UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

ATMOSPHERIC PHYSICS GRADUATE PROGRAM
Baltimore, Maryland 21250
http://physics.umbc.edu

General University Information
President: Freeman A. Hrabowski
Dean of Graduate School: Janet C. Rutledge
University website: http://www.umbc.edu
Control: Public
Setting: Suburban
Total Faculty: 825
Total Graduate Faculty: 527
Total number of Students: 13,839
Total number of Graduate Students: 2,596

Department Information
Department Chairman: Prof. L. Michael Hayden, Chair
Department Contact: Jennifer Salmi, Business Services Specialist
Total full-time faculty: 23
Total number of full-time equivalent positions: 23
Full-Time Graduate Students: 41
First-Year Graduate Students: 12
Female First-Year Students: 1
Total Post Doctorates: 5

Department Address
1000 Hilltop Circle
Physics Building, Room 220
Baltimore, MD 21250
Phone: (410) 455-2513
Fax: (410) 455-1072
E-mail: jen.salmi@umbc.edu
Website: http://physics.umbc.edu

ADMISSIONS

Admission Contact Information
Address admission inquiries to: Dr. Laszlo Takacs, Graduate Admissions Coordinator, Department of Physics
Phone: (410) 455-2513
E-mail: takacs@umbc.edu
Admissions website: http://physics.umbc.edu

Application deadlines
Fall admission:
U.S. students: January 1
Int’l. students: January 1
Spring admission:
U.S. students: November 1
Int’l. students: May 1

Application fee
U.S. students: $50
Int’l. students: $50

Admissions information
For Fall of 2016:
Number of applicants: 11
Number admitted: 7
Number enrolled: 4

Admission requirements
Bachelor’s degree requirements: Bachelor’s degree in Physics, Atmospheric Sciences, Chemistry, Math, Engineering, or related field is required.
Minimum undergraduate GPA: 3.0

GRE requirements
The GRE is required.
Quantitative score: 150

Advanced GRE requirements
The Advanced GRE is not required.

TOEFL requirements
The TOEFL exam is required for students from non-English-speaking countries.
PBT score: 550
iBT score: 90

Other admissions information
Additional requirements: Letters of recommendation, undergraduate transcripts, personal statement.
Undergraduate preparation assumed: Young and Freedman. University Physics; Reif, Thermal Physics; Marion, Newtonian Dynamics; Tippler and Llewellyn, Introduction to Modern Physics; Griffiths, Introduction to Electrodynamics.

TUITION

Tuition year 2016–17:
Tuition for in-state residents
Full-time students: $603 per credit
Tuition for out-of-state residents
Full-time students: $997 per credit
Credit hours per semester to be considered full-time: 9
Deferred tuition plan:
Health insurance: Available
Other academic fees: $130/credit.
Academic term: Semester
Number of first-year students who received full tuition waivers: 4

Teaching Assistants, Research Assistants, and Fellowships
Number of first-year Teaching Assistants: 7
Average stipend per academic year
Teaching Assistant: $23,700
Research Assistant: $27,000
Fellowship student: $29,000

FINANCIAL AID

Application deadlines
Fall admission:
U.S. students: April 15
Int’l. students: April 15
Spring admission:
U.S. students: November 1

Loans
Loans are available for U.S. students.
Loans are available for international students.
GAPSFAS application required: No
FAFSA application required: No

For further information
Address financial aid inquiries to: Dr. Laszlo Takacs, Graduate Admissions Coordinator, Department of Physics.
Phone: (410) 4552513
E-mail: takacs@umbc.edu
Financial aid website: http://www.umbc.edu/financialaid/


Maryland

HOUSING

Availability of on-campus housing
Single students: Yes
Married students: No

For further information
Address housing inquiries to: Office of Residential Life.
Housing aid website: http://www.umbc.edu/reslife/

Table A—Faculty, Enrollments, and Degrees Granted

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>2016–17 Faculty</th>
<th>Enrollments</th>
<th>Number of Degrees Granted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Master’s</td>
<td>Doctorate</td>
<td>Master’s</td>
</tr>
<tr>
<td>Atmospheric Physics</td>
<td>5</td>
<td>15</td>
<td>2(10)</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>15</td>
<td>2(10)</td>
</tr>
<tr>
<td>Full-time Grad. Stud.</td>
<td>–</td>
<td>15</td>
<td>–</td>
</tr>
<tr>
<td>First-year Grad. Stud.</td>
<td>–</td>
<td>4</td>
<td>–</td>
</tr>
</tbody>
</table>

