

School of Science and Health

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The School of Science and Health encompasses the sciences, mathematics, psychology, and the health professions. Our mission is to prepare students for: professions in science and health, entrance into graduate and professional school and to assure that all students at Philadelphia University graduate with literacy in the scientific method and quantitative reasoning. The school emphasizes superb teaching, individualized attention, strong professional preparation and student participation in research.

The undergraduate programs offered in the School of Science and Health are:

- Biochemistry
- Biology
- Biopsychology
- Chemistry
- Environmental and Conservation Biology
- Health Sciences
- Joint B.S. Health Sciences/M.S. Physician Assistant Studies
- Pre-Medical Studies
- Psychology

The science programs include a core of mathematics and science consisting of Biology, Biochemistry, Calculus, Chemistry and Physics. The Chemistry and Biochemistry programs are accredited by the American Chemical Society (ACS). Biology and Psychology majors will discover exciting courses and electives that will be beneficial for industrial positions or graduate school acceptance. Student research in all science programs is encouraged.

The Physician Assistant Studies program was the first health care program to be offered in the School of Science and Health. This program is fully accredited. Health care programs require a strong science foundation. In addition, experiences in health care delivery settings are an integral part of

the program and are crucial to education in the health care field.

College Studies Program

The School of Science and Health is jointly responsible, with the School of Liberal Arts, for the general education core of all students. Students learn the scientific method and quantitative reasoning as part of the College Studies program. Below are the science and quantitative requirements:

Science Group

All students will complete two science courses to enhance their understanding of the scientific method and its application. Most programs require completion of both courses by the end of sophomore year. Certain majors require specific courses and sequences. Students should take the sequence that best suits the requirements of their majors.

SCI-101	ENVIRONMENTAL SCIENCE
SCI-102	EXPLORING SCIENCE
BIOL-101	CURRENT TOPICS IN BIOLOGY
CHEM-101	GENERAL CHEMISTRY (Required for certain majors)
PHYS-101	GENERAL PHYSICS (Required for certain majors)
BIOL-103/103L	BIOLOGY I (Required for Science Majors only)
CHEM-103/103L	CHEMISTRY I (Required for Science and Engineering Majors only)
PHYS 201/201L	PHYSICS I (Required for Science and Engineering Majors only)

Quantitative Reasoning Group

Students take one or two courses in mathematics in order to develop quantitative logic and reasoning skills and to further strengthen their critical thinking. The specific course sequence will depend on the student's major and the level of mathematics with which the student enters the University determined by the results of placement. Students must take the highest level of mathematics for which they are qualified. Students will be advised by their academic advisors concerning appropriate-level mathematics courses. The five approved Quantitative Reasoning Sequences are listed below.

<i>Quantitative Reasoning I</i>	<i>Quantitative Reasoning II</i>
MATH-100/101 Finite Mathematics	MATH-103 Introduction to Calculus
MATH-102 Pre-Calculus	MATH-103 Introduction to Calculus
MATH-102 Pre-Calculus	MATH-111 Calculus I
MATH-111 Calculus I	MATH-112 Calculus II
MATH-103 Introduction to Calculus	Free Elective

The College Studies Program check sheet can be found on page 60.

Biochemistry

The Bachelor of Science in Biochemistry combines the disciplines of biology and chemistry to enable students to pursue careers in research, industry and advanced study in graduate programs. A variety of opportunities exists in research and development in the pharmaceutical industry, specialty-chemical companies and genetics, molecular biology and bioengineering research. The program provides an appropriate preparation for medical and other health sciences professional schools. Biochemistry majors maintain a consistently high placement rate in major-related careers and graduate school programs.

A wide array of career choices are available to professionals in this important field, including research-management positions at large pharmaceutical and chemical companies such as GlaxoSmithKline, McNeil Pharmaceuticals, Rohm and Haas, DuPont, Merck and Eastman Kodak.

The program, accredited by the American Chemical Society (ACS), not only prepares students for careers in research, development or production in the chemical industry, but for advanced study in graduate and/or medical school. The University maintains close ties with the ACS, which frequently invites students to present their research findings at meetings. Students have recently given presentations in Washington, D.C., San Francisco and San Diego. Students accumulate field-related research experience throughout their college careers due to the small class size and "hands-on" approach by faculty. As a result, many students have seen their work published in scholarly journals as early as the freshman year.

The Biochemistry check sheet can be found on page 131.

