Doctoral Qualification Exam

1. In the Doctoral Qualification Exam, candidates will be asked questions under four main topics. These topics will cover both undergraduate (Callister and Rethwisch, *Materials Science and Engineering: An Introduction*) and graduate-level subjects (as described under each topic). Some of the questions will be "mandatory," while others will be "elective." The four main topics from which the questions will be drawn are as follows:

a) Structure and Processing (Ceramics, Metals, Polymers, Materials Science in general)

MSE534	ADVANCED MATERIALS SCIENCE AND ENGINEERING
MSE507	POLYMERS FOR ADVANCED TECHNOLOGIES
MSE530	ADVANCED CERAMIC PROCESSING
MSE516	STEEL AND HARDENABILITY

b) Thermodynamics, Kinetics, Phase relations and diagrams

MSE535	ADVANCED THERMODYNAMICS OF MATERIALS
MSE523	PHASE DIAGRAMS IN ADVANCED MATERIALS
MSE548	DIFFUSION AND PHASE TRANSFORMATION IN METALS AND ALLOYS

c) Physical properties (Electrical, Magnetic, Mechanical, Optical, etc) and Characterization

MSE537	ADVANCED MATERIALS CHARACTERIZATION TECHNIQUES
MSE309	MECHANICAL PROPERTIES OF MATERIALS
MSE311	MATERIALS CHARACTERIZATION TECHNIQUES
MSE402	ELECTRICAL MAGNETIC AND OPTICAL PROPERTIES IF MATERIALS

d) Specific field (based on students' grad-level courses)

MSE503	ADVANCES IN NANOCOMPOSITE TECHNOLOGY
MSE507	POLYMERS FOR ADVANCED TECHNOLOGIES
MSE517	SINTERING THEORY
MSE519	THIN FILM COATING TECHNOLOGIES
MSE523	PHASE DIAGRAMS IN ADVANCED MATERIALS
MSE529	FRACTURE MECHANICS
MSE535	ADVANCED THERMODYNAMICS OF MATERIALS
MSE537	ADVANCED MATERIALS CHARACTERIZATION TECHNIQUES
MSE539	BIOINSPIRED DESIGN AND PROCESSING OF MATERIALS
MSE547	FUNDAMENTALS OF ELECTROCHEMICAL SCIENCE
MSE551	QUANTUM BIOMIMETIC SENSORS
MATH511	ADVANCED ENGINEERING MATHEMATICS I
MSE506	COMPOSITE MATERIALS
MSE510	PROCESSING AND APPLICATION OF POROUS CERAMICS
MSE516	STEEL AND HARDENABILITY
MSE520	CHEMICAL METALLURGY
MSE530	ADVANCED CERAMIC PROCESSING
MSE534	ADVANCED MATERIALS SCIENCE AND ENGINEERING
MSE536	POLYMER MATERIALS AND RHEOLOGY
MSE542	METHODS OF APPLIED MATHEMATICS
MSE544	CORROSION AND CORROSION CONTROL
MSE546	ELECTRICAL CHARACTERIZATION TECHNIQUES FOR SEMICONDUCTORS
MSE548	DIFFUSION AND PHASE TRANSFORMATION IN METALS AND ALLOYS
MSE550	BIOSENSORS: PHYSICAL AND CHEMICAL PROPERTIES
MSE552	PHYSICAL FOUNDATION OF MATERIALS SCIENCE
MSE554	METAL ADDITIVE MANUFACTURING
MSE556	METAMATERIALS AND AUXETIC STRUCTURES
MSE596	SUPERCONDUCTING MATERIALS AND APPLICATIONS

2. In order for a candidate to take the oral exam, they must score at least 70 points out of 100 in the written exam. However, the candidate must score at least 5 points out of 25 in each category of questions. To pass, the candidate must succeed in both the oral and written exams.

3. Doctoral candidates have two attempts to pass the doctoral qualifying exam. Candidates who fail both attempts will be dismissed from the university.

Updated on 7 April 2025