Module designation	*Instrumentation Technology*
Semester(s) in which the module is taught	*6th*
Person responsible for the module	*Dr. Ir. Paul Benyamin Timotiwu, M.S.*
Language	*Indonesian language*
Relation to curriculum	*Elective*
Teaching methods	*Lectures (100 minutes)* *Practicum sessions (170 minutes)*
Workload (incl. contact hours, self-study hours)	*Contact hours : 14 weeks x 100 minutes* *Structured learning: 14 weeks x 120 minutes* *Independent study: 14 weeks x 120 minutes* *Practicum sessions: 14 weeks x 170 minutes*
Credit points	*3 (2-1) CP or 4.76 (ECTS)* *((14 weeks x 100 minutes) + (14 weeks x 120 minutes) +* *(14 weeks x 120 minutes) + (14 weeks x 170 minutes)) :* *60 minutes/hour* *= 119 hours : 25 study hours/ECTS* *= 4.76 (ECTS)*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	- *Students are able to apply the basic concepts and principles of cultivation technology and the development of sustainable agriculture technology;* - *Students are able to analyze and interpret data and apply logical, critical, and systematic thinking by avoiding plagiarism;* - *Students are able to assess and develop knowledge of science and technology by paying attention to the humanities and scientific ethics, able to work in a collective collegial team, and being a motivator in society.*
Content	*Develop knowledge about quantitative and qualitative analysis of agriculture products using modern instruments and skills to use the results for data analysis. Course contents are Microscopy Methods, Spectroscopy Methods, Atomic Absorption Spectrometry (AAS), Gas Chromatography Methods, High-Performance Liquid Chromatography Methods, and Bio-molecule Methods*
Examination forms	*oral presentation, essay*

Study and examination requirements	*Participants are evaluated based on their performance in class (lectures) (70%) and lab (practicum) (30%).* *Performance in theory (100%):* *Mid Exam (20%)* *Final Exam (20%)* *Assignments (40%)* *Class participation (10%)* *Individual quiz (10%)* *Performance in practicum (100%):* *Practicum exam (30%)* *Pre-test or post-test (10%)* *Experiment reports (60%)*
Reading list	1. *Harvey, D. 2000. Modern Analytical Chemistry. Mc Graw Hill. Boston* 2. *Skoog, D.A., D.M. West, F.J. Holler, S.R. Crouch.2013. Principles of Instrumental Analysis, 6th Edition, Saunders C. Vollege Publishing, New York* 3. *Singh D., P.K. Chonkar, B.S. Dwivedi. 2013. Manual on Soil, Plant, and Water Analysis. Westville Pub. House, New Delhi* 4. *Ankerman D, and R. Large. 2001. Agronomy handbook: soil and plant analysis. A & L Laboratories. Nebraska* 5. *Benton Jones J. 2001. Laboratory Guide for Conducting Soil and Plant Analysis. CRC Press.* 6. *Wilson K. and J. Walker. 2010. Biochemistry and Molecular Biology. Cambridge Univ. Press.*