

NUCLEAR SCIENCE AND ENGINEERING (COURSE 22)

Department of Nuclear Science and Engineering (<https://catalog.mit.edu/schools/engineering/nuclear-science-engineering/#undergraduatetext>)

Bachelor of Science in Nuclear Science and Engineering

General Institute Requirements (GIRs)

The General Institute Requirements include a Communication Requirement that is integrated into both the HASS Requirement and the requirements of each major; see details below.

Summary of Subject Requirements	Subjects
Science Requirement	6
Humanities, Arts, and Social Sciences (HASS) Requirement [can be satisfied by 22.04[J] in the Departmental Program]; at least two of these subjects must be designated as communication-intensive (CI-H) to fulfill the Communication Requirement.	8
Restricted Electives in Science and Technology (REST) Requirement [can be satisfied from among 1.00, 2.086, 6.100A/6.100B, 6.3700, 8.03, 18.03, 18.05, 18.600, and 22.01, 22.02, or 22.071 in the Departmental Program]	2
Laboratory Requirement (12 units) [can be satisfied by 22.09 in the Departmental Program]	1
Total GIR Subjects Required for SB Degree	17

Physical Education Requirement

Swimming requirement, plus four physical education courses for eight points.

Departmental Program

Choose at least two subjects in the major that are designated as communication-intensive (CI-M) to fulfill the Communication Requirement.

Basic Requirements	Units
2.005 Thermal-Fluids Engineering I	12
18.03 Differential Equations ¹	12
22.01 Introduction to Nuclear Engineering and Ionizing Radiation	12

Computation Elective

Select one of the following:	12
1.000 Introduction to Computer Programming and Numerical Methods for Engineering Applications	

2.086	Numerical Computation for Mechanical Engineers
6.100A & 6.100B	Introduction to Computer Science Programming in Python and Introduction to Computational Thinking and Data Science ²
12.010	Computational Methods of Scientific Programming
22.C25[J]	Real World Computation with Julia

Required Core Subjects

22.02	Introduction to Applied Nuclear Physics	12
22.033	Nuclear Systems Design Project	15
22.04[J]	Social Problems of Nuclear Energy (CI-M)	12
22.05	Neutron Science and Reactor Physics	12
22.06	Engineering of Nuclear Systems	12
22.061	Fusion Energy	12
22.09	Principles of Nuclear Radiation Measurement and Protection (CI-M)	15

Required Thesis ³

22.THT	Undergraduate Thesis Tutorial	3
22.THU	Undergraduate Thesis (CI-M)	9

Mathematics Elective

Select one of the following:	12
6.3700	Introduction to Probability
18.04	Complex Variables with Applications
18.05	Introduction to Probability and Statistics
18.075	Methods for Scientists and Engineers
18.600	Probability and Random Variables

Materials Science and Physics Elective

Select one of the following:	12
1.050	Solid Mechanics
2.001	Mechanics and Materials I
3.010	Structure of Materials
3.013	Mechanics of Materials
8.03	Physics III

Restricted Elective in NSE ⁴

Select one of the following:	12
22.071	Analog Electronics and Analog Instrumentation Design
22.022	Quantum Technology and Devices
22.039	Integration of Reactor Design, Operations, and Safety
22.051	Systems Analysis of the Nuclear Fuel Cycle
22.055	Radiation Biophysics

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22.072	Corrosion: The Environmental Degradation of Materials	
22.074	Radiation Damage and Effects in Nuclear Materials	
22.078[J]	Nuclear Energy and the Environment: Waste, Effluents, and Accidents	
22.081[J]	Introduction to Sustainable Energy	
22.03[J]	Introduction to Design Thinking and Rapid Prototyping (when paired with another 6 unit subject in NSE)	
22.Co1 & 6.Co1	Modeling with Machine Learning: Nuclear Science and Engineering Applications and Modeling with Machine Learning: from Algorithms to Applications	
2.006	Thermal-Fluids Engineering II	
3.14	Modern Physical Metallurgy	
Units in Major		186
Unrestricted Electives		48
Units in Major That Also Satisfy the GIRs		(48)
Total Units Beyond the GIRs Required for SB Degree		186

The units for any subject that counts as one of the 17 GIR subjects cannot also be counted as units required beyond the GIRs.

¹ 18.032 Differential Equations is also an acceptable option.

² CSE.C20 is permitted in place of 6.100B.

³ Unit totals shown are the minimum requirements.

⁴ Consult the NSE Academic Office, Room 24-102, regarding substitutions.