Date	**2015-16**	**Credits**	**5 credits**
Course Title	**Functional Analysis I**	**Course Number**	**MAT461**
Pre-requisite (s)	**MAT234 Advanced Calculus, MAT351 General Topology**	**Co-requisite (s)**	
Hours	**42 hours**	**Out Of Class Work Hours**	**84 Hours**

Place and Time of Class Meeting

Tuesdays 11:00-13:00, room D107
Wednesdays 10:00-11:00, room D107

Name and Contact Information of Instructor

Dr. Neil Course
neil.course@okan.edu.tr

Book required

Gerald Teschl**, Topics in Real and Functional Analysis**, free ebook
(www.mat.univie.ac.at/_gerald/ftp/book-fa).

Hüsnü Kızmaz, **Fonksiyonel Analize Giriş**, K.Ü.Fen-Edebiyat Fakültesi.

Classroom expectations for students

Attendance Policy

Students are expected to attend greater than 70% of scheduled lectures for the courses that they are registered for and to achieve the goals set forth by each class instructor. Attendance is taken daily. It is the student's responsibility to arrange to make up work missed because of an absence. Students are expected to study approximately 2 hours outside of class for each 1 hour of lectures given.

Student Tardiness Policy

A student is considered tardy/late if he/she comes to class 15 minutes late. With three tardies the student accumulates one full absence. If the student misses half of the class period, it is a full absence. When a student has more than 3 tardies, the instructor will contact the Institution Coordinator of Student Affairs and Academic Department and request an intervention session with the student. The goal of the intervention session is to develop and implement an intervention program to help students learn new ways to save and manage time.

NOTE: Plagiarism is defined as the use, without proper acknowledgment, of the ideas, phrases, sentences, or larger units of discourse from another writer or speaker. Plagiarism includes the unauthorized copying of software and the violation of copyright laws. Students who commit plagiarism will obtain a grade of “Failure” on their exam or assignment.

Course Description (must correspond exactly to Catalog description)

This course is designated to provide a basic introduction to the area of mathematics described by the course title. In particular, students will study Metric Spaces, Topological Spaces, Banach Spaces, Hilbert Spaces, completeness, bounded operators, sums and quotients of Banach Spaces, spaces of continuous and differentiable functions, orthonormal bases, the Projection Theorem, the Riesz Lemma, operators defined via forms, orthogonal sums and tensor products, compact operators, the Spectral Theorem for Compact, and Symmetric Operators.

Learning Objectives

At the end of this course students will be able:

- To understand and recall the definitions of key concepts in this area of mathematics;
- To understand and recall the important results discussed;
- To apply all of the methods and techniques discussed and developed in the topics mentioned in course description;
- To provide proofs to elementary problems in this area of mathematics.

Topical Outline and Schedule

DATE	WEEK 1
SPECIFIC OBJECTIVES	• Introduction to the course • Revision of the theory of topology and metric spaces
TOPIC (S)	• Syllabus • Book • Course website • Homework • Expectations • Plagiarism • Motivation • **Topology** • **Metric spaces**
LEARNING ACTIVITIES	• Lectures • Independent study •
OUT OF CLASS WORK ASSIGMENT	• Download the course textbook
DATE	**WEEK 2**
SPECIFIC OBJECTIVES	• Revision of the theory of topology and metric spaces •
TOPIC (S)	• **Topology** • **Metric spaces**
LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 1.1 in the text book (Please note that section numbers may change between different versions of the textbook.) • Read around the subject • Complete homework problems •
DATE	**WEEK 3**
SPECIFIC OBJECTIVES	• Revision of the theory of topology and metric spaces

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TOPIC (S)	• **Topology** • **Metric spaces** •
LEARNING ACTIVITIES	• Lectures • Independent study •
OUT OF CLASS WORK ASSIGMENT	• Read section 1.1 in the text book • Read around the subject • Complete homework problems •
DATE	**WEEK 4**
SPECIFIC OBJECTIVES	• Students will start to develop a basic understanding of the topics listed below •
TOPIC (S)	• **Norms** • **Normed spaces** • **Banach Spaces** • **Inner Products** • **Inner Product Spaces** • **Hilbert Spaces** • **Completeness**
LEARNING ACTIVITIES	• Lectures • Independent study •
OUT OF CLASS WORK ASSIGMENT	• Read section 1.2 in the text book • Read section 1.3 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 5**
SPECIFIC OBJECTIVES	• Students will continue to develop a basic understanding of the topics listed below
TOPIC (S)	• **Norms** • **Normed spaces**

