Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MATH 501	Advanced Analysis	1	3	0	0	3	8

Prerequisites	
Admission Requirements	

Language of Instruction	Turkish
Course Type	Compulsory
Course Level	Masters Degree
Objective	The course aims to cover some parts of the content of Mat 101,102, 201, 202, 301,331 and 452 given in the undergraduate level at Galatasaray University. We try to understand definitions, theorems, and proofs of some results in Real Analysis. We don't prove everything but will try to get a deeper understanding and hope to consolidate your understanding in Real Analysis.
Content	1. Analytic functions, harmonic functions. 2. Cauchy-Riemann equation. 3. Cauchy integral theorem 4. Cauchy integral formula 5. Riemann Integral for several variable functions, Fubini's theorem. 6. Lebesgue Outer measure. Measurable sets in R, then in R^n 7. Measurable Functions 8. Completion of a Measure space 9. Lebesgue Integral 10. Properties of Lebesgue Integral 11. Comparison of Riemann and Lebesgue Integrals, Convergence Theorems 12. Lebesgue Integral in R^n, Fubinis'theorem for Lebesgue Integral 13. L^p spaces, Convolution 14. Jordan and Hahn Decompositions, Radon–Nikodym Theorem
References	1) A. W. Knapp, Basic Real Analysis, with an appendix ”Ele- mentary Complex Analysis”, Digital Second Edition, 2016. 2) G.B. Folland, Real Analysis: Modern Techniques and Their Applications, 1999. 3) W. Rudin, Real and Complex Analysis, McGraw-Hill Inc., 1966.

Theory Topics

Week	Weekly Contents
1	Finite and infinite sets, countability.
2	Interchange of Limits, Pointwise Convergence, Uniform Convergence
3	Riemann Integral
4	Metric Spaces, Open/Closed sets, Compactness, Completeness, Examples: C(S) and B(S)
5	Riemann Integral for several variable functions, Fubini's theorem.
6	Lebesgue Outer measure. Mesaurable sets in R, then in R^n
7	Measurable Functions
8	Completion of a Measure space
9	Lebesgue Integral
10	Properties of Lebesgue Integral / Midterm

Week	Weekly Contents
11	Comparison of Riemann and Lebesgue Integrals, Lebesgue Convergence Theorems
12	Lebesgue Integral in R^n, Fubinis'theorem for Lebesgue Integral
13	L^p spaces, Convolution
14	Jordan and Hahn Decompositions, Radon–Nikodym Theorem