Module Descriptions

A **module** is a self-contained **learning unit** within a higher education program that includes thematically related courses and is assigned a **fixed number of credits**. It follows specific **learning objectives**, includes an **assessment component**, and contributes to achieving the qualifications of a degree program. In some countries, “modules” are also named “courses”.

Please provide a module description for each module. In addition to the compulsory and elective modules, this also includes credited internships and the final thesis.

Please summarize all module descriptions in one document (Module Handbook) and create a table of contents so that the modules can be found easily.

Module designation	*Plant Breeding*
Semester(s) in which the module is taught	*3*
Person responsible for the module	*Prof. Dr. Muh. Farid BDR*
Language	*Bahasa Indonesia*
Relation to curriculum	*Compulsory ~~/ elective / specialisation~~*
Teaching methods	*Face-to-face lectures and independent learning*
Workload (incl. contact hours, self-study hours)	1. *Lectures: 2 × 50 × 16 = 1,600 minutes (26.67 hrs)* 2. *Structured assignments: (total 2 × 60 × 16) = 1,920 minutes (32 hrs)* - *Individual assignments: 2 × 120 × 3 = 720 minutes (12 hrs)* - *Group assignments: 2 × 120 × 3 = 720 minutes (12 hrs)* - *Quiz: 2 × 15 × 10 = 300 minutes (5 hrs)* - *Discussion: 2 × 30 × 3 = 180 minutes (3 hrs)* 3. *Independent study: (total 2 × 60 × 16) = 1,920 minutes (32 hrs)* - *Accessing SIKOLA, participating in online discussion forums, reading materials, etc.* 4. *Practicum: (total: 1 × 170 × 16) = 2,720 minutes (45.33 hrs)* - *Field work: 1 × 170 × 16 = 2,720 minutes (45.33 hrs)*
Credit points	*3 credits equal to 4.86 ECTS*
Required and recommended prerequisites for joining the module	*Plant Genetics*

Module objectives/intended learning outcomes	*In terms of knowledge:* - *Student able to explain the meaning and scope of plant breeding and germplasm collection.* - *Student able to explain the role of biotechnology in plant breeding, including genetic engineering, tissue culture, and Marker-Assisted Selection (MAS), as well as the role of mutation techniques, male sterility technology, hybrid variety production, ploidy, and genome structure.* - *Student able to explain various modes of plant reproduction and their relevance to plant breeding, including sexual, asexual, and apomictic reproduction, and the genetic implications of each mode.* - *Student able to understand and explain the genetic basis and variability, selection methods in plant breeding, heritability estimation methods, the significance of heritability, inbreeding, and heterosis.* - *Student able to explain several breeding methods for self-pollinated, cross-pollinated, and vegetatively propagated plants, along with seed multiplication and the release of new varieties.*
Content	1. *Meaning and scope of plant breeding* 2. *Germplasm collection* 3. *Role of biotechnology in plant breeding* 4. *Role of mutation in plant breeding* 5. *Male sterility and hybrid variety production* 6. *Modes of plant reproduction and their relevance to plant breeding* 7. *Genetic variability and selection in plant breedin* 8. *Heritability, selection response, heterosis, and inbreedin* 9. *Breeding methods for self-pollinated crops* 10. *Breeding methods for cross-pollinated crops* 11. *Seed multiplication and new variety release*
Examination forms	*Quiz, individual assignment, group assignment, discussion*
Study and examination requirements	*To successfully pass the module, students must attend at least 80% of the classes, complete all assignments and exams, and obtain a final grade of at least 45%* (minimum passing grade: D).

Reading list	1. *Acquaah, G. (2009). Principles of Plant Genetics and Breeding. John Wiley & Sons.* 2. *Crowder, L. V., Kusdiarti, L., & Soetarso. (1990). Genetika Tumbuhan. Yogyakarta: Gadjah Mada University Press.* 3. *Ronald, P. (2011). Plant Genetics, Sustainable Agriculture and Global Food Security. Genetics, 188(1), 11–20.* 4. *White, J. W., Andre-Sanchez, P., Gore, M. A., Bronson, K. F., Coffelt, T. A., Conley, M. M., ... & Jenks, M. A. (2012). Field-Based Phenomics for Plant Genetics Research. Field Crops Research, 133, 101–112.* 5. *Gupta, P. K., & Tsuchiya, T. (Eds.). (1991). Chromosome Engineering in Plants: Genetics, Breeding, Evolution. Newnes.* 6. *Shu, Q. Y., Forster, B. P., & Nakagawa, H. (Eds.). (2012). Plant Mutation Breeding and Biotechnology. CABI.* 7. *Pathirana, R. (2011). Plant Mutation Breeding in Agriculture. Plant Science Reviews, 107–110.*