Program Requirements

Core Subjects

22.101 Applied Nuclear Physics 12
22.102 Applications of Nuclear Science and Engineering 3
22.103 Nuclear Technology and Society 9

Field of Specialization (choose one) 1 36

**Nuclear Reactor Engineering**

22.211 Nuclear Reactor Physics I
22.312 Engineering of Nuclear Reactors

*Plus one of the following subjects:*

22.313[J] Thermal Hydraulics in Power Technology
22.315 Applied Computational Fluid Dynamics and Heat Transfer
22.39 Integration of Reactor Design, Operations, and Safety

**Nuclear Reactor Physics**

22.211 Nuclear Reactor Physics I
22.312 Engineering of Nuclear Reactors

*Plus one of the following subjects:*

22.212 Nuclear Reactor Analysis II
22.213 Nuclear Reactor Physics III
22.251 Systems Analysis of the Nuclear Fuel Cycle

**Nuclear Materials**

3.20 Materials at Equilibrium
22.71[J] Modern Physical Metallurgy

*Plus one of the following subjects:*

3.21 Kinetic Processes in Materials
22.72 Corrosion: The Environmental Degradation of Materials
22.73[J] Defects in Materials
22.74[J] Radiation Damage and Effects in Nuclear Materials
22.76[J] Ionics and Its Applications

**Fusion Plasma Physics**

22.611[J] Introduction to Plasma Physics I
22.62 Fusion Energy

*Plus one of the following subjects:*

22.63 Engineering Principles for Fusion Reactors
2.612 Marine Power and Propulsion
22.615 MHD Theory of Fusion Systems
22.67[J] Principles of Plasma Diagnostics

**Fusion Engineering**

22.611[J] Introduction to Plasma Physics I
22.62 Fusion Energy

*Plus one of the following subjects:*

22.211 Nuclear Reactor Physics I
22.71[J] Modern Physical Metallurgy
22.74[J] Radiation Damage and Effects in Nuclear Materials
22.312 Engineering of Nuclear Reactors

**Quantum Science and Engineering**

8.511 Theory of Solids I
22.51[J] Quantum Technology and Devices

*Plus one of the following subjects:*

22.52 Quantum Theory of Materials Characterization
8.333 Statistical Mechanics I
8.421 Atomic and Optical Physics I

**Nuclear Security and Policy**

6.3702 Introduction to Probability
22.90 Nuclear Science and Engineering Laboratory

*Plus one specialist subject by petition*

**Advanced Subjects** 24

Two advanced subjects closely related to the doctoral thesis topic. May not overlap with the student’s field of specialization but can be from a different field of specialization.

**NSE Breadth Requirement** 12

One NSE subject outside the field of specialization.

**Unrestricted Elective** 12

**Graduate Research**

22.911 Seminar in Nuclear Science and Engineering 3
22.THG Graduate Thesis 3

**Total Units** 195

Note: Students in this program can choose to receive the Doctor of Philosophy or the Doctor of Science in Nuclear Science and Engineering or in another departmental field of specialization. Students receiving veterans benefits must select the degree they wish to receive prior to program certification with the Veterans Administration.
Students may also petition for a unique field of specialization.

Students must register for 22.911 each term, starting the fall term after completing the qualifying milestones, except the final semester in which they plan to defend their thesis.

Students must register for graduate thesis until they complete all degree requirements, including defending the thesis, and submission of a final, approved thesis document. The units here represent a minimum, not a typical or maximum number of units.