GRADUATE DEGREE REQUIREMENTS

Master’s: The M.S. degree is designed to prepare the graduate for immediate entry into the workforce as a practicing professional or as an entry into a doctoral program. This degree program is designed to offer students maximum flexibility, with many of the course requirements being electives. The minimum requirement for the master’s degree is a total of 30 credit hours, of which 18 credit hours must be taken at the 600-level or higher. Students are encouraged to choose the thesis option, although a non-thesis option is available. All students must pass two ATPH core courses: PHYS 621: Atmospheric Physics I and PHYS 622: Atmospheric Physics II with a minimum grade of “B-“. Additional 600-level or higher credits may be specialized ATPH courses or general physics courses. The specialized ATPH courses include PHYS 721: Radiative Transfer and PHYS 731 Atmospheric Dynamics, PHYS 722: Remote Sensing of the Earth’s Atmosphere; PHYS 627 Atmospheric Measurement; PHYS 732: Computational Fluid Dynamics; and PHYS 741: Inverse Methods and Data Analysis. The general physics courses include courses in the areas of Electromagnetism; Statistical Mechanics; Classical Mechanics; Quantum Mechanics; Mathematical Physics and Optics. In addition, all students also are required to take PHYS 698: Physics Seminar for three semesters; PHYS 690: Professional Techniques in Physics; and a minimum of 18 credit hours of PHYS 899: Doctoral Thesis Research. To be admitted to candidacy for the doctoral degree, students first must complete the Ph.D. core curriculum (PHYS621 & PHYS622) with a minimum grade of “B-“ and then pass the ATPH qualifying examination. The qualifying examination for ATPH students will be offered twice a year, one in late August and the other in January. The examination includes a written and an oral component and is designed to evaluate the student’s level of knowledge in the areas taught in the first year of the ATPH physics program as well as the student’s abilities to perform research. Students must pass the entire qualifying examination by the beginning of their 4th semester. Students who fail to do so will not be admitted to candidacy for the Ph.D. degree. A prospective doctoral student must select a faculty advisor to supervise the dissertation research. Usually dissertation research is performed under the direction of a tenure-track faculty member of the UMBC department of physics. After selecting an advisor, students should begin acquiring the necessary background knowledge and skills to conduct research and develop a research plan. By the beginning of the 3rd year, a prospective doctoral student, in consultation with their advisor, should form a preliminary committee consisting of the advisor and two other faculty members from the UMBC Department of Physics. At least two of the members of this committee must be tenure-track faculty. The preliminary committee is charged with determining whether the student should be admitted to candidacy for the doctoral degree. A recommendation to this effect must be made to the full physics faculty by the start of the 4th year. The full faculty will then vote whether to recommend to the Graduate School that the student be admitted to candidacy for the doctoral degree. Immediately after it has been formed, the preliminary committee will meet with the student to discuss the proposed research project and progress to date. The committee will inform the student of any actions he or she must perform satisfactorily for the committee to make a positive recommendation to the faculty. In formulating its recommendation, the committee may gather and consider any relevant information concerning the student’s potential for performing research at the doctoral level. This information should include, but is not limited to, the student’s overall graduate record, a written research proposal and an oral presentation of the proposed research project. After admission to candidacy and completion of the research, the student will be required to write and defend a dissertation before a committee constituted in accordance with Graduate School regulations. This research should be of a quality suitable for publication in a refereed physics journal.

