QUANTUM MASTER OF SCIENCE and TECHNOLOGY DEGREE PROGRAM CHECKLIST
COLUMBIA UNIVERSITY
August, 2024

Name (please print):_____

UNI:_____

Core Courses		
Number	Name	Points
Engineering Track Electives Courses		
Number	Name	Points

- 30 points of credit
- 15 points Required Core Courses (list below)
- 15 points Track Electives Courses
- Advisor approval for all courses outside of SEAS
- No credit for 3000 level or lower courses
- GPA above 2.7
- No more than 6 points research (e.g. ELEN E4998, ELEN E6001, E9001)
- No more than 3 points of APPROVED nontechnical courses (including courses in SEAS with significant nontechnical content)
- Completion within 5 years
- No grade of P or R (with the exception of ENGI E4000)
- No credit for courses with material typically found in undergraduate engineering programs.

Approvals

for the Department:_____ date:_____

for the Dean:_____ date:_____

Note: If any of the listed courses were taken during the BS, a copy of an approved BS excess sheet must be attached.

Required Core Courses - 15 Credits
1. COMS W4281 Introduction to Quantum Computing
2. ENGI E4000 Professional Development and Leadership (0-credit requirement)
3. PHYS 4082 Experiments in Quantum Physics
4. PHYS 4084 Quantum Simulation and Computing Lab
5. PHYS GR6037 Quantum Mechanics I
6. PHYS GR6038 Quantum Mechanics II
ENGINEERING TRACKS ELECTIVES
APMA E4001 Principles of Applied Math
APMA E4008 Advanced Linear Algebra
APMA E4150 Applied Functional Analysis
APPH E4112 Laser Physics
APPH E4114 Quantum and Nonlinear Photonics
APPH E6082 Solid State II
CHEN E4880 Atomistic Simulation for Science and Engineering
COMS W4236 Introduction to Computational Complexity
CSEE W4824 Computer Architecture
CSEE W6998 Formal Verification of Systems Software
CSOR E4231 Analysis of Algorithms or CSOR 4246 Algorithm for Data Science
ELEN E4411 Fundamentals of Photonics
ELEN E4730 Quantum Optimization and Quantum Machine Learning
ELEN E6333 Semiconductor Device Physics
ELEN E6414 Photonic Integrated Circuits
ELEN E6717 Classical and Quantum Information Theory
ELEN E6730 Quantum Sensing Theory
ELEN E6887 Classical and Quantum Error Correcting Codes
ELEN E6896 Quantum Computing and Communications
ELEN E6945 Device Nanofabrication
MSAE E4206 Electronic and Magnetic Properties of Solids
MECE E6137 Nanoscale Actuation and Sensing
MECE E6720 Nano/Microscale Thermal Transport Processes
+ Select relevant electives from the Physics Track list (to be discussed with assigned academic advisor)
PHYSICS TRACKS ELECTIVES
GR6020 Frontiers of Condensed Matter
GR6060 Atomic Physics
GR6065 Quantum Optics

GR6080 Scientific Computing
GR6082 Condensed Matter Physics I
GR6083 Condensed Matter Physics II
GR8036 Advanced Statistical Mechanics
GU4024 Applied Quantum Mechanics
+ Select relevant electives from the Engineering Track list (to be discussed with assigned academic advisor)

Example course selection for student interested in quantum photonics

Core Courses		
Number	Name	Points
COMS W4281	Introduction to Quantum Computing	3
ENGI E4000	Professional Development and Leadership	0
PHYS 4082	Experiments in Quantum Physics	3
PHYS 4084	Quantum Simulation and Computing Lab	3
PHYS GR6037	Quantum Mechanics I	4.5
PHYS GR6038	Quantum Mechanics II	4.5
Engineering Track Electives Courses		
Number	Name	Points
APPH E4114	Quantum and Nonlinear Photonics	3
ELEN E4411	Fundamentals of Photonics	3
PHYS 6065	Quantum Optics	3
ELEN E6730	Quantum Sensing Theory	3
ELEN E4998	Research	3