FI562 Nuclear Physics

Module name:	Nuclear physics	
Module level, if applicable:	Undergraduate	
Code:	FI-562	
Sub-heading, if applicable:	-	
Classes, if applicable:	-	
Semester:	6th	
Module coordinator:	Mohammad Arifin	
Lecturer(s):	Mohammad Arifin	
Language:	Bahasa Indonesia	
Classification within the curriculum:	Compulsory course	
Type of teaching format	Contact hours per week during the semester	Class Size
1. Lecture (conceptual, contextual and problem-solving approaches through expository, discussions and exercises). 2. Structured activities (assignments based on conceptual, contextual and problem-solving approaches) 3. Self-study (reading literature)	3 hours 20 minutes	35
Workload:	The total workload is 181 hour 20 minutes (6.4 ECTS) per semester, consisting of 46 hour 20 minutes /2800 minutes lectures (1.65 ECTS), 56 hours/3360 minutes structured activities (1.98 ECTS) and 56 hours/3360 minutes self-study (1.98 ECTS) per week for 14 weeks, 22 hour 23 minutes for two exams (0.79 ECTS)	
Credit points:	6.4 ECTS	
Pre-requisites course(s):	FI360 Modern Physics, FI560 Quantum Physics	
Course Learning Outcomes (CLO):	After taking this course the students have ability to: CLO1. Explain the basic concepts of structure, reactions, and basic physical processes in the nucleus and on nucleonic and sub-nucleonic particles. CLO2. Apply it in everyday life, in technology and technology products (devices and instrumentation) CLO3. Participate in developing it in the breadth of standard physics disciplines and science and technology in general in the global literature	

<table>
<tr><td>Content:</td><td>Survey and review of the basic characteristics of matter-energy and the structure of the universe (particles and fundamental tools), the development of chronological atomic models, the discovery of the atomic nucleus and the Coulomb Rutherford scattering experiment (quantitative and qualitative), the general characteristics of the atomic nucleus (dimensions, mass, electric charge, abundance, isotopes, isobars, isotopes, isomers, spin-parity, spin, isospin, etc.), introduction to quantum mechanics for nuclear physics, natural decay of radioactive elements (single and multiple), concepts of force and nuclear potential (Yukawa , Wood Saxon, potential models: effective, phenomenological/realistic, etc.), nuclear models (Fermi gas, liquid drop, shell, cluster, and complex), alpha, beta and gamma decay reactions, general concepts of nuclear reactions (nucleus simple and composite), fission and fusion reactions, introduction to reactor physics (characteristics and types of fission and fusion reactors), application of radioisotopes in everyday life (radiometry and instrumentation: agriculture, medicine, industry, etc.), in technology and technological products (devices/instruments), introduction to high energy physics (physics of accelerators, sub-nucleonic particles and fundamentals), introduction to astrophysics and nuclear cosmology.</td></tr>
<tr><td>Study/exam achievements:</td><td>The final mark will be weight as follow:
<table>
<tr><th>No</th><th>CLO</th><th>Assessment Object</th><th>Assessment Techniques</th><th>Weight</th></tr>
<tr><td>1</td><td>CLO1,
CLO2,
CLO3</td><td>Subject specific competences:
a. Assignments
b. Quiz
c. Exam:
- Mid Exam
- Final Exam</td><td>

Written
Written test

Written test
Written test</td><td>

20 %
10 %

30 %
40%</td></tr>
<tr><td colspan="4">Total</td><td>100%</td></tr>
</table></td></tr>
<tr><td>Forms of media:</td><td>Board, LCD Projector, Laptop/Computer</td></tr>
<tr><td>Literature:</td><td>1. Beiser, Arthur, (2003), Concepts of Modern Physics, Sixth Edition, McGraw-Hill Higher Education, A Division of The McGraw-Hill Companies 1221, Avenue of the Americas, New York, NY, 10020, USA.
2. Blatt, John M. and Victor F. Weisskopf, (2010), Theoretical Nuclear Physics, Dover Publications Inc., Copy Right Springer Verlag, New York.
3. Das, A. and Ferbel, T., (2003), Introduction to Nuclear and Particle Physics, Second Edition, World Scientific Publishing Co. Pte. Ltd., 5 Toh Tuck Link, 596224, Singapore.
4. Shultis, J. Kenneth and Faw, Richard E., (2008), Fundamentals of Nuclear Science and Engineering, 2nd Edition, CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
5. Wong, Samuel S. M., (2004), Introductory Nuclear Physics, Second Edition, Wiley-VCH Verlag GmbH & Co. KgaA, Germany.</td></tr>
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PLO and CLO mapping

	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12
CLO1		√										
CLO2		√										

CLO3		√										