<table>
<tr><td>Module designation</td><td>Reasoning and Proving
Indonesian title: Penalaran dan Pembuktian
Course code: 8420202153</td></tr>
<tr><td>Semester(s) in which the module is taught</td><td>Semester 5 (Third year)</td></tr>
<tr><td>Person responsible for the module</td><td>Coordinator: Prof. Dr. Tatag Yuli Eko Siswono, M.Pd
Teaching staff: Prof. Dr. Tatag Yuli Eko Siswono, M.Pd; Dr. Abdul Haris Rosyidi, S.Pd., M.Pd.; Dr. Sugi Hartono, M.Pd</td></tr>
<tr><td>Language</td><td>Indonesian</td></tr>
<tr><td>Relation to curriculum</td><td>Elective</td></tr>
<tr><td>Teaching methods</td><td>Lectures, tutorial assignments, and individual study
Media and tools: Slides and LCD projectors, whiteboard</td></tr>
<tr><td>Workload (incl. contact hours, self-study hours)</td><td>(Estimated) total workload: 2 CU × 170 minutes × 16 weeks = 5,440 minutes = 90.67 hours (≈ 3.18 ECTS)
Contact hours: lectures, 2 × 50 minutes per week × 16 weeks = 26.67 hours (class hours per week: 340 minutes = 5.67 hours, including structured activities)
Private study including examination preparation: structured assignments, 2 × 60 minutes per week × 16 weeks = 32.00 hours; independent study, 2 × 60 minutes per week × 16 weeks = 32.00 hours (total 64.00 hours)</td></tr>
<tr><td>Credit points</td><td>2 CU (3.18 ECTS)
1 CU = 170 minutes per week × 16 weeks = 45.3 hours; 1 ECTS = 28.48 hours (144 CU = 229 ECTS), so 1 CU = 1.59 ECTS (UNESA Rector's Decree No. 736/HK/KM/2023).</td></tr>
<tr><td>Required and recommended prerequisites for joining the module</td><td>Foundations of Mathematics</td></tr>
<tr><td>Module objectives/intended learning outcomes</td><td>Programme learning outcomes (PLO) addressed:
PLO-5: Apply the basic principles of mathematics to solve simple mathematical problems.
PLO-6: Demonstrate mathematical knowledge and insight.
PLO-7: Demonstrate pedagogical knowledge in designing, implementing and evaluating mathematics learning.</td></tr>
<tr><td>Content</td><td>Studying the meaning and benefits of proof, the types of reasoning used in the proof process and their characteristics, including deductive reasoning and inductive reasoning (analogy, generalization), types of proof in mathematics (proof, formal, informal, direct proof, contradiction, induction, and proof with examples and non-examples) and how to communicate proof through IT-based active learning</td></tr>
<tr><td>Examination forms</td><td>Final score is calculated from the weekly assessment scheme below (CLO/PLO addressed and weight of each assessment):
<table>
<tr><th>Week</th><th>CLO</th><th>PLO</th><th>Weight (%)</th></tr>
<tr><td>1</td><td>CLO-1</td><td>PLO-6</td><td>5</td></tr>
<tr><td>2</td><td>CLO-2</td><td>PLO-5</td><td>5</td></tr>
<tr><td>3</td><td>CLO-3</td><td>PLO-6</td><td>5</td></tr>
<tr><td>4</td><td>CLO-4</td><td>PLO-6</td><td>5</td></tr>
<tr><td>5</td><td>CLO-5</td><td>PLO-5</td><td>5</td></tr>
</table></td></tr>
</table>

	6	CLO-6	PLO-6	5
	7	CLO-7	PLO-5	10
	8	CLO-8	PLO-6	5
	9	CLO-9	PLO-7	5
	10	CLO-10	PLO-5	5
	11	CLO-11	PLO-6	5
	12	CLO-12	PLO-6	5
	13	CLO-13	PLO-6	5
	14	CLO-14	PLO-6	5
	15	CLO-15	PLO-6	5
	16	CLO-16	PLO-6	15

Study and examination requirements

Students are considered competent and pass if the final score is at least 55 or C.

Final index (grade conversion):

Index	Converted score	Score range (A = final score)
A	4.00	85 ≤ A ≤ 100
A-	3.75	80 ≤ A < 85
B+	3.50	75 ≤ A < 80
B	3.00	70 ≤ A < 75
B-	2.75	65 ≤ A < 70
C+	2.50	60 ≤ A < 65
C	2.00	55 ≤ A < 60
D	1.00	40 ≤ A < 55
E	0.00	0 ≤ A < 40

Reading list

1. Sundstrom, T. 2014. Mathematical Reasoning: Writing and Proof Version 2.0 California: Creative Commons
2. Brodie, K.(2009). Teaching mathematical reasoning in secondary school classrooms (Vol. 775). Springer Science & Business Media.
3. Nickerson, R. S. 2009. Mathematical reasoning : patterns, problems, conjectures, and proofs. New York: Psychology Press.
4. Reid, D. A., & Knipping, C. (2010). Proof in mathematics education. Research, learning and teaching.
5. Stylianou, D. A.,Blanton, M. L., & Knuth, E. J. (2010). Teaching and learning proof across the grades: A K-16 perspective. Routledge