

Harmonic Analysis

Spring Semester 2019

(Second Semester 1397-1398)

Code: 2214768-01

Credits: 4

Instructor: Hossein Hosseini Giv (giv@math.usb.ac.ir, hossein.giv@gmail.com)

Lecture times: Sunday and Tuesday, 09:30-11:30 AM

Classroom address: Instructor's office at the Faculty of Mathematics

Assessment Policy: 40% midterm exam, 60% final exam

Textbook: Peter Massoupuust and Brigitte Forster (Editors), Four Short Courses on Harmonic Analysis: Wavelets, Frames, Time-Frequency Methods, and Applications to Signal and Image Analysis, Birkhäuser Basel, 2010.

Course Contents

1st week: Basics of time-frequency analysis

2nd week: The Fourier transform

3rd week: Windowed Fourier transform

4th week: The wavelet transform

5th week: Bases and Bessel sequences

6th week: Frames and Riesz bases

7th week: B-splines

8th week: Gabor frames

9th week: Duals of frames

10th week: Explicit construction of dual Gabor frame pairs

11th week: Unified theory of reproducing systems

12th week: Wave packet systems

13th week: Affine systems with composite dilations

14th week: Continuous shearlet transform

15th week: Continuous shearlet transform

16th week: Wavelets on the sphere