DREXEL UNIVERSITY

DEPARTMENT OF PHYSICS

Philadelphia, Pennsylvania 19104

Students Accepted For Degree	FIELDS		
	Physics	Astronomy	Related Fields
Doctorate	X		
Master's	X		

1. General

President: John A. Fry
Dean of the College of Arts and Sciences: Donna Murasko
Department Head: Michel Vallières
Department Telephone Number: (215) 895-2708
Type of Institution: University
Control: Private
Setting: Urban
Total Faculty: 1,500
Total Students: 22,493
Total Graduate Students: 9,009
Annual Graduate Tuition:
All Graduate Students: $915/cr. hr.
Tuition rates for: 2010–11
Deferred tuition plan: Yes
General Fees: $240 full-time
$120 part-time
Term: Quarter

2. Number of Faculty in Department

The combined total of full-time faculty in the three professorial ranks is 21. The combined total of full-time, part-time, and other faculty at all ranks is 36.

3. Admission, Financial Aid, and Housing

Address admission inquiries to: Office of Graduate Admissions, enroll@drexel.edu
Graduate application fee required: $75 (waived for online application)
Admission deadline (Fall admission): 2/1 for Ph.D. program with assistantship support (TA/RA). 9/1 for MS program only (no financial support available)
Admission information: For fall admission, 2010–11, 7 students were accepted with full financial support from 135 applicants.
Admission requirements: For admission to the graduate programs, a Bachelor's degree in an approved program is required with a minimum undergraduate GPA of 3.0/4.0 specified. The GRE general tests is required for financial aid. Students from non-English speaking countries are required to demonstrate proficiency in English via the TOEFL exam. Minimum acceptable score for admission is 550, (80 IBT, 213 CBT) but opportunities for financial aid are greater for TOEFL scores near or above 600 (100 IBT, 250 CBT). Teaching assistants educated in non-English-speaking countries must complete a special English program.
Undergraduate preparation assumed: Advanced undergraduate coursework in classical mechanics, electromagnetism, statistical physics, and quantum mechanics. Mathematics coursework in differential equations and linear algebra.
Address program questions and financial aid inquiries to: Dr. Michael Vogeley, Director of Graduate Studies, Department of Physics, physics@drexel.edu
GAPSFAS application required: No
Loans available: No
Address housing inquiries to: Office of Residential Living
On-campus, single student housing available: Yes
Cost/quarter: $2,975 (undergraduate priority)
On-campus, married student housing available: No
Off-campus: $695/month (average) $425-1,124/month

Table A—Faculty, Enrollments, and Degrees Granted

Research Specialty	2009–10 Faculty	Enrollment[1] Fall 2009		No. of Degrees Granted[2] 2009–10 (2005–09)			Median No. of Years for 2009–10 Ph.D.'s
		Master's	Doctorate	Master's	Terminal Master's	Doctorate	
Astrophysics	4	0	12	2(3)	0(2)	2(1)	6
Biophysics	5	0	11	0(7)	0(3)	0(5)	–
Condensed Matter Physics	4	0	3	0(1)	0(3)	0(0)	–
Particles & Fields	4	0	5	0(1)	0(1)	0(1)	–
Other Theoretical/ Math.	2	0	7	0(5)	0(0)	1(2)	–
Non-specialized	2	0	0	0(0)	0(0)	0(0)	7
Total		0	38	2(17)	0(9)	3(9)	
Full-time Grad. Stud.			36				
Part-time Grad. Stud.			2				
First-year Grad. Stud.			7				
Median Years in Grad. Study (2009–10 Degrees)				2	2	6	6
Undergraduate Degrees, 2009–10 (2005–09):15(36)							

[1]Students not yet committed to a research specialty are entered under non-specialized.
[2]Five-year totals in parentheses.

4. Graduate Degree Requirements

Master's: The requirement for the Master's degree is 45 quarter credits in an approved program. The student is required to maintain at least a 3.0 GPA. There is no thesis or foreign language requirement for the M.S. degree. There is no specific residence requirement for the M.S. degree. There are no examinations required for the M.S. degree.
Doctorate: In addition to required graduate-level coursework in physics, the successful Ph.D. candidate must (a) pass the Ph.D. candidacy examinations, both written and oral; and (b) perform original research, write a satisfactory thesis describing that research, and defend the thesis in an oral examination. There is no foreign language requirement.
Thesis: Thesis may be written *in absentia*.
Special Equipment, Facilities, or Programs: Students in the Graduate program are able to access a diverse range of experimental facilities including:
(1) Astrophysics Facilities: Numerical Astrophysics Facility, primarily networked LINUX and Mac OS X workstations emphasizes theoretical and numerical studies of stars, star clusters, the early Universe, galaxy distributions, cosmology modeling and gravitational lensing. The facility also employs special purpose high performance computers, such as the Gravity Pipeline Engine (GRAPE), a new Beowulf cluster

(128 processors, 128G RAM, 2TB RAID disk) and a system using Graphics Processing Units to achieve computational speeds of up to a trillion floating point operations per second. The Joseph R. Lynch Observatory houses a 16 inch Mead Schmidt-Cassegrain telescope equipped with SBIG CCD camera. Drexel is a participant in the Sloan Digital Sky Survey, which operates a 2.5m telescope at Apache Point, NM and the Large Synoptic Survey Telescope to be built in Chile (first light 2014).

