



B.Sc. (Physics-General) Degree Program
Faculty of Applied Sciences
University of Sri Jayewardenepura

Course Title	Atomic & Nuclear Physics
Course Code	PHY 208 1.0
Credit Value	01
Status	Core
Year / Level	Year 2/ Physics General
Semester	2
Theory: Practical: Independent Learning	16: 06: 40
Other: Pre-requisite Course/s	None

Aims of the Course:

1. Explain how the atomic and nuclear physics fundamentals are useful to understand the beginning of everything.
2. Provide a sound foundation to understand higher order applications in the field of atomic and nuclear physics.
3. Discuss how the study of Atomic & Nuclear Physics plays a vital part both in other areas of physics and, more generally in science, technology, and industry.

Intended Learning Outcomes:

On the successful completion of this course, the student should be able to:

1. Acquire knowledge and understanding about the electronic and nuclear structure of atoms.
2. Solve problems related to the structure of atoms and the effect of ionizing radiation on the body and the environment.
3. Develop appreciation of the influence of atomic and nuclear physics on modern scientific development.
4. Develop the foundations for examining in more detail various aspects of experimental and theoretical physics which relate to both atomic and nuclear physics.
5. Explain the key areas in which Atomic and Nuclear Physics affect everyday living.

Course Content:

An understanding of the nature of atoms is developed by examining the basic quantum mechanical model for the electronic structure of atoms. Central to this model is the interaction of atoms with light and electric and magnetic fields. Applications that are important for our standards of time and length will be discussed. We then delve further into the atom and examine the structure of the nucleus. The basic concepts and theories of nuclear physics are developed as well as an understanding of the applications of nuclear science.

Scope and Schedule of Teaching - Learning Activities:

Topic No.	Topic / Sub Topic	No. of Hrs.			Teaching Method	Assessment Criteria	ILO Alignment
		T	P	IL			
1	Pre-Test	0	1.0	0	SA-1	Bonus-2%	
2	Introduction to Atomic & Nuclear Physics course	1	0.5	2	Lecture/FA 1	4%	1
3	Structure of the Atom	1	0	2	Lecture		1, 2
4	Atomic Spectra	1	0	2			2
5	Bohr's model of the atom	1	0.5	2	Lecture /FA 2	4%	2
6	Wave mechanics	1	0	2	Lecture		2
7	Hydrogen Atom	1	0	2			2
8	Multi-electron atom	1	0.5	2	Lecture/FA3	4%	2
9	Chemical properties of the elements	1	0	2	Lecture		3
10	Periodic Table	1	0	2	Lecture		3
11	Quantum Mechanical approach	1	0.5	2	Lecture/FA 4	4%	3,4
12	Structure of the Nucleus, What's inside?	1	0	2	Lecture		3,4
13	Nuclear Reactions, spontaneous decay of a nucleus	1	0.5	2	Lecture /FA 5	4%	4
14	Stability of the nucleus-Fission	1	0	2	Lecture		4,5
15	Stability of the nucleus-Fusion	1	0.5	2	Lecture/FA 6	4%	4,5
16	Review + Prepare a Timeline	1	0.5	4	FA 7	10%	1-4
17	Review + Create a Flipgrid video	1	0.5	4	FA 8	10%	5
18	Post-Test- (Part A-Final Exam)	0	1.0	4	SA-3	20%	1-5
<i>Total</i>		<i>16</i>	<i>06</i>	<i>40</i>			

Linking Program Outcomes with ILOs:

Program Learning Outcomes:

1. Demonstrate competency in theoretical knowledge and practical and/or technical skills in respective subject areas i.
2. Communicate efficiently and effectively in the respective subject areas using written, oral, visual and/or electronic forms.
3. Facilitate, and participate as an empathetic and emotionally intelligent team player with leadership qualities, in a group, diverse team or organization.
4. Apply subject based knowledge and skills creatively in making appropriate judgments in changing situations.
5. Integrate creativity and innovation to achieve entrepreneurial competencies.
6. Implement solutions in keeping with ethical, societal and environmental norms and need for sustainable development.
7. Secure life goals through lifelong learning with the aim of strengthening professional skills, and ensuring the betterment of the community.

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7
ILO 1	***	*		*	***		*
ILO 2	***	**		*	***		*
ILO 3	***	**		**	**	**	*
ILO 4	**	***	**	**	**	**	**
ILO 5	**	***	**	**	**	***	***

*** - Strongly Linked; ** - Medium linked; * Weakly linked

Mode of Assessment:

Formative Assessment (FA): FA1-FA6 (Best 5 FAs) 20% + FA7 10%+ FA8 10% = 40% of Total Marks

Summative Assessment (SA): End Semester Examination: 1-hour paper covering 20 MCQs (40%) + SA2 (Pre-Test) 2% + SA 3 (Post-Test) 20 % = 60% of Total Marks

References

Atomic & Nuclear Physics, by S. N. Ghoshal, ISBN 10: 8121904137, ISBN 13: 9788121904131

Atomic Physics, by S. N. Ghoshal, ISBN 10: 8121910951, ISBN 13: 9788121910958