DOCTOR OF PHILOSOPHY IN NUCLEAR SCIENCE AND ENGINEERING

Department of Nuclear Science and Engineering (*http://catalog.mit.edu/schools/engineering/nuclear-science-engineering/#phd-dsc*)

Program Requirements

Core Modules [1]		
22.11	Applied Nuclear Physics	6
22.12	Radiation Interactions, Control, and Measurement	6
22.13	Nuclear Energy Systems	6
22.14	Materials in Nuclear Engineering	6
22.15	Essential Numerical Methods	6
22.16	Nuclear Technology and Society	6
Field of Specialization (choose one) [2]		**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		
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	
Nuclear Science and Technology		
8.511	Theory of Solids I	
22.51[J]	Quantum Technology and Devices	
Plus one of the following subjects:		
22.90	Nuclear Science and Engineering Laboratory	
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.		
Minor Subjects		**24**
Two coordinated graduate subjects, or three undergraduate subjects taken while a graduate student in the department, outside the field of specialization and area of thesis research.		
22.94	Research in Nuclear Science and Engineering [3]	24
22.THG	Graduate Thesis [3]	36
22.911	Seminar in Nuclear Science and Engineering [4]	3
Total Units		**183**

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.

[1] *Students may take the Core Module coursework or register as a Listener and take only the final exam. Students must complete all core module final exams by the end of the fourth term and are allowed one retake. A final exam GPA of 4.5 is needed to clearly pass the written qualifier. A final exam GPA of 4.0–4.5 will require faculty review prior to the student embarking on doctoral research. Students earning a final exam GPA below 4.0 will not be permitted to progress further in the doctoral program.*

[2] *Students may also petition for a unique field of specialization.*

[3] *Students must register for research or thesis until they complete appropriate milestones, including passing the doctoral qualifying process, submitting an approved thesis prospectus, 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.*

[4] *Students must register for 22.911 each term that they register for thesis, except the final semester in which they plan to defend their thesis.*