Course Module

# Insect Biodiversity and The Utilization

Faculty of Forestry

Mulawarman University

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| Module name | Insect Biodiversity and The Utilization |
| Modul level, if applicable | Graduates Programme |
| Code, if applicable | 220401802P026 |
| Subtitle, if applicable | |
| Courses, if applicable | Regular |
| Semester(s) in wich the module is taught | II (two) |
| Person resposible for the module | Dr.rer.nat. Harmonis, S.Hut., M.Sc. |
| Lecturer | Dr.rer.nat. Harmonis, S.Hut., M.Sc.<br>Dr. Ir. Djumali Mardji, M.Agr. |
| Language | Indonesia |
| Relation to curriculum | Programme, mandatory |
| Type of teaching, contact hours | Lecture, 2 lecture contact hours |
| Workload | Number of meetings per semester: 16 meetings<br>(14 meetings for learning activity, 1 meeting for mid semester, 1 meeting for final examination)<br>2 x 50 minutes lectures, 2 x 60 minutes structured assignment, 2 x 60 minutes individual activity, with a total time of 4760 minutes or equivalent to a total of 79.3 hours in 14 weeks per semester |
| Credit points | 2 SKS (3.2 ECTS)<br>Details:<br>1 Credit = 170 min/week<br>1 Credit = 170 min x 14 week = 2,380 min/semester<br>1 ECTS = 25 h / semester<br>1 Credit = 2,380 / 60 / 25 = 1.6 ECTS<br>2 Credit = 1.6 x 2 = 3.2 ECTS |
| Requirements according to the examination regulations | Have attended not less than 80% class meetings |
| Recommended prerequisites | |
| Module objectives/intended learning outcomes | **Intended Learning Outcomes**<br>**Knowledge and Understanding**<br>**ILO-1 :** Applying scientific ethics, norms, and values of professionalism<br>**Investigation** |

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| | **ILO-3 :** Able to analyze current problems and issues, and assess the ecological, social, and economic impacts of implementing programs in the forestry and tropical environmental sectors.<br><br>**Engineering Design and Practice**<br><br>**ILO-4 :** Develop research schemes based on inter or multidisciplinary approaches to tropical forestry and the environment, and communicate the results to the public.<br><br>**Social Competences**<br><br>**ILO-5 :** Lead, work in a team, and be responsible for achieving group work results.<br><br>**Course Learning Outcomes**<br><br>**Knowledge and Understanding**<br><br>**CLO-2 :** Able to identify insect groups that have the potential for utilization and development through domestication and cultivation.<br>**Investigation**<br>**CLO-3 :** Able to choose and initiate efforts to utilize insect biodiversity by taking into account the principle of sustainability. |
| Content | This course contains the biodiversity of tropical insects and their ecological roles, as well as the utilization of insects as pollinators, biological control, bioindicators and bionics. Then in this course also presented material about domestication and cultivation efforts and efforts which include; honey bees, silkworms, lice, and butterfly tourism gardens.<br><br>After attending this course, students have the ability to:<br>1. Describe the biodiversity of tropical insects and be able to compare insect characteristics based on their taxonomic groups.<br>2. Able to describe the role and behavior of each insect taxonomic group.<br>3. Able to determine pollinator insects and their introduction techniques.<br>4. Students are able to analyze the advantages and disadvantages of the concept of biological control.<br>5. Able to choose the right biological control technique.<br>6. Able to analyze the usefulness of bioindicators and simulate bioindicator identification techniques.<br>7. Able to analyze the potential use of insects as bionic agents through biomimetic, biomimicry and biomimese approaches.<br>8. Able to identify insects that have the potential to be domesticated and cultivated. |

