

2023 MODULE DESCRIPTION

BACHELOR PROGRAM
AGRICULTURAL ENGINEERING
FACULTY OF AGRICULTURE
HASANUDDIN UNIVERSITY
2023



Industrial Ecology

Elective

Module designation	<i>Industrial Ecology</i>
Semester(s) in which the module is taught	<i>Elective</i>
Person responsible for the module	<ul style="list-style-type: none"> • <i>Dr. Ir. Daniel Useng, M.Eng.Sc</i> • <i>Diyah Yumeina RD, STP., M.Agr., Ph.D</i>
Language	<i>Indonesia</i>
Relation to curriculum	<i>Elective</i>
Teaching methods	<i>Lecture</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:</i> $2 \text{ SKS} \times 1.7 = 3.4 \text{ ECTS} = 91.8 \text{ hours}$</p> <ul style="list-style-type: none"> • <i>Lecture = 23.3 hours</i> • <i>Excercise = 28 hours</i> • <i>Sel study = 28 hours</i> • <i>Exam = 4 hours (MID term and final)</i> • <i>Exam preparation = 8.5 hours</i>
Credit points	$2 \text{ SKS} = 3.4 \text{ ECTS}$
Required and recommended prerequisites for joining the module	<i>Renewable Energy</i> <i>Electricity and Agricultural Electrification</i> <i>Water Resources Management</i> <i>Agro-industry Management</i>
Module objectives/intended learning outcomes	<i>ILO 3: Apply knowledge of mathematics, sciences, and engineering principles in agricultural fields; (Knowledge 1)</i>
Content	<i>Students can understand and master ecological principles and apply ecological principles in relations between industries such as industrial symbiosis, and life cycle analysis principles, students also understand the concepts of material flow and energy flow analysis, zero emissions, sustainable development, and the basics basis of environmental impact analysis.</i>
Examination forms	<i>Writing</i>
Study and examination requirements	<i>Attendance above 80%</i>
Reading list	<p><i>Main Textbook:</i></p> <ul style="list-style-type: none"> • <i>Ayres & Ayres 2002. A Handbook of Industrial Ecology. E.Elgars Publ. Northampton, pp 680.</i> • <i>Xiaohong Li, 2018. Industrial Ecology and Industry Symbiosis's for Environmental Sustainability: Delnitions, Frameworks and Applications. Palgape, MacMillan. Pp 144.</i> <p><i>Supporting Textbooks:</i></p> <ul style="list-style-type: none"> • <i>Adoue. C., 2011. Implementing Industrial Ecology: Methodological Tools and Reflections for Constructing a Sustainable Development. CRC, Taylor & Francis. Madison. Pp 157.</i>

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| | <ul style="list-style-type: none">• <i>Suh. S. (ed), 2009. Handbook of Input-Output Economics in Industrial Ecology. Springer.</i> |
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