UIN SUNAN KALIJAGA YOGYAKARTA
FACULTY OF SCIENCE AND TECHNOLOGY
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Undergraduate Programme in Biology
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MODULE HANDBOOK

Module Name	Biological and environmental instrumentation
Module level, if applicable	Bachelor
Code, if applicable	BIO425102
Subtitle, if applicable	-
Courses, if applicable	Biological and environmental instrumentation
Semester(s) in which the module is taught	6th (sixth)
Person responsible for the module	Siti Aisah, S.Si., M.Si
Lecturer(s)	Siti Aisah, S.Si., M.Si., Dr. Aryan Pramudya K., S.Si., M.Si
Language	Indonesia
Relation to curriculum	compulsory course in the first year (2nd semester) Bachelor Degree
Type of teaching, contact hours	100 minutes of lectures, 170 minutes labwork and 120 minutes structured activities per week
Workload	Total workload is 136 hours per semester, which consists of 100 minutes lectures per week for 16 weeks, 120 minutes structured activities per week, 120 minutes individual study per week, 170 minutes laboratory work in total is 16 weeks per semester, including mid-exam and final exam
Credit points	3 credits (4,5 ECTS)
Requirements according to the examination regulations	
Recommended prerequisites	No prerequisites are stated on
Module objectives/intended learning outcomes	After completing this course, the students:

CO 1	Able to integrate principles of biology, biological resources, environment, and other relevant knowledge as well as the concept of its application in the field of general and specific biology P (LO 4; (Acts 11, 12)
CO 2.	Able to apply the basic principles of software applications, basic instruments, standard methods for analysis and synthesis in general and specific fields of biology carefully; P (LO 5; CP 13)
CO 3	Able to integrate relevant theories, materials, methodologies, ethical frameworks and research procedures, as well as Islamic insights and values in the study of biodiversity and conservation appropriately; P (LO 6; CP 14)
CO 4	Examine the implications of the development or implementation of science and technology in accordance with their expertise in a logical, critical, systematic, and innovative manner by applying humanities values based on scientific rules, procedures and ethics in order to produce ideas that are scientifically described in the form of final project reports and uploading them on the university website; KU (LO 8; KU 17,

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	CO 5: CO Able to make appropriate decisions in the context of solving problems in their field of expertise based on the results of valid information and data analysis; KU (LO 9; KU 21) CO 6: Able to present solutions in solving biology-related problems through the effective application of relevant biological knowledge, methods and technologies in the management of biological resources and the environment within a specific scope; KK (LO 10; KK 27, 28)
Content	1. Introduction to Biological and Environmental Instrumentation 2. Measurement and Sensor Basics 3. Spectroscopic Engineering, Chromatography and Electrophysiology 4. Microscopy and Imaging 5. Instrumentation for Environmental Monitoring 6. Electrochemical Engineering, Isotope and Radioactive Engineering 7. Molecular Engineering and Genetics 8. Geographic Information System (GIS) and Remote Sensing 9. Instrumentation for Biodiversity Analysis 10. Ethics and Safety in Instrumentation
Study and examination requirements and forms of examination	The final mark will be weighted as follows: **NO** / **Assessment methods (components, activities)** / **Weight (percentage)** 1 / Final Examination / 30% 2 / Mid-Term Examination / 30% 3 / Labwork / 25% 4 / Class Activities: Quiz, Homework, etc. / 15% The final assessment is expressed in the form of a letter value converted from a number value with the following categories: **NO** / **Number Value** / **Letter Value** / **NO** / **Number Value** / **Letter Value** 1 / ≥ 95 / A / 7 / 65-69.99 / B/C 2 / 90-94.99 / A- / 8 / 60-64.99 / C+ 3 / 85-89.99 / A/B / 9 / 55-59.99 / C 4 / 80-84.99 / B+ / 10 / 50-54.99 / C- 5 / 75-79.99 / B / 11 / 55-34.99 / D 6 / 70-74.99 / B- / 12 / <35 / E
Media employed	White-board, Lcd Projector, e-learning (https://daring.uin-suka.ac.id/)
Reading list	1. Skoog, D. A., Holler, F. J., & Crouch, S. R. (2017). Principles of Instrumental Analysis (7th ed.). Boston: Cengage Learning. 2. Artiola, J., Pepper, I. L., & Brusseau, M. L. (2004). Environmental Monitoring and Characterization. Burlington, MA: Academic Press. 3. Banwell, C. N., & McCash, E. M. (1994). Fundamentals of Molecular Spectroscopy (4th ed.). New York: McGraw-Hill. 4. Miller, J. M. (2005). Chromatography: Concepts and Contrasts (2nd ed.). Hoboken, NJ: Wiley-Interscience. 5. de Hoffmann, E., & Stroobant, V. (2007). Mass Spectrometry: Principles and Applications (3rd ed.). Chichester: John Wiley & Sons.

6. Bozzola, J. J., & Russell, L. D. (1999). Electron Microscopy: Principles and Techniques for Biologists (2nd ed.). Sudbury, MA: Jones and Bartlett Publishers.
7. Bard, A. J., & Faulkner, L. R. (2001). Electrochemical Methods: Fundamentals and Applications (2nd ed.). New York: Wiley.
8. Walker, J. M. (Ed.). (2005). Techniques in Molecular Biology (4th ed.). Totowa, NJ: Humana Press.
9. Campbell, J. B., & Wynne, R. H. (2011). Introduction to Remote Sensing (5th ed.). New York: Guilford Press.
10. Bolstad, P. (2016). GIS Fundamentals: A First Text on Geographic Information Systems (5th ed.). XanEdu Publishing.

PLO and CO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
CO 1				√							
CO 2				√							
CO 3					√						
CO 4					√						