(2) Biophysics Facilities: (a) Modulated excitation kinetics laboratory uses frequency domain techniques to follow internal dynamics of biological molecules. (b) Spatially resolved kinetics laboratory uses simultaneously resolved spatio-temporal data at microscopic resolution to follow biological self-assembly processes, such as polymerization of sickle hemoglobin. (c) Atomic Force Microscope (AFM) facility to study the structure and interaction of macromolecule via imaging, and to investigate the mechanical and kinetic properties of individual protein molecules via nanomanipulation. (d) Computational Biophysics facility including two Beowulf clusters (44-node dual-core Xeon, 43-node dual quad-core Xeon [344 cores]), 24TB RAID disk server, and ten linux workstations connected through a gibabit network. (e) Preparative laboratory provides facilities for biological sample purification and characterization.

(3) Condensed Matter Facilities: Ultra-low temperature laboratory has a dilution refrigerator, ^{3}He and ^{4}He cryostats and microwave sources to study quantum phenomena in nano- and microscale devices, superconducting qubits, nanostructrures and quantum fluids and solids.

(a) Magnetic material: laboratory conducts research on amorphous magnetic thin films, fiber optical sensors, (b) Surface science laboratory has scanning probe microscopy to study surface structure interfaces at the atomic level.

(4) Particle Physics Facilities: Detector development laboratory provides experimental support for an international research program in nonaccelerator particle and nuclear physics performing tests of invariance principles and conservation laws, and neutrino oscillations.

(5) General Support Facilities: Include an electronics shop capable of custom design and fabrication of electronics and computer components, and a machine shop to assist in the design, construction, and repair of mechanical component.

Table B—Appointments to Graduate Students, 2009–10

Title of Appointee	Appointments		Academic Load Allowed in Credit Hours	Hours of Service Per Week	Stipend for Calendar Year ($)
	Total	First-year			
			Quarter		
Teaching Assistant[1]	24	7	9	20	21,000
Research Assistant[1]	11	0	9	20	21,000–24,000
Self-supported	3	0	9	–	
Total	38	7			

[1]Plus tuition remission and health insurance.

Table C—Separately Budgeted Research Expenditures

Research Specialty	No. of Grants	Expenditures* ($) Fiscal Year 2008–09
Astrophysics	11	1,280,000
Biophysics	4	646,000
Condensed Matter	1	40,000
Particles & Fields	2	214,000
Nonlinear Dynamics	1	13,000
Total	19	2,193,000

*actual expenditures, not indirect costs.

FACULTY

Professors

Bose, Shymalendu, Ph.D., Maryland, 1967. Fullerenes and carbon nanotubes; superconductivity; x-ray and electron spectroscopies of solids

DiNardo, N. John, Ph.D., Pennsylvania, 1982. Studies of surfaces and interfacial phenomena in solids.

Ferrone, Frank, Ph.D., Princeton, 1974. Experimental and theoretical protein dynamics; kinetics of biological self-assembly. Sickle Hemoglobin.

Finegold, Leonard X., Ph.D., London, 1959. Biophysics; granular physics.

Gilmore, Robert, Ph.D., MIT, 1967. Analysis of data from chaotic dynamical systems; applications of group theory to problems in atomic, molecular, nuclear, and solid state physics.

House, Frederick B., Ph.D., Wisconsin, 1965. Satellite meteorology; Earth energy budget.

Lane, Charles C., Ph.D., Cal. Tech., 1987. Nonaccelerator-based particle physics. Solar neutrinos and neutrino oscillations (Projects CHOOZ and KamLAND).

Lim, Tech-Kah, Ph.D., Adelaide, 1968. Physics education.

McMillan, Stephen L. W., Ph.D., Harvard, 1983. Stellar dynamics; large-scale computations of stellar systems.

Steinberg, Richard I., Ph.D., Yale, 1969. Experimental tests of invariance principles and conservation laws; solar neutrinos and neutrino oscillations (Project CHOOZ).

Tyagi, Somdev, Ph.D., Brigham Young, 1976. Physics of high-temperature superconductivity; magnetic properties of thin-sputtered films of amorphous metallic alloys; fiber optical sensors giant magnetoresitive (GMR) materials.

Vallières, Michel, Ph.D., Pennsylvania, 1972. Department Head. Large-scale shell-model calculations; computer architecture for nuclear physics problems.

