

## İndirilme Tarihi

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## MAT590 - ADVANCED INTEGRAL TRANSFORMS II - Fen Bilimleri Enstitüsü - Matematik Ana Bilim Dalı

### General Info

#### Objectives of the Course

The purpose of this course is for the student to have detailed information about Mellin and Hankel transformations, which have an important place in the theory of integral transformations.

#### Course Contents

Mellin Transform, Inverse Mellin Transform, Hankel Transform, Inverse Hankel Transform, Convolution

#### Recommended or Required Reading

1) Textbook - Yaşar, İrfan Baki. İntegral Dönüşümleri ve Uygulamaları. Siyasal Kitabevi, 2003. <br /> 2) Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta <br /> 3) Lecture Notes

#### Planned Learning Activities and Teaching Methods

Teaching Methods: -Lecture Method: Used for the direct transmission of theoretical knowledge. It is particularly effective at the beginning of the course and when introducing new topics. -Question-Answer Method: Used to increase student participation and assess their level of understanding. This method encourages active participation and helps reinforce learning. -Discussion Method: Aims to develop students' critical thinking skills and enables them to evaluate topics from different perspectives. This method encourages deep thinking. Planned Learning Activities: -Weekly Lectures: The designated topics will be covered each week, along with the solution of related example problems. -Assignments: Regular assignments will be given to help students reinforce their understanding and improve their practical skills. -Midterm and Final Exams: Exams will be conducted to assess students' level of knowledge and understanding of the topics.

#### Recommended Optional Programme Components

1- Preliminary Knowledge and Preparation: Students are advised to have a solid foundation in differential equations and integral calculus before starting this course. This will help them better understand the course content. 2- Regular Study: Due to the theoretical nature of the course, it is important to review topics regularly and come to weekly lessons prepared. 3- Utilizing Additional Resources: In addition to the course textbook, reviewing supplementary materials on integral equations and transformations can contribute to understanding the topics from different perspectives. 4- Practice and Problem Solving: To reinforce theoretical knowledge, additional exercises and problem-solving activities are recommended. In particular, practicing solutions for different integral transforms will help students grasp the subject more effectively. 5- Taking Advantage of Office Hours: Students are encouraged to utilize the instructor's office hours to clarify any unclear topics or questions. These recommendations will help students gain a deeper understanding of the course content and enhance their academic success.

#### Instructor's Assistants

There are no teaching assistants for this course.

#### Presentation Of Course

This course is conducted through face-to-face education. Teaching methods such as verbal lectures, discussions, and question-and-answer sessions are used in the course.

#### Dersi Veren Öğretim Elemanları

Assoc. Prof. Dr. Cahit Köme Dr. Öğr. Üyesi Sure Köme

### Program Outcomes

1. Recognizes the concepts of Mellin and Inverse Mellin transforms.
2. Recognizes the concepts of Hankel and Inverse Hankel transforms.
3. Recognize the concept of convolution

### Weekly Contents

Order	PreparationInfo	Laboratory TeachingMethods	Theoretical	Practise
1	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393	Oral presentation, Discussion, Question and answer	Basic definitions about Integral transforms	
2	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393	Oral presentation, Discussion, Question and answer	Basic definitions about Integral transforms	
3	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393	Oral presentation, Discussion, Question and answer	Introduction to the Mellin transforms	

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
4	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393		Oral presentation, Discussion, Question and answer	Basic properties of Mellin transforms	
5	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393		Oral presentation, Discussion, Question and answer	Algebraic properties of the convolution and inverse Mellin transforms	
6	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393		Oral presentation, Discussion, Question and answer	Applications of Mellin transforms	
7	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:367-393		Oral presentation, Discussion, Question and answer	Applications of Mellin transforms	
8				Midterm Exam	
9	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	Basic definitions and properties about Hankel transforms	
10	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	Basic definitions and properties about Hankel transforms	
11	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	Applications of Hankel transforms	
12	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	Applications of Hankel transforms	
13	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	Applications of Hankel transforms	
14	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	General applications and properties of inverse Hankel transforms	
15	Textbook - Yaşar, İrfan Baki. Pages related to the subject of the book Integral Transformations and Their Applications Textbook-Integral Transforms and Their Applications - Lokenath Debnath, Dambaru Bhatta-Page:343-359		Oral presentation, Discussion, Question and answer	General applications and properties of inverse Hankel transforms	