Doctorate: The minimum requirement for the Ph.D. is 46 credit hours, with a minimum of 27 credit hours of lecture courses at the 600-level or higher and 12 credit hours of doctoral research (PHYS 899). The graduate program director must approve all coursework. All students must pass two ATPH core courses: PHYS 621: Atmospheric Physics I and PHYS 622: Atmospheric Physics II with a minimum grade of “B-“. All students must also take the PHYS 640: Computational Physics. Additional 600-level or higher credits may be specialized ATPH courses or general physics courses. The specialized ATPH courses include PHYS 721: Radiative Transfer and PHYS 731 Atmospheric Dynamics, PHYS 722: Remote Sensing of the Earth’s Atmosphere; PHYS 627 Atmospheric Measurement; PHYS 732: Computational Fluid Dynamics; and PHYS 741: Inverse Methods and Data Analysis. The general physics courses include courses in the areas of Electromagnetism; Statistical Mechanics; Classical Mechanics; Quantum Mechanics; Mathematical Physics and Optics. In addition, all students also are required to take PHYS 698: Physics Seminar for three semesters; PHYS 690: Professional Techniques in Physics; and a minimum of 18 credit hours of PHYS 899: Doctoral Thesis Research. To be admitted to candidacy for the doctoral degree, students first must complete the Ph.D. core curriculum (PHYS621 & PHYS622) with a minimum grade of “B-“ and then pass the ATPH qualifying examination. The qualifying examination for ATPH students will be offered twice a year, one in late August and the other in January. The examination includes a written and an oral component and is designed to evaluate the student’s level of knowledge in the areas taught in the first year of the ATPH physics program as well as the student’s abilities to perform research. Students must pass the entire qualifying examination by the beginning of their 4th semester. Students who fail to do so will not be admitted to candidacy for the Ph.D. degree. A prospective doctoral student must select a faculty advisor to supervise the dissertation research. Usually dissertation research is performed under the direction of a tenure-track faculty member of the UMBC department of physics. After selecting an advisor, students should begin acquiring the necessary background knowledge and skills to conduct research and develop a research plan. By the beginning of the 3rd year, a prospective doctoral student, in consultation with their advisor, should form a preliminary committee consisting of the advisor and two other faculty members from the UMBC Department of Physics. At least two of the members of this committee must be tenure-track faculty. The preliminary committee is charged with determining whether the student should be admitted to candidacy for the doctoral degree. A recommendation to this effect must be made to the full physics faculty by the start of the 4th year. The full faculty will then vote whether to recommend to the Graduate School that the student be admitted to candidacy for the doctoral degree. Immediately after it has been formed, the preliminary committee will meet with the student to discuss the proposed research project and progress to date. The committee will inform the student of any actions he or she must perform satisfactorily for the committee to make a positive recommendation to the faculty. In formulating its recommendation, the committee may gather and consider any relevant information concerning the student’s potential for performing research at the doctoral level. This information should include, but is not limited to, the student’s overall graduate record, a written research proposal and an oral presentation of the proposed research project. After admission to candidacy and completion of the research, the student will be required to write and defend a dissertation before a committee constituted in accordance with Graduate School regulations. This research should be of a quality suitable for publication in a refereed physics journal.
The chair of this committee must be a regular member of the graduate faculty and a tenure-track faculty member in the Department of Physics.

**Thesis:** Thesis may be written in absentia.

**SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS**

There are close relationships between UMBC and several other research institutions in the Baltimore-Washington area. Formal cooperative agreements are in place between the UMBC and NASA Goddard Space Flight Center (GSCF) in the form of the Joint Center for Earth Systems and Technology (J CET) http://j cet.umbc.edu, the Center for Research and Exploration in Space Science and Technology (CRESST) http://cresst.umd.edu/, and the Goddard Planetary Heliophysics Institute (GPHI) http://gphi.umbc.edu. UMBC also hosts the Center for Advanced Studies in Photonics Research (CASPR) http://www.umbc.edu/caspr/.

**Table B—Separately Budgeted Research Expenditures by Source of Support**

<table>
<thead>
<tr>
<th>Source of Support</th>
<th>Departmental Research</th>
<th>Physics-related Research Outside Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal government</td>
<td>$4,453,938</td>
<td>$256,851</td>
</tr>
<tr>
<td>State/local government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-profit organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$4,453,938</td>
<td>$256,851</td>
</tr>
</tbody>
</table>

**Table C—Separately Budgeted Research Expenditures by Research Specialty**

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>No. of Grants</th>
<th>Expenditures ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric Physics</td>
<td>19</td>
<td>$2,322,350</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>$2,322,350</td>
</tr>
</tbody>
</table>

**FACULTY**

**Professor**

- **Martins**, Vanderlei J., Ph.D., University of Sao Paulo, 1999. Aerosol and Cloud Physics; radiative transfer; optics, satellite remote sensing; instrumentation development for laboratory, field, aircraft, and satellite measurements.
- **Pittman**, Thomas, Ph.D., University of Maryland, Baltimore County, 1996. Graduate Program Director – Physics. Quantum optics and quantum computing.
- **Shih**, Yanchun, Ph.D., University of Maryland, 1987. Quantum optics; laser physics; nonlinear optics.


