quantitative and qualitative; non-test</p> <p><b>Form of Assessment :</b><br/>Participatory Activities</p>   | Discussion and Presentation<br>6 X 50  |  | <p><b>Material:</b> Plant monographs<br/><b>References:</b> <i>Simpson, MG 2010. Plant Systematics. Amsterdam: Elsevier.</i></p>   | 0%  |
| 16 |   |   | <p><b>Form of Assessment :</b><br/>Participatory Activities</p>  | UAS<br>2 x 50  |  |  | 10% |

#### Evaluation Percentage Recap: Case Study

| No | Evaluation                                      | Percentage |
|----|---|------------|
| 1. | Participatory Activities                        | 26.66%     |
| 2. | Project Results Assessment / Product Assessment | 46.66%     |
| 3. | Practical Assessment                            | 26.66%     |
|    |   | 99.98%     |

## Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.