MODULE HANDBOOK

Module Name	Natural Product Chemistry
Module level	Bachelor
Abbreviation, if applicable	3074112069
Sub-heading, if applicable	-
Course included in the module, if applicable	-
Semester/term	5th / Third Year
Module coordinator(s)	Prof. Dr. Tukiran, M.Si.
Lecturer(s)	Prof. Dr. Tukiran, M.Si., Prof. Dr. Suyatno, M.Si., Dr. Ratih Dewi Saputri, M.Si
Language	Indonesian
Classification within the curriculum	Elective Course
Teaching format/class hours per week during the semester	2 hours lecturers (50 min per hour)
Workload	2 x 50 minutes lectures, 2 x 60 minutes structured activity, 2 x 60 minutes individual activity, 14 weeks per semester, 79.33 total hours per semester ~ 3.18 ECTS**
Credit points	2 CU x 1.59 = 3.18 ECTS
Prerequisite course(s)	-

Targeted learning outcomes	CLO 1 Students can use the concept of secondary metabolite compounds to screen, isolate, and test the bioactivity of secondary metabolites CLO 2 Students can describe the basic principles of formation reactions and biosynthetic pathways for secondary metabolites. CLO 3 Students can master the basic concepts of secondary metabolites and their benefits for humans. CLO 4 Students can make decisions based on the results of screening, isolation, and bioactivity tests of secondary metabolites. CLO 5 Students Have a responsible attitude in developing extracts or isolates as herbal medicinal ingredients.

Content	1. Classification and benefits of secondary metabolite compounds. 2. Explanation of various types of extracts that traditional and modern industries can utilize. 3. Indonesian medicinal plant bioactive compounds and their uses. 4. Data collection of plant bioactive compounds 5. Can use the explanation of traditional medicine. 6. Terpenoids, classification, biosynthesis, and distribution in plants. 7. Steroids, classification, biosynthesis, and distribution in plants. 8. Phenylpropanoids, classification, biosynthesis, and distribution in plants. 9. Polyketides, classification, biosynthesis, and distribution in plants. 10. Flavonoids, classification, biosynthesis, and distribution in plants. 11. Alkaloids, classification, biosynthesis, and distribution in plants. 12. Isolation methods/techniques. 13. Identify isolated compounds through chemical tests. 14. Explain the results of the study of the journal of natural materials chemistry. 15. Present work visits in groups from the traditional medicine (herbal) industry, natural ingredients industry, and pharmaceutical industry.
Attribute Soft skill:	Active communication; Disipline; Collaboration; Responsibility; and Argumentation in class and outdoor setting

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<tr>
<td>Study/exam achievements</td>
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Students are considered to complete the course and pass if they obtain at least 40% of maximum final grade. The final grade (NA) is calculated based on the following ratio:
<table>
<tr><th>Assessment Components</th><th>Percentage of contribution</th></tr>
<tr><td>Participation</td><td>20%</td></tr>
<tr><td>Assignment</td><td>30%</td></tr>
<tr><td>Mid-semester test</td><td>20%</td></tr>
<tr><td>Final semester test</td><td>30%</td></tr>
</table>
Grade Conversion of 0-100 scale into 0-4 scale is set as below:
<table>
<tr><th>Letter</th><th>Number</th><th>Grade interval</th></tr>
<tr><td>A</td><td>4.00</td><td>$85 \leq A \leq 100$</td></tr>
<tr><td>A-</td><td>3.75</td><td>$80 \leq A- < 85$</td></tr>
<tr><td>B+</td><td>3.50</td><td>$75 \leq B+ < 80$</td></tr>
<tr><td>B</td><td>3.00</td><td>$70 \leq B < 75$</td></tr>
<tr><td>B-</td><td>2.75</td><td>$65 \leq B- < 70$</td></tr>
<tr><td>C+</td><td>2.50</td><td>$60 \leq C+ < 65$</td></tr>
<tr><td>C</td><td>2.00</td><td>$55 \leq C < 60$</td></tr>
<tr><td>D</td><td>1.00</td><td>$40 \leq D < 55$</td></tr>
<tr><td>E</td><td>0.00</td><td>$0 \leq E < 40$</td></tr>
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<tr><td>Media</td><td>Computer, LCD, Whiteboard, presentation, and book</td></tr>
<tr><td>Learning Methods</td><td>Lecture using: Student-centered approach; project-based learning; and discussion; and presentations (structured activities).</td></tr>
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Literature	1. Sutoyo, S., Amaria, A., Sanjaya, I.G.M., Hidayah, R., Sari, D.P., Dwitarini, N., Oktavia, F.D., Nurulhidayah, A.F. 2022. Synthesis of Nanoherbal from Ethanol Extract of Indonesian Fern Selaginella plana and Antibacterial Activity Assay. *Trop J Nat Prod Res*. **Vol** 6 (1), 44-49. 2. Saputri, R.D., Tjahjandarie, T.S., Tanjung, M. 2021. Two novel coumarins bearing an acetophenone derivative from the leaves of *Melicope Quercifolia. Natural Product Research*. **Vol** 35 (8), 1256-1261. 3. Dewick, P.M., 2009. Medicinal Natural Product: A Biosynthetic Approach, 3rd Ed., John Willey & Sons, Inggris. 4. Tukiran. 2015. Kimia Bahan Alam: Berbasis Field Study dan Pendekatan Chemo-Enterprenuership, Surabaya: Penerbit Unesa University Press. 5. Achmad, S.A., Hakim, E.H., Makmur, L., Syah, Y.M, Juliawati, L.D., dan Mujahidin, D., 2007, Tumbuhan-tumbuhan Obat Indonesia, ITB Press, Bandung. 6. Vermerris, W., and Nicholson, R., 2006, Phenolic Compound Biochemistry, Springer. 7. Andersen, O.M., and Markham, O.M., 2006, Flavonoid: Chemistry, Biochemistry and Applications, CRC Press, Taylor and Francis Group. 8. Cordell, G.A., 2002. *The Alkaloid: Chemistry and Pharmacology*, Academic Press Inc.
Notes:	*1 CU in learning process = three periods consist of: (a) scheduled instruction in a classroom or laboratory (50 minutes); (b) structured activity (60 minutes); and (c) individual activity (60 minutes) according to the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 44 the Year 2015 jo. the Regulation of Indonesia Ministry of Research, Technology, and Higher Education No. 50 the Year 2018.
	**1 CU = 1,59 ECTS according to Rector Decree Of Universitas Negeri Surabaya No. 598/UN38/Hk/Ak/2019