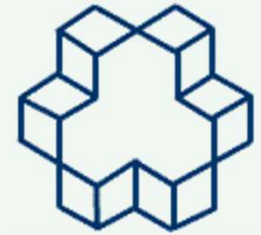




Company Logo

K. N. Toosi University of Technology

Faculty of Materials Science and Engineering



## Materials Characterization Methods

First Session

(Topics, References and Evaluation)

Reza Eslami-Farsani



# Course Description



**This topic focuses on the necessary knowledge, understanding and skills required for materials characterization and analysis methods. These methods for analyzing and characterizing materials have been developed to the point where they can be applied routinely not only in research and development, but also in manufacturing processes in various industries. The tools and devices can be used daily for inspection, quality control, materials characterization, and failure analysis.**

**In this course, the students become familiar with methods of materials characterization and analysis. In this regard, the set of covered topics include the introduction of materials characterization methods such as X-ray, microscopic, chemical, thermal and surface analysis.**

# Topics



- ✓ Introduction to Materials Characterization Methods
- ✓ X-Ray
- ✓ Optical Microscopy
- ✓ Interaction of electrons with materials
- ✓ The use of electron beams in the materials analysis
- ✓ Scanning Electron Microscope (SEM)
- ✓ Application of X-ray in SEM
- ✓ Transmission Electron Microscope (TEM)
- ✓ Thermal Analysis (TGA, etc.)
- ✓ Surface Analysis (AES, etc.)
- ✓ Chemical Analysis (AAS, etc.)

# References



1. B. D. Cullity, Elements of X-ray Diffraction, Addison-Wesley, U.K.
2. P. J. Goodhew, J. Humphrey & R. Beanland, Electron Microscopy and Analysis, Taylor and Francis, USA.
3. D. B. Williams, C. Barry Carter, Transmission Electron Microscopy, Springer, USA.
4. ASM Handbook, Vol. 10, Materials Characterization, ASM International, USA.

# Course Outline



Course Unit: 3

Course Type: Theoretical

Duration: 1 semester (16 weeks)

Course Hours: 3 hours lecture per week

Course Evaluation (from 20):

- Midterm 1: 2 Points
- Midterm 2: 2 Points
- PowerPoint Presentation (Seminar): 3 Points
- Movie (related to the seminar topic): 1 Points
- Final Exam: 12 Points

Title of Seminar: One of the **materials characterization methods** (except the topics discussed in class)

# How to Deliver the Documents?



- All documents should be email until the final exam. The necessary documents are as following:
- PowerPoint file in non-slide show mode
- (Students prepare their PowerPoint file based on the template)
- Movie file
- (Note: The name of PowerPoint and movie files should only include the name of the student and the research topic (for example: Eslami- SEM))



# How to Contact Me?



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