

Department of Biology

Biology Student Success Handbook

WP

Will.
Power.

WILLIAM
PATERSON
UNIVERSITY

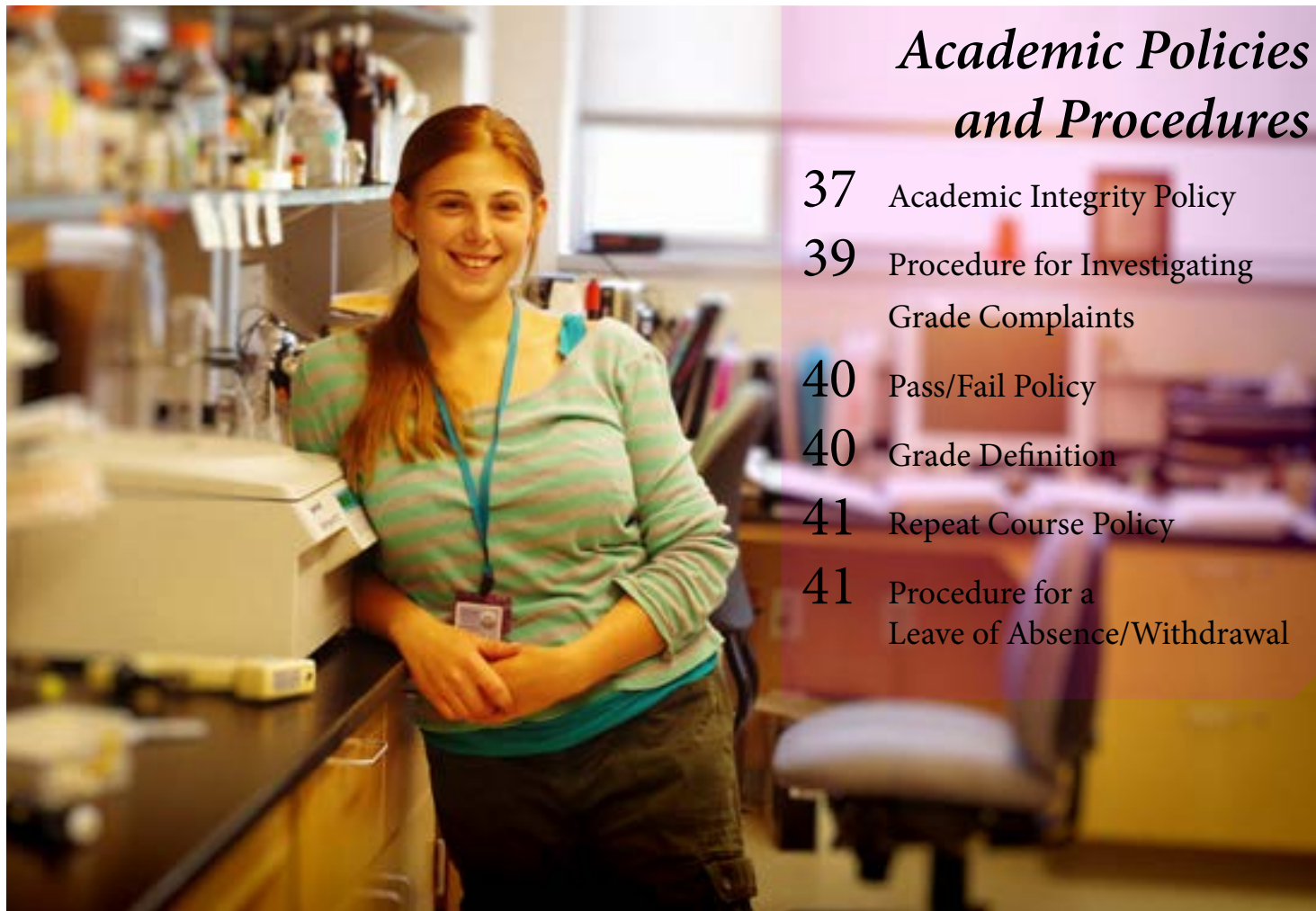
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William Paterson
University's
Science Complex
At the Forefront of
Science Education
in New Jersey

Welcome Message from Dr. David Slaymaker, Chairperson



This booklet is designed to help launch students to successfully navigate through the programs in biology or biotechnology to graduation, and the beginnings of a career or professional training.

Included in these pages are a description of the biology curriculum, a listing of courses and specific course requirements in biology and other required sciences and mathematics. The University Core Curriculum portion of the curriculum is also discussed. The latter is common to all undergraduates. Additionally, there is information about advisement, registration procedures, integrity policies, extracurricular clubs and organizations, scholarship opportunities, and many other aspects of University life that will help students make their years as undergraduates at William Paterson University a rewarding experience. Refer to this handbook when you have specific questions; if you do not find the answers consult

your advisor or the department chairperson (973/720-2439) or one of our faculty members listed in this handbook and inquire in person. Many questions regarding the biology department can be found on our website at <http://www.wpunj.edu/cosh/departments/biology>. Course descriptions can be found in the WPUNJ online course catalog.

The Biology department also has a student listserv for updates on available courses, seminars, job and scholarship opportunities, and meetings. These notices will be sent to your WPUNJ student email account.

Good Luck!



Dr. James T. Arnone

Courses: General Biology I, Genetics
Research: Genomics and Molecular biology using *Saccharomyces cerevisiae*
Office: SciE4042 x3457 ArnoneJ@wpunj.edu
Laboratory: SciW203

Dr. Robert Benno

(Director Animal Research Facility)
Courses: Animal Physiology, Histology, Neuroscience
Research: Developmental neurobiology
Office: SciE4047 x3440 BennoR@wpunj.edu
Laboratory: SciE2008

Dr. Sonya Bierbower

Courses: Animal Physiology
Research: Brain edema, Neuroinflammation responses after Traumatic Brain Injury
Office: SciE4052 x3455 BierbowerS@wpunj.edu
Laboratory: SciE2010

Dr. Danielle Desroches

(Coordinator: GS-LSAMP and MAPS)
Courses: Anatomy & Physiology, Endocrinology
Research: Neuroendocrinology; teratogenic agents and development
Office: SciE4046 x2329 DesrochesD@wpunj.edu

Dr. Eileen Gardner

(Coordinator: ISSBB and NOYCE)
Courses: General Biology I, Cell Biology, Developmental Biology, Immunology
Research: Cytoskeletal proteins; protein expression during development
Office: SciE4057 x3441 GardnerE@wpunj.edu
Laboratory: SciW205

Dr. David Gilley

Courses: Ecology Evolution and Behavior, Animal Behavior
Research: Insect social organization and its evolution; honey bee pheromones
Office: SciE4038 x2549 GilleyD@wpunj.edu
Laboratory: SciW307

Dr. Jeung Woon Lee

Courses: Anatomy & Physiology, Neuroscience
 Research: Neurophysiology of pain, stem/progenitor cell transplantation
 Office: SciE4044 x2442 LeeJ22@wpunj.edu
 Laboratory: SciW305

Dr. Claire Leonard

(Coordinator: Pre-Professional Society)
 Courses: Cell Biology, Histology, Biotechnology: Cell Culture
 Research: Molecular biology of metabolic diseases
 Office: SciE4058 x2791 LeonardC@wpunj.edu
 Laboratory: SciW205



Dr. Gilley's research is focused on the physiology of honey bee pheromones, and insect social organization/ecology.

NOTE: A sample of undergraduate majors courses are listed for each faculty. The listed research topics briefly summarize current foci of each professor; additional research opportunities may also be available. Interested? Talk to us! Check out our web pages: <http://www.wpunj.edu/cosh/departments/biology/faculty.dot>

Dr. Kendall Martin

Courses: Microbial Ecology, Microbiology, Basic Microbiology, Biology Seminar
 Research: Microbial ecology, Plant-microbe associations, Animal microbiome
 Office: SciE4045 x3452 MartinK31@wpunj.edu
 Laboratory: SciW319

Dr. Jaishri Menon

(Coordinator: Annual Undergraduate Research Symposium)
 Courses: Comparative Vertebrate Anatomy, Histology, Transmission Electron Microscopy (TEM), Recent Trends in Reproduction and Fertility
 Research: Physiology and vertebrate morphology
 Office: SciE4040 x2795 MenonJ@wpunj.edu
 Laboratory: SciW205

Dr. Emily Monroe

Courses: General Biology I, Biotechnology: Gene Expression, General Genetics
 Research: Genomics and molecular biology of marine micro organisms; secondary metabolism; harmful algal blooms
 Office: SciE4053 x2792 MonroeE@wpunj.edu
 Laboratory: SciW317

Dr. Emmanuel Onaivi

Courses: Neuroscience, Ecology Evolution & Behavior, Pharmacology
 Research: Molecular biology of drug abuse
 Office: SciE4049 x3453 OnaiviE@wpunj.edu
 Laboratory: SciW203

Dr. Pradeep Patnaik

Courses: General Biology I, Genetics, Molecular Biology
 Research: DNA replication and the molecular genetics of parasitic protozoa
 Office: SciE4055 x3454 PatnaikP@wpunj.edu
 Laboratory: SciW215

Dr. Michael Peek

(Graduate Coordinator)
 Courses: Ecology, Evolution & Behavior, Plant Physiology, Plant Ecology
 Research: Plant ecophysiology; Plant root dynamics
 Office: SciE4054 x2247 PeekM@wpunj.edu
 Laboratory: SciW317

Dr. Lance Risley

(Advisor: Beta Beta Beta Honor Society)
 Courses: General Biology II, Ecology Evolution & Behavior, General Ecology, Zoology, Conservation Biology
 Research: Ecology of bats; conservation of forest ecosystems
 Office: SciE4051 x3438 RisleyL@wpunj.edu
 Laboratory: SciE4017

Dr. David Slaymaker (CHAIRPERSON)

Courses: General Biology I, General Botany, General Genetics, Biotech: Cell Culture, Biotech: Proteins
 Research: Genetic diversity in natural and restored populations of American beachgrass
 Office: SciE4064B x2439 SlaymakerD@wpunj.edu
 Laboratory: SciW215

Dr. Joseph Spagna

Coordinator: Biology Honors Track
 Courses: General Biology II, Ecology Evolution and Behavior, Field Entomology, Evolution
 Research: Evolutionary biomechanics of spiders and ants
 Office: SciE4039 x2793 SpagnaJ@wpunj.edu
 Laboratory: SciW317

**Dr. Stephen Vail**

(Assistant Chairperson)
 Courses: Ecology Evolution & Behavior, General Ecology, Evolution, Mathematical Biology
 Research: Population biology; ecology of tick-borne diseases
 Office: SciE4041 x2487 VailS@wpunj.edu
 Laboratory: SciW317

Dr. Miryam Wahrman

Courses: General Biology I, Bioethics, Molecular Biology, Research Methods
 Research: Molecular biology of development; biotechnology, bioethics
 Office: SciE4050 x3456 WahrmanM@wpunj.edu
 Laboratory: SciW306

Dr. Carey Waldburger

(Post-Baccalaureate Advisor)
 Courses: General Biology I, Biotechnology: DNA, Basic Microbiology, General Genetics
 Research: Microbiology, bacteria-textile interaction; biotechnology, bioethics
 Office: SciE4048 x2486 WaldburgerC@wpunj.edu
 Laboratory: SciW215

