Modern Physics

CATHOLIC UNIVERSITY OF KOREA

강 의 계 획 서

2016학년도 제1학기

교과목명	국 문	현대물리학			
	영 문	Modern Physics			
과목번호-분반	01136-01	이수구분	제1전공선택	시간/학점	3/3
요일 및 시간 (강의실)	화4~5(D301), 목 4(D301)	수강대상		선수과목	
담당교수	성 명	연구실	전화번호	E-MAIL	
	마크앤클리프	D327	02-2164-4841	mark.ancliff@gmail.com	
Web Site			영어강의 유형		

1.교과목 개요

This class will introduce some of the main developments in physics over the last hundred years. We will focus mainly on the theory of special relativity, and briefly introduce the fundamental ideas of quantum mechanics, particle physics and general relativity. These theories revolutionized the understanding of physics from the start of the twentieth century, and form the basis for most current physics research.

2. 강의목표

The goal of this class is to teach students the theoretical background of modern physics, which they will go on to study in more detail and depth in later classes. The central topic of special relativity will be introduced with some depth and mathematical rigour, whereas the introductions to quantum mechanics, general relativity and particle physics will be more brief and less rigorous, aiming only to give a ‘flavour’ of the fundamental ideas.

3. 강의방법

Three hours of lectures per week. In the second half of the semester Students will give presentations (in English), either in a group or individually, explaining selected topics in modern physics to the other students.

It is not necessary to buy a book for this class as notes will be provided

4. 평가방법

Attendance (10%)
Online quizzes (10%)
Presentations (20%)
Midterm Exam (30%)
Final Exam (30%)

5. 과제물

Unassessed worksheets will be given every one or two weeks. Every two-weeks there will be an online quiz (six in total). Midterm and final exams will be closely based on the worksheets and quizzes.

6. 실험, 실습계획

7. 관련강의

8. 교재

도서명	출판사	저자	연도	교재여부
Concepts of Modern Physics	McGraw-Hill	Arthur Beiser	2002	교재
The Feynman Lectures on Physics	Addison-Wesley	Feynman, Leighton, Sands	1965	부교재

9. 강의일정 및 내용

주	기간	강의내용	참고자료	비고
1	2016-03-02 ~ 2016-03-08	Course Introduction Problems with classical physics at the start of the twentieth century		
2	2016-03-09 ~ 2016-03-15	SPECIAL RELATIVITY The finite speed of light, concept of the aether		
3	2016-03-16 ~ 2016-03-22	Experiments to detect the aether --Aberration of starlight --The Michelson-Morley experiment		
4	2016-03-23 ~ 2016-03-29	Constant speed of light in every reference frame Galilean Invariance in Newtonian Mechanics Postulates of Special Relativity		
5	2016-03-30 ~ 2016-04-05	Length Contraction and Time Dilation The Lorentz transformation Time dilation: Muon decay experiment		
6	2016-04-06 ~ 2016-04-12	Travels in Space-Time and the Twin Paradox Transformation of velocities The Doppler effect		
7	2016-04-13 ~ 2016-04-19	4-vector algebra 4-vectors in SR: position, velocity, momentum --The mass-energy-momentum relationship (E=mc^2...) --Existence of zero-mass particles		
8	2016-04-20 ~ 2016-04-26	Midterm Exam		
9	2016-04-27 ~ 2016-05-03	QUANTUM MECHANICS Experimental evidence for energy quantization - Planck radiation law - Photo-electric effect Wave and particle descriptions of light De-Broglie wavelength Young's slit experiment		
10	2016-05-04 ~ 2016-05-10	Schrodinger wave equation Difference between Bosons and Fermions Spin		
11	2016-05-11 ~ 2016-05-17	- Student Presentations -		
12	2016-05-18 ~ 2016-05-24	PARTICLE PHYSICS Classification of fundamental particles Classification of fundamental forces Conservation laws		
13	2016-05-25 ~ 2016-05-31	Relativistic particle collisions		
14	2016-06-01 ~ 2016-06-07	GENERAL RELATIVITY Idea of geodesics The metric tensor and curvature Curvature of space time by energy Einstein Field Equation and Equation of motion		
15	2016-06-08 ~ 2016-06-14	Curvature of space time by energy Einstein Field Equation and Equation of motion		

주	기간	강의내용	참고자료	비고
16	2016-06-15 ~ 2016-06-21	Final Exam		