Vogeley, Michael S., Ph.D., Harvard, 1993. Cosmology; Sloan Digital Sky Survey; formation of structure in the universe.

Yuan, Jian-Min, Ph.D., Chicago, 1973. Theoretical and computational biophysics, biological pathways and networks, protein folding and stability, protein aggregation, systems biology, and nonlinear dynamics.

Associate Professors

Cruz Cruz, Luis, Ph.D., MIT, 1994. Molecular dynamics of proteins; Spatial correlations; Cellular automata.

Goldberg, David M., Ph.D., Princeton, 2000. Gravitational lensing; cosmic microwave background; cosmology; computational physics.

Richards, Gordon, Ph.D., Chicago, 2000. Quasars, Quasars Absorption Lines, Gravitational Lensing, Galaxy Evolution, Sloan Digital Sky Survey.

Urbanc, Brigita, Ph.D., Ljubljana. 1994. Slovenia. Computa-

tional biophysics; Protein folding and assembly.

Yang, Guoliang, Ph.D., Southern Illinois, 1992. Atomic force microscope (AFM) study of single protein molecules; elastic properties of individual DNA and protein molecules.

Assistant Professors

Maricic, Jelena, Ph.D., Hawaii, 2005. Neutrino Oscillations, Geoneutrinos, Solar Neutrinos, and Neutrino Applications.

Ramos, Roberto, Ph.D., Washington, 1999. Low temperature condensed matter physics, quantum computing, nanoscience, quantum fluids and solids.

Teaching Faculty

Trout, Joseph, Ph.D., Philadelphia, 1998. In charge of Instructions and Laboratories.

Research Faculty

Allred, Joel, Ph.D., Washington, 2005. Simulations of solar and stellar flares.

Aprelev, Alexey, Ph.D., St. Petersburg, 1995. Experimental Biophysics.

MacNeice, Peter, Ph.D., Cambridge, 1994. Solar Physics; Magnetohydrodynamics; high-performance computing; parallel adaptive mesh refinement techniques.

Olson, Kevin, Ph.D., Massachusetts. Development of parallel, numerical algorithms for Astrophysics applications.

Vesperini, Enrico, Ph.D., Pisa, 1994. Evolution of galaxies and globular clusters, numerical simulations.

Postdoctoral Fellows

Barz, Bogdan, Ph.D., Columbia, 2009. Molecular dynamics of proteins.

Jampani, Srinivasa, Ph.D., Hyderabad, 2010. Computational biophysics.

Rajesh, Deo, Ph.D., Georgia, 2007. Multiwavelength studies of AGNs using the Sloan Digital Sky Survey and Spitzer Space telescopes.

Sereda, Yuri, Ph.D., Kharkiv, 2001. Molecular dynamics of proteins.

Zbiri, Karim, Ph.D., Nantes, 2007. Nuclear Physics, heavy ions collisions and Monte Carlo simulations.

Visiting Faculty

Spicer, Daniel, Ph.D., Maryland, 1976. Space and solar plasma physics, magnetohydrodynamics and numerical 3D.

RESEARCH SPECIALTIES AND FACULTY

Theoretical

Astrophysics. Goldberg, McMillan, MacNiece.
Biophysics. Cruz, Urbanc, Yuan.
Condensed Matter Theory. Bose.
Mathematical Physics. Gilmore.

Experimental

Astrophyics. Richards, Vogeley.
Biophysics. Ferrone, Yang.
Condensed Matter Physics. Ramos, Tyagi.
Nonaccelerator-based Particle Physics. Lane, Maricic.

GRADUATE PROGRAM HIGHLIGHTS

- Begin research in the first year with freedom to explore different areas of physics before choosing a thesis topic.
- Participation by students in major world-wide research collaborations, including KamLAND, Double Chooz, the Sloan Digital Sky Survey, and the Large Synoptic Survey Telescope.
- Collaboration with researchers at nearby institutions including Princeton and U. Pennsylvania.
- All coursework and exam requirements finished by June of second year (with award of the M.S. in Physics along the way).
- An active tightly-knit community of graduate students that enjoys dinners and outings together.
- Physics Graduate Student Association run by our students and funded by the University.
- Weekly graduate student-only research seminars (free lunch!).
- Mentoring program that matches new students with current students.
- Interaction with world-renowned researchers who visit Drexel for our colloquium series and the annual Kaczmarczik Lecture, which has featured several Nobel laureates.

Our graduate program is a very important part of our department. We currently have 38 graduate students working in a wide range of areas of research. Students are strongly encouraged to begin research from the moment they arrive, and first and second year students do a number of small research projects. There are opportunities for research in a variety of specialized areas, and students are encouraged to ‘‘shop around’’ prior to their thesis. We also offer topical courses in areas of current research, including Astrophysics, Biophysics, Nanoscience, Nonlinear Dynamics, Particle Physics, and Solid State.