

# Department of Materials Science and Engineering, National Taiwan

## University Doctoral Program Qualification Examination Measures

Passed by the department meeting on 5<sup>th</sup> July year 110

### 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 and once during the winter vacation. Examinees must register one month in advance of the qualification examination to be eligible. Those who do not register will not be eligible to take the examination.

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

#### 1. Core:

##### Metals, Processing, and Ceramics divisions:

Thermodynamics of Materials, Kinetics of Materials, Crystal Structure, Electron Microscopy, Solid State Physics, Mechanical Behavior of Materials, Phase Transformation, Failure Analysis.

##### Polymers and Soft Matters division:

Thermodynamics of Materials, Kinetics of Materials, Polymer Synthesis, 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, Semiconductor Component Physics, Optoelectronic Materials.

#### 2. Specialty:

##### Metals and Processing divisions:

Phase Balance and Phase Diagram, Powder Metallurgy, Special Topics on Metallic Glasses, Surface Analysis Technology, Principles and Applications of Scattering, Welding Metallurgy, Special Topics on Metallic Materials.

##### Ceramics division:

Ceramic Composite, Principle and Technology of Solid Fuel Cell, Special Topics on Metallic Glasses, Physical Ceramics, Material Transport Phenomenon, Thermal Process in Ceramics, Ceramics Smart Materials, Surface Analysis Technology, First Principles Computational Materials Science, Biomedical Engineering.

##### Polymers and Soft Matters division:

Nanomaterials, Precision Polymer Synthesis, Engineering Statistics, Introduction to Electrochemistry, Polymer Physics I: Solid State Physics, Principles and Applications of

Scattering, First Principles Computational Materials Science.

Electronic Materials division:

Magnetic Material, Failure Analysis, Modern Physics, Semiconductor process, First Principles Computational Materials Science, Nanoelectronics, Electromagnetism, Electronics 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 has the option of taking another test on that failed subject. But in the event that the student fails the second test, the student will disqualify and be terminated from the program. The identities of all examinees are concealed throughout the grading process and are only disclosed in the department meeting, where the scores of the examination will not be adjusted or altered. (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 before the start of their third year of study or be terminated from the 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. Decision on the application will be given by the curriculum committee.

Department of Materials Science and Engineering, National Taiwan  
University Doctoral Program Qualification Examination Exemption

Measures

Passed by the department meeting on 5th July year 110

- A. Students who have previously enrolled in the Department of Materials Science and Engineering, National Taiwan University (MSE department) master's program and completed 2 or more core courses in the program with grades in the top 15% of their classes 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 subject：

Metals, Processing, and Ceramics divisions: 8 designated courses:

Thermodynamics of Materials, Kinetics of Materials, Crystal Structure, Electron Microscopy, Solid State Physics, Mechanical Behavior of Materials, Phase Transformation, Failure Analysis.

Polymers and Soft Matters division: 7 designated courses:

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

Electronic Materials division: 7 designated courses:

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

The required number of the designated courses for exempting the Core subject is three. Additional courses taken from the above pool can count toward the designated courses for exempting the Specialty subject.

2、Specialty subjects：

Metals and Processing divisions:

Phase Balance and Phase Diagram, Powder Metallurgy, Special Topics on Metallic Glasses, Surface Analysis Technology, Principles and Applications of Scattering, Welding Metallurgy, Special Topics on Metallic Materials.

Ceramics division:

Ceramic Composite, Principle and Technology of Solid Fuel Cell, Special Topics on Metallic Glasses, Physical Ceramics, Material Transport Phenomenon, Thermal Process in

Ceramics, Ceramics Smart Materials, Surface Analysis Technology, First Principles Computational Materials Science, Biomedical Engineering.

Polymers and Soft Matters division:

Nanomaterials, Precision Polymer Synthesis, Engineering Statistics, Introduction to Electrochemistry, Polymer Physics I: Solid State Physics, Principles and Applications of Scattering, First Principles Computational Materials Science.

Electronic Materials division:

Magnetic Material, Failure Analysis, Modern Physics, Semiconductor process, First Principles Computational Materials Science, Nanoelectronics, Electromagnetism, Electronic package.

The required number of the designated courses for exempting the Specialty subject is three.

3. A total of 6 designated courses are required for exempting both the Core and Specialty subjects. The required grade is B or above.
  4. In the event that a new course is added to the pool of designated courses, the division(s) that the new course is listed under will be at the discretion of the lecturer.
  5. Availability of the designated courses may be periodic or intermittent. Prudent advance planning is advised.
- C. Article B applies to students graduating from other master's programs of NTU.
- D. Article B also applies to students graduating from master's programs of other institutions than NTU who have taken the designated courses with official credits.
- E. If any of the designated courses is not available for a prolonged period, students are advised to choose other designated courses of their respective divisions. In the event that the number of available designated courses is insufficient, students may, with the approval of their respective advisor, apply for permits to substitute courses offered by other programs for the unavailable designated courses, provided that the substituting courses are similar in content to the designated courses. Decision on the applications will be given by the curriculum committee.