Workload

<b>Activities</b>	<b>Number</b>	<b>PLEASE SELECT TWO DISTINCT LANGUAGES</b>
Vize	1	2,00
Teorik Ders Anlatım	14	3,00
Diğer	14	5,00
Ara Sınav Hazırlık	4	4,00
Final Sınavı Hazırlık	5	4,00
Final	1	2,00
Derse Katılım	7	4,00

Assesments

<b>Activities</b>	<b>Weight (%)</b>
Ara Sınav	40,00
Final	60,00

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11	P.O. 12	P.O. 13	P.O. 14	P.O. 15	P.O. 16	P.O. 17	P.O. 18	
L.O. 1	5				5														5
L.O. 2	5				5														5
L.O. 3	5				5														5

Table :

- P.O. 1 :** Analiz, Uygulamalı matematiğin, Geometri ve Cebirin bazı alt toerileri hakkındaki temel teoremleri yeni problemlere uygulayabilir.
- P.O. 2 :** programcılığı 2
- P.O. 3 :** Matematik, fen bilimleri ve kendi dalları ile ilgili konularda yeterli alt yapıya sahiptir ve bu alanlardaki teorik ve uygulamalı bilgileri matematik problemlerin çözümleri için kullanır.
- P.O. 4 :** Bilimsel, matematiksel düşünme yeteneği kazanabilme ve ilgili alanlarda bu bilgiyi kullanabilme.
- P.O. 5 :** Bilimsel, matematiksel düşünme yeteneği kazanabilme ve ilgili alanlarda bu bilgiyi kullanabilme.
- P.O. 6 :** Temel matematiksel beceriler (problem çözme, akıl yürütme, ilişkilendirme, genelleme) ve bu becerilere dayalı yetenekler edinebilme. (Rasyonel düşünme tekniği kazandırabilme)
- P.O. 7 :** Bilim ve teknolojiadaki gelişmeleri izleme ve kendini sürekli yenileme becerisi kazanabilme.
- P.O. 8 :** Bilgiye erişebilme ve bu amaçla kaynak araştırması yapabilme, veri tabanlarını ve diğer bilgi kaynaklarını kullanabilme becerisine sahip olabilme.
- P.O. 9 :** Çalışma hayatında etik sorumlulukların gereklerini yerine getirebilme.
- P.O. 10 :** Bilim tarihi ve bilimsel bilginin üretimiyle ilgili bilgi edinebilme.
- P.O. 11 :** Eleştirel ve yaratıcı düşünmenin ve problem çözme becerilerinin gelişimi için uygun yöntem ve tekniklerle etkinlikler düzenleyebilme.
- P.O. 12 :** Çalışma hayatı ve sosyal yaşam ile ilgili konularda bireysel ve takım çalışmaları yapabilme.
- P.O. 13 :** Alanı ile ilgili konularda düşüncelerini ve konulara ilişkin çözüm önerilerini yazılı ve sözlü olarak aktarabilme.
- P.O. 14 :** Matematiksel bilgi birikimlerini teknolojide kullanabilme.
- P.O. 15 :** Alanındaki bilgileri izleyebilecek ve meslektaşları ile iletişim kurabilecek düzeyde bir yabancı dili geliştirebilme.
- P.O. 16 :** Gerçek dünya problemlerinde Matematiksel prensipleri uygulayabilme.
- P.O. 17 :** Farklı disiplinlerin yaklaşım ve bilgilerini Matematikte kullanabilme.
- P.O. 18 :** Matematik alanındaki bir problemi, bağımsız olarak kurgulayabilme, çözüm yöntemi geliştirebilme, çözebilme, sonuçları değerlendirebilme ve gerektiğinde uygulayabilme.
- L.O. 1 :** Mellin ve Ters Mellin dönüşümleri kavramlarını tanıtır.
- L.O. 2 :** Hankel ve Ters Hankel dönüşümleri kavramlarını tanıtır.
- L.O. 3 :** Konvolüsyon kavramını tanıtır