Diponegoro University
Faculty of Science and Mathematics
Undergraduate Program Of Chemistry

Module designation	**Bioinorganic Chemistry (BioAno)**
Semester(s) in which the module is taught	6
Person responsible for the module	Sriatun, M.Si Drs. Suhartana, M.Si
Language	Indonesian
Relation to curriculum	~~Compulsory /~~ elective ~~/ specialisation~~
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Face to face : 1 x (2 x 50 min); Structured study: 1 x (2 x 60 min); Self study: 1 x (2 x 60 min)
Credit points	2
Required and recommended prerequisites for joining the module	Kano3
Module objectives/intended learning outcomes	1. Demonstrate an attitude of being responsible for work in their field of expertise independently 2. Mastering the theoretical concepts of structure, properties, changes, kinetics, and energetics of molecules and chemical systems, identification, separation, characterization, transformation, synthesis of macromolecular chemicals and their application 3. Able to analyze several alternative solutions in identification, analysis, isolation, transformation, and synthesis of available chemicals and present analysis conclusions for appropriate decision making. 4. Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pays attention to and uses humanities values by their field of expertise

Content	1. Molecular structure and molecular interactions, Essential inorganic chemistry: Essential chemical elements, Metals in biological systems, Complexation of metal ions, Electronic structures and geometries of metals in biological systems, Bioorganometallic chemistry, Electron transfer, Sodium, and potassium transport, Calcium signaling proteins, Zinc in transcription, selective Transport and storage of elemental iron 2. Molecular and biomolecular interactions, Transport, Transfer, and transcription of elements 3. Transport and storage of oxygen 4. Molecular and biomolecular interactions, Transport, Transfer, and transcription of elements 5. Transport and storage of oxygen: Mechanisms of binding oxygen to metals 6. Molecular interactions and catalyst concepts, Catalytic processes in biological systems: Acid-base catalysts, Enzymes associated with H2O2 and O2 7. Molecular interactions and catalyst concepts, Catalytic processes in biological systems: Enzyme reactions containing Co (cobalt), Transfer of oxygen atoms by enzymes Molybdenum and tungsten/tungsten 8. Molecular and Biomolecular Interaction, Sensors in biological systems: Iron proteins as sensors 9. Interaction of molecules and biomolecules, sensors in biological systems 10. Proteins containing Cu and Zn as sensors 11. Molecular interactions, Biomineralization: CaCO3, Ca5(PO4)X, SiO2 12. Molecular and Biomolecular interactions, Metals that play a role in the medical field: Metal toxicity and homeostasis, Factors that cause metals to be toxic 13. Molecular and Biomolecular Interaction, Metals that play a role in the medical field: Therapeutic compounds: Anti-cancer, Anti-rheumatic, Anti-diabetic 14. Diagnostic agents: Tc imaging agent, Gd imaging agent
Exams and assessment formats	Mid-Semester Exam and Final Exam
Study and examination requirements	Participatory Activities 20% Project Results 30% Task 10% Quiz 10% Mid-semester 15% Final exams 15%

Reading list	1. Bowser, J., 1990, “Inorganic Chemistry”,John Wiley & Sons, New York. 2. Cotton, F.A & Wilkinson, G., 1987,”Basic Inorganic Chemistry”, John Wiley & Sons, New York. 3. Manku,G.S., 1980, “Theoritical Principles of Inorganic Chemistry”, Mc. Graw Hill, New York. 4. Huhey, J.E., 1983, “Inorganic Chemistry Principles of Structure and Reactivity”, 3ed, Harper Inc, New York. 5. Kaim, Wolfgang and Schwederski, Brigitte, 1994, "Bioinorganic Chemistry: Inorganic Elements in the Chemistry of Life", John Wiley and Sons. 6. Wilkins,Patricia C. and Wilkins, Ralph G., 1997, "Innorganic Chemistry in Biology", Oxford University Press. Inc., New York. 7. Caret, Robert L., Denniston, Katherine J., and Topping, Joseph J., 1993, " Principles and Aplications of Inorganic, Organic and Biological Chemistry", Wm. C. Brown Publisher. 8. Rosette M. Roat-Malone., 2001, "Bioinorganic Chemistry: A Short Course", John Willey and Sons Inc. Publication