THE BIOLOGY ADMINISTRATIVE STAFF MEMBERS

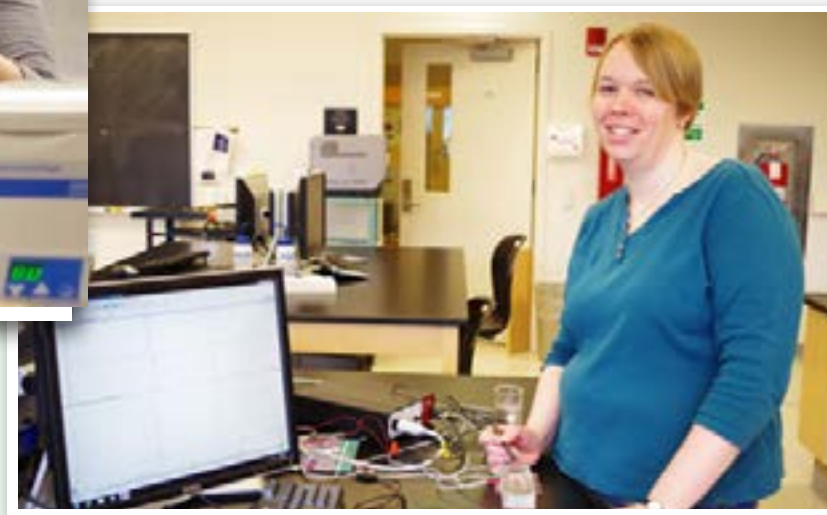
Dr. David Slaymaker, Chairperson	SciE 4064B	x2439	slaymakerd@wpunj.edu
Dr. Stephen Vail, Asst. Chair	SciE 4041	x2487	vails@wpunj.edu
Abigail Sanchez, Secretary	SciE 4064	x2265	sancheza11@wpunj.edu
Georgeann Russo, Secretary	SciE 4064	x2245	russog@wpunj.edu

DEPARTMENT LABORATORY TECHNICIANS

Mrs. Trish Bush	SciE 4013	x3450	busht@wpunj.edu
Mr. Norman Schanz	SciE 2008Q	x2453	schanz@wpunj.edu
Mrs. Susan Sgro	SciE 4015	x2619	sgro@wpunj.edu
Mr. Mike Wyrwa	SciE 4002	x2357	wyrwam@wpunj.edu

IMPORTANT CAMPUS PHONE NUMBERS

Advisement Center	x2727
Registrar	x2700
Bursar	x3695
Academic Support Center	x3324
Science Enrichment Center	x3340
Financial Aid	x2202
Student Information Center	x2292
WPU Campus Police	x2300



DEPARTMENT OF BIOLOGY MISSION STATEMENT

The Department of Biology offers intellectually challenging programs leading to Bachelor and Master of Science degrees in biology and biotechnology. The programs are designed to prepare students for a variety of science and science-related careers, and for advanced study in graduate and professional schools. Careers for which our students prepare include teaching, scientific research, medicine and the allied-health professions, technical careers in the biomedical/pharmaceutical industry, and science administration and regulatory jobs in government.

The department offers undergraduate and graduate students opportunities to participate in exciting research with experienced investigators. The graduate

programs are designed to provide advanced knowledge and skills that will allow these students to move to the forefront of their professions or successfully pursue higher degrees. Workshops sponsored with the Office of Continuing Education provide opportunities for full-time professionals to incorporate recent discoveries and state-of-the-art technology in their work places.

The department actively supports the research efforts of its faculty, recognizing that these endeavors create a stimulating and exciting working and learning community. The faculty of the department makes every effort to periodically re-examine the programs in the light of advances in the discipline, providing an environment that is conducive to scholarship and commensurate with the goals of the institution.

STUDENT LEARNING OUTCOMES

Students graduating with a biology degree will be able to demonstrate a fundamental understanding of basic biological concepts. Students will be expected to communicate these concepts orally, on written examinations, and

in laboratory environments. They will have mastered the ability to formulate sound hypotheses in biology and to understand contemporary means for testing them. Students will have the ability to design experiments that utilize skill acquired from coursework and hands-on laboratory experience in order to collect and analyze biological data and come to logical conclusions that reflect an understanding of biological principles and phenomena.



THE DEPARTMENT AND CURRICULUM

All undergraduate curricula at William Paterson University consist of two parts:

1. **University Core Curriculum:** The Core constitutes a third of the entire undergraduate curriculum at WPU (approx. 40 credits). It contains a number of courses from across the university's academic departments developed specifically for the Core program. Students create their Core experience by choosing a sequence of thirteen (13) courses from each of the following six areas of study.

Areas one, two and three are broadly viewed as “foundational” wherein courses will expose students to basic ideas, concepts, theories, perspectives, histories, methods, problems and debates from within any discipline in ways that clarify the meanings and scope of that area. Areas four, five and six are broadly viewed as “themes” that are core challenges in the 21st century. Courses in these areas will build upon the “foundational” knowledge and skills acquired by students.

For more information, visit: <http://www.wpunj.edu/ucc/ucc-in-depth.dot>

Integrating Core with Majors

To allow for better integration of Core and student majors, the Faculty Senate passed the following resolution on January 25, 2011: Students may use up to three courses in their major to fulfill UCC requirements. One of these UCC/major courses may be a foundational course offered in Areas One, Two or Three. All UCC/major designated courses must be approved by the UCC Council.

Developmental Core

- To ensure a developmental sequence of courses within the Core, students are expected to
- Take at least 18 credits in Areas 1-3 before they take Area 4, and
 - Take Area 4 before they take Areas 5 and 6

Writing Intensive (WI) and Technology Intensive (TI) Requirements

WPU is committed to a nurturing learning environment in which writing and technology literacies are taken seriously across disciplines. Many courses at WPU are designated as “WI” or “TI.” These are attributes to courses which could be in any major discipline or in the Core.

- Four (4) Writing Intensive (WI) courses
- Two (2) Technology Intensive (TI) courses

Thus any course - within the Core, or any major, or any minor, or any free elective - that has been designated as a WI or TI course can be used by a student to satisfy the above requirements.



2. **The Major: Biology/Biotechnology Curricula** are designed for students interested in some aspect of the living world (animals, plants, microbes), specific areas of biology (neurobiology, animal behavior, ecology, molecular biology, teaching biology), and numerous other fields of biology. As a student of Biology/Biotechnology you will take 33-35 credits in Biology as well as 31-32 credits in co-requisites (Chemistry (16), Physics (8), and Mathematics (8)).

The details of each program - Biology and Biotechnology are listed on the next few pages. The department also offers Pre-Professional Programs in pre-medicine, pre-dentistry, and other related areas that are explained in greater detail on page 19. For those students planning a career in teaching K- 12 please also refer to the College of Education's Handbook.

Notice: The Biology Core-course Rules

A) C- Minimum Grade Policy

All Biology and Biotechnology majors are required to earn grades of at least C- in their core courses. If a student has received a grade below C- in a particular core course, that student did not meet the program's grade requirements for the course and that student will not be allowed to proceed into sequential courses (those that require the core course as a prerequisite), nor to graduate, until they have received a grade of C- or better. The BS Biology core courses are BIO 1630 (General Biology I), BIO 1640 (General Biology II), BIO 2050 (Cell Biology), BIO 2060 (Genetics), and BIO 2490 (Ecology Evolution & Behavior). The BS Biotechnology core courses are BIO 1630, 2050, and 2060.

B) Single Repeat Policy

Only ONE repeat is allowed for each of the BS Biology and BS Biotechnology core courses. This policy is effective Fall semester 2013 and applies to current and new BS Biology and BS Biotechnology majors. Students in other majors do not fall under this policy. For current majors in Biology and Biotechnology, the policy only applies to courses completed for the first time in Fall 2013.

C) Biology Pre-requisite Policy

All biology and biotechnology majors must successfully complete (with a C- or better) the core courses required for their major before progressing to upper-level biology courses (3000 and above). In other words, the core course sequence is a prerequisite for all upper-level biology courses. Core courses for the BS Biology major are BIO 1630 (General Biology I), BIO 1640 (General Biology II), BIO 2050 (Cell Biology), BIO 2060 (Genetics), and BIO 2490 (Ecology Evolution & Behavior). Core courses for the BS Biotechnology major are BIO 1630, 2050, and 2060. Core courses also include BIO 1120 and 1130 if a student is using these to fulfill the requirement for BIO 1640.

Notice: Minimum GPA Requirement

All Biology Majors must maintain an Overall Grade Point Average of 2.0 or above in all major courses in order to graduate with a BS degree in Biology/Biotechnology.

To calculate your GPA note the following:

- A) Each credit earned with a grade of A = 4.0, A- = 3.7, B+ = 3.3, B = 3.0, B- = 2.7, C+ = 2.3, C = 2.0, C- = 1.7, D+ = 1.3, D = 1.0, F = 0, P=not included
- B) This means a grade of B for a 4 credit course=4(credits) x 3 =12 points; C (for a 3 credit course) = 3 x 2 = 6 points, etc.
- C) Add together all points earned and divide by the credits earned = GPA
Example above 18 (points) divided by 7 (credits) = 2.57
- D) Each semester add the number of points to the previous total points
Add the number of credits (remember varies between courses) to previous total
Divide new credit total into new point total = new GPA
- E) Courses retaken - only the last grade counts in your GPA; subtract all other grades: (points and credits), add new grade (points and credit), ask advisor for help!
- F) All repeat courses Must be taken at WPUNJ or the prior grade will still count in the student's GPA.



Curriculum Control Sheets

College of Science and Health, Bachelor of Science in BIOLOGY

UCC REQUIREMENTS [40-41 credits]
AREA 1: PERSONAL WELLBEING [3]

_____ 3 cred.

AREA 2: EXPRESSION [9]

a. Arts/Communication

_____ 3 cred.

b. Writing

ENG 1100 College Writing _____ 3 cred.

c. Literature

_____ 3 cred.

AREA 3: WAYS OF KNOWING [19-20]

a. Philosophical Perspectives

_____ 3 cred.

b. Historical Perspectives

_____ 3 cred.

c. Social/Behavioral Science (2 different disciplines)

_____ 3 cred.

_____ 3 cred.

d. Scientific Perspectives (choose 1 of the following)

PHYS 2550 College Physics I or PHYS 2600

General Physics I _____ 4 cred.

e. Quantitative Thinking

MATH 1600 Calculus I _____ 4 cred.

AREA 4: DIVERSITY & JUSTICE [3]

Must complete 18 credits in UCC prior to taking Area 4

_____ 3 cred.

AREA 5: CIVIC & COMMUNITY ENGAGEMENT [3]
 MUST COMPLETE Area 4 before taking Areas 5&6

_____ 3cred.

AREA 6: GLOBAL AWARENESS [3]

MUST COMPLETE Area 4 before taking Areas 5&6

_____ 3cred.

FIRST YEAR SEMINAR [1.5]

Required for 1st year students & transfers with less than 12 credits

_____ 1.5 cred.

INTENSIVE REQUIREMENTS

These courses can be double counted within the UCC, the major, or as free electives. If you are a transfer with an AA/AS degree you must take one WI course and zero TI courses.

