

**DEPARTMENT OF MATERIALS SCIENCE AND
ENGINEERING, NATIONAL TAIWAN UNIVERSITY**
Regulations for the Doctoral Program Qualification Examination

October 23, 2023
August 09, 2024

Amended and passed by the Department meeting
Translation updated

A. Examination Time:

1. Ph.D. students must take the qualification examination before the start of their second year in their program, either taking it during the summer vacation at the end of their first year or during the winter vacation of their first year. Failure to do so counts as a failed attempt at the qualification examination.
2. The qualification examination is held twice a year, once during the summer vacation and once during the winter vacation. Examinees must register one month in advance of the qualification examination to be eligible. Those without registration are not eligible to take the examination.

B. Examination subjects: The qualification examination consists of two subjects, Core and Specialty, the contents of which differ for different academic divisions as detailed below:

1. Core:

Metals, Processing, and Ceramic divisions:

Thermodynamics of Materials, Kinetics of Materials, Crystal Structure, Electron Microscopy, Solid-state Physics, Mechanical Behavior of Materials, Phase Transformation, Electrochemistry for Materials Science.

Polymers and Soft Matters division:

Thermodynamics of Materials, Kinetics of Materials, Polymer, Polymer Physical Chemistry, Electron Microscopy, Crystal Structure, Solid-state Physics.

Electronic Materials division:

Thermodynamics of Materials, Kinetics of Materials, Crystal Structure, Electron Microscopy, Solid-state Physics, Physics of Semiconductor Devices, Optoelectronic Materials.

2. Specialty:

Metals and Processing divisions:

Phase Equilibria and Phase Diagrams, Powder Metallurgy, Electronic Spectroscopy in Surface Analysis, Analytical Techniques with Ions and Probes, Principles and Applications of Scattering, Welding Metallurgy, Special Topics on Metallic Materials, Materials Microstructure & Defects, Solidification Processing, Thin Film Materials Science, Introduction to Texture Analysis.

Ceramics division:

Ceramic-matrix Composites, Fundamentals and Technology of Solid Oxide Fuel Cell, Special Topics on Metallic Glasses, Physical Ceramics, Materials Transportation,

Thermal Process in Ceramics, Ceramics Smart Materials, Surface Analysis, First Principles Computational Materials Science, Bioengineering.

Polymers and Soft Matters division:

Nanomaterials, Precise Controlled Polymerization, Engineering Statistics, Introduction of Electrochemistry, Polymer Physics I: in Solid State, Principles and Applications of Scattering, First Principles Computational Materials Science.

Electronic Materials division:

Magnetic Materials, Failure Analysis, Modern Physics, Semiconductor Processing Technology, First Principles Computational Materials Science, Nanoelectronics, Electromagnetic, Electronic Packaging.

- C. Each of the two subjects is scored separately. The minimal passing score for each of the subjects is 70 (out of a total of 100). For a student's first attempt at the qualification examination, in the case that the student fails only one of the two subjects, the student will only be required to retake the failed subject. However, in the event that the student fails the subject for the second time, the student will be dismissed from the university and be terminated from the doctoral program. The identities of all examinees are concealed throughout the grading process and are only disclosed at the Department meeting, where the scores of the examination will not be adjusted or altered for each individual. (Scores are rounded to the nearest integer.)
- D. Students are allowed a maximum of two attempts at the qualification examination. Students must pass the qualification examination within two years of study, i.e. before the start of their third school year, or they will be dismissed and terminated from the doctoral program.
- E. Method for generating tests: Test questions are drawn from test banks.
- F. A student may, with the approval of the student's advisor, apply for an extension of the permitted timeframe for passing the qualification examination, if the student has difficulty fulfilling the permitted timeframe due to pregnancy, childbearing, childrearing for children under the age of three, or other exceptional circumstances. Approval on the application or not will be decided by the Department Curriculum Committee.

**DEPARTMENT OF MATERIALS SCIENCE AND
ENGINEERING, NATIONAL TAIWAN UNIVERSITY**
**Regulations for the Doctoral Program Qualification Examination
Exemption**

October 23, 2023
August 09, 2024

Amended and passed by the Department meeting
Translation updated

- A. Students who had previously been enrolled in the Master's program at Department of Materials Science and Engineering (MSE), National Taiwan University (NTU) and had completed 2 or more core courses in the program with grades in the top 15% of their class can be exempted from the qualification examination.
- B. The Core and Specialty subjects of the qualification examination can be exempted for students who have taken the required number of designated courses and received the required grades. The designated courses for exempting the Core and Specialty subjects, respectively, are different for the different divisions as detailed below:

1. Core:

Metals, Processing, and Ceramic divisions:

Thermodynamics of Materials, Kinetics of Materials, Crystal Structure, Electron Microscopy, Solid-state Physics, Mechanical Behavior of Materials, Phase Transformation, Electrochemistry for Materials Science.

Polymers and Soft Matters division:

Thermodynamics of Materials, Kinetics of Materials, Polymer, Polymer Physical Chemistry, Electron Microscopy, Crystal Structure, Solid-state Physics.

Electronic Materials division:

Thermodynamics of Materials, Kinetics of Materials, Crystal Structure, Electron Microscopy, Solid-state Physics, Physics of Semiconductor Devices, Optoelectronic Materials.

Doctoral students can have the Core subject in their qualification examination exempted by passing three Core subjects from their respective divisions. In the case that a student passes more than three Core subjects, the extra courses taken can be counted as Specialty subjects.

2. Specialty:

Metals and Processing divisions:

Phase Equilibria and Phase Diagrams, Powder Metallurgy, Electronic Spectroscopy in Surface Analysis, Analytical Techniques with Ions and Probes, Principles and Applications of Scattering, Welding Metallurgy, Special Topics on Metallic Materials, Materials Microstructure & Defects, Solidification Processing, Thin Film Materials Science, Introduction to Texture Analysis.

Ceramics division:

Ceramic-matrix Composites, Fundamentals and Technology of Solid Oxide Fuel Cell, Special Topics on Metallic Glasses, Physical Ceramics, Materials Transportation, Thermal Process in Ceramics, Ceramics Smart Materials, Surface Analysis, First Principles Computational Materials Science, Bioengineering.

Polymers and Soft Matters division:

Nanomaterials, Precise Controlled Polymerization, Engineering Statistics, Introduction of Electrochemistry, Polymer Physics I: in Solid State, Principles and Applications of Scattering, First Principles Computational Materials Science.

Electronic Materials division:

Magnetic Materials, Failure Analysis, Modern Physics, Semiconductor Processing Technology, First Principles Computational Materials Science, Nanoelectronics, Electromagnetic, Electronic Packaging.

Doctoral students can have the Specialty subject in their qualification examination exempted by passing three Specialty subjects from their respective divisions.

- C. Article B is also applicable to students that have graduated from other Master's programs of NTU.
- D. Article B is also applicable to students that have graduated from Master's programs of other institutions than NTU and had taken the designated courses whose credits are admitted by NTU.
- E. If any of the designated courses is not available for a prolonged period, students are advised to take other designated courses from their respective divisions. In the event that the number of available designated courses is insufficient, students may, with the approval of their respective advisors, apply to take substitute courses offered by other academic programs for the unavailable designated courses, provided that the substituting courses are similar in content to the designated courses. Approval on the application or not will be decided by the Department Curriculum Committee.