

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	<i>Mathematical Modelling</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Prof. Dr. Ariyadi Wijaya S.Pd.Si., M.Sc. Endah Retnowati, S.Pd., M.Ed., Ph.D.</i>
Language	<i>Indonesian.</i>
Relation to curriculum	<i>Elective.</i>
Teaching methods	<i>Lectures and discussions.</i>
Workload (incl. contact hours, self-study hours)	<i>Total workload is 90.67 hours per semester which consists of 100 minutes lectures, 120 minutes structured activities, and 120 minutes self-study per week for 16 weeks.</i>
Credit points	2
Required and recommended prerequisites for joining the module	-

Module objectives/intended learning outcomes	<i>After taking this course the students have ability to:</i> <i>CO1. Explain the ontology and epistemology of various models: the Idealist Model, including Classical, Modern, and Contemporary perspectives; the Realist Model, including Classical, Modern, and Contemporary perspectives; as well as the Hermeneutic Model in its Modern and Contemporary forms.</i> <i>CO2. Develop and implement mathematical models in the context of mathematics education.</i> <i>CO3. Design models and applications within the context of mathematics education.</i> <i>CO4. Examine and critically analyze modeling competences in mathematics education.</i> <i>CO5. Analyze effective modeling pedagogy and design appropriate modeling tasks for use in mathematics education.</i> <i>CO6. Investigate the implementation of mathematical modeling in both primary and secondary school settings.</i> <i>CO7. Examine the obstacles and challenges associated with the teaching and learning of mathematical modeling.</i> <i>CO8. Analyze the role and implementation of mathematical modeling in the PISA framework.</i> <i>CO9. Examine the integration of mathematical modeling and Information and Communication Technology (ICT) in mathematics education.</i>
Content	<i>The Mathematical Modeling course examines the role of mathematical modeling and its applications in the context of mathematics education. It covers a range of topics essential for understanding and implementing modeling in educational settings, including the development and application of models in teaching, modeling competences, and effective pedagogical strategies for modeling instruction. The course also focuses on the design of modeling tasks, explores how modeling is integrated into both primary and secondary school curricula, and investigates the challenges and barriers faced in teaching modeling. In addition, students will analyze how mathematical modeling is represented in international assessments such as PISA, and explore the integration of modeling with Information and Communication Technology (ICT) to enhance learning in mathematics education.</i>
Examination forms	<i>Assignments, presentations and written examinations.</i>

Study and examination requirements	<i>The course assessment is divided into two main components:</i> Cognitive Assessment (50%) <i>This includes the following elements:</i> - Attendance: 2% - Quiz: 3% - Assignment: 5% - Midterm Exam (UTS): 15% - Final Exam (UAS): 25% Participatory Assessment (50%) <i>This includes:</i> - Case Study: 15% - Team-Based Project: 35% Total: 100%
Reading list	- Blum, W.; Galbraith, P.L.; Henn, H-W.; & Niss, M. (2007). <i>Modelling and applications in mathematics education</i>. New York: Springer - Kaiser, G.; Blum, W.; Ferri, R. B.; & Stillman, G. A. (2011). <i>Trends in teaching and learning of mathematical modelling</i>. New York: Springer. - Stillman, G. A.; Blum, W.; & Biembengut, M. S. (2015). <i>Mathematical Modelling in Education Research and Practice</i>. New York: Springer - Stillman, G. A.; Blum, W.; & Biembengut, M. S. (2015). <i>Mathematical Modelling in Education Research and Practice</i>. New York: Springer - OECD. (2003). <i>The PISA 2003 Assessment Framework: Mathematics, Reading, Science and Problem Solving Knowledge and Skills</i>. Paris: OECD.