**UNIVERSITAS NEGERI YOGYAKARTA**
**FACULTY OF MATHEMATICS AND SCIENCE**
**DEPARTMENT OF BIOLOGY EDUCATION**
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| **Bachelor of Science in Biology** | **MODULE HANDBOOK** |
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| Module name: | Laboratory Work in Multivariat Biology Research Methodology |
| Module level, if applicable: | Undergraduate |
| Code: | BIM6232 |
| Sub-heading, if applicable: | - |
| Classes, if applicable: | - |
| Semester: | Odd |
| Module coordinator: | Prof Dr. Bambang Subali, M.S. |
| Lecturer(s): | Prof Dr. Bambang Subali, M.S. & Ir. Suhandoyo, M.S. |
| Language: | Bahasa Indonesia |
| Classification within the curriculum: | Compulsory Course |
| Teaching format / class hours per week during the semester: | 170 minutes Lab work per week |
| Workload: | Total workload is 46 hours per semester which consists of 170 minutes lab work per week for 16 weeks. |
| Credit points: | 1SKS (1 ECTS) |
| Prerequisites course(s): | Bivariat Biology Research Methodology |
| Program Learning Outcome(s) | PLO 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)<br>PLO 9 : Being able to work and create jobs/being an entrepreneur in the field of Biology<br>PLO 11: Possessing scientific skills to support the ability to speak in local, national, and international forums |
| Targeted learning outcomes: | After taking this course, the students have ability to:<br>CO1. Mengkaji prinsip, perancangan, pelaksanaan, dan pelaporan penelitian dengan desain observasi multivariat dalam bidang biologi.<br>CO2. Mengkaji prinsip, perancangan, pelaksanaan, dan pelaporan penelitian dengan desain eksposfakto multivariate dalam bidang biologi.<br>CO3. Mengkaji prinsip, perancangan, pelaksanaan, dan pelaporan penelitian dengan desain eksperimen sejati pola multivariat dalam bidang biologi. |

<table>
<tr><td></td><td>CO4. Mengkaji prinsip, perancangan, pelaksanaan, dan pelaporan penelitian dengan desain eksperimen semu pola multivariat dalam bidang biologi.<br>CO5. Merancang penelitian multivariat dengan desain observasi multivariat dalam bidang biologi.<br>CO6. Merancang penelitian multivariat dengan desain eksposfakto multivariat dalam bidang biologi.<br>CO7. Merancang penelitian multivariat dengan desain eksperimen sejati pola multivariat dalam bidang biologi.<br>CO8. Merancang penelitian multivariat dengan desain eksperimen semu pola multivariat dalam bidang biologi.<br>CO9. Mengomunikasikan dan berkolaborasi baik secara lesan atau tulisan dalam menyajikan hasil diskusi kelompok di depan kelas</td></tr>
<tr><td>Content:</td><td>Mata praktikum Metodologi multivariat mencakup kajian prinsip dan prosedur perancangan pelaksanaan dan pelaporan penelitian yang melibatkan lebih dari dua variabel (lebih dari satu variabel bebas dengan satu variabel tergayut, satu variabel bebas dengan lebih dari satu variabel tergayut, dan lebih dari satu variabel bebas dengan lebih dari satu variabel tergayut). Kajian penelitian multivariat berkaitan dengan tujuan untuk menyelidiki pola hubungan stimulus respon dan dengan tujuan untuk menyelidiki perbedaan respon akibat pengaruh variabel bebas baik dalam desain observasi, eksposfakto, eskperimen, dan tersarang (nested).</td></tr>
<tr><td>Study / exam achievements:</td><td>The final mark will be weight as follow:<br><br>
<table>
<tr><th>No</th><th>CO</th><th>Assessment Object</th><th>Assessment Technique</th><th>Weight</th></tr>
<tr><td>1</td><td>CO1 to CO9</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>
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</td></tr>
<tr><td>Forms of media:</td><td>Real objects, model, multimedia</td></tr>
<tr><td>References:</td><td>A. Utama:<br>1. Bausell, B. (1994). Conducting meaningfull experiments: 40 steps to becoming a scienteist. Thousanf Oaks: International Educational and Profesional Publiser,SAGE Publications<br>2. Drew, Cl.J. (1980). Introduction to designing and conducting research. St. Louis: The C.V. Mosby Company.<br>3. Keppel, G. (1982). Design and analysis a researcher handbook. New Jersey: Departement of Psychology University of California.<br>4. Kirk, R.E. 1995. Experimental design: Procedures for behavioral science. Pasific Grove: Brooks/Colc l'ublishing Conrpanv<br>5. Moh Nazir. (1988). Metode penelitian. Jakarta: Galia Indonesia</td></tr>
</table>

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**II. Pendukung:**

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25. Mendenhall, W. (1968*). Introduction to linier models and the design of experiments*. California: Wadsworth, Belmont.

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| | 26. Moed, H.F. & Glanzel, W. (2004). *Handbook of Quantitative Science and Technology Research*. New York: Kluwe Academic Publishers.<br>27. Nasution, A.H. dan Barizi. (1980) *Metode statistika untuk penarikan kesimpulan*. Ed keempat. Jakarta: Gramedia.<br>28. Rosner, B. (1990). *Fundamentals of biostatistics*. 3-rd ed. Bostos: PWS-Kent Publishing Company.<br>29. Siegel, S. (1956). *Nonparameteric statistics for the beavioral sciences*. Tokyo: Mc-Graw-Hill Kogakusha, Ltd.<br>30. Sokal, RR. and Rohlf. (1969). *Biometry: The principles and practice of statistics in biological approach*. 2-nd ed. New York: Mc-Graw-Hill Book Company.<br>31. Steel, R.G.D. and Torrie, J.H. (1980). *Principles and procedures of statistics: A biometrical approach*. 2-nd ed. New York: Mc-Graw-Hill Book Company.<br>32. Sudjana. (1966). *Metode statistika*. Edisi keempat. Bandung: Tarsito.<br>33. Yamane, T. (1973). *Statistics: An introductory analysis*. 3-rd ed. Tokyo: Harper International Edition.<br>34. Buku-buku referensi lainnya dalam bentuk buku elektronik. |

**PLO dan CO Maping**

| | PLO 1 | PLO 2 | PLO 3 | PLO 4 | PLO 5 | PLO 6 | PLO 7 | PLO 8 | PLO 9 | PLO 10 | PLO 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | | | | | V | | | | | | |
| CO 2 | | | | | V | | | | | | |
| CO 3 | | | | | V | | | | | | |
| CO 4 | | | | | V | | | | | | |
| CO 5 | | | | | | | | | V | | |
| CO 6 | | | | | | | | | V | | |
| CO 7 | | | | | | | | | V | | |
| CO8 | | | | | | | | | V | | |
| CO9 | | | | | | | | | | V | |