	• **Banach Spaces** • **Inner Products** • **Inner Product Spaces** • **Hilbert Spaces** • **Completeness**
LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 1.4 in the text book • Read around the subject • Complete homework problems
DATE	**WEEKS 6**
SPECIFIC OBJECTIVES	• Students will broaden their understanding of the topics listed below
TOPIC (S)	• **Norms** • **Normed spaces** • **Banach Spaces** • **Inner Products** • **Inner Product Spaces** • **Hilbert Spaces** • **Completeness** • **Linear Operators** • **Bounded Linear Operators** • **Sums and Quotients of Banach Spaces**
LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 1.5 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 7**
SPECIFIC OBJECTIVES	• Students will have developed a basic understanding of the topics listed below
TOPIC (S)	• **Norms** • **Normed spaces**

	• **Banach Spaces** • **Inner Products** • **Inner Product Spaces** • **Hilbert Spaces** • **Completeness** • **Linear Operators** • **Bounded Linear Operators** • **Sums and Quotients of Banach Spaces**
LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 1.6 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 8**
SPECIFIC OBJECTIVES	• Assessment
TOPIC (S)	• Midterm Exam
LEARNING ACTIVITIES	• Exam
OUT OF CLASS WORK ASSIGMENT	• Revision • Read around the subject
DATE	**WEEK 9**
SPECIFIC OBJECTIVES	• Students will begin to develop a basic understanding of the topics listed below
TOPIC (S)	• **Hilbert Spaces** • **Orthonormal Bases** • **The Projection Theorem** • **The Reisz Representation Theorem/The Reisz Lemma** • **Operators defined via forms** • **Orthogonal Sums and Tensor Products**

LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 2.1 in the text book • Read section 2.2 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 10**
SPECIFIC OBJECTIVES	• Students will continue to develop a basic understanding of the topics listed below •
TOPIC (S)	• **Hilbert Spaces** • **Orthonormal Bases** • **The Projection Theorem** • **The Reisz Representation Theorem/The Reisz Lemma** • **Operators defined via forms** • **Orthogonal Sums and Tensor Products**
LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 2.3 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 11**
SPECIFIC OBJECTIVES	• Students will have developed a basic understanding of the topics listed below
TOPIC (S)	• **Hilbert Spaces** • **Orthonormal Bases** • **The Projection Theorem** • **The Reisz Representation Theorem/The Reisz Lemma** • **Operators defined via forms** • **Orthogonal Sums and Tensor Products**
LEARNING ACTIVITIES	• Lectures • Independent study

OUT OF CLASS WORK ASSIGMENT	• Read section 2.4 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 12**
SPECIFIC OBJECTIVES	• Students will begin to develop a basic understanding of the topics listed below
TOPIC (S)	• **Compact Operators** • **The Spectral Theorem for compact symmetrical operators** • **Sturm-Lioville operators**
LEARNING ACTIVITIES	• Lectures • Independent study •
OUT OF CLASS WORK ASSIGMENT	• Read section 3.1 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 13**
SPECIFIC OBJECTIVES	• Students will continue to develop a basic understanding of the topics listed below
TOPIC (S)	• **Compact Operators** • **The Spectral Theorem for compact symmetrical operators** • **Sturm-Lioville operators**
LEARNING ACTIVITIES	• Lectures • Independent study
OUT OF CLASS WORK ASSIGMENT	• Read section 3.2 in the text book • Read around the subject • Complete homework problems
DATE	**WEEK 14**

SPECIFIC OBJECTIVES	• Students will have developed a basic understanding of the topics listed below
TOPIC (S)	• **Compact Operators** • **The Spectral Theorem for compact symmetrical operators** • **Sturm-Lioville operators**
LEARNING ACTIVITIES	• Lectures • Independent study •
OUT OF CLASS WORK ASSIGMENT	• Read section 3.3 in the text book • Read around the subject • Complete homework problems

Instructional Methods

In developing methodological strategies, it is best to discuss them between teachers and students in an environment of freedom and mutual agreement in order to ensure that the students make them their own and take responsibility for their execution and for attaining the goals of this course.

The following strategies may be used in this class:
1. A review of the literature.
2. Check of the reading.
3. Analysis of assigned readings.
4. Group discussions and implementations.
5. Individual and group discussions.
6. Preparation of homework.

Instructional Materials and References

Gerald Teschl**, Topics in Real and Functional Analysis**, free ebook
(www.mat.univie.ac.at/_gerald/ftp/book-fa).

Home study materials provided online at www.neilcourse.co.uk

Assessment Criteria and Methods of Evaluating Students

76 – 100%	→ AA
70 – 75%	→ BA
65 – 69%	→ BB
59 – 64%	→ CB
53 – 58%	→ CC
47 – 52%	→ DC
39 – 46%	→ DD
0 – 39%	→ FF

There will not be a curve!

Generally, the grades "AA" to "BB" are considered impressive grades. Grades "CB" to "DD" are considered merely passing grades.

Distribution of Grade Elements

4 pieces of homework:	25%
Midterm Exam:	25%
Final Exam:	50%
Total:	100 %

Date Syllabus Was Last Reviewed: Saturday, 26 September 2015.