WRITING INTENSIVE (WI) *W

The first WI course must be Area 2 College Writing

At least one course must be at the 3000 or above level

ENG 1100 College Writing _____ 3 cred.

_____ 3 cred.

_____ 3 cred.

_____ 3 cred.

TECHNOLOGY INTENSIVE (TI) *T

_____ 3 cred.

_____ 3 cred.

UNIVERSITY REQUIREMENTS

FOREIGN LANGUAGE [6]

_____ 3 cred.

_____ 3 cred.

Biology Core*

BIO 1630 General Biology I
 BIO 1640 General Biology II
 BIO 2050 Cell Biology
 BIO 2060 Genetics
 BIO 2490 Ecology, Evolution & Behavior

Co-Requirements for all Concentrations

CHEM 1600/1610 General Chemistry I & II
 CHEM 2510 & 0510/2520 & 0520 Organic Chem I & II
 PHYS 2560 College Physics II or PHYS 2610 General Physics II (matching course to Area 3d)
 MATH 1610 Calculus II or MATH 2300 Statistics or MATH 3720 Math Models in Biological Science

Students must earn at least a C- in all 5 Biology Core courses before taking any upper level Biology courses.*

General Concentration

- Select one Plant course: BIO 3610, BIO 3630, OR BIO 3650
- Biology Electives: Must complete 3 courses, 3000 level or above (3-4cr.) At least one must be 4 credit.
- BIO 4800 Biology Seminar or BIO 4990 Independent Study

Physiology & Behavior Concentration

- BIO 3500 Animal Behavior
- BIO 3080 Animal Physiology
- Biology Electives: Must complete 2 courses, 3000 level or above (3-4 cr.) At least one must be 4 credit.
- BIO 4800 Biology Seminar or BIO 4990 Independent Study

Ecology Concentration

- BIO 3630 Terrestrial Plant Ecology
- BIO 3400 General Ecology
- Ecology Elective: Must complete 1 course, 3000 level or above (3-4 cr.)
- Biology Elective: Must complete 1 course, 3000 level or above (3-4 cr.)
- BIO 4800 Biology Seminar or BIO 4990 Independent Study

PHYSIOLOGY CONCENTRATION					
1st semester		Credits	2nd semester		Credits
BIO 1630	General Bio I	4	BIO 1640	Gen. Bio II	4
MATH	Calculus I Pre-Req.	4	MATH	Calculus I (meets 3e)	4
-----	Area 1/2/3	3	-----	Area 1/2/3	3
-----	Area 1/2/3	3	-----	Area 1/2/3	3
WPU 1010	FYS	1.5			
Credits		15.5	Credits		14
5th semester			6th semester		
BIO 2490	Ecol., Evol. & Behavior	4	BIO 3500	Animal Behavior	4
CHEM 2510	Organic Chem. I	4	CHEM 2520	Organic Chem. II	4
PHYS 2550 or 2560	College or General PHYS I (meets 3d)	4	PHYS 2560 or 2610	College or General PHYS II	4
MATH	Math Co-Req.	4	-----	Area 1/2/3/4	3
Credits		16	Credits		15

PHYSIOLOGY CONCENTRATION					
3rd semester		Credits	4th semester		Credits
BIO 2060	Genetics	4	BIO 2050	Cell Biology	4
CHEM 1600	General Chem. I	4	CHEM 1610	General Chem. II	4
-----	Area 1/2/3	3	-----	Area 1/2/3/4	3
-----	Area 1/2/3	3	-----	Area 1/2/3/4	3
Foreign Lang. I		3	Foreign Lang. II		3
Credits		17	Credits		17
7th semester			8th semester		
BIO 3080	Animal Physiology	3-4	BIO	Bio Elective	3-4
BIO	Bio Elective	3-4	BIO 4800 or BIO 4990	Biology Seminar or Indp. Study	2
-----	Area 5	3	-----	3 courses of Free Elec., WI or TI	9
-----	Area 6	3			
Credits		12-14	Credits		14-15

BIOLOGY GENERAL CONCENTRATION					
1st semester		Credits	2nd semester		Credits
BIO 1630	General Bio I	4	BIO 1640	Gen. Bio II	4
MATH	Calculus I Pre-Req.	4	MATH	Calculus I (meets 3e)	4
-----	Area 1/2/3	3	-----	Area 1/2/3	3
-----	Area 1/2/3	3	-----	Area 1/2/3	3
WPU 1010	FYS	1.5			
Credits		15.5	Credits		14
5th semester			6th semester		
BIO 2490	Ecology, Evolution, Behavior	4	BIO	Bio Plant or Elective	3-4
CHEM 2510	Organ. Chem. I	4	CHEM 2520	Organ. Chem. II	4
PHYS 2550 or 2560	College or Gen. PHYS I (meets 3d)	4	PHYS 2560 or 2610	College or Gen. PHYS II	4
MATH	Math Co-Req.	4	-----	Area 1/2/3/4	3
Credits		16	Credits		14-15

ECOLOGY CONCENTRATION					
1st semester		Credits	2nd semester		Credits
BIO 1630	Gen. Bio I	4	BIO 1640	Gen. Bio II	4
MATH	Calculus I Pre-Req.	4	MATH	Calculus I (meets 3e)	4
-----	Area 1/2/3	3	-----	Area 1/2/3	3
-----	Area 1/2/3	3	-----	Area 1/2/3	3
WPU 1010	FYS	1.5			
Credits		15.5	Credits		14
5th semester			6th semester		
BIO 2490	Ecology, Evol & Behavior	4	Elective	Ecology or Biology Elective	4
CHEM 2510	Organic Chem. I	4	CHEM 2520	Organic Chem. II	4
PHYS 2550 or 2560	College or General PHYS I (meets 3d)	4	PHYS 2560 or 2610	College or Gen. PHYS II	4
MATH	Math Co-Req.	4	-----	Area 1/2/3/4	3
Credits		16	Credits		15

BIOLOGY GENERAL CONCENTRATION					
3rd semester		Credits	4th semester		Credits
BIO 2060	Genetics	4	BIO 2050	Cell Biology	4
CHEM 1600	Gen. Chem. I	4	CHEM 1610	Gen. Chem. II	4
-----	Area 1/2/3	3	-----	Area 1/2/3/4	3
-----	Area 1/2/3	3	-----	Area 1/2/3/4	3
Foreign Lang. I		3	Foreign Lang. II		3
Credits		17	Credits		17
7th semester			8th semester		
BIO	Bio Plant or Elective	3-4	BIO	Bio Plant or Elective	3-4
BIO	Bio Plant or Elective	3-4	BIO 4800 or BIO 4990	Biology Seminar or Indp. Study	2
-----	Area 5	3	-----	3 courses of Free Elec., WI or TI	9
-----	Area 6	3			
Credits		12-14	Credits		14-15

ECOLOGY CONCENTRATION					
3rd semester		Credits	4th semester		Credits
BIO 2060	Genetics	4	BIO 2050	Cell Biology	4
CHEM 1600	Gen. Chem. I	4	CHEM 1610	Gen. Chem. II	4
-----	Area 1/2/3	3	-----	Area 1/2/3/4	3
-----	Area 1/2/3	3	-----	Area 1/2/3/4	3
Foreign Lang. I		3	Foreign Lang. II		3
Credits		17	Credits		17
7th semester			8th semester		
BIO 3400	General Ecology	3-4	Elective	Ecology or Bio Elective	3-4
BIO 3630	Terr. Plant Ecology	3-4	BIO 4800 or BIO 4990	Biology Seminar or Indp. Study	2
-----	Area 5	3	-----	3 courses of Free Elec., WI or TI	9
-----	Area 6	3			
Credits		12-14	Credits		14-15

Biology Elective Courses

Course		Credits
BIO 3080	Animal Physiology	4
BIO 3180	Zoology	4
BIO 3200	Microbiology	4
BIO 3330	Field Entomology	4
BIO 3350	Field Botany.....	3
BIO 3400	General Ecology.....	4
BIO 3450	Conservation Biology.....	3
BIO 3500	Animal Behavior.....	3
BIO 3610	General Botany.....	4
BIO 3630	Terrestrial Plant Ecology.....	4
BIO 3650	Plant Physiology.....	4
BIO 3990	Selected Topics.....	1-6
BIO 4020	Aquatic Ecology.....	4
BIO 4110	Human Reproduction	4
BIO 4160	Comparative Animal Physiology.....	4
BIO 4170	Histology.....	4
BIO 4210	Developmental Biology.....	4
BIO 4440	Evolution.....	3
BIO 4600	Pharmacology	3
BIO 4700	Bioethics and Society	3
BIO 4840	Scanning Electron Microscopy	4
BIO 4850	Transmission Electron Microscopy.....	4
BIPY 4740	Neuroscience.....	4
BIPY 4750	Behavior Genetics	4
BIPY 4900	Human Neuropsychology.....	3
CHEM 4270	Biochemistry I.....	4

Note:

- Several courses from the Department of Environmental Science and Geography can be used as electives for the Ecology concentration. A list of approved courses is available from the Biology Department.
- Electives in orange text are Plant Electives.** One plant course required for General Concentration
- Junior and senior biology majors may take graduate biology courses at the 5000 level with the permission of the instructor, the Department of Biology chairperson, and the Dean of the College. GPA of 3.0 required. These credits (5000s) could be applied to either the undergraduate or graduate degree at WPUNJ.
- A student in any of the biology concentrations must complete a minimum of two laboratory courses at the 3000 level or above to graduate from the biology program.

*BIO 1120 and 1130, General Anatomy and Physiology I and II, may substitute for Bio 1640 by permission of the Biology Department chairperson, in which case BOTH must be taken. These courses are for students interested in health-related fields, such as physical therapy or physician assistant.

Curriculum Control Sheets College of Science and Health Bachelor of Science in BIOTECHNOLOGY

UCC REQUIREMENTS [40-41 credits]			
AREA 1: PERSONAL WELLBEING [3]			AREA 5: CIVIC & COMMUNITY ENGAGEMENT [3] MUST COMPLETE Area 4 before taking Areas 5&6
_____	3 cred.	_____	3cred.
AREA 2: EXPRESSION [9]			AREA 6: GLOBAL AWARENESS [3] MUST COMPLETE Area 4 before taking Areas 5&6
a. Arts/Communication			_____ 3cred.
_____	3 cred.		
b. Writing			FIRST YEAR SEMINAR [1.5] Required for 1st year students & transfers with less than 12 credits
ENG 1100 College Writing	3 cred.		_____ 1.5 cred.
c. Literature			
_____	3 cred.		
AREA 3: WAYS OF KNOWING [19-20]			INTENSIVE REQUIREMENTS These courses can be double counted within the UCC, the major, or as free electives. If you are a transfer with an AA/AS degree you must take one WI course and zero TI courses.
a. Philosophical Perspectives			
_____	3 cred.		
b. Historical Perspectives			WRITING INTENSIVE (WI) *W The first WI course must be Area 2 College Writing At least one course must be at the 3000 or above level
_____	3 cred.		_____ 3 cred.
c. Social/Behavioral Science (2 different disciplines)			_____ 3 cred.
_____	3 cred.		_____ 3 cred.
d. Scientific Perspectives (choose 1 of the following)			TECHNOLOGY INTENSIVE (TI) *T
PHYS 2550 College Physics I or PHYS 2600 General Physics I	4 cred.		_____ 3 cred.
			_____ 3 cred.
e. Quantitative Thinking			UNIVERSITY REQUIREMENTS FOREIGN LANGUAGE [6]
MATH 1600 Calculus I	3 cred.		_____ 3 cred.
			_____ 3 cred.
AREA 4: DIVERSITY & JUSTICE [3]			
Must complete 18 credits in UCC prior to taking Area 4			
_____	3 cred.		