Biology

The Bachelor of Science in Biology at Philadelphia University affords students opportunities to pursue careers or graduate and professional study in disciplines as diverse as biotechnology, genetic counseling, pharmaceuticals, industrial food quality control, conservation and parks management, urban restoration and planning, pollution management and remediation, cellular biology, microbiology and immunology, secondary education, animal care, physical therapy and cancer research. An investigative approach in field and laboratory courses promotes development of technical competence, as well as conceptual understanding. Small class size and a common math and science core foster an interactive community of science students and faculty, which leads to unique opportunities for interdisciplinary projects. Most students hone their analytical skills through research with faculty on campus or at other institutions through internships, and many present their work at professional society meetings or publish in scientific journals. Students are strongly encouraged to participate in the student group "Science in Action" which sponsors academic, recreational, community service activities and a year-end student poster presentation.

The Biology check sheet can be found on page 133.

Biopsychology

Interest in biological explanations of behavior has increased dramatically in the last decade and has led to a greater appreciation for researching brain functioning in order to understand behavior. The demand for highly trained, behaviorally oriented scientists in academic and industrial research has been substantial and is reflected in the rise of graduate programs in biopsychology and related fields such as neuroscience. The Bachelor of Science in Biopsychology integrates psychology and the natural sciences to provide a fuller understanding of the biological basis of behavior. The Biopsychology major is a science-based curriculum designed to prepare students for medical school, direct entry into medical/pharmaceutical research or graduate programs in psychology, biopsychology, animal behavior, neuroscience and occupational therapy. Students will complete a common core of courses in psychology and science and select one of three concentration tracks: Animal Behavior, Graduate Study or Pre-Medical Studies.

Psychology Concentration Option

(select one, seven-course option)

Pre-Medical Studies Option

- CHEM-201/201L, CHEM-202/202L, PHYS-201/201L, PHYS-203/203L and three additional advanced courses from biology and psychology areas (see advisor)

Animal Behavior Option

- CHEM-207/207L, ECBIO-201, ECBIO-301 and four additional advanced courses from biology and psychology areas (see advisor)

Graduate Study Option

- seven advanced courses from biology and psychology areas (at least three from each area; see advisor)

The Biopsychology check sheet can be found on page 135.

Chemistry

The Bachelor of Science in Chemistry, accredited by the American Chemical Society (ACS), not only prepares students for careers in research, development or production in the chemical industry, but also for advanced study in graduate and/or medical school.

The two options within this program, chemistry and environmental science, provide the student the opportunity to investigate and to research developments in modern chemistry. Upper-level chemistry majors may work with a faculty member on a research project of mutual interest. As a result of these projects, some of the students have seen their work presented in national meetings and published in scholarly journals. The University maintains close ties with the ACS, which welcomes information about student research at its regular meetings.

By working with faculty on real projects, students learn how to complete each step of an independent research project that leads to the production of a scientific report suitable for publication in peer-reviewed journals. Recent faculty-

student partnerships have led to joint presentations at national conferences in Atlanta, Toronto, Denver, San Diego and New Orleans.

Chemistry affects our daily lives more than most people realize. From the paint we use to decorate our homes and the dyes used to create patterns in everyday items such as apparel and home furnishings, to the antibiotics prescribed to us by our doctors, experienced chemists are needed to produce many of the practical, revolutionary and necessary goods we often take for granted. Field-related research and experience are offered as part of the University's Chemistry major, preparing graduates for an abundance of career opportunities. Chemistry majors maintain a consistently high-placement rate in major-related careers and graduate school programs. Large pharmaceutical and chemical companies such as GlaxoSmithKline, McNeil Laboratories, Rohm and Haas, Merck and DuPont hire our students to become research chemists managers and associates, based on their outstanding classroom and laboratory experience and extensive research work, begun as early as the freshman year. Faculty-student research partnerships are an important part of the program.

Students have the option of choosing advanced study in Chemistry or Environmental Science.

The Chemistry check sheet can be found on page 137.

Environmental and Conservation Biology

The new innovative Environmental and Conservation Biology major dovetails with the major in Landscape Architecture preparing students for a wide range of environmental careers in government agencies, nonprofit organizations, research and consulting. The program emphasizes skills development in plant and animal field identification, Geographic Information Systems (GIS) technology, chemical analysis, experimental design, urban landscape planning, wildlife management and ecology. Exciting opportunities are provided for students to develop and apply their expertise through internships, research and field courses. These include marine conservation in Jamaica, wildlife management in Yellowstone National Park and water quality sampling techniques in the Delaware and Chesapeake Bays.

