



**UNIVERSITAS NEGERI YOGYAKARTA**  
**FACULTY OF MATHEMATICS AND SCIENCE**  
**DEPARTMENT OF BIOLOGY EDUCATION**

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<b>Bachelor of Science in Biology</b>	<b>MODULE HANDBOOK</b>
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Module name:	Laboratory Work in Bioremediation
Module level, if applicable:	Undergraduate
Code:	BIM6182
Sub-heading, if applicable:	-
Classes, if applicable:	-
Semester:	Even
Module coordinator:	Dr. Tien Aminatun
Lecturer(s):	Dr. Tien Aminatun, Anna Rakhmawati, M.Si
Language:	Bahasa Indonesia
Classification within the curriculum:	Elective Course
Teaching format / class hours per week during the semester:	100 minutes lectures, 120 minutes structured activities, and 120 minutes individual study per week
Workload:	Total workload is 91 hours per semester which consists of 100 minuteslectures, 120 minutes structured activities, and 120 minutes individual study per weekfor 16 weeks.
Credit points:	1 SKS (2 ECTS)
Prerequisites course(s):	Environmental Science, Microbiology
Program Learning Outcome(s)	<ol style="list-style-type: none"> <li>4. Comprehensively mastering Biology (core biology) to solve problems in the field of Biology (problem-solving) and to underlie the concepts of related sciences</li> <li>5. Mastering the techniques and methodologies in Biology as well as familiar with the equipment used in Biology laboratories in order to get the knowledge of Biology (how we know what we know)</li> <li>6. Being adaptive, creative, innovative in applying the concepts of Biology and other related fields</li> <li>7. Being skillful in applying the techniques used in laboratories and daily life</li> <li>9. Being able to work and create jobs/being an entrepreneur in the field of Biology</li> <li>10. Having managerial ability to supervise and evaluate workers and optimizing the networks in order to develop professionalism</li> <li>11. Possessing scientific skills to support the ability to speak in local, national, and international forums</li> </ol>
Targeted learning outcomes:	<p>After taking this course, the students have ability to:</p> <p>CO1. Memahami pengaruh mikroorganismen dan ada tidaknya aerasi dalam pengolahan limbah cair organik secara mikrobioremediasi</p> <p>CO2. Memahami peran berbagai jenis tumbuhan dan</p>

	<p>mempraktekkannya dalam pengolahan limbah cair laundry secara fitoremediasi</p> <p>CO3. Membandingkan efektivitas berbagai jenis tumbuhan air sebagai fitoremediator limbah cair laundry</p> <p>CO4. Memahami dan mempraktekkan manfaat kapang sebagai mikoremediator pada limbah pertanian, khususnya residu pestisida</p> <p>CO5. Membandingkan efektivitas berbagai genus kapang sebagai mikoremediator pestisida</p> <p>CO6. Mengkomunikasikan hasil praktek bioremediasi</p>															
Content:	<p>Matakuliah ini menekankan pada praktek pemanfaatan organisme untuk memperbaiki kerusakan lingkungan, yaitu dalam mengubah polutan beracun menjadi lebih sederhana dan tidak beracun, sehingga dapat digunakan sebagai landasan dalam pengolahan limbah dan pengelolaan lingkungan. Dalam matakuliah praktikum ini mahasiswa melakukan praktek bioremediasi dengan mikroorganisme (konsorsium bakteri), kapang, dan tanaman</p>															
Study / exam achievements:	<p>The final mark will be weight as follow:</p> <table border="1"> <thead> <tr> <th>No</th> <th>CO</th> <th>Assessment Object</th> <th>Assessment Technique</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CO1 to CO6</td> <td>Observed attitudes , knolwedge, and skills</td> <td>Survey, test, rubrics and manuals</td> <td>100%</td> </tr> <tr> <td colspan="4">Total</td> <td>100%</td> </tr> </tbody> </table>	No	CO	Assessment Object	Assessment Technique	Weight	1	CO1 to CO6	Observed attitudes , knolwedge, and skills	Survey, test, rubrics and manuals	100%	Total				100%
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1	CO1 to CO6	Observed attitudes , knolwedge, and skills	Survey, test, rubrics and manuals	100%												
Total				100%												
Forms of media:	Real objects, model, multimedia															
References:	<p>A. A. G. Tyler Miller, JR. 2001. <i>Environmental Science, Working with The Earth</i>. 8th Edition. Brooks/Cole Thomson Learning. USA.</p> <p>B. McCutcheon, S.G, Schnoor, J.L. 2003. <i>Phytoremediation Transformation and Control of Contaminants</i>. Wileyinterscience.</p> <p>C. Crawford, R.L. and Crawford, D.L. 2005. <i>Bioremediation: Principles and Applications</i>. University of Idaho, Moscow, Idaho, USA, Cambridge University Press</p> <p>D. Fingerman, M., Nagabhushanam, R. 2005. <i>Bioremediation of Aquatic and Terrestrial Ecosystems</i>. Science Publisher, Plymoth UK.</p> <p>E. Singh, S.N., and Tripathi, R.D. 2007. <i>Environmental Bioremediation Technologies</i>. Springer, Beriin</p> <p>F. Chojnacka, K. 2009. <i>Biosorption and Bioaccumulation in Practice</i>. Nova Science Pubisher. New York</p> <p>G. Budi Prasetijo. 2011. <i>Bioremediasi</i>. Smart e-book. Publikasi di website</p> <p>H. Ekosari, R. 2011. <i>Bioremediasi</i>. Publikasi di website</p>															

**PLO and CO mapping**

