COURSE DESCRIPTION

Thermal and Statistical Physics2

CATHOLIC UNIVERSITY OF KOREA

강 의 계 획 서

2016학년도 제1학기

교과목명	국 문	열및통계물리학2			
	영 문	Thermal and Statistical Physics2			
과목번호-분반	01291-01	이수구분	제1전공선택	시간/학점	3/3
요일 및 시간 (강의실)	월4~5(V204), 금 4(V204)	수강대상		선수과목	열및통계물리학1
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 use the theory of statistical mechanics introduced in the Thermal and Statistical Physics 1 (열및통계물리학1) to look at a range of physical systems and phenomena. Topics will include: single particle statistics (the Maxwell-Boltzmann and Planck distributions), the behaviour of gases at low temperatures (in particular the different behaviour of Bosons and Fermions, Bose-Einstein condensation and the (nearly) free-electron gas model in conducting solids): the behaviour of systems with interactions (introducing the idea of quasiparticles through the study of vibrations in solids, and the general theory of phase transitions); and the behaviour of systems away from thermal equilibrium (including the heat equation, random walks and Brownian motion).

2. 강의목표

The aim of this course is to extend the theory and methods learned in the Thermal and Statistical Physics 1 class to look at a much wider range of physical systems and phenomena. By the end of the course students should have a good overview of the field of statistical physics and have a deep understanding of a few primary examples and techniques. This class will also introduce all the techniques needed for graduate study in statistical physics.

3. 강의방법

Three hours of lectures per week, with some problem-solving sessions. Summary lecture notes and worksheets will be provided.

4. 평가방법

Attendance (10%)
Homework (10%)
Midterm Exam (40%)
Final Exam (40%)

5. 과제물

Problem sheets will be provided every couple of weeks. Some of these will be discussed in the class and some will be assessed as homework.

6. 실험, 실습계획

7. 관련강의

열및통계물리학1

8. 교재

도서명	출판사	저자	연도	교재여부
Thermal Physics	WH Freeman & Co.	Kittel and Kroemer	1980	교재
Introduction to Statistical Physics	Springer	S. R. A. Salinas	2001	부교재

9. 강의일정 및 내용

주	기간	강의내용	참고자료	비고
1	2016-03-02 ~ 2016-03-08	Course Introduction Review of Statistical and Thermal Physics 1		
2	2016-03-09 ~ 2016-03-15	Review of Statistical and Thermal Physics 1 Single particle distributions: the Maxwell-Boltzmann distribution		
3	2016-03-16 ~ 2016-03-22	Black-body radiation The Planck radiation distribution The Stefan-Boltzmann law		
4	2016-03-23 ~ 2016-03-29	Chemical potential and chemical reactions		
5	2016-03-30 ~ 2016-04-05	The Grand Canonical Ensemble The general theory of statistical ensembles		
6	2016-04-06 ~ 2016-04-12	Fermi Gases -- The Fermi-Dirac distribution -- Degenerate Electron gases: white dwarf stars		
7	2016-04-13 ~ 2016-04-19	Fermi Gases -- The free electron model in metals -- Heat capacity of metals -- Conductors, semi-conductors and insulators		
8	2016-04-20 ~ 2016-04-26	Midterm Exam		
9	2016-04-27 ~ 2016-05-03	Bose Gases -- Bose-Einstein distribution -- Black body radiation as a photon gas		
10	2016-05-04 ~ 2016-05-10	Bose Gases -- Phonons and the Debye model		
11	2016-05-11 ~ 2016-05-17	Bose Gases -- Bose-Einstein Condensation		
12	2016-05-18 ~ 2016-05-24	Phase Transitions -- Characterization of first order and continuous transitions -- Phase diagrams and critical points -- Critical Parameters		
13	2016-05-25 ~ 2016-05-31	Phase Transitions -- Mean field approximation to the para-ferro-magnetic phase transition -- Lattice gases -- Concept of Universality		
14	2016-06-01 ~ 2016-06-07	Non-equilibrium systems -- Brownian motion: The Einstein and Langevin approaches -- Diffusion and heat equations		
15	2016-06-08 ~ 2016-06-14	Non-equilibrium systems -- Kinetic theory: The Boltzmann equation		
16	2016-06-15 ~ 2016-06-21	Final Exam		