BIOTECH CORE* [9 cred.]

- BIO 1630 General Biology I
- BIO 2050 Cell Biology
- BIO 2060 Genetics

BIOTECH UPPER LEVEL COURSEWORK

[23 – 25 cred.]

- BIO 3200 Microbiology
- BIO 4240 Molecular Biology
- BIO 4300 Biotechnology: DNA
- BIO 4310 Biotechnology: Cell Culture
- BIO 4800 Biology Seminar or

BIO 4990 Independent Study

Choose 1 of the following courses:

- BIO 3610 General Botany

CO-REQUIREMENTS [28 cred.]

- CHEM 1600 General Chemistry I
- CHEM 1610/0610 General Chemistry II
- CHEM 2510/0510 Organic Chemistry I
- CHEM 2520/0520 Organic Chemistry II
- CHEM 4270 Biochemistry
- PHYS 2560 College Physics II or PHYS 2610

General Physics II (take matching Area 3d course)

Choose 1 of the following courses:

- MATH 1610 Calculus II
- MATH 2300 Statistics
- MATH 3720 Math Models in Biological

Students must earn a C- in all Biotech Core* courses.

BIOTECHNOLOGY ELECTIVES

Courses	Credits
BIO 3610 Botany.....	4
BIO 3650 General Plant Physiology.....	4
BIO 4160 Comparative Animal Physiology.....	4
BIO 4170 Histology.....	4
BIO 4210 Developmental Biology.....	4
BIO 4500 Molecular Biology of Prokaryotes.....	4
BIO 4700 Bioethics and Society.....	3
BIO 4740 Neuroscience.....	4
BIO 4990 Independent Study.....	2-4
CHEM 4700 Advanced Biochemistry.....	3

SUGGESTED SEQUENCE OF COURSES					
1st semester		Credits	2nd semester		Credits
BIO 1630	General Biology I	4	BIO 2060	Genetics	4
MATH	Calculus I pre-requisite	3-4	MATH 1600	Calculus I (meets Area 3e)	4
-----	Area 1, 2, or 3 course	3	-----	Area 1, 2, or 3 course	3
-----	Area 1, 2, or 3 course	3	-----	Area 1, 2, or 3 course	3
WPU 1010	First-Year Seminar	1.5			
Credits		14.5-15.5	Credits		14
3rd semester			4th semester		
BIO 2050	Cell Biology	4	BIO 3610 or BIO 3650	General Botany or Plant Physiology	3-4
CHEM 1600	General Chemistry I	4	CHEM 1610	General Chemistry II	4
LANG	Foreign Language I	3	LANG	Foreign Language II	3
-----	Area 1, 2, or 3 course	3	-----	Area 1, 2, 3 or 4 course	3
-----	Area 1, 2, or 3 course	3	-----	Area 1, 2, 3 or 4 course	3
Credits		17	Credits		16-17
5th semester (Junior year)			6th semester (Junior year)		
BIO 3200	General Microbiology	4	BIO	Biology Elective	3-4
CHEM 2510	Organic Chemistry I	4	CHEM 2520	Organic Chemistry II	4
PHYS 2550 or PHYS 2600	College or General Physics I (meets Area 3d)	4	PHYS 2560 or PHYS 2610	College or General Physics II	4
BIO 4240	Molecular Biology	3	-----	Area 1, 2, 3 or 4 course	3
Credits		15	Credits		14-15
7th semester (Senior year)			8th semester (Senior year)		
BIO 4300	Biotechnology: DNA	4	BIO 4800 or BIO 4990	Biology Seminar or Independent Study	2
CHEM 4270	Biochemistry	4	MATH	Math Co-Requisite	4
-----	Area 5 course	3	BIO 4310	Biotechnology: Cell Culture	4
-----	Area 6 course	3	-----	TI, WI, Minor or Free Electives	3
-----	TI, WI, Minor or Free Electives	3			
Credits		17	Credits		13

Course Rotation for Undergraduate Biology Courses 2015 - 2020

Semester Offered

Course	F 2015	S 2016	F 2016	S 2017	F 2017	S 2018	F 2018	S 2019	F 2019	S 2020	Summer	Winter
BIO 1120 General A&P I	X	X	X	X	X	X	X	X	X	X	X	
BIO 1130 General A&P II	X	X	X	X	X	X	X	X	X	X	X	
BIO 1630 General Biology I	X	X	X	X	X	X	X	X	X	X	X	
BIO 1640 General Biology II	X	X	X	X	X	X	X	X	X	X	X	
BIO 2050 Cell Biology	X	X	X	X	X	X	X	X	X	X	X	
BIO 2060 General Genetics	X	X	X	X	X	X	X	X	X	X	X	
BIO 2490 Ecol Evol & Behav	X	X	X	X	X	X	X	X	X	X		
BIO 3080 Animal Physiology	X	X	X	X	X	X	X	X	X	X		
BIO 3180 Zoology		X				X				X		
BIO 3200 Microbiology	X	X	X	X	X	X	X	X	X	X		
BIO 3330 Field Entomology											X	
BIO 3350 Field Botany											X	
BIO 3400 Ecology	X		X		X		X		X			
BIO 3450 Conservation Biology												X
BIO 3500 Animal Behavior	X		X		X		X		X			
BIO 3520 Economic Botany												
BIO 3610 General Botany	X		X		X		X		X			
BIO 3650 Plant Physiology		X		X		X		X		X		
BIO 3720 Math Models		X		X		X		X		X		
BIO 3990 Selected Topics												
BIO 3990 Selected Topics: Genomics		X		X		X		X		X		
BIO 3990 Selected Topics: Parasitology				X				X				
BIO 4020 Aquatic Ecology												
BIO 4110 PhysHuman Reproduction		X				X				X		
BIO 4160 Comp Animal Phys												
BIO 4170 Histology				X				X				
BIO 4210 Developmental Bio				X			X			X		
BIO 4240 Molecular Biology	X		X		X		X		X			
BIO 4300 Biotech: DNA	X		X		X		X		X			
BIO 4310 Biotech: Cell Culture		X		X		X		X		X		
BIO 4440 Evolution	X				X				X			
BIO 4600 Pharmacology	X		X		X		X		X			
BIO 4630 Terr Plant Ecology	X		X		X		X		X			
BIO 4700 Bioethics		X		X		X		X		X		
BIO 4800 Senior Seminar	X	X	X	X	X	X	X	X	X	X		
BIO 4840 SEM		X		X		X		X		X		
BIO 4850 TEM			X			X			X			
BIPY 4740 Neuroscience		X			X			X				
BIPY 4750 Behavior Genetics												

STUDENT RESEARCH OPPORTUNITIES

Both Biology and Biotech students are strongly encouraged to engage in active field or laboratory research projects with a faculty mentor as part of their educational experience. You are thus encouraged to approach any faculty member at any time to ask about research opportunities or visit:

<http://www.wpunj.edu/cosh/departments/biology/student.dot>.

In addition, the programs below can help you find and/or fund research projects at WPU, or beyond.

Independent Study

Independent study allows juniors and seniors to receive degree credits for carrying out a research project with a faculty mentor. Students must have at least a 3.0 grade point average to apply and students (under the guidance of a faculty mentor) must submit a project proposal. Interested students should speak to faculty members about available research projects. This can be taken instead of the Biology Seminar requirement. *For details, see page 23.*

GS-LSAMP-MAPS

(Garden State -Louis Stokes Alliance for Minority Participation/ Minority Association of Premedical Students)

These programs, led by Dr. Danielle Desroches, provide support and mentoring to increase the participation of minority students in science. In cooperation with the Minority Education and Enrichment Center, these programs provide financial

support for minority students to participate in summer research internships on and off campus. GS-LSAMP- MAPS also hosts meetings where students present their work, socialize, and learn about available scholarships, grants, and research opportunities. Contact Dr. Desroches for details and meeting times.

Summer Experience

This departmental program helps place students in off-campus summer research positions in a wide range of biological disciplines. Local, national, and international opportunities are available in fields such as ecology, behavior, cell and molecular biology, and forensic pathology. Students have worked at academic, government, and industry locations. This program also provides funding to help students pursue these opportunities. Contact Dr. David Slaymaker, Dr. Claire Leonard or Dr. Danielle Desroches about the many opportunities available.



Center for Research (CfR)

CfR was established by the College of Science and Health to support student involvement in the rapidly developing fields of biology, biotechnology, biochemistry, and environmental sciences. CfR provides funding for summer research projects involving undergraduates and also provides a moderate summer stipend for students. Interested students should talk with individual faculty members about research projects and about the availability of CfR support.



Student Undergraduate Research Program (SURP)

SURP is sponsored by the Provost's Office. SURP awards provide up to \$2000 for undergraduate research projects (equipment, supplies, and travel). Students must apply for SURP awards in cooperation with a faculty mentor so talk with individual faculty about this opportunity.



Biology and Biotechnology students should consider an extra-curricular research experience (with our faculty or in an off-campus program) as an important and integral part of their degree plan!

INDEPENDENT STUDY AND RESEARCH OPPORTUNITIES

Students are encouraged to join faculty in laboratory research. This experience can help the student in many ways. It gives students laboratory experience and it is excellent to have this type of experience on the resume, either for employment or for professional school. It also helps the students to determine which area of research is most interesting to them. This research can be conducted as an independent study for university credit. Financial support for students is sometimes available through grants awarded to members of our faculty. In addition, the College of Science and Health provides financial support for research through its Center for Research (CFR). Grants from the CFR are competitive and awarded to both faculty and students. The student should find a faculty member who is conducting research that sounds interesting and approach him/her to ask about research opportunities.

The Department of Biology also offers financial and logistical support for placement of undergraduate students, majoring in biology or biotechnology, in off-campus summer programs (including internships) offered locally, nationally, and internationally. These opportunities include competitive federally funded research programs, summer courses, positions with government agencies, corporate-sponsored internships, and placement with researchers in students' areas of interest.

ELIGIBILITY: Undergraduate status. Federally supported programs typically require U.S. citizenship or permanent residency. Field-oriented research programs require personnel in good physical condition. In some cases, minimum age of 18 is required. Minority and economically disadvantaged students are particularly encouraged to apply.

DURATION: Summer programs for undergraduates can range from 2 to 16 weeks and usually take place sometime during the months of May through August. While many programs have fixed lengths and start/end dates, some programs are more flexible and may be tailored to student availability.

