



**YOGYAKARTA STATE UNIVERSITY
FACULTY OF MATHEMATICS AND NATURAL SCIENCES**

SYLLABI

FRM/FMIPA/063-00
1 April 2010

Faculty : Mathematics and Natural Sciences
Study Program : Physics Education
Course / Code : Atomic Physic
Credit : Theory: 3 SKS Practice: 0 sks
Semester : 5st
Prerequisite/Code : -
Professor : -

I. Course Description

This course studies the development of atomics theory, the formulation of the Bohr atomic model, formulation of quantum model, Schrodinger equation, atom with many electrons, Pauli exclusion principle, energy levels, Zeeman effects, Millikan Experiment, cathode ray, orbital, rotation, and vibration wave equation, and the fundamentals of lasser.

II. Standard of Competence

After conducting this course, the students can understand and analyze the relationship observable in atomic phisics and physics phenomenon that occurred in atomic level, also can know the application of the atomic phisics in the daily life.

III. Activity

Mee-ting	Basic Competence	Essentials Concept	Learning Strategy	Learning Materials/ References	Character
1 st	Introduction	<ul style="list-style-type: none"> • Sillaby • Course Contract 	Discussion and information	Sillaby	responsible

2 nd	To understand the development of atomic physics	<ul style="list-style-type: none"> • Democritus atomic theory • Dalton atomic theory • Thomson atomic theory 	Discussion and information	A, B	Confident complying, appreciating
3 th	To understand the atomic theory	<ul style="list-style-type: none"> • Rutherford atomic theory • Bohr atomic theory 	Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively,
4 th	To understand the structure of atom	<ul style="list-style-type: none"> • Energy levels • Atomic spectrum • Spectral Series • Correspondence principle 	Experiment Discussion and information	A,B	Responsible, thinking logically, creatively, innovatively,
5 th	To understand the quantum theory of hydrogen atom	<ul style="list-style-type: none"> • The Schrodinger equation of the hydrogen atom • Quantum number • Max-Born interpretation 	Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively
6 th	To understand the angular momentum of atom	<ul style="list-style-type: none"> • The meaning of angular momentum • Quantification of L_x and L_z • The effects of magnetic field in atomic energy 	Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively appreciating

7 th	Mid term exam				
8 th	To understand the spin momentum of atom	<ul style="list-style-type: none"> • The meaning of spin momentum • Quantification of S_x and S_z • Larmor frequency 	Discussion and information	A, B	Responsible, thinking logically, creatively, inovatively, dicipline, curious
9 th	To understand the Zeeman Effects	<ul style="list-style-type: none"> • Zeeman Effects • Energy Transition • Selection rule 	Discussion and information	A, B	Responsible, thinking logically, creatively, inovatively, dicipline, curious
10 th	To understand the periodics table	<ul style="list-style-type: none"> • Periodics table • The nature of elements in group • The nature of elements in period 	Discussion and information	A, B	Responsible, thinking logically, creatively, inovatively, dicipline, curious
11 th	To understand the periodics table	<ul style="list-style-type: none"> • The electric nature of elements • The magnetics nature of elements 	Discussion and information	A, B	Responsible, thinking logically, creatively, inovatively, dicipline, curious
12 th	To understand the LS and JJ coupling	<ul style="list-style-type: none"> • The total of anguler momentum • LS coupling 	Discussion and information	A, B	Responsible, thinking logically, creatively, inovatively, dicipline,

		<ul style="list-style-type: none"> • JJ coupling 			curious
13 th	To understand the cathode ray	<ul style="list-style-type: none"> • The dynamics of electron motions in the electric field • The dynamics of electron motions in the magnetic field • The nature of cathode ray • Production of cathode ray 	Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively, discipline, curious
14 th	To understand the Millikan Experiment	<ul style="list-style-type: none"> • Scheme of experiment • Procedure of experiment • The results of experiment 	Experiment Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively, discipline, curious
15 th	To understand the fundamentals of laser	<ul style="list-style-type: none"> • Optics Pumping • Production of Laser 	Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively, discipline, curious
16 th	To understand the molecule	<ul style="list-style-type: none"> • Molecule bonding • The levels of rotation energy • The levels of vibration energy 	Discussion and information	A, B	Responsible, thinking logically, creatively, innovatively, discipline, curious
	FINAL EXAM				

IV. Reference

Compulsory:

A. Jerremy I. Pfeffer and Sholomo Nir. 2000. *Modern Physics, An Introductory Text*. London: Imperial College Press.

Additional:

B. Yusman Wiyatmo. 2008. *Fisika Atom dalam Perspektif Klasik, Semiklasik, dan Kuantum*. Yogyakarta: Pustaka Pelajar.

V. Evaluation

No	Componen	Worth
1	Participation	10 %
2	Assignment	40 %
3	Midterm Exam	25%
4	Final Exam	25%
		100%

Yogyakarta, January 31th 2013

Yusman Wiyatmo, M.Si.
NIP: 19680712 199303 1 004