Module Handbook of Laboratory Classes in Biochemistry

Module designation	This course is a compulsory subject for students of the Faculty of Agriculture. This course discusses the basic concepts of introduction to agricultural science and matters related to the development of science and technology, agricultural systems, sustainable agriculture, and understanding the basics of agricultural extension and communication, and agricultural education for human resources who conduct agricultural activities.
Semester(s) in which the module is taught	Second Semester
Person responsible for the module	M. Saifur Rohman, S.P., M.Si., M.Eng., Ph.D.
Language	Bahasa Indonesia/Indonesian Language
Relation to curriculum	*Compulsory Course*
Teaching methods	Lecture are conducted in the class with 80-100 students. In every meeting, there will be delivered pre-test, interactive lecture and laboratory practices. Details: 1. Laboratory Work 2. Pre-test 3. Laboratory Report 4. Post-Laboratory test
Workload (incl. contact hours, self-study hours)	- Laboratory Work = 1 SKS x 150 minutes x 5 meetings = 750 minutes = 12,5 hours = 12,5 hours/30hours = 0,42 ECTS - Laboratory Report Assignment = 1 SKS x 150 minutes x 5 meetings = 750 minutes = 12,5 hours = 12,5 hours/30hours = 0,42 ECTS - Pretest = 1 SKS x 14 minutes x 5 meetings = 90 menit = 1,5 hours = 1,5 hours/30hours = 0,05 ECTS - Self Study = 1 SKS x 230 minutes x 5 meetings = 1.150 menit = 19,2 hours = 19,2 hours/30hours = 0,64 ECTS - Total Workload = 1,53 ECTS
Credit points	*0/1 Credit Points*
Required and recommended prerequisites for joining the module	*None*

Module objectives/intended learning outcomes	*Program Learning Outcomes (PLO):* *PLO1: Able to explain theoretical concepts regarding plant production technology by giving attention to economic and social-humanitarian aspects to achieve quality, sustainable and profitable agriculture.* *PLO2: Able to explain theoretical concepts of biology microorganism and develop microbial-based technology to increase plant production and environmental services.* *PLO3: Able to identify, design, implement, and solve problems that arise in the implementation of agricultural businesses.* *Course Learning Outcomes (CLO):* *CLO1: Students can explain the basic concept of biochemistry and its role in biological systems, as well as its relationship and development in various fields of science.* *CLO2: Students can explain the structure and biosynthesis of carbohydrates, lipids, amino acids, and nucleic acids.* *CLO3: Student can explain the biochemical processes, such as metabolism and metabolism catalysts, and their role in the biological system and their effect on agricultural activities.*
Content	1. *Carbohydrate Analysis: Molisch Test, Fehling Test, Nelson Test, Seliwanoff Test (1 meeting)* 2. *Lipid and Fatty Acid Analysis: soap formation, f fatty acids isolation and unprecipitated salt analysis, unsaturated free fatty acids analysis, and free fatty acids analysis (1 meeting)* 3. *Protein and Amino Acid Analysis: Ninhydrin Test, Xanthoproteic Test, Millon Test, Lead Sulphide Test, Biuret Test, denaturation by heating and extreme pH (1 meeting)* 4. *Enzyme Activity Analysis: nitrate reductase activity testing and amylase activity testing (1 meeting)* 5. *Visualization of Deoxyribonucleic Acid (DNA) (1 meeting)* 6. *Final exam (1 meeting)*
Examination forms	*High Order Thinking Skills Examination*
Study and examination requirements	*To be able to take the final exams, the minimum of student attendance is 100% of effective laboratory practices and submit all of their laboratory reports.*

Reading list	*Main References:* 1. *John Moore and Richard Langley. 2008.Biochemistry for Dummies. (e-book available)* 2. *David L. Nelson and Michael M. Cox. 2004.Lehninger Principles of Biochemistry. W.H. Freeman & Co. (e-book available)* 3. *Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer. 2002. Biochemistry. W.H. Freeman & Co. (e-book available)* 4. *Trudy McKee and James McKee. 2003. Biochemistry: The Molecular Basis of Life. Third edition. McGraw-Hill, Boston.* 5. *Albert L. Lehninger. 1995. Dasar-dasar Biokimia. (Alih bahasa: Maggy Thenawidjaja). Penerbit Erlangga, Jakarta.* 6. *David S. Page. 1995. Prinsip-prinsip Biokimia. Penerbit Unair, Surabaya.* 7. *Soeharsono. 1982. Biokimia I dan II. Gadjah Mada University Press, Yogyakarta.* *Additional References:* 1. *Scientific journals related to biochemistry and its applications in agriculture* 2. *Laboratory Classes in Biochemistry Handbook*