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 Biotechnology*
Semester(s) in which the module is taught	*5*
Person responsible for the module	*Prof. Dr. Rinaldi Sjahril*
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 × 8 = 240 minutes (4 hrs)* - *Discussion: 2 × 30 × 4 = 240 minutes (6 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)* - *Laboratory 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	-
Module objectives/intended learning outcomes	*In terms of knowledge:* - *Student is able to understand and comprehend the basic science of genetics, DNA, and biotechnology.*

Content	1. *Introduction* 2. *Structure and components of cells, and bioinformatics* 3. *Genetic constitution changes, DNA replication, and gene expression* 4. *Improvement of plant traits through in vitro culture, mutation, and production of plant secondary metabolites* 5. *Principles and concepts of genetic engineering* 6. *Applications of biotechnology for crop improvement*
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. *Dubey, R.C. (2006). A Textbook of Biotechnology. Multicolour Illustrative Edition. New Delhi: S. Chand Company.* 2. *George, E.F., & Sherrington, P.D. (1984). Plant Propagation by Tissue Culture: Handbook and Directory of Commercial Laboratories. Einstein Press, UK.* 3. *Hartiko, H. (1995). Recombinant DNA. PAU Biotechnology, Gadjah Mada University, Yogyakarta.* 4. *Mantell, S.H., Mattheus, J.A., & McKee, R.A. (1985). Principles of Plant Biotechnology. Blackwell Scientific Publications, Oxford, London* 5. *Nasir. (2001). Agricultural Biotechnology. PT Grafindo, Jakarta.* 6. *Prentio, S. (1984). Biotechnology: A New Revolution. George Braziller Inc., New York.* 7. *Soemartono, Nasrullah, & Hartiko, H. (1992). Quantitative Genetics and Biotechnology. Gadjah Mada University, Yogyakarta.* 8. *Wattimena, G.A. (1992). Plant Biotechnology. Directorate General of Higher Education, PAU Biotechnology, IPB Bogor.* 9. *Yusuf, M. (1998). Molecular Genetics. Biotechnology Study Program, IPB Bogor.* 10. *Yuw, T.W. (2006). Agricultural Biotechnology. Agricultural Series. Gadjah Mada University Press.*