

### Mathematical Higher Order Thinking

Module designation	Mathematical Higher Order Thinking
Semester(s) in which the module is taught	III (odd semester)
Person responsible for the module	Tian Abdul Aziz, Ph.D. Dr. Flavia Aurelia Hidajat, M.Pd.
Language	Bahasa Indonesia
Relation to curriculum	Elective course
Teaching methods	Lecture (i.e., group discussion, and presentation) Structured assignments (i.e., Instrument development based on HOTS, HOTS-based learning design and articles- learning design)
Workload (incl. contact hours, self-study hours)	For this course, students required to meet a minimum of 154.67 hours in one semester, which consist of: 26.67 hours for contact hours for the lecture 64 hours for structured assignments 64 hours for private study
Credit points	5.2 ECTS / 2 CP
Required and recommended prerequisites for joining the module	Development and Problems in Mathematics Education
Module objectives/intended learning outcomes	Students are able to: 1. CLO 1: analyze the basic concept of higher order thinking skills. 2. CLO 2: analyze and design mathematical teaching and learning to develop students higher order thinking skills. 3. CLO 3: analyze and develop instrument to measure students higher order thinking skills.
Content	Students will learn about: Main concepts of higher order thinking skills, theories related to learning and higher order thinking skills (HOTS), specific methods and strategies to enhance higher order thinking skills, research related to HOTS based teaching and learning, development of HOTS based teaching and learning, HOTS assessment instruments, models HOTS assessment, research related to HOTS assessment instruments, development of HOTS assessment instruments, affective aspects of HOTS, and research trends related to HOTS.
Examination forms	Assessment of the learning process according to the following components: presentation 20%; HOTS based instruments development 40%, and HOTS based instructional design 40%.
Study and examination requirements	Students should have attended all lectures and submitted all scheduled individual and group assignments.  Forms of examination: project and presentation

Reading list	<ol style="list-style-type: none"> <li>1. King, F. J., Goodson, L., &amp; Rohani, F. (1998). Higher order thinking skills: Definition, teaching strategies, assessment. Publication of the Educational Services Program, now known as the Center for Advancement of Learning and Assessment. Obtido de: <a href="http://www.cala.fsu.edu">www.cala.fsu.edu</a>.</li> <li>2. Lewis, A., &amp; Smith, D. (1993). Defining higher order thinking. <i>Theory into practice</i>, 32(3), 131-137.</li> <li>3. Gossen, B. (1991). The fundamental skills of higher order thinking. <i>Journal of Learning Disabilities</i>, 24(6), 343-353.</li> <li>4. Ivie, S. D. (1998). Ausubel's learning theory: An approach to teaching higher order thinking skills. <i>The High School Journal</i>, 82(1), 35-42.</li> <li>5. Newmann, F. M. (1988). Higher order thinking in the high school curriculum. <i>NASSP Bulletin</i>, 72(508), 58-64.</li> <li>6. Kurikulum Nasional Mata pelajaran Matematika</li> <li>7. Way, J. (2008). Using questioning to stimulate mathematical thinking. <i>Australian Primary Mathematics Classroom</i>, 13(3), 22.</li> <li>8. Cañas, A. J., Reiska, P., &amp; Möllits, A. (2017). Developing higher-order thinking skills with concept mapping: A case of pedagogic frailty. <i>Knowledge Management &amp; E-Learning</i>, 9(3), 348–365.</li> <li>9. Apino, E., &amp; Retnawati, H. (2017, February). Developing instructional design to improve mathematical higher order thinking skills of students. In <i>Journal of Physics: Conference Series</i> (Vol. 812, No. 1, p. 012100).</li> <li>10. Misrom, N. B., Muhammad, A., Abdullah, A., Osman, S., Hamzah, M., &amp; Fauzan, A. (2020). Enhancing students' higher-order thinking skills (HOTS) through an inductive reasoning strategy using Geogebra. <i>International Journal of Emerging Technologies in Learning (iJET)</i>, 15(3), 156-179.</li> <li>11. Hmelo, C. E., &amp; Ferrari, M. (1997). The problem-based learning tutorial: Cultivating higher order thinking skills. <i>Journal for the Education of the Gifted</i>, 20(4), 401-422.</li> <li>12. Watson, A. (2001). Low attainers exhibiting higher-order mathematical thinking. <i>Support for Learning</i>, 16(4), 179-183.</li> <li>13. Tajudin, N. A. M., &amp; Chinnappan, M. (2016). The Link between Higher Order Thinking Skills, Representation and Concepts in Enhancing TIMSS Tasks. <i>International Journal of Instruction</i>, 9(2), 199-214.</li> <li>14. Pratama, G. S., &amp; Retnawati, H. (2018, September). Urgency of higher order thinking skills (HOTS) content analysis in mathematics textbook. In <i>Journal of Physics: Conference Series</i> (Vol. 1097, No. 1, p. 012147).</li> <li>15. As'ari, dkk. (2019) Mengembangkan HOTS (High Order Thinking Skills) melalui Matematika. Malang: Penerbit Universitas Negeri Malang</li> <li>16. Hadi, S., Retnawati, H., Munadi, S., Apino, E., &amp; Wulandari, N. F. (2018). The difficulties of high school students in solving higher-order thinking skills problems. <i>Problems of Education in the 21st Century</i>, 76(4), 520.</li> <li>17. Retnawati, H., Djidu, H., Kartianom, A., &amp; Anazifa, R. D. (2018). Teachers' knowledge about higher-order thinking skills and its learning strategy. <i>Problems of Education in the 21st Century</i>, 76(2), 215.</li> </ol>
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