DESCRIPTIONS AND DEADLINES: Printed descriptions of a wide variety of summer programs are available for students to examine. Deadlines are variable among programs and generally range from the first week of February to later in the spring. See Dr. Slaymaker for out-of-state programs and Dr. Leonard for in-state programs and especially corporate internships.

HOW TO APPLY FOR DEPARTMENTAL SUPPORT: Contact Dr. Slaymaker (973/720-2439; SlaymakerD@wpunj.edu) for application forms and instructions.



'Paola Velandia holding a red bat captured in a southern New Jersey cedar swamp. Paola assisted Dr. Risley with bat research funded by the Federal Aviation Administration.'

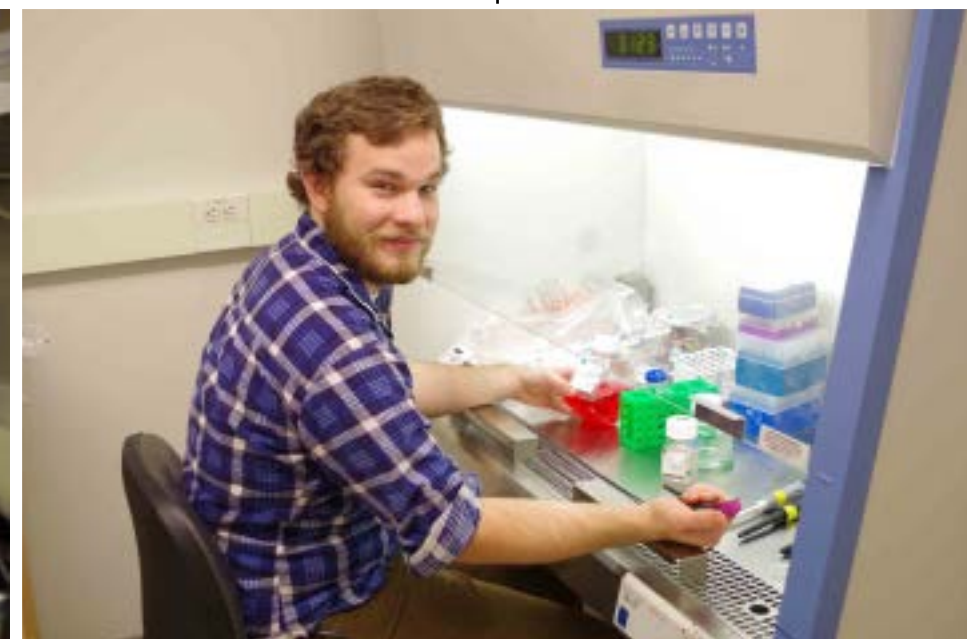
Students are able to present their findings at various meetings, including a regional meeting dedicated to undergraduate research, held here at William Paterson University. See your mentor for more information.

LABORATORIES AND EQUIPMENT

Major facilities and equipment include: The animal facilities, with colonies of genetically selected mice and rooms for data collection and analysis; the neurobiology facility, including a computerized image processing system and facilities for animal surgery and behavioral and physiological research; confocal and electron microscopy facilities, including transmission and scanning electron microscopes and associated specimen preparation equipment, an X-ray analyzer and two darkrooms; biotechnology facilities and tissue culture lab, including PCR units, electrophoresis units, computerized UV spectrophotometers, high pressure liquid chromatography units, ultracentrifuges and three scanning spectrophotometers; greenhouse; and a well-equipped ecology laboratory with both stationary and field equipment. In addition to laboratory facilities, the department is well-

equipped for field-oriented aquatic and terrestrial ecological research.

Our campus is surrounded by forest and includes several streams, a waterfall, and three ponds. All of these are explored by students in various Biology courses. An adjacent 1,000 acres of protected forest, purchased by the city of Wayne and The Nature Conservancy has been described as the largest parcel of undeveloped forest in the New York Metropolitan area. It is, of course, an excellent outdoor laboratory for ecological projects. In May 1998, Bayer Corporation donated the nearby Oldham Pond to WPUNJ. This 26.5 acre facility is being utilized by both Biology and Environmental Science students in efforts to better understand this urban-impacted ecosystem. The Department of Biology is located in the new 232,000 sq. ft. Science Complex, opened in 2012.



MINOR IN BIOLOGY

A minor in Biology is suggested for students majoring in one of the other sciences, as well as students enrolled in Nursing, Psychology, Community Health, and those students who have a special interest in the field of biology. This course sequence may broaden future graduate and employment opportunities.

Required Courses: BIO 1630, 1640, 2050, 2060 and 2490 20 credits

One year of Chemistry and Precalculus are strongly recommended.

TRANSFER STUDENTS

Transfer students from within the University must abide by all rules and regulations for degree requirements; every time a student changes his/her major there is the potential of losing credit in a specified area and accumulating elective credits that will prevent timely graduation in the newly chosen major. Students must be prepared to spend additional time as undergraduates to complete the requirements. (e.g., a mathematics requirement for a business major does not fulfill the mathematics requirement for a science/biology major). Transfer students from Nursing or Community Health will be able to substitute BIO 1120/1130 for BIO 1640 and may be able to substitute BIO 1700 for BIO 3200.

Transfer students with undergraduate course credits (but no bachelors degree) must complete a minimum of 30 credits at WPUNJ with a minimum of five (5) biology courses (at least three with a laboratory) and fulfill all other degree requirements for the major in order to graduate.

Transfer students with an AA or AS Degree from a New Jersey Community College automatically receive credit for all University Core Curriculum requirements, but should check their transcript carefully with regards to majors courses and consult the department chairperson with any questions.

Second Degree students, who have earned a bachelors degree with a different major either at WPUNJ or another accredited institution must take a minimum of thirty (30) credits at WPUNJ. This must include at least 50% of the major (biology) and all co-requisite courses unless previously completed, in order to receive a second degree. Transfer students who have completed the equivalent of BIO 1120/1130 will receive credit for **either** BIO 1640 or as a free elective.

ACADEMIC ADVISEMENT

Each biology student is assigned to a specific faculty member who will act as an advisor and as a mentor to help the student plan his/her academic career, choose appropriate courses each semester and guide his/her progress toward timely graduation. **Every student is expected to consult his/her advisor** during each semester, at least before registration and more frequently if there are questions or problems.

NEW JERSEY N-12 TEACHING CERTIFICATION

Students interested in NJ State Teacher Certification must contact the College of Education at the beginning of the sophomore year (after 30 earned credits) to be able to complete the requirements for certification in a timely fashion. Students will be assigned a second advisor, who will assist in choosing the certification courses and field-study sequence.

Students planning this route are advised to choose the General Biology Concentration.

HONORS PROGRAMS AT WPUNJ

For talented and highly motivated students of all majors the institution offers specific Honors tracks that complement the standard curricula offered by the five colleges. Each Honors Track Program has as its primary goal to enrich the student's collegiate experience and provide a unique educational opportunity for enhancing the individual learning environment. There are seven (7) specific honors tracks, one of which is closely related to biology: **Biopsychology**; but you may also be interested in one of the other six.

Consult the Honors College Office, Raubinger Hall, Extension 3658, or Dr. Robert Benno in the Department of Biology, Ext. 3440 for more information.



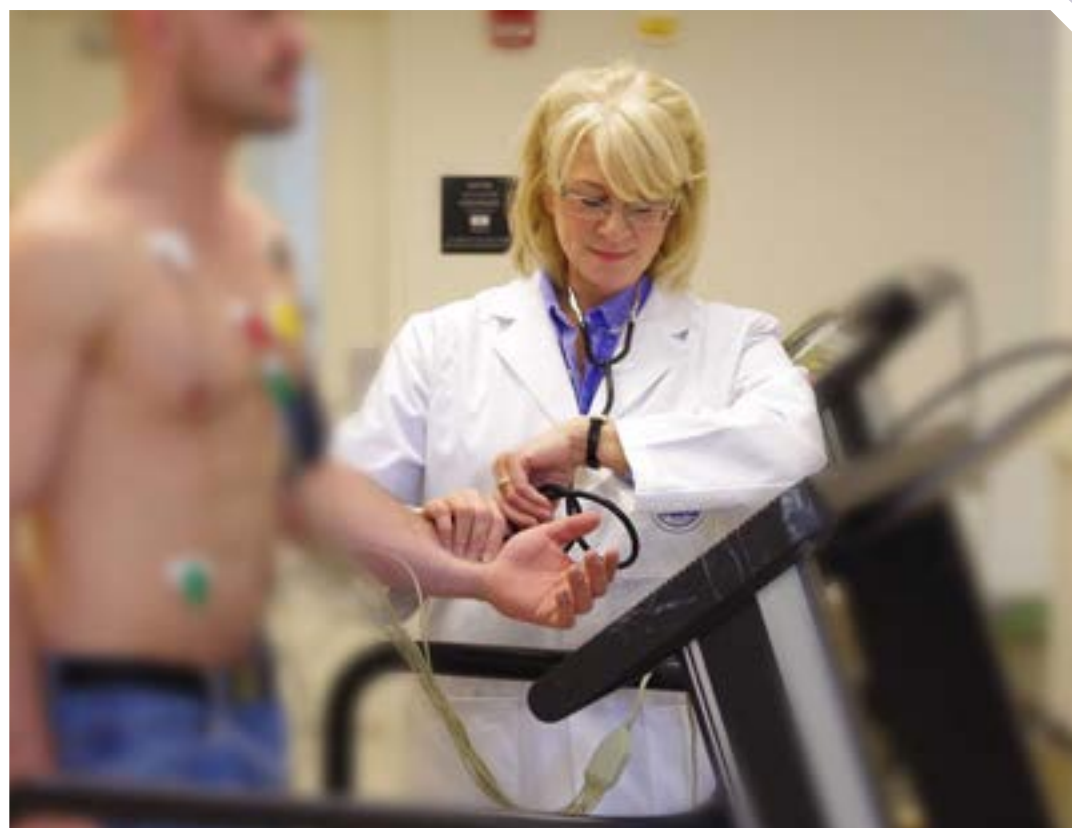
PRE-PROFESSIONAL PROGRAMS

The Department of Biology *within the biology major* offers course sequences which prepare students for entrance to **health related professional schools** which lead to doctoral degrees in Medicine, Dentistry, Veterinary Medicine, Chiropractic, Podiatry, Optometry, Pharmacy, Physical Therapy and Masters degree in Physicians Assistant.

The Pre-Professional Committee advises students on course selection, coordinates a speaker series through the *Future Health Professionals*, writes letters of recommendation to professional schools, gives mock interviews for students and facilitates the application process to professional schools. For more information consult Dr. Claire Leonard at X2791 or leonardc@wpunj.edu or visit <http://www.wpunj.edu/cosh/departments/biology/undergraduate-programs/ppp.dot>. Students interested in any professional program should consult the pre-professional advisor early in their undergraduate careers.

Students interested in professional schools are not limited to a biology or other science major, although most of them choose this path. A certain course sequence in Biology, Chemistry and Physics; high GPA, and good scores on the MCATS and any chosen major are acceptable.

Over the past five years 80% of our students who applied to professional schools have been accepted.