The Environmental and Conservation Biology check sheet can be found on page 141.

Health Sciences

The healthcare job market is one of the fastest growing segments of the economy today in the United States. The need for additional healthcare providers and allied health personnel is rapidly expanding. Graduates from the BS in Health Sciences will have the necessary preparation in science, psychology and the liberal arts to successfully gain admission into and complete a graduate program for many allied health professions. They will also gain the skills in information literacy needed to answer relevant professional questions through database searching and critical analysis of original research,

as well as become proficient in written, verbal and electronic communication.

The curriculum includes a strong foundation of natural science courses combined with human sciences, psychology and unique practical and clinical experiences. Each student is required to complete an extensive volunteer and shadowing experience as part of their coursework. Students are encouraged to explore a variety of healthcare opportunities by shadowing and gaining patient contact at a variety of area hospitals and clinics. The free electives that are built into the curriculum allow students to explore an area of specialization or sample a variety of different courses that are offered at the University. Students also have the opportunity to study abroad.

Philadelphia University provides exceptional facilities for the Health Science program. In addition to the fully equipped genetics, microbiology and histology labs, there is a physical diagnosis lab and gross anatomy (cadaver dissection) lab which students will have the opportunity to explore. The small class size fosters peer interaction and a close-knit community of students and faculty.

Students pursuing a Bachelor of Science (B.S.) degree in Health Science will be prepared to enter into professional and graduate schools in a variety of allied health fields. Students can pursue a career or graduate study in diverse disciplines such as physician assistant studies, occupational therapy, physical therapy, exercise science, community health, social work, community counseling, education, research, rehabilitation, crisis intervention, healthcare administration, public health and human resource management. The opportunities are boundless.

The Health Sciences check sheet can be found on page 143.

Physician Assistant Studies

Combined B.S. Health Sciences/M.S. Physician Assistant Studies

A physician assistant (PA) is a medical professional who practices medicine with the supervision of a licensed physician. PAs provide a wide variety of medical services traditionally performed by physicians. The concept for the profession originated in the early to mid-1960s as a way to enhance the provision of medical care to people residing in medically underserved areas. The care of the underserved remains an ongoing goal of the profession.

Physician assistants work in all 50 states, Guam and the District of Columbia in a wide range of medical settings including physicians' offices, hospitals, clinics, emergency departments, military and Veterans Administration installations, nursing homes, industrial health centers and correctional institutions. They work in conjunction with a physician and have a wide array of responsibilities including taking medical histories, conducting physical examinations, ordering or performing lab and other diagnostic tests, synthesizing data to make a proper diagnosis, developing a treatment plan, performing health-related counseling, performing various procedures such as casting and suturing and assisting in surgery. PAs can prescribe medication in all states.

The Physician Assistant Studies program is a comprehensive academic experience that stresses the practical application of current medical theory. Most of the program faculty are actively practicing health care providers with a great depth of knowledge and experience. Students are exposed to the clinical environment throughout their education with patient contact even during the classroom or didactic portion of the program. The Physician Assistant Studies program is fully accredited by the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA).

The typical student in the Physician Assistant Studies program will spend approximately \$3,000 on medical equipment, books, malpractice liability insurance and other program-related fees for both professional-phase years combined. This does not include tuition, housing, food, living expenses, travel costs, health center fees, graduation fees, and pre-professional phase book costs. All of these costs, except book costs, are listed elsewhere in the University catalog.

While this is a full-time, day program, the clinical or practical portion may involve some night and weekend hours. Admission criteria, procedures and technical standards are listed in the Physician Assistant Studies Program Information Booklet available from the Office of Admissions and at www.PhilaU.edu.

Freshman Admission Option

This option is designed for students who have no, or few college credits (less than 16 credit hours). It is designed as a five-year course of study and includes complete undergraduate and graduate degrees. The first six semesters (three years), make up the pre-professional phase, are designed to academically prepare students for PA training and provide a comprehensive general education. The pre-professional phase consists of medically related science and psychology prerequisite courses along with all of the components of the College Studies program. After successful completion of the pre-professional phase (which includes maintaining the required grade point averages of 3.0 cumulative and 3.0 science and core prerequisite, acquiring the required letters of reference, completing a personal essay and obtaining approval of the PA Program Admissions Committee), students are admitted to the professional phase. Students must complete all required courses in the pre-professional phase to enter the professional phase.

