

VETERINARY AND BIOMEDICAL SCIENCES, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Description

This major provides a strong background in those biological and physical sciences underlying contemporary veterinary science and establishes a sound foundation for graduate-level study in veterinary and related biomedical disciplines. The student has the option to focus their area of study by selecting supporting courses in a variety of areas.

The mission of the Veterinary and Biomedical Sciences major is to prepare students for admission to veterinary school and/or entry into graduate programs or employment in veterinary and biomedical research and development. Students may prepare for graduate programs in disciplines such as genetics, nutrition, microbiology, animal sciences, physiology, biochemistry, or others.

What is Veterinary and Biomedical Sciences?

Veterinary and Biomedical Sciences is a pre-professional major for students interested in a career in veterinary medicine or any of its related biomedical disciplines.

You Might Like this Program If...

- You are interested in a science-based education that can help prepare you to study the scientific basis of animal health and well-being

Entrance to Major

In order to be eligible for entrance to the Veterinary and Biomedical Sciences major a student must have:

- attained a cumulative grade point average of at least a 2.0 and
- completed BIOL 110, CHEM 110, CHEM 111 and earned a grade of C or better in each of these courses.

Degree Requirements

For the Bachelor of Science degree in Veterinary and Biomedical Sciences, a minimum of 124 credits is required:

Requirement	Credits
General Education	45
Electives	7-10
Requirements for the Major	87-90

18 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Code	Title	Credits
Prescribed Courses		
CHEM 112	Chemical Principles II	3
CHEM 113	Experimental Chemistry II	1
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
MICRB 201	Introductory Microbiology	3
MICRB 202	Introductory Microbiology Laboratory	2
PHYS 250	Introductory Physics I	4
PHYS 251	Introductory Physics II	4
VBSC 211	The Immune System and Disease	3
VBSC 421	Comparative Anatomy of Vertebrates	4
<i>Prescribed Courses: Require a grade of C or better</i>		
ANSC 201	Animal Science	4
ANSC 301	Principles of Animal Nutrition	3
BIOL 110	Biology: Basic Concepts and Biodiversity	4
BIOL 222	Genetics	3
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
VBSC 403	Principles of Animal Disease Control	3
Additional Courses		
ANSC 423	Comparative Physiology of Domestic Animals	3
or BIOL 472	Human Physiology	
STAT 200	Elementary Statistics	3-4
or STAT 250	Introduction to Biostatistics	
Select 3 credits of the following:		3
AGBM 101	Economic Principles of Agribusiness Decision Making	
ECON 102	Introductory Microeconomic Analysis and Policy	
ECON 104	Introductory Macroeconomic Analysis and Policy	
Select 4 credits of the following:		4
BIOL 220W	Biology: Populations and Communities	
BIOL 230W	Biology: Molecules and Cells	
BIOL 240W	Biology: Function and Development of Organisms	
BMB 251	Molecular and Cell Biology I	
Select 6-8 credits of the following:		6-8
CHEM 202 & CHEM 203	Fundamentals of Organic Chemistry I and Fundamentals of Organic Chemistry II	
CHEM 210 & CHEM 212 & CHEM 213	Organic Chemistry I and Organic Chemistry II and Laboratory in Organic Chemistry	
Select 6 credits of the following:		6
BMB 211 & BMB 212 & BMB 221	Elementary Biochemistry and Elementary Biochemistry Laboratory and Applied Biochemistry	
BMB 401 & BMB 402	General Biochemistry and General Biochemistry	
Supporting Courses and Related Areas		
<i>Supporting Courses and Related Areas: Require a grade of C or better</i>		
Select 9 credits of 400-level courses from department list		9

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- **United States Cultures:** 3 credits
- **International Cultures:** 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Program Learning Objectives

- **Critical Review of Literature:** Students will be able to search, critically evaluate, and discuss the scientific literature and popular press articles in the field of Veterinary and Biomedical Sciences.
- **Life & Physical Science Competency:** Students will exhibit competency in the physical and life sciences, including anatomy, physiology, chemistry, cell biology, microbiology, and immunology.
- **Application of Data and Knowledge:** Students will be able to apply research data and their knowledge from the physical and life sciences toward the management of health and diseases of animals.
- **Effective Communication:** Students will demonstrate effective oral and written communication to both professional and lay audiences.
- **Career Development:** Students will know career options within the Veterinary and Biomedical Sciences and be prepared to succeed in post-graduate jobs and in professional or graduate schools.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

University Park

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SUGGESTED ACADEMIC PLAN

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2023-24 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

Veterinary and Biomedical Sciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
AGBM 101, ECON 102, or ECON 104 [†]	3 CHEM 112 [‡]	3
CHEM 110 ^{*#†}	3 CHEM 113 [†]	1
CHEM 111 ^{*#†}	1 MATH 141 or 141B ^{††}	4
MATH 140 or 140B ^{††}	4 ENGL 15, 30H, or ESL 15 ^{††}	3
VBSC 50 (or First-Year Seminar)	3 General Education Course	3
General Education Course	3 General Education Course	3
	17	17