WPUNJ / RUTGERS 3+ 3 Pre-Physical Therapy Program

The Department of Biology at William Paterson University (WPUNJ) in conjunction with the Rutgers School of Health Related Professions (SHRP) has established a collaborative 3 + 3 program of study leading to the Bachelor of Science degree in Biology from WPUNJ and the Doctor of Physical Therapy degree from the Rutgers SHRP after completion of a six year joint program. Successful students will spend three years (or the time required to complete 83.5 credits) in *the Pre-Physical Therapy program at WPUNJ* fulfilling the requirements for admission to the Doctor of Physical Therapy program at Rutgers SHRP.* The following requirements must be completed at William Paterson University:

**Major Science and Mathematics Courses:

General Biology I (BIO 1630)	4 credits
General Anatomy & Physiology I, II (BIO 1120, 1130)	8 credits
General Chemistry I, II (CHEM 1600, 1620)	8 credits
College Physics I, II (PHYS 2550, 2560)	8 credits
Calculus I (MATH 1600)	4 credits
Statistics for science majors (MATH 2300)	4 credits
Genetics (BIO 2060)	4 credits
Total	40 credits

University Core Curriculum and Elective Courses:

First Year Seminar (WPU 1010)	1.5 credits
UCC Personal Well-Being	3 credits
UCC Expression (Art & Comm; Literature; Writing)	9 credits
UCC Ways of Knowing (Philos.; Hist; Soc & Behav)	12 credits
(Must include General Psychology (PSY 1100))	
UCC Ways of Knowing (Science: College Physics I (PHYS 2550))	(list above)
UCC Ways of Knowing (Quantitative: MATH 1600)	(list above)
UCC Diversity and Justice	3 credits
UCC Community and Civic Knowledge	3 credits
UCC Global Awareness	3 credits
Foreign Language	6 credits
Biomechanics (KNES 3300)	3 credits
Writing Intensive (3 courses) – may be included in above courses	
Technology Intensive (2 courses) – may be included in above courses (list above)	
Total	43.5 credits

Total number of credits required at WPUNJ

83.5 credits**

Students must maintain a GPA of at least 3.0 to be competitive for admission to the Physical Therapy program at Rutgers SHRP. A GPA of 3.3 is preferred.

Three Year Suggested Course Sequence

Freshman Year				
Fall	Cr.	Spring	Cr.	Total Cr.
BIO 1630	4	BIO 1120	4	
WPU 1010	1.5	MATH 1600	4	
UCC	3	UCC	3	
UCC	3	UCC	3	
UCC	3			
	14.5		14	28.5

NOTE: BIO1120 and BIO1130 are also offered in Summer sessions 1 and 2, respectively.

Sophomore Year				
Fall	Cr.	Spring	Cr.	Total Cr.
BIO 1130	4	BIO 2060	4	
CHEM 1600	4	CHEM 1620	4	
Foreign Lang. I	3	Foreign Lang. II	3	
UCC	3	UCC	3	
	14		14	28

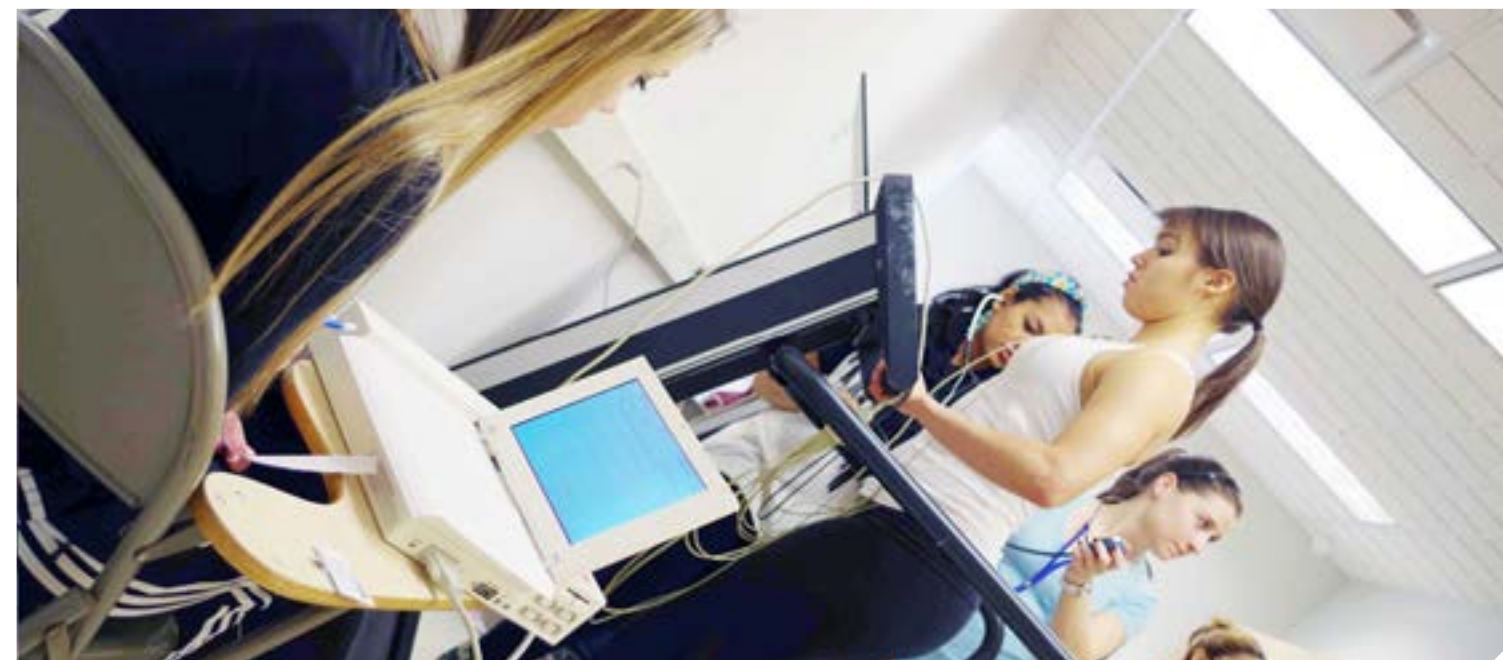
Junior Year				
Fall	Cr.	Spring	Cr.	Total Cr.
PHYS 2550	4	PHYS 2560	4	
MATH 2300	4	KNES 3300	3	
UCC	3	UCC	3	
UCC	3	UCC	3	
	14		13	27

Senior Year (to complete Biology/Biotechnology Major)

Organic Chemistry I, II (CHEM 2510, 0510, 2520, 0520)	8 credits
Cell Biology (BIO 2050)	4 credits
Ecology, Evolution and Behavior (BIO 2490)	4 credits
Biology Electives (3000-4000 level)	15-16 credits
Biology concentration-specific course	3-4 credits
Biology Seminar (BIO 4800)	2 credits
Total credits	36-38 credits

*Admission to the Physical Therapy Program at Rutgers SHRP is not guaranteed.

**University policy requires that at least 30 of the 83.5 total credits shall be completed at WPU. Further, half the 'major' courses (20 of 40 credits), including at least 8 credits of biology, must be taken at WPU.



ADDITIONAL FACTS ABOUT THE WPUNJ / RUTGERS 3+ 3 Pre-Physical Therapy Program

1. The primary advantage for a student in this articulated program is that it reduces one year of schooling. Students who apply to Rutgers SHRP from non-articulating schools must have a bachelor's degree.
2. Rutgers SHRP has a total of approximately 50 slots available each year.
3. The GRE is required for admission and letters of recommendation from Physical Therapists for whom the applicant has worked or volunteered.
4. Applicants should contact Dr. Leonard who will help them with their application packets. Applications for Rutgers SHRP's Physical Therapy program are available online at http://shrp.rutgers.edu/dept/PT/north/admissions/application_process_tips.htm
5. Students should apply to Rutgers SHRP during the summer (e.g., July, August) before their third year. Deadline for applications is October 1st.
6. Tuition for the Rutgers SHRP, DPH PT program is available on their website at http://rbhs.rutgers.edu/studentfinancialaid/index_new_brow.htm
7. Undergraduate financial aid will end when the student completes the program at William Paterson University.
8. After the required 83.5 credits at WPUNJ, the number of credits required in the Physical Therapy program at Rutgers SHRP is 110, with a required summer semester at the beginning of the program.
9. The contact person for the Admission Committee at Rutgers SHRP is available at http://shrp.rutgers.edu/dept/PT/north/faculty_staff/faculty_staff.html

Students accepted in the Physical Therapy Program at Rutgers SHRP will receive the BS from William Paterson University after the completion of the first year at Rutgers SHRP, and a Doctor of Physical Therapy (DPT) degree after the completion of the program.

Students not admitted to the Physical Therapy program after their 3rd year of study in the Pre-PT program, may complete the Biology or Biotechnology major within the 4th year at William Paterson University.

WPUNJ / RUTGERS 3 + 3 Pre-Physician Assistant Program

The Department of Biology at William Paterson University (WPUNJ) in conjunction with the Rutgers School of Health Related Professions (SHRP) has established a collaborative 3 + 3 program of study leading to the Bachelor of Science degree in Biology from WPUNJ and the Master of Science-Physician Assistant degree from the Rutgers SHRP after completion of a six year joint program. Successful students will spend three years (or the time required to complete 92.5 credits) in the Pre-Physician Assistant (pre-PA) program at WPUNJ fulfilling the requirements for admission to the MS-Physician Assistant program at Rutgers SHRP.* The following requirements must be completed at William Paterson:

**Major Science and Mathematics Courses:

General Biology I (BIO 1630)	4 credits
General Anatomy & Physiology I, II (BIO 1120, 1130)	8 credits
Cell Biology (BIO 2050)	4 credits
Genetics (BIO 2060)	4 credits
General Chemistry I, II (CHEM 1600, 1620)	8 credits
Organic Chemistry I, II (CHEM 2570, 2580)	8 credits
College Physics I, II (PHYS 2550, 2560)	8 credits
Calculus I (MATH 1600)	4 credits
Statistics (MATH 2300)	4 credits
Total	52 credits

University Core Curriculum (UCC) and Elective Courses:

First Year Seminar (WPU 1010)	1.5 credits
UCC Personal Well-Being	3 credits
UCC Expression (Art & Comm; Literature; Writing) (Must include College Writing (ENG 1110))	9 credits
UCC Ways of Knowing (Philos.; Hist; Soc & Behav) (Must include General Psychology (PSY 1100))	12 credits
UCC Ways of Knowing: Science (College Physics I (PHYS 2550))	(list above)
UCC Ways of Knowing: Quantitative (Calculus I (MATH 1600))	(list above)
UCC Diversity and Justice	3 credits
UCC Community and Civic Knowledge	3 credits
UCC Global Awareness	3 credits
Foreign Language	6 credits

Writing Intensive (3 courses) – may be included in above courses
 Technology Intensive (2 courses) – Cell Biology and Genetics (list above)

Total 40.5 credits

Total number of credits required at WPUNJ 92.5 credits**

Students must have a GPA of at least 3.0 to be considered for admission to the MS-Physician Assistant program at Rutgers SHRP.

*Admission to the MS-Physician Assistant Program at Rutgers SHRP is not guaranteed.

