Syllabus (2021-1)

Course Title	Topics course in Mathematics II	Course No.	37430-01
Department/ Major	Mathematics	Credit/Hours	3/3
Class Time/ Classroom	Untact		
Instructor	Name Chulkwang Kwak	Department Mathematics	
	E-mail ckkwak@ewha.ac.kr	Phone 4439	
Office Hours/ Office Location	Any time via QnA in cyber campus or email		

Ⅰ. Course Overview

1. Course Description

Fourier analysis is the study of how general functions can be decomposed into trigonometric or exponential functions with definite frequencies. There are two types of Fourier expansions:

- Fourier series : If a (reasonably well-behaved) function is periodic, then it can be written as a discrete sum of trigonometric or exponential functions with specific frequencies.
- Fourier transform: A general function that isn't necessarily periodic (but that is still reasonably well-behaved) can be written as a continuous integral of trigonometric or exponential functions with a continuum of possible frequencies.

The reason why Fourier analysis is so important in physics is that many (although certainly not all) of the differential equations that govern physical systems are linear, which implies that the sum of two solutions is again a solution. Therefore, since Fourier analysis tells us that any function can be written in terms of sinusoidal functions, we can limit our attention to these functions when solving the differential equations. And then we can build up any other function from these special ones.

2. Prerequisites

Advanced Calculus I, II, Basic knowledge on complex numbers

3. Course Format

Lecture				
100%				

(Instructor can change to match the actual format of the class.)

Explanation of course format: This course consists of two lectures and one recitation class per a week.

4. Course Objectives

This course aims to introduce the Fourier analysis. In particular, this subject provides basic properties of the Fourier series of Riemann integrable functions, and under these properties, we are going to study the convergence of the Fourier series in some sense. Moreover, we extend the Fourier series to the continuous one the so-called Fourier transform. Finally, we are briefly see the Fourier analysis on discrete domain.

5. Evaluation System

☐ Relative evaluation ☐ **Absolute evaluation** ☐ Others : _____

– Explanation of evaluation system:

Absolute evaluation

Attendance	Report			
80%	20%			

Ratio can be modified.

* Evaluation of group projects may include peer evaluations.

Ⅱ. Course Materials and Additional Readings

1. Required Materials
Princeton Lectures in Analysis I Fourier Analysis: An Introduction by Elias M. Stein and Rami Shakarchi
2. Supplementary Materials

3. Optional Additional Readings

Ⅲ. Course Policies

- **The class style is "untact". All lectures will be given in cyber campus (recorded videos will be uploaded).**
- "F" grade will be automatically given for absences more than 1/3 of all classes.

Ⅳ. Course Schedule (15 credit hours must be completed.)

- Star(*) marked sections will be given in Korean and will not be included in ranges of midterm and final
- Appendices (A.1, A.2 and A.3) and all star marked sections will be given if time allows
- Course schedule can be modified

Week	Date	Topics & Class Materials, Assignments
Week 1	9/2	Chapter 1. Basic Properties of Fourier Series (Chapter 2 in the textbook)
	9/7	
Week 2	9/9	
	9/14	
Week 3	9/16	
	9/21	

Week	Date	Topics & Class Materials, Assignments
Week 4	9/23	Chapter 2. Convergence of Fourier Series (Chapter 3 in the textbook)
	9/28	
Week 5	9/30	
	10/5	
Week 6	10/7	
	10/12	
Week 7	10/14	Chapter 3. Some Applications of Fourier Series (Chapter 4 in the textbook)
	10/19	
Week 8	10/21	
	10/26	
Week 9	10/28	Chapter 4. The Fourier Transform on $\mathbb{R}$ (Chapter 5 in the textbook)
	11/2	
Week 10	11/4	
	11/9	
Week 11	11/11	
	11/16	
Week 12	11/18	
	11/23	
Week 13	11/25	
	11/30	
Week 14	12/2	Chapter 5. Finite Fourier Analysis (Chapter 7 in the textbook)
	12/7	
Week 15	12/9	
	12/14	
Makeup Class	(mm/dd)	

V. Special Accommodations

* According to the University regulation section #57-3, students with disabilities can request for special accommodations related to attendance, lectures, assignments, or tests by contacting the course professor at the beginning of semester. Based on the nature of the students' request, students can receive support for such accommodations from the course professor or from the Support Center for Students with Disabilities (SCSD). Please refer to the below examples of the types of support available in the lectures, assignments, and evaluations.

Lecture	Assignments	Evaluation
· Visual impairment : braille, enlarged reading materials · Hearing impairment : note-taking assistant · Physical impairment : access to classroom, note-taking assistant	Extra days for submission, alternative assignments	· Visual impairment : braille examination paper, examination with voice support, longer examination hours, note-taking assistant · Hearing impairment : written examination instead of oral · Physical impairment : longer examination hours, note-taking assistant

- Actual support may vary depending on the course.