The professional phase is 25 months of continuous study and includes the didactic level that consists of three semesters of classroom and laboratory work in basic and applied medical science, and the clinical level that consists of six rotations and four preceptorships at a variety of clinical sites such as hospitals and medical offices. Students must complete all didactic-level courses before they can enter the clinical level. The first semester of the professional phase is composed of mandatory foundation courses. The remaining courses in the professional phase are graduate courses.

After successful completion of the fall semester of year four (the first professional-phase semester), students will receive a Bachelor of Science in Health Sciences and be eligible to participate in the May Commencement ceremony.

Upon completion of the full five-year program, graduates will receive a Master of Science in Physician Assistant Studies, be eligible to sit for the Physician Assistant National Certifying Examination, and be able to participate in the Commencement ceremony.

Transfer Student Option

This option is designed for students with a substantial number of college credits (approximately 64), but who do not have a bachelor's degree. This option includes an accelerated bachelor's degree-completion program, and the complete professional-phase Physician Assistant Studies Program. Students wishing to enter the program in this option must meet two sets of prerequisite requirements prior to entrance into the program. The first is the PA-specific prerequisites that include science and psychology courses. The second consists of the College Studies prerequisites that are general education courses required for the bachelor's degree. Both sets of requirements must be met before a student can gain entrance into the program. These prerequisites are listed in the Physician Assistant Studies Program Information Booklet available from the Office of Admissions and at www.PhilaU.edu.

Students admitted into this option typically spend three years at the University. The first year (two semesters) comprises the pre-professional phase that consists of advanced science and psychology courses, and the remainder of the College Studies or general education program. The pre-professional phase may be shorter, depending on the number of applicable transfer credits a student has, but must be at least one semester. After successful completion of the pre-professional phase, students will enter the professional phase, which is described above.

After successful completion of the fall semester of year two (the first professional-phase semester) students will receive a Bachelor of Science in Health Sciences and be eligible to participate in the May Commencement ceremony. Upon completion of the full three-year program (both the pre-professional and the professional phases) graduates will receive a Master of Science in Physician Assistant Studies, be eligible to sit for the Physician Assistant Studies National Certifying Examination and be able to participate in the Commencement ceremony.

Clinical Education

Upon successful completion of the didactic level of the professional phase, the PA student proceeds into the clinical education level of the program. The PA student will spend 36 weeks in Clinical Rotations (six 6-week blocks) and another 24 weeks in Preceptorships (four 6-week blocks) before completing the course of study for Physician Assistant Studies. These experiences most likely will involve night and weekend hours.

Clinical Rotations (6 credits/rotation)

The clinical rotations are six-week blocks in the areas of medicine, pediatrics, surgery, psychiatry/mental health, women's health and emergency medicine, and are designed to expose the PA student to patient care in a variety of

settings. The student is directly involved with the evaluation and management of patients to the extent that the clinical preceptor or supervisor is comfortable with the level of knowledge and skills of the PA student. Typically, the student spends at least 40 hours per week in the clinical setting, attending to patients and partaking of continuing medical-education seminars.

Preceptorship IA, IB, IIA, IIB (6 credits/ Preceptorship)

These clinical training experiences are designed to enhance the PA student's knowledge, technical skills, clinical judgment and confidence in the evaluation and management of common medical problems. One of these must be done as two 6-week blocks in an ambulatory, primary-care setting such as an outpatient family practice, general practice or general internal medicine office or center.

The remaining preceptorship experiences include the Floating Medicine Block in which students do six additional weeks in a medically related specialty such as family, internal or geriatric medicine, and the clinical elective. During the elective students can spend more time in one of their rotation specialties or gain experience in other settings such as neonatology, HIV, correctional medicine, urology, orthopedic surgery, cardio thoracic surgery and others. Continuity of care and regular feedback from clinical faculty are the hallmarks of these experiences.

