

Department of Physics

(DIVISION OF SCIENCE)

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GENERAL INFORMATION

The City College offers the following master's degree in Physics:

M.A.

DEGREE REQUIREMENTS

Required Courses

Physics:	
V0100: Mathematical Methods in Physics	4
V1100: Analytical Dynamics	4
V1500-1600: Electromagnetic Theory	8
V2500-2600: Quantum Mechanics	8
Elective Courses	6
Total Credits	30

Additional Requirements

No more than nine credits taken in 60000-level courses (see Physics 55100-55500, 58000, 58100 in the Undergraduate Bulletin) may be counted toward the graduate degree. Nine credits may be taken in graduate courses in subjects other than Physics, upon approval of the Graduate Committee.

Thesis: Not required.

Comprehensive Examination: A written comprehensive examination is required unless waived by the Graduate Committee.

Foreign Language Requirement: Not required.

TRANSFER TO Ph.D. PROGRAM

Students in the Master's Program at The City College can usually transfer to the Ph.D. program by taking and passing the "First Examination." See the Graduate Advisor.

ADVISEMENT

Graduate Advisor

Prof. Timothy Boyer
Marshak 331; 212-650-5585

COURSE DESCRIPTIONS

MASTER'S LEVEL COURSES

U3500: Modern Physics I (same as Physics 55100)
3 HR./WK.; 3 CR.

U4500: Solid State Physics (same as Physics 55400)
3 HR./WK.; 3 CR.

V0100: Mathematical Methods in Physics
Topics in complex variables; methods for ordinary and partial differential equations; Green's functions; eigenfunction expansions; integral transforms; integral equations; tensor analysis; group theory; higher algebra; numerical methods. All master's students will generally be required to take Physics V0100. 3 HR./WK., PLUS CONF.; 4 CR.

V1100: Analytical Dynamics
The Lagrangian formulation, including Hamilton's principle; Lagrange's equations; central force motion; Kepler problem, scattering; rigid body motion; transformation matrices. Eulerian angles, inertia tensor. The Hamiltonian formulation including canonical equations; canonical transformations; Hamilton-Jacobi theory. Small oscillations. Continuous systems and fields. Relativistic dynamics. All master's students will generally be required to take V1100. Prereq or coreq: Physics V0100. 3 HR./WK., PLUS CONF.; 4 CR.

V1500-1600: Electromagnetic Theory
Electrostatics, magnetostatics, and boundary value problems; Maxwell's equations; multipole radiation from accelerated charges; scattering theory; special theory of relativity. Prereq or coreq: Physics V0100. All master's students will generally be required to take V1500-1600. 3 HR./WK., PLUS CONF.; 4 CR./SEM.

V2500-2600: Quantum Mechanics

Historical foundations. The Schrodinger formulation, wave packets, and uncertainty principle. Harmonic oscillator and potential barrier problems. W.K.B. approximation. Operators and eigenfunctions. Central forces and orbital angular momentum. Scattering, Born approximation, partial waves. Linear vector spaces. The Heisenberg formulation. Spin and total angular momentum. Perturbation theory: bound state, time-dependent. Systems of identical particles. Introduction of relativistic quantum mechanics. All master's students will generally be required to take Physics V2500-2600. Prereq: Physics V0100. 3 HR./WK., PLUS CONF.; 4 CR./SEM.

V3800: Biophysics

Introduction to the structure, properties and function of proteins, nucleic acids, lipids and membranes. In depth study of the physical basis of selected systems including vision, nerve transmission, photosynthesis, enzyme mechanism and cellular diffusion. Introduction to spectroscopic methods for monitoring reactions and determining structure including light absorption or scattering, fluorescence NMR and X-ray diffraction. The course emphasizes reading and interpretation of original literature. Pre- or coreq: Physics V2500. 3 HR./WK., PLUS CONF.; 4 CR.

V4100: Statistical Mechanics

Probability theory, ensembles, approach to equilibrium, quantum and classical ideal and non-ideal gases, cooperative phenomena, density matrices, averages and fluctuations, and other selected topics, such as the time-temperature Green's functions, non-zero temperature variational and perturbation methods. Prereq: Physics V2500. 3 HR./WK., PLUS CONF.; 4 CR.

V4500: Solid State Physics

Principles of crystallography; crystal structure; lattice vibrations, band theory, defects; study of ionic crystals, dielectrics, magnetism, and free electron theory of metals and semiconductors. Topics of current interest such as high temperature superconductivity, quantum Hall Effect, and fullerenes will be included, depending on interest. Prereq: Physics V2500. 3 HR./WK., PLUS CONF.; 4 CR.

V7100, 77200: Graduate Physics Laboratory I, II

The concepts and tools of experimental physics. Basic analog apparatus and digital electronics; the use of minicomputers for data acquisition, the control of experiments and data analysis; discussion of intrinsic noise and error analysis. Execution of several advanced experiments, including statistics of radioactive decay, Raman spectroscopy, temperature dependence of resistivity, and others. The second semester of this course is W5901. 2 LECT., 2 LAB. HR./WK.; 4 CR.

DOCTORAL COURSES OPEN TO MASTER'S STUDENTS

The City College is the major participant in the University Ph.D. program in Physics. A set of graduate courses is offered at City College, as well as extensive research facilities for experimental and theoretical research. Both master's and undergraduate students often take part in these research efforts. Some of the courses offered regularly on the advanced level include:

W1200: Continuum Mechanics
4 CR.

W2005-2600: Quantum Field Theory
4 CR./SEM.

W3400: Theory of Relativity
4 CR.

W4500-4600: Quantum Theory of Solids
4 CR./SEM.

W5100-5900: Selected Topics in Advanced Physics
4 CR.

For more details please see the Bulletin of The Graduate School of the City University of New York.

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