**For eligibility consult Dr. Leonard, pre-professional advisor.

Three Year Suggested Course Sequence

Freshman Year				
Fall	Cr.	Spring	Cr.	Total Cr.
BIO 1630	4	BIO 1120	4	
WPU 1010	1.5	MATH 1600	4	
UCC	3	UCC	3	
UCC	3	UCC	3	
UCC	3	UCC	3	
14.5		17		31.5

NOTE: BIO1120 and BIO1130 are also offered in Summer sessions 1 and 2, respectively.

Sophomore Year				
Fall	Cr.	Spring	Cr.	Total Cr.
BIO 1130	4	BIO 2060	4	
CHEM 1600	4	CHEM 1620	4	
Foreign Lang. I	3	Foreign Lang. II	3	
MATH 2300	4	UCC	3	
		UCC	3	
14		17		32

Junior Year				
Fall	Cr.	Spring	Cr.	Total Cr.
PHYS 2550	4	PHYS 2560	4	
CHEM 2570	4	CHEM 2580	4	
BIO 2050	4	UCC	3	
UCC	3	UCC	3	
15		14		29
			Total Credits	92.5

Students accepted in the MS-Physician Assistant Program at Rutgers SHRP will receive the BS Biology degree from William Paterson University after the completion of the first year at Rutgers SHRP, and a MS-Physician Assistant degree after the completion of the program.

Students not admitted to the MS-Physician Assistant Program after their 3rd year of study in the Pre-PA program, may complete the BS Biology major within the 4th year at William Paterson University.

**Senior Year
(to complete Biology Major)**

Ecology, Evolution and Behavior (BIO 2490) AND (select ONE of the three Concentrations below)	4 credits
Biology: General Concentration (Plant course + 3 Biology Electives) OR	14-16 credits
Biology: Physiology & Behavior Concentration (An. Behavior + An. Physiology + 2 Biology Electives) OR	14-15 credits
Biology: Ecology Concentration (Ecology + Pl. Ecology + 2 Biology Electives) AND	14-16 credits
Biology Seminar (BIO 4800)	2 credits
Writing Intensive course (upper level)	3 credits
Total	23-25 credits

**ADDITIONAL FACTS ABOUT THE
PRE-PHYSICIAN ASSISTANT/MS-PHYSICIAN
ASSISTANT PROGRAM AT WPUNJ/RUTGERS SHRP**

1. The primary advantage for a student in this articulated program is that it reduces one year of schooling. Students who apply to Rutgers SHRP from non-articulating schools must have a bachelor's degree.
2. Rutgers SHRP has a total of approximately 50 slots available each year.
3. While no entrance exam is required, the applicant should become very familiar with the Admissions tab on the website (http://shrp.rutgers.edu/dept/primary_care/paweb/index.html). The student should pay particular attention to the General Info, Tuition & Fees, and Essential Functions (and the section for International Students where applicable). For all 3+3 students, the guidelines for articulated schools are given at the BOTTOM of the web site in a section entitled: "Admission Requirements for those who are seeking admission from one of our 3+3 articulated institutions."
4. An important note about the articulation agreement is as follows : "Please note that enrollment at one of these institutions does not guarantee admittance to the Physician Assistant Program nor does meeting the minimum requirements."
5. Application Deadlines for 3+3 Applications: "Applications are submitted directly to the PA Program by June 1 at the end of the sophomore year." The website for the downloadable application is found on the web site for general information: http://shrp.rutgers.edu/dept/primary_care/paweb/index.html. This web site includes application instructions and a form for recommenders. *Note: If the applicant applies at the end of their junior year, they will be ineligible to apply for the 3+3 program.*
6. Letters of Recommendation for the WPU/ Rutgers SHRP PA program do NOT include a pre-professional committee letter, and it is the responsibility of the student to learn which letters are required (see website listed in #3), to engage the recommenders, provide them with the correct timeline for the application and provide all addresses or web links etc.
7. Undergraduate financial aid will end when the student completes the program at William Paterson University.
8. After the required 92.5 credits at WPUNJ, the number of credits required in the MS-Physician Assistant Program at Rutgers SHRP is 44 credits during the 4th year of study (136.5 credits for BS degree).
9. Contact person is the admissions coordinator Rebecca Santiago: santanre@rutgers.edu

ASSESSMENT PROCEDURES FOR STUDENT LEARNING OUTCOMES

All students entering William Paterson University as Biology/Biotechnology majors in Fall 2002 or thereafter must complete the *specified departmental curriculum, other curricular requirements, and take a comprehensive exit exam*, to qualify for the BS degree. The primary purpose of the exit exam is as an evaluation tool for the programs the department offers and to determine how well these programs serve the students and fulfill the goals and objectives that the faculty has laid out.

During the *Biology Seminar (BIO 4800)* students will complete a questionnaire, and their competence in terms of the learning outcomes objectives listed under lecture material will be assessed.

After a certain period all graduates will receive a questionnaire relating to the biology major programs and the students perception of the appropriateness and relevance of the curriculum in the light of their current situation.

ADVANCED PLACEMENT CREDIT

Biology Department High School Advanced Placement Course Credit Policy: Students who took the Advanced Biology Placement course and received a minimum score of 50 will be granted 4 credits for General Biology I (BIO 1630). The total number of credits required for graduation with a major in Biology or Biotechnology remains the same.



ACADEMIC INTEGRITY POLICY FOR WILLIAM PATERSON UNIVERSITY STUDENTS*

I. Standards of Academic Conduct

As an academic institution committed to the discovery and dissemination of truth, William Paterson University expects that all members of the University community shall conduct themselves honestly and with professional demeanor in all academic activities.

William Paterson University has established standards of academic conduct because of its belief that academic honesty is a matter of individual and university responsibility and that, when standards of honesty are violated, each member of the community is harmed.

Members of the University community are expected to acknowledge their individual responsibility to be familiar with and adhere to the Academic Integrity Policy.

II. Violations of Academic Integrity

Violations of the Academic Integrity Policy will include, but not be limited to, the following examples:

A. Cheating during examinations includes any attempt to (1) look at another student's examination with the intention of using another's answers for attempted personal benefit; (2) communicate in any manner, information concerning the content of the examination during the testing period or after the examination to someone who has not yet taken the examination; (3) use any materials, such as notebooks, notes, textbooks or other sources, not specifically designated by the professor of the course for student use during the examination period, or (4) engage in any other activity for the purpose of seeking aid not authorized by the professor.

B. Plagiarism is the copying from a book, article, notebook, video, or other source material, whether published or unpublished, without proper credit through the use of quotation marks, footnotes, and other customary means of identifying sources, or passing off as one's own the ideas, words, writings, programs, and experiments of another, whether or not such actions are intentional or unintentional. Plagiarism will also include submitting, without the consent of the professor, an assignment already tendered for academic credit in another course.

C. Collusion is working together in preparing separate course assignments in ways not authorized by the instructor. Academic work produced through a cooperative (collaborative effort) of two or more students is permissible only upon the explicit consent of the professor. The collaboration must also be acknowledged in stating the authorship of the report.

D. Lying is knowingly furnishing false information, distorting data or omitting to provide all necessary, required information to the University's advisor, registrar, admissions counselor, professor, etc., for any academically related purpose.

E. Other concerns which relate to the Academic Integrity Policy include such issues as computer security, stolen tests, falsified records, and vandalism of library materials. No list could possibly include all the possible violations of academic integrity. These examples should, however, give a clearer idea of the intent and extent of application of this policy.

III. Resolution of Academic Integrity Policy Violations

- A. If a faculty member has sufficient reason to believe that a violation may have occurred on any work submitted for a grade, he/she must attempt to discuss this matter with the student within ten (10) working days of the incident.
- B. After discussing this matter with the student, and if the student accepts the proposed penalty, the student waives his/her right to a hearing. Depending on circumstances, as assessed by the faculty member who has discussed the matter with the student, the following penalty could be imposed:
1. Resubmission of the assignment
 2. Failure of the assignment
 3. Failure of the course
 4. Forced withdrawal from the course with no credit received
 5. Impose other appropriate penalties with the consent of the student
 6. Recommendation of the President of suspension or expulsion from the University
- C. If the student does not admit to a violation or disagrees with the proposed penalty he/she must:
1. Speak directly to the faculty member within ten (10) working days of being informed of a violation or of the proposed penalty. If, after repeated attempts, the student is unable to reach the faculty member within ten (10) working days, the student must notify the department chairperson in writing within that ten (10) day period.
 2. If, after discussion with the faculty member, the student is dissatisfied with the outcome, the student must contact the department chairperson presenting a dated, written, and signed statement describing the specific basis for the complaint. At this time, the student will also provide the faculty member with a copy of these written materials.
 3. The department chairperson will try to resolve the issue by reaching a settlement which is agreed upon by both the student and the faculty member. If the issue is not resolved at the chairperson's level, the student will request that the chairperson convene the Department Executive Council (or other appropriate department committee)--excluding the faculty member involved - to hear the appeal. The faculty member will submit a written, dated and signed statement of the alleged violation to the council/committee. The student will submit a written, dated and signed statement describing the basis of the complaint. The accuser will assume the burden of proof. When the faculty member involved is the chairperson, then the student will request that the dean of the college convene the Department Executive Council (or other appropriate department committee). The Department Executive Council/Committee will submit its decision to the chairperson (or college dean, if the faculty member involved is the chairperson).

4. If not satisfied with the Department Executive Council's (or other appropriate department committee's) decision, the student may ask the dean of that college to bring the matter to the College Council. The faculty member will submit a written, dated and signed statement of the alleged violation. The student will submit a written, dated and signed statement describing the basis for the complaint. The accuser will assume the burden of proof. The chairperson of the department concerned will not take part in the final vote (though the written decision from the department chairperson will be part of the record). (The College Council's decision will constitute the University's final decision regarding the substantive nature of the case.) Future appeals based on violations of due process are permitted to the limit of the law.

5. Each step in the procedure must be initiated within ten (10) working days of the faculty, chairperson, department, or college response. Dated, written, and signed statements are required at each step. Likewise, at each level, the faculty member(s), chairperson, Department Executive Council (or other appropriate department committee) or College Council must complete a review of all pertinent written materials prior to rendering a decision, in writing, within ten (10) working days of receipt of complaint materials. In case the faculty member has verifiably been unable to be contacted, or in other instances of extenuating circumstances affecting students or faculty, it is understood that the student's right to appeal will not be jeopardized and the time constraints will be extended. Due process must be followed at every step of this procedure. No penalty will be changed by anyone other than the faculty member convincing evidence that the penalty was inconsistent with professional standards of the discipline.

1. Each student who registers a complaint with a department chairperson must be given a copy of this policy. A copy must be attached to the appeal and signed by the student to indicate that he/she has been given a copy of the procedure, read it, and understand it before the appeal can proceed.

*From Undergraduate Catalogue:

<http://www.wpunj.edu/cte/wpu-academic-integrity-policy.dot>

PASS/FAIL POLICY

A maximum of one course (3-4 credits) may be taken Pass/ Fail during a semester and no more than 12 credits may be taken Pass/ Fail in a student's academic career.