PA Program Technical and Professional Standards

For admission to the program, candidates must:

- Have the academic ability to learn a large volume of technically detailed information and be able to synthesize and use this data to solve complex clinical problems. This information must be acquired in a short and intense period of study that requires well-developed study skills and a high level of motivation and may require considerable personal and financial sacrifice;
- Possess the emotional maturity and stability to approach highly stressful human situations in a calm and rational manner;
- Have the ability to effectively communicate with ill patients from a wide diversity of cultural and socioeconomic backgrounds in an empathetic and sensitive fashion;
- Have well-developed oral and written communication skills;
- Have comfort with the role of a dependent practitioner operating under the supervision of a licensed physician, while simultaneously feeling comfortable with the large amount of responsibility that goes along with the delivery of patient care in sometimes remote locations;
- Display strong ethical integrity consistent with working as a healthcare professional;
- Have sufficient physical abilities in the areas of sensory function (vision, hearing, and touch sensation), hand-eye coordination, and neurologic and muscular coordination and control to competently perform the technical activities that are a critical part of the program and profession, including:

- a) Physical examinations, which include visual inspection, listening to heart and lung sounds with a stethoscope, examination by touch to gather information such as skin temperature and texture and other maneuvers;
- b) Performance and interpretation of diagnostic studies such as blood tests, EKGs and X-rays;
- c) Surgical assisting, which can involve activities such as control of bleeding and suturing (wound closure by placing stitches); and
- d) Performing common procedures such as applying casts, suturing, cardiopulmonary resuscitation (CPR), venipuncture (placing needle into a vein to collect a blood sample) and starting an intravenous access line.

The Physician Assistant Studies check sheet can be found on page 145.

Pre-Medical Studies

The future medical practitioner must be a capable scientist able to make independent judgments and data evaluations in order to treat the patient. It is the goal of the Bachelor of Science in Pre-Medical Studies to prepare students for these professions. Philadelphia University has a strong basis in healthcare stemming from a long-established Physician Assistant Studies program, Occupational Therapy and Midwifery programs. This, combined with the University's diversity of focus, which includes both science and liberal arts strengths, results in a graduate who has the analytical, verbal, written and empathic skills necessary to become an effective health practitioner.

Faculty involved in the Pre-Med curriculum have been active in developing novel methods of instruction and assessment of students skills, which include the use of case-history analyses, discussion of social and ethical aspects of medicine and disease risk assessment through genetic monitoring. Students also develop their empathy and professional skills through two unique, three-credit preceptorships, when they receive off-campus training and work hands-on with healthcare professionals, several of whom are Philadelphia University alumni. As well as receiving grades for these experiences, students learn firsthand what being in healthcare means. At Philadelphia University, we are aware that a successful student is one who is nurtured and advised during their formative, science-intensive, four-year experience so that they can develop and discover all their talents. For the Pre-Med program, the mentoring and monitoring of their progress as they proceed through the curriculum is both via an effective Pre-Med Committee, and by dedicated Pre-Med advisors, all of whom are previous health care graduates. In order to be a successful candidate for any graduate school students must maintain a 3.0 minimum GPA, at least between their sophomore and senior years. Any student not maintaining a GPA commensurate with success in the major will be asked to transfer to another major by the Pre-Med Committee, as this will be considered ineffective progress towards graduation. Philadelphia University Pre-Medical Studies graduates have an excellent placement record in

medical, osteopathic, dental and veterinary schools including University of Pennsylvania, Temple University, Thomas Jefferson University, University of Maryland, Philadelphia College of Osteopathic Medicine and New York College of Osteopathic Medicine. The Program has developed a scholarship program for Pre-Medical Students to attend a MCAT (Medical School Admission Exam) Preparation Program and has developed affiliation agreements with medical and other professional schools.

The Pre-Medical Studies check sheet can be found on page 147.

Psychology

Psychology is the scientific study of behavior. The Bachelor of Science in Psychology is designed to provide students with a broad understanding of the goals and possibilities of the field. The curriculum provides students with an in-depth understanding of the principles of behavior, the scientific methods used to derive those principles and appropriate ways to apply such knowledge.

The Psychology curriculum is designed to meet the educational requirements for graduate school in psychology or for students planning careers outside of academic psychology. Students take a core group of courses that emphasize the research-based nature of psychology and select additional

courses in psychology depending upon their interests and goals. At the senior level, students conduct an advanced research project and may pursue internships at local counseling centers, human-services agencies, hospitals, residential treatment centers or other locations.

Psychology graduates may choose to work in professions such as counseling, social work, education or research. Other positions available to Psychology majors include human resource management, rehabilitation, community counseling and crisis intervention. The major allows students the flexibility to pursue graduate studies in related disciplines such as education, occupational therapy and management.

The Psychology check sheet can be found on page 149.

