



MINISTRY OF EDUCATION, CULTURE, RESEARCH AND  
TECHNOLOGY

**UNIVERSITAS NEGERI MAKASSAR**

FACULTY OF MATHEMATICS AND NATURAL SCIENCES  
DEPARTMENT OF BIOLOGY

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**Module Handbook for Bionanoteknologi**

Module designation	<i>Bionanotechnology</i>
Module level, if applicable	<i>Bachelor of science</i>
Code, if applicable	22A42C407
Subtitle, if applicable	-
Courses, if applicable	-
Semester(s) in which the module is taught	6
Person responsible for the module	<i>Prof. Hartati., S.Si., M.Si., Ph.D</i>
Lecturer	<i>Prof. Hartati., S.Si., M.Si., Ph.D Hartono, S.Si., M.Si., Ph.D Drs. Subaer, Ph.D</i>
Language	<i>Indonesia</i>
Relation to curriculum	<i>Elective course, 6th semester</i>
Type of teaching, contact hours	<i>Learning methods: lectures, project based learning, discussions, assignments. CSU : 2 2 x 50 minutes lecture = 100 minutes 2 x 60 minutes scheduled task = 120 minutes 2 x 60 minutes independent task = 120 minutes Total teaching format = 340 minutes = 5.7 hours</i>
Workload	<i>Total workload = (Total Teaching format x 16) = 5.7 x 16 = 91,2 jam</i>
Credit points	<i>2 CSU (3 ECTS)</i>
Requirements according to the examination regulations	<i>Student must have attended at least 80% of the lectures to sit in the exams</i>
Recommended prerequisites	<i>Biochemistry, Cell Biology</i>
Module objectives/intended learning outcomes	<ol style="list-style-type: none"> <li>1. <i>Able to describe the basic structure of mammalian cell membrane, cell cycle different types of cell receptors</i></li> <li>2. <i>Able to understanding of properties Nanobiomaterials and biocompatibility.</i></li> <li>3. <i>Able to describe the structural &amp; functional principles of Bionanotechnology</i></li> <li>4. <i>Able to describe the protein and DNA based Nanostructures</i></li> <li>5. <i>Able to describe techniques of characterization of size nanoparticles</i></li> <li>6. <i>Able to understanding of synthesis of nanocomposites and its characterization through FTIR and UV</i></li> </ol>

	7. <i>Able to perform in vivo and in vitro analysis of nanoparticles (antimicrobial and antifungal tests).</i>
Content	<i>Basic of Cell biology, Nanobiomaterials and Biocompatibility, Structural &amp; Functional Principles of Bionanotechnology, Protein and DNA Based Nanostructures. Experiments: Synthesis of various metal and metal oxide nanoparticles and analysis by UV-Vis Spectrophotometer; Techniques of characterization of size of nanoparticles X-ray diffraction (XRD), synthesis of nanocomposites and its characterization through FTIR and UV spectrometer. Analysis in vitro and in vivo of Nanoparticles</i>
Study and examination requirements and forms of examination	<i>Midterm and final exam, assignments</i>
Media employed	<i>LMS-SYAM OK, Power Point Presentation, Textbook, Journal Article, Handout</i>
Reading list	<ol style="list-style-type: none"> <li>1. <i>Molecular Cell Biology, Harvey Lodish, Published by W.H. Freeman &amp; Company</i></li> <li>2. <i>Biomaterials: A Nano Approach, S Ramakrishna, M Ramalingam, T.S. Sampath Kumar, Winston O. Soboyejo, Published by CRC Press</i></li> <li>3. <i>Bionanotechnology: Lessons from Nature, D S. Goodsell, by John Wiley &amp; Sons, Inc.</i></li> <li>4. <i>Nanobiotechnology: Concepts, Applications and Perspectives, (edited by C. M. Niemeyer and C. A. Mirkin), Wiley-VCH Verlag GmbH &amp; Co. KGaA, Weinheim,</i></li> <li>5. <i>Nanobiotechnology: Concepts, Applications and Perspectives, Edited by Christof M. Niemeyer and Chad A. Mirkin, Wiley-VCH, 2004, ISBN 3527306587, 9783527306589.</i></li> </ol>