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<tr><td></td><td>9. Able to determine a suitable beekeeping system.<br>10. Able to determine harvesting and processing techniques for honey bee products.<br>11. Able to determine the silkworm cultivation system.<br>12. Able to determine harvesting techniques and processing of silkworm products.<br>13. Able to determine the lice cultivation system.<br>14. Able to determine the management system of butterfly educational tourism gardens.</td></tr>
<tr><td>Study and examination requirements and forms of examination</td><td>Evaluation and assessment of the learning process are following scheme 5 in the Academic Regulations of Mulawarman University:
<table>
<tr><th>No.</th><th>Objects of Assessment</th><th>Forms of Assessment</th><th>Quantity (%)</th></tr>
<tr><td>1</td><td>Affective and class attendance</td><td>Participation</td><td>10</td></tr>
<tr><td>2</td><td>Assignment</td><td>Q&A</td><td>20</td></tr>
<tr><td>3</td><td>Mid-semester test</td><td>Written test</td><td>30</td></tr>
<tr><td>4</td><td>Final semester test</td><td>Written test</td><td>40</td></tr>
<tr><td colspan="3">TOTAL</td><td>100</td></tr>
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<tr><td>Media employed</td><td>Laptop, LCD</td></tr>
<tr><td>Reading list</td><td>
1. Allsopp M, de Lange WJ, Veldtman R., 2008. Valuing insect pollination services with cost of replacement. PLS one 3(9):e3128. doi:10.1371/Journal.pone.0003128.<br>2. Anonim. 2009b. Introduction to biological control. http://ucdnema. ucdavis.edu/imagemap/nemmap/ENT135/5EntNem.htm.<br>3. Anonim. 2009a. Natural pest control for the indoor gardener. http://www.jasons-indoor-guide-to-organic-and-hydroponics - gardening.com/natural-pest-control. html.<br>4. Awan, A 2007. Domestikasi ulat sutera liar Attacus atlas (Lepidoptera: Saturniidae) dalam usaha meningkatkan persuteraan nasional. Disertasi. Sekolah Pascasarjana Institut Pertanian Bogor, Bogor.<br>5. Banaszak J (2000) Pollinating insects (Apoidea) from “Puszcza Zielonka” Landscape Park, Poland. In: Banaszak J (ed.) Ecology of Forest Islands. Bydgoszcz Pedagogical University Press, Bydgoszcz.<br>6. Beccaloni GW, Gaston KJ (1995) Predicting the species richness of neotropical forest butterflies: Ithomiinae (Lepidoptera: Nymphalidae) as indicators. Biological Conservation 71: 77–86.<br>7. Begon M, Townsend CR, Harper JL (2006) Ecology: from Individuals to Ecosystems. 4th edn. Blackwell Publishing. United Kingdom.
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8. Bobo KS, Waltert M, Fermon H, Njokagbor J, Mühlenberg M (2006) From forest to farmland: butterly diversity and habitat associations along a gradient of forest conversion in southwestern Cameroon. Journal of Insect Conservation 10: 29–42.
9. Cleary DFR (2004) Assessing the use of butterflies as indicators of logging in Borneo at three taxonomic levels. Journal of Economic Entomology 97: 429–435.
10. Cleary DFR, Genner MJ (2006) Diversity patterns of Bornean butterfly assemblages. Biodiversity and Conservation 15: 517–538.
11. Coulson, R.N., & Witter J.A. 1984. Forest entomology (Ecology and management). New York: A Wiley-Interscience Publication.
12. Dufrêne M, Legendre P (1997) Species assemblages and indicator species: the need for a flexible asymmetrical approach. Ecological Monographs 67: 354–366.
13. Erwin, T.L., 2004. The biodiversity question: how many species of terrestrial arthropods are there? In: Lowman, M.D., Rinker, H.B. (Eds.), Forest Canopies. Academic/Elsevier, San Diego, pp. 259e269.
14. Evans, J. 1982. Plantation forestry in the tropics. Oxford: Clarendon Press. 472 pp.
15. Foottit, R.G., Adler, P.H., 2009. Insect Biodiversity: Science and Society. Wiley-Blackwell Publishing, Oxford, p. 632.
16. Franz, J.M., & Krieg, A. 1982. Biologische schädlingsbekampfung. 3.Auflage. Berlin und Hamburg: Verlag Paul Parey. 252 pp.
17. Guntoro, S. 2006. Budidaya Ulat Sutera. Penerbit Kanisius. Yogyakarta.
18. Harmonis, 2007. Potensi dan prospek pengembangan usaha perlebahan di Kalimantan Timur. Rimba Kalimantan 12 (1): 25 –34.
19. Harmonis, 2013. Butterflies of lowland East Kalimantan and their potential to assess the quality of reforestation attempt. [Dissertation]. Albert-Ludwigs-University, Freiburg im Breisgau, Germany.
20. Herrera CM (1990) Daily patterns of pollinator activity, differential pollinating effectiveness, and floral resource availability, in summer- flowering Mediterranean shrub. Oikos 58: 277–288.
21. Holt EA, Miller SW (2011) Bioindicators: using organisms to measure environmental impacts. Nature Education Knowledge 2: 2–8.
22. Kumar B., 2011. Study of Income and Employment of Lac Cultivation in Betul District of Madhya Pradesh. Available from: http://krishikosh.egranth.ac.in/bitstream/1/5810018990/1/T-82780.pdf.

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24. Lawton JH, Bignell DE, Bolton B, Bloemers GF, Eggleton P, Hammond PM, Hodda M, Holt RD, Larsen TB, Mawdsley NA, Stork NE, Srivastava DS, Watt AD (1998) Biodiversity inventories, indicator taxa and affects of habitat modification in tropical forest. Nature 391: 72–76.
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natural enemies: community structure and interactions. Journal of Applied Ecology 35: 708–719.
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