* Only free elective courses may be taken P/F. Major and co-requirements cannot be taken pass/fail.

* Students must complete a Pass/Fail contract in the Office of the Registrar. Deadlines are posted on the Semester Calendar.

* Once the pass/fail contract is submitted it cannot be reversed.

* If a grade of F is earned in a pass/fail course, it is calculated into the student's GPA

* Second degree students may not take a course on a pass/fail basis

* The following categories of graduate students may not take a course on a pass/fail basis: GN, GC, GE, GT, GM

* The above policy as outlined was revised and applies to all students in attendance as of Fall 2003.

GRADE DEFINITIONS

A	Excellent	F	Failing
A-		P	Passed course, taken on a Pass/Fail basis, equivalent to A-D
B+		S	Satisfactory (Basic Skills courses, not for graduation credit)
B	Good	In	Incomplete
B-		N	Unacceptable, must repeat (Writing Effective Prose, Basic Skills, and Freshman Seminar)
C+		M	Missing, no grade submitted
C	Satisfactory	WD	Withdrawn Officially
C-		AU	Audit
AU	Audit		
D+			
D	Minimally passing		

NOTE: (P/F) A "PASS" "may not always be" transferable to another college.

REPEAT COURSE POLICY

Only currently enrolled undergraduate first degree students may repeat once any course taken toward degree completion in which a grade of D+ or D has been received. A grade of F may be repeated only twice.

- Continuing students DO NOT need to complete an application to repeat courses. Courses will be systematically updated.
- Maximum number of repeats per course is two (2).

NOTE: Biology and Biotechnology Core courses can only be repeated once.

- Only the last grade will be computed in the GPA.
- All grades will be shown on the transcript.
- The course being repeated may only be taken on a pass/fail basis if it was initially taken pass/fail.
- Course substitutions are not permitted.
- Students must be registered and have paid for the courses that are being repeated.

PROCEDURES FOR A LEAVE OF ABSENCE/WITHDRAWAL

Leave of Absence (*For details go to*)

<http://www.wpunj.edu/registrar/academic-regulations/leave.dot>

Withdrawal from the University (*For details go to*)

<http://www.wpunj.edu/registrar/academic-regulations/leave.dot>

SCIENCE ENRICHMENT CENTER

The Science Enrichment Center sponsored by the college of Science and Health offers a variety of resources to enhance student learning of difficult topics in the sciences. **OPEN TO ALL STUDENTS** the services are available both at the Center (Science East 3054) and also on the WEB.

Visit the Center to check the days and times (changes each semester) as to when the center is open and take advantage of the following services:

1. Academic Assistance - (tutoring, exam review, study groups)
2. Laboratory Equipment - (anatomical models, rocks, slides, field guides, maps)
3. Reference Material - (available in the Center and on-line)
4. Test Bank - (old tests available at the Center and on-line, solution manuals, MCAT Review books, textbooks)
5. Computer Lab - (computers, presentation system, scanner, technological assistance, science links)
6. Other - (computer programs, audiovisual tapes, study guides, video disks)
7. Workshops - (how to study for science courses - TBA)

For further information contact: Donna Potacco, X3340, SciE3054, potaccod@wpunj.edu,
<http://www.wpunj.edu/sec>.

BIOLOGY ALUMNI

The department is proud of the accomplishments of our graduates in Biology/Biotechnology. We like to keep track of your careers and future and urge all to join the Alumni Association of WPUNJ, and especially the departmental Alumni group, so we may send you the an annual copy of the BIO ALUMNI NEWS. This newsletter was started more than 30 years ago and keeps you informed of faculty, staff and alumni's whereabouts, families, research, etc. Also keep in touch via Facebook.com (name: [BioWilliamPaterson](#))!

Annually, 70-80% of our students (Biology/Biotechnology) who applied to professional and graduate degree programs are accepted immediately upon graduation. The remainders of the graduates enter the job market in industry, business, research and clinical laboratories, and frequently continue their education on a part-time basis. Our Pre-professional advisors and the faculty as a whole have been very successful in guiding students through the application process toward achieving admission to their chosen professional schools and other career goals. Alumni are frequently invited back to share their WPUNJ experience, graduate education, and working experiences with current undergraduate Biology/Biotechnology majors.



SCHOLARSHIPS, AWARDS, HONOR SOCIETY

1. Undergraduate scholarship: Improving Student Success in Biology and Biotechnology (ISSBB)

Twenty to 25 scholarships have been made available by a generous grant from the National Science Foundation. Scholarship awards will vary based on financial need, with a maximum award of \$10,000, and will be given each year to full-time William Paterson University students pursuing a B.S. in Biology or Biotechnology and planning to pursue careers in scientific research, industry or teaching. To be eligible for an ISSBB Scholarship, you must:

- Be eligible for and plan to enroll or continue full time in either the Biology or Biotechnology B.S. degree program at William Paterson University and be considering a career in industry, scientific research or teaching.
- Provide documentation that you are a U.S. citizen, national, alien lawfully admitted for permanent residence, or an alien classified as a refugee at the time of application
- Submit a Free Application for Federal Student Aid (FAFSA) by the ISSBB application deadline.
- Provide two letters of recommendation – one of which must be from a science, math or technology instructor
- Provide a personal statement outlining goals, financial need, education plans and career objectives.



Scholarships are renewable for up to four years given the student maintains a minimum GPA of 2.8 in science and math and a cumulative GPA of 3.0 or higher. For more information, contact Dr. Eileen Gardner 973/720-3441 or [download a scholarship application](#) from the Biology department website.

2. Undergraduate Scholarship: **Robert Noyce Teacher Scholarship (NOYCE)**

Students studying to teach science or math who intend to spend at least 2 years teaching in a high need school are eligible for scholarships up to \$10,000 a year for up to two years. These scholarships have been made available by a generous grant from the National Science Foundation. To be eligible for a Robert Noyce Teacher Scholarship, you must:

- Be enrolled in a Mathematics or Science major and an Education major (leading to middle school (5-8) or high school certification) at William Paterson University.
- Have completed at least 60 credits and have taken at least 15 credits towards the science or math major.
- Have achieved an overall Grade Point Average (GPA) of 2.8 at WPUNJ and in your major.
- Provide documentation that you are a U.S. citizen, national, or permanent resident alien at the time of application.
- Complete and file a Free Application for Federal Student Aid (FAFSA) with the Financial Aid Office.
- Be prepared to complete two years of teaching in a USDOE designated high-need school for each year of scholarship support

For more information contact Dr. Eileen Gardner at gardnere@wpunj.edu

3. Undergraduate Scholarship: C. Kent Warner

The Department of Biology annually awards a **maximum of five \$1,000 scholarships** to biology or biotechnology majors. The scholarships are named for C. Kent Warner who served at William Paterson from 1958-1963 as the first Chairman of the Department of Science and Mathematics. To be eligible, you must:

1. Be officially registered as an undergraduate biology or biotechnology major.
2. Be a full-time student (registered for at least 12 credits) at the time of application and remain a full-time student throughout the year for which the scholarship is awarded.
3. Be a sophomore or above (minimum of 24 credits) and have completed General Biology I and/or II at the time you would receive the scholarship.
4. Have a minimum GPA of 3.0 at the time of application.

Scholarships are credited toward the student's spring tuition.

Applications may be picked up in the Department of Biology Office, SciE 4064 in February.

4. Biology Honor Society Beta Beta Beta
Advisor: Dr. Lance Risley – SciE 4051 – 973/720-3438

The William Paterson University Biology Department is proud of its affiliation with the Chi Rho Chapter of Beta Beta Beta, a national honor society founded in 1922 for students in the biological sciences. The William Paterson University Chapter has been in existence since 1986. Membership is based on achievement in Biology as well as overall academic performance. Membership invitations are extended during the spring semester primarily to Juniors and Seniors, but outstanding sophomores may also be invited to join.

5. Graduation Awards

1. *Outstanding Senior Award - Criteria*

For relatively high academic standing (not necessarily highest)

2. *C. Kent Warner Award - Criteria*

- a. High academic standing
- b. Contributions to the Department, College, and University are considered

3. *Biology Faculty Award - Criteria*

Academic excellence despite encountering severe obstacles and hardships.

4. *Undergraduate Research Award*

This award honors the best research project by an undergraduate

5. *Capstone Award*

High score on ETS Capstone exam



JOB OPPORTUNITIES

Students interested in working up to twenty hours per week as paid Student Assistants either in the office or as a Lab Assistant to one of the laboratory technicians may contact the Financial Aid Office (x2203) and fill out an application. On-campus jobs have the advantage that students can choose convenient hours and save time traveling to and from off-campus jobs. It is also advantageous for biology majors to get to know the department and the faculty.

CAREERS

You will have many career options upon graduation and even before you are completed with your studies. About half of our graduates go directly to graduate or professional school to continue their education. Others obtain positions in business, industry, and research laboratories or enter the teaching profession. It is important to start looking into possible career choices with your faculty advisor and the career services staff as early as your freshman year, but keep an open mind!

SUGGESTED CAREER PLANNING TIMETABLE

FRESHMAN YEAR

1. Identify personal interests, needs and skills.
2. Visit the Career Services Office in University Commons.
3. Expand your information about occupations that are of interest (visit the Career Library).

JUNIOR YEAR

1. Consider the variety of choices that will be open to you after graduation; immediate full-time employment, further schooling, etc.
2. Plan for your choices.

SOPHOMORE YEAR

1. Reassess the suitability of your major. Consider selecting a new major more consistent with your interests, abilities, and goals.
2. Develop tentative short and long range goals.
3. Attend a workshop exploring careers in your major.
4. Consider activities such as part-time jobs, internships, volunteer/community work, summer research.
5. Discuss career and educational plans with your advisor.

SENIOR YEAR

1. Take necessary examinations (graduate study, government, jobs, and professional school).
2. Complete applications for graduate/professional study.
3. Establish your reference/credential file.
4. Attend workshops on resume writing, interview techniques, job search strategies, etc.

TRAINING AND CAREERS IN BIOLOGY

START



Bachelor's Degree

- Assistant Research Scientist
- Dental Hygienist
- Laboratory Director
- Elementary School Teacher
- High School Teacher
- Science Editor/Writer
- Pharmaceutical Sales
- Personnel Officer
- Psychotherapy Assistant
- Business
- Park Ranger
- Museum Curator
- Dental Hygienist
- Lab Technician
- Landscape Design

Professional Schools

- Veterinary Medicine
- Pharmacy
- Chiropractic
- Dentistry
- Medicine
- Optometry
- Osteopathic Medicine
- Podiatry

Master's Degree

- Teaching High School
- Teaching Jr. College
- Research Position
- Exercise Physiology
- Biostatistician
- Medical Librarian
- Psychometrician
- Fish & Wildlife Manager
- Conservation Scientist

Additional 1-2 year Program

- Hospital Lab Technician
- Physical Therapy
- Occupational Therapy
- Physician Assistant
- Genetic Counselor

Ph.D. Degree

- College Professor
- Senior Research Scientist
- Laboratory Director
- Consultant
- Forensic Scientist

Post Doctorate 2-4 years

- College Professor
- Independent Researcher
- Senior Research Scientist
- Museum Curator