Module Descriptions

A **module** is a self-contained **learning unit** within a higher education program that includes thematically related courses and is assigned a **fixed number of credits**. It follows specific **learning objectives**, includes an **assessment component**, and contributes to achieving the qualifications of a degree program. In some countries, “modules” are also named “courses”.

Please provide a module description for each module. In addition to the compulsory and elective modules, this also includes credited internships and the final thesis.

Please summarize all module descriptions in one document (Module Handbook) and create a table of contents so that the modules can be found easily.

Module designation	*Green Materials Chemistry*
Semester(s) in which the module is taught	6th
Person responsible for the module	*Prof. Dr. Cahyorini Kusumawardani M.Si.*
Language	*Bahasa Indonesia*
Relation to curriculum	*Compulsory / ~~elective / specialisation~~*
Teaching methods	*Lecture, discussion, project*
Workload (incl. contact hours, self-study hours)	Total workload of the activity is 91 hours per semester for 16 weeks which consist of*:* *100 minutes/week for class learning* *120 minutes/week for structured activities* *120 minutes/week for individual study*
Credit points	*2 SKS (3,2 ECTS)*
Required and recommended prerequisites for joining the module	*Creative, Innovative, Entrepreneurship*

<table>
<tr><td>Module objectives/intended learning outcomes</td><td>On successful completion of the course students should be able to:
1. Students are able to demonstrate responsibility toward themselves and their surroundings through the use of environmentally friendly chemicals.
2. Students are able to analyze theoretical concepts and applications related to the structure, properties, analysis, synthesis, and characterization of materials, as well as the modification of materials, including environmentally friendly nanomaterials and polymers.
3. Students are able to present arguments regarding various solutions to environmental problems caused by material use through the synthesis and modification of eco-friendly materials.
4. Students are able to develop collaborative skills in making decisions related to issues arising from the use of non-environmentally friendly materials.
5. Students are able to communicate ideas about global developments in materials science and various methods of material synthesis and modification, including polymers.</td></tr>
<tr><td>Content</td><td>1. Concept and terminology of material chemistry
2. Material structure, crystal structure, chemistry binding, and the relation with material properties
3. Metal material, metal oxide, metal alloy, structure of metal material, metal binding, properties and application of metal material
4. Polymer material, polymer structure, chemistry binding in polymer, synthesis of polymer, properties and application of polymer, smart polymer
5. Ceramics material, ceramics structure, chemistry binding in ceramics, synthesis of ceramics, properties and application of ceramics
6. Biomaterial’s classification, modifications, and applications
7. Conductor, Isolator, semiconductor, and superconductor materials: modifications, and applications
8. Nanomaterial and Nanotechnology
9. Nanomaterial for drug delivery Herb nanomaterial medicine</td></tr>
<tr><td>Examination forms</td><td>Project report and presentation, written tests</td></tr>
<tr><td>Study and examination requirements</td><td>Minimum attendance at lectures is 75%
Final score (NA) is calculated as follows:
<table><tr><th>Learning Outcome</th><th>Weight (%)</th><th>Technique of Assesment</th></tr><tr><td>1, 2</td><td>5</td><td>Participation</td></tr><tr><td>5</td><td>10</td><td>Task</td></tr><tr><td>1,5</td><td>10</td><td>Mid-term Written Test</td></tr><tr><td>1,5</td><td>15</td><td>Final Term</td></tr><tr><td>3, 4</td><td>30</td><td>Case Study</td></tr><tr><td>3, 4</td><td>30</td><td>Team Based Project</td></tr></table></td></tr>
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Reading list	1. Lawrence, HV (2006), Material Science, Addison-Wesley Longman 2. Lawrence, HV (1992), Elements of Material Science and Engineering, Pearson Education 3. Burns, G.; Glazer, A.M. (1990). Space Groups for Scientists and Engineers (2nd ed.). Boston: Academic Press, Inc 4. Fahlman BD (2019), Material Chemistry, 2nd Edition, Central Michigan University, Springer, USA 5. Allcock HR (2019), Introduction to Material Chemistry, 2nd Edition, New York, Wiley 6. Moore J.A., Carraher C.E. (1983) Modification of Polymers. In: Carraher C.E., Moore J.A. (eds) Modification of Polymers. Polymer Science and Technology, vol 21. Springer, Boston, MA

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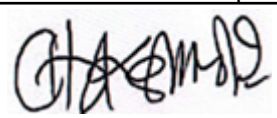		
Prof. Dr. Cahyorini Kusumawardani M.Si.		Program Study Coordinator