**Associate Professor**

- **Georganopoulos**, Markos, Ph.D., University of Thessaloniki, 1989. Broad-band synchrotron emission from relativistic flows in active galaxies, galactic microquasars and gamma-ray bursts.
- **Henriksen**, Mark J., Ph.D., University of Maryland, 1986. Astrophysics; X-ray astronomy.
- **Hoban**, Susan, Ph.D., University of Maryland, College Park, 1989. Scientific information systems; digital library technologies and information technologies for science, technology, engineering and mathematics (STEM) education.
- **Sparling**, Lynn C., University of Texas, Austin, 1987. Atmospheric physics; modeling.
- **Takacs**, Laszlo, Ph.D., Eotvos University, 1978. Director of UMBC Nano-Imaging Center, Chair of Graduate Admissions Committee. Amorphous and metastable crystalline alloys; energy-dissipative X-ray diffraction; magnetic susceptibility.
- **Worchesky**, Terrance L., Ph.D., Georgetown University, 1984. Associate Departmental Chair Undergraduate Program Director. Optical properties of semiconductors; photonics.
- **Zhang**, Zhibo, Ph.D., Texas A&M University, 2008. Graduate Program Director–Atmospheric Physics. Climate/Atmospheric Science. Satellite-based remote sensing; cloud and aerosol micro-physical and optical properties; radiative transfer; aerosol-cloud-precipitation-radiation interactions; atmospheric physics.

**Assistant Professor**

- **Defner**, Sebastian, Ph.D., University of Augsburg, 2011. Quantum Foundations, Theoretical Physics. My research concerns all topics of Quantum Thermodynamics. As a theoretical physicist, I employ tools from Statistical Physics, Open Quantum Dynamics, Quantum Information Theory, Quantum Optics, Condensed Matter Theory and Optimal Control Theory to investigate the nonequilibrium properties of nanosystems operating far from thermal equilibrium.
- **Meyer**, Eileen, Ph.D., Rice University, 2012. Astrophysics.
- **Peltom**, Matthew, Ph.D., Stanford University, 2002.
- **Zhai**, Pengwang, Ph.D., Texas A&M University, 2006. Climate/Atmospheric Science. Light scattering; radiative transfer; remote sensing; aerosols and clouds.

**Emeritus**

- **Hoff**, Raymond M., Ph.D., Simon Fraser University, 1975. Atmospheric physics; lidar, air quality, satellite remote sensing.
- **Melli**, Harvey, Ph.D., College of William and Mary, 1970. Atmospheric lidar; remote sensing.
- **Rasera**, Robert L., Ph.D., Purdue University, 1965. Perturbed gamma-ray angular correlation spectroscopy.
Research Professor
Strow, L. Larrabee, Ph.D., University of Maryland, 1981. High-resolution infrared molecular spectroscopy; atmospheric radiative transfer.

Research Associate Professor
Kundu, Prasun, Ph.D., University of Rochester, 1981. Satellite and ground-based remote sensing.
McCann, Kevin J., Ph.D., Georgia Institute of Technology, 1974. Lidar and atmospheric aerosols.
Varnai, Tamas, Ph.D., McGill University, 1996. Cloud physics and radiation transfer.

Research Assistant Professor
De Souza-Machado, Sergio, Ph.D., University of Maryland, College Park, 1996. Infrared remote sensing, radiation transfer, spectroscopy, plasma physics.
Yuan, Tianle, Ph.D., University of Maryland College Park, 2008. Climate/Atmospheric Science. Aerosol-cloud-precipitation interactions; remote sensing.

Lecturer

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical
Air Quality. Study the impact of atmospheric pollutions, such as ozone, aerosols and smoke on air quality and public health. De Souza-Machado, Demoz, Sparling.
Atmospheric Physics. Atmospheric dynamics; hurricane; radiative transfer; aerosol-cloud-precipitation interactions; cloud physics; remote sensing. De Souza-Machado, Demoz, Hoff, Benjamin Johnson, Kundu, Martins, Melfi, Olson, Remer, Sparling, Strow, Varnai, Yuan, Zhai, Zhang.

Experimental
Atmospheric Physics. Aerosol and cloud properties; atmospheric dynamics; remote sensing measurements; LIDAR; aerosol-cloud-precipitation interactions; air pollution; atmospheric radiative transfer; optics instrumentation. De Souza-Machado, Demoz, Hoff, Benjamin Johnson, Kundu, Martins, Remer, Sparling, Strow, Varnai, Yuan, Zhang.

View additional information about this department at www.gradschoolshopper.com