Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MATH 535	Written Exposition Skills	1	1	0	0	1	4

Prerequisites	
Admission Requirements	

Language of Instruction	Turkish
Course Type	Compulsory
Course Level	Masters Degree
Objective	Yüksek lisans tezi ve makale yazımında gerekli bilimsel metin yazma tekniklerini yaparak öğrenmek.
Content	Yazılacak bilimsel metin içeriği değişkendir ve seçim yapmak öğrencinin ilgisine bırakılmıştır.
References	Uygun şekilde atıf yapmak suretiyle tüm matematik metinleri kullanmak serbesttir.

Theory Topics

Week	Weekly Contents
1	Explaining the course requirements.
2	Topic selection
3	Text project submission
4	Scientific text writing.
5	Submission of the initial draft and revisions.
6	Continue writing the text.
7	Continue writing the text.
8	Continue writing the text.
9	Submission of the second draft and revisions.
10	Continue writing the text.
11	Continue writing the text.
12	Continue writing the text.
13	Submission of the final draft and revisions.
14	Submission of the final draft and revisions.

Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MATH 501		1	3	0	0	3	7

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Compulsory
Course Level	Masters Degree

Objective	The course aims to offer a new understanding of real analysis seen at undergraduate level, but in a more topological perspective. We try to understand what is the norm in analysis, and what is the exception. We don't prove everything but will try to get a deeper understanding and hope to consolidate your understanding in Real Analysis.
Content	1. Basic facts of real analysis, normed vector spaces, metric topology 2. Banach spaces 3. Banach spaces 2 4. Baire Theory 5. Nowhere continuous/differentiable functions and Darboux functions 6. Baire 1 functions and set of discontinuities of real functions 7. Set of convergence of sequences of functions and power series 8. Mid-term exam 9. Integration of functions in |R^2 10. Parametrized curves and Green Theorem 11. Parametrized surfaces and Stokes Theorem 12. Holomorphic functions and Cauchy theory 13. Laurent series, singularities and residues 14. Conformal applications
References	

Theory Topics

Week	Weekly Contents
1	
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8	Ara Sınav
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14	

Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MATH 536	Teaching Experience	1	2	0	0	2	5

Prerequisites	
Admission Requirements	

Language of Instruction	Turkish
Course Type	Compulsory
Course Level	Masters Degree
Objective	Matematiğin tarihi gelişimini ve felsefesini aktarabilmek.
Content	Matematik tarihi ve felsefesi üzerine bir bakış (bknz: konu başlıkları)

References	W. Dunham, Journey through Genius: The Great Theorems of Mathematics, Penguin, 1991 J. R. Brown, Philosophy of Mathematics: A Contemporary Introduction to the World of Proofs and Pictures, Routledge, 2008

Theory Topics

Week	Weekly Contents
1	1 Platonism
2	2 Picture proofs
3	What is applied mathematics?
4	4 Hilbert and Gödel
5	5 Knots and notation
6	6 What is a definition?
7	7 Constructive approach
8	8 Midterm exam
9	Proofs, pictures and procedures
10	Computation, proof and conjecture
11	How to refute the continuum hypothesis
12	Calling the bluff
13	Euler and his contributions to mathematics
14	Gauss and his contributions to mathematics

Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MATH 540		1	3	0	0	3	7

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Elective
Course Level	Masters Degree
Objective	Öğrencilerin Bilgisayar Cebir Sistemlerinin çalışma prensiplerini öğrenmesi ve matematiksel çalışmaları için bu programları etkili bir şekilde kullanabilecek hale gelmeleri.
Content	SageMath'in Yapısı SageMath'te Aritmetik SageMath kütüphanelerinde etkili bir şekilde gezinme, kaynak koda erişim SageMath'te Doğrusal (Lineer) Cebir SageMath'te Reel Analiz ve Görselleştirme SageMath'te Denklemleri Çözme GAP Aracılığıyla SageMath'te Grup Teorisi SageMath'e Yeni Özellikler Ekleme ve Bunları Belgeleme

References	Computational Mathematics with SageMath, Zimmermann et al., https://dl.lateralis.org/public/sagebook/sagebook-ba6596d.pdf Lecture Notes of MSC320 Intoduction to Symbolic Computation, Jan Verschelde, Department of Mathematics, Statistics and Computer Science, University of Illinois at Chicago, https://homepages.math.uic.edu/~jan/mcs320/mcs320notes/index.html Lecture Notes of MAT007 Introduction to computer algebra and mathematical programming, Johannes Schmitt, University of Zurich, https://johannesschmitt.gitlab.io/mat007/index.html Sage for Undergraduates, 2nd Edition, Gregory V. Bard, American Mathematical Society SageMath ile Matematik, Sinan Kapçak, Nesin Yayınevi, 2023 https://nesinkoyleri.org/wp-content/uploads/2023/06/sagemath_kitap_20230510.pdf

Theory Topics

Week	Weekly Contents
1	Ways of using SageMath, its general structure
2	Arithmetic in SageMath
3	Solving Equations in SageMath
4	Plotting in SageMath
5	Midterm 1
6	Linear Algebra with SageMath
7	Linear Algebra with SageMath
8	Linear Algebra with SageMath
9	Polynomials with SageMath
10	Midterm 2
11	Polynomials with SageMath
12	Polynomials with SageMath
13	Group theory with SageMath
14	Group theory with SageMath

Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
MATH 504		1	3	0	0	3	7

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Compulsory
Course Level	Masters Degree
Objective	Temel cebirsel kavramların anlaşılması ve bu kavramların profesyonel matematik içerisinde kullanılabilmesi.
Content	Ders iki bölümden oluşur. Birincisi cebirin genel sözlüğünü kurar: işlemleriyle tanımlanan yapılar, evrensel özellikleriyle bölümler, A'dan A[X]'e neyin geçtiği, grup etkileri, modüller, tensör çarpımı. İkincisi cisim genişlemelerini ve Galois teorisini işler: cebirsel kapanış, ayrılabilirlik, Galois karşılıklığı, sonlu cisimler ve siklotomi, radikallerle çözülebilirlik. Bölümleri bir sonuç birbirine bağlar: halkalar için kanıtlanan Hilbert taban teoremi Nullstellensatz'ın ihtiyaç duyduğu sonuçtur. Alıştırmalar dersin bir parçasıdır ve sonraki sonuçlarda kullanılır.

References	Serge Lang Algebra / https://gitlab.com/onayg/mat504

Theory Topics

Week	Weekly Contents
1	Algebraic structures; quotients; congruences.
2	Noetherian rings and the Hilbert basis theorem; factorial rings and Gauss's theorem.
3	Group actions; orbit-stabiliser; class equation; Cauchy; Burnside.
4	Symmetric group; cycles; signature; simplicity of A_n for n ≥ 5.
5	Sylow's theorems; groups of small order.
6	Modules; Z-modules; K[T]-modules; free modules.
7	Torsion K[T]-modules; Jordan and rational forms; Cayley-Hamilton.
8	Tensor products; universal property; base change.
9	Field extensions; minimal polynomials; Zariski's lemma; Nullstellensatz.
10	Splitting fields; algebraic closure; extension of embeddings.
11	Separability; reduced base change; perfect fields; characteristic p.
12	Normal extensions; primitive element; Galois correspondence.
13	Finite fields; cyclotomic polynomials; Galois group (Z/nZ)^×.
14	Solvable groups; radical extensions; insolvability of the quintic.