

**Module title: Functional Analysis**

**Module Code: 24-...**

**Module Credit: 4**

**Term:** Second Term 1397-98

**Lecturer:** Mojtaba Bakherad  
(Mojtaba.bakherad@yahoo.com)

**Lecturing time:** Sat. (0000) and Mon. (0000)

**Assessments:** 30% mid-term 1 exam  
5% Quiz  
5% home works  
60% final exam

**Class attendance:** **REGULAR ATTENDING IS IMPORTANT AND EACH SESSION YOUR ATTENDANCE WILL BE CHECKED**

**References:** **Functional Analysis (2nd Edition)**  
Walter Rudin  
ISBN-13: 978-0070542365

**Introductory Functional Analysis with Applications (1st Edition)**  
Erwin Kreyszig  
ISBN 0-471-53478-1

## **Module Subjects:**

### **Introduction to Normed Spaces:**

- 1<sup>st</sup>. week: Vector Space
- 2<sup>nd</sup>. week: Normed Space. Banach Space
- 3<sup>rd</sup>. week: Further Properties of Normed Spaces
- 4<sup>th</sup>. week: Finite Dimensional Normed Spaces and Subspaces

### **Inner Product Spaces. Hilbert Spaces:**

- 5<sup>th</sup>. week: Bounded and Continuous Linear Operators
- 6<sup>th</sup>. week: Linear Operators and Functionals on Finite Dimensional Spaces
- 7<sup>th</sup>. week: Inner Product Space. Hilbert Space
- 8<sup>th</sup>. week: Orthogonal Complements and Direct Sums

### **Representation of Functionals:**

- 9<sup>th</sup>. week: Orthonormal Sets and Sequences
- 10<sup>th</sup>. week: Hilbert-Adjoint Operator
- 11<sup>th</sup>. week: Self-Adjoint, Unitary and Normal Operators

### **Fundamental Theorems for Normed:**

- 12<sup>th</sup>. week: Zorn's Lemma
- 13<sup>th</sup>. week: Hahn-Banach Theorem.
- 14<sup>th</sup>. week: Hahn-Banach Theorem for Complex Vector Spaces and Normed Spaces
- 15<sup>th</sup>. week: Adjoint Operator, Reflexive Spaces
- 16<sup>th</sup>. week: Strong and Weak Convergence, Convergence of Sequences of Operators and Functionals