Second Year

Fall	Credits Spring	Credits
BIOL 110 ^{*#†}	4 BIOL 220W, 230W, 240W, or BMB 251	3-4
CHEM 202 or 210	3 CHEM 203 or 212 <i>and</i> 213	3-5
PHYS 250	4 PHYS 251	4
CAS 100, CAS 100A, CAS 100B, or CAS 100C ^{††}	3 ANSC 201 [*]	4
General Education Course	3	
	17	14-17

Third Year

Fall	Credits Spring	Credits
ANSC 301 [*]	3 MICRB 201	3
STAT 250 or 200	3-4 MICRB 202	2
BMB 401 or 211 <i>and</i> 212	3 BMB 402 or 221	2-3
BIOL 222 [*]	3 VBSC 211	3
General Education Course	3 ENGL 202C ^{††}	3
	General Education Course	3
	15-16	16-17

Fourth Year

Fall	Credits Spring	Credits
VBSC 421	4 BIOL 472 or ANSC 423	3
VBSC 403 [*]	3 Supporting Course 400 Level [*]	3
Supporting Course 400 Level [*]	3 Elective	3
Supporting Course 400 Level [*]	3 Elective	3
Elective	3	
	16	12

Total Credits 124-129

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

Advising Notes:

- Students should consult with an academic adviser regarding selection of CHEM 202 and CHEM 203 versus CHEM 210, CHEM 212, and CHEM 213.
- If completing CHEM 212, CHEM 213 must also be completed.
- The BMB selection should be based on the student's Organic Chemistry selection. In most cases, students enrolled in CHEM 202 and 203 course select BMB 211, BMB 212, and BMB 221.
- Students cannot receive credit for both BMB 211 and BMB 401.
- Students that desire to attend veterinary school or graduate school are strongly encouraged to select additional animal biology courses in their elective selections.
- Students should consult with an academic adviser regarding the appropriate selection of supporting courses. Supporting courses must be selected from an approved list.

- Students should work with an academic adviser in the development of their plan as some courses are not taught every semester.

Veterinary and Biomedical Sciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
AGBM 101, ECON 102, or ECON 104 [†]	3 CHEM 112 [†]	3
CHEM 110 ^{*#†}	3 CHEM 113 [†]	1
CHEM 111 ^{*#†}	1 MATH 141 ^{††}	4
MATH 140 ^{††}	4 ENGL 15, 30H, or ESL 15 ^{††}	3
General Education Course	3 General Education Course	3
First-Year Seminar	1-3 General Education Course	3
	15-17	17

Second Year

Fall	Credits Spring	Credits
BIOL 110 ^{*#†}	4 BIOL 220W, 230W, 240W, or BMB 251	3-4
CHEM 202 or 210	3 CHEM 203 or 212 <i>and</i> 213	3-5
PHYS 250	4 PHYS 251	4
CAS 100, CAS 100A, CAS 100B, or CAS 100C ^{††}	3 General Education Course	3
General Education Course	3	
	17	13-16

Third Year

Fall	Credits Spring	Credits
STAT 250 or 200	3-4 MICRB 201	3
ANSC 201 [*]	4 MICRB 202	2
BMB 401 or 211 <i>and</i> 212	3 BMB 402 or 221	2-3
BIOL 222 [*]	3 VBSC 211	3
Elective	3 ENGL 202C ^{††}	3
	General Education Course	3
	16-17	16-17

Fourth Year

Fall	Credits Spring	Credits
ANSC 301 [*]	3 BIOL 472 or ANSC 423	3
VBSC 421	4 Supporting Course 400 Level [*]	3
VBSC 403 [*]	3 Elective	3
Supporting Course 400 Level [*]	3 Elective	3
Supporting Course 400 Level [*]	3 Elective	3
	16	15

Total Credits 125-132

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Advising Notes:

- Students should consult with an academic adviser regarding selection of CHEM 202 and CHEM 203 versus CHEM 210, CHEM 212, and CHEM 213.
- If completing CHEM 212, CHEM 213 must also be completed.
- The BMB selection should be based on the student's Organic Chemistry selection. In most cases, students enrolled in CHEM 202 and 203 course select BMB 211, BMB 212, and BMB 221.
- Students cannot receive credit for both BMB 211 and BMB 401.
- Students that desire to attend veterinary school or graduate school are strongly encouraged to select additional animal biology courses in their elective selections.
- Students should consult with an academic adviser regarding the appropriate selection of supporting courses. Supporting courses must be selected from an approved list.
- Students should work with an academic adviser in the development of their plan as some courses are not taught every semester.

Contact

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