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:
1. attained a cumulative grade point average of at least 2.0 and
2. 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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Electives</td>
<td>7-10</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>87-90</td>
</tr>
</tbody>
</table>

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.

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 (http://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.)
• Quantification (GQ): 6 credits
• Writing and Speaking (GWS): 9 credits

Knowledge Domains
• Arts (GA): 6 credits
• Health and Wellness (GHW): 3 credits
• Humanities (GH): 6 credits
• Social and Behavioral Sciences (GS): 6 credits
• Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)
• Inter-Domain or Approved Linked Courses: 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 2.0 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 (http://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.

**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 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

### Prescribed Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 112</td>
<td>Chemical Principles II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 113</td>
<td>Experimental Chemistry II</td>
<td>1</td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td>4</td>
</tr>
<tr>
<td>MICRB 201</td>
<td>Introductory Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>MICRB 202</td>
<td>Introductory Microbiology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>PHYS 250</td>
<td>Introductory Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 251</td>
<td>Introductory Physics II</td>
<td>4</td>
</tr>
<tr>
<td>VBSC 211</td>
<td>The Immune System and Disease</td>
<td>3</td>
</tr>
<tr>
<td>VBSC 421</td>
<td>Comparative Anatomy of Vertebrates</td>
<td>4</td>
</tr>
</tbody>
</table>

**Prescribed Courses: Require a grade of C or better**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 201</td>
<td>Animal Science</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 301</td>
<td>Principles of Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 110</td>
<td>Biology: Basic Concepts and Biodiversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 222</td>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
<tr>
<td>VBSC 403</td>
<td>Animal Science</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional Courses**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 423</td>
<td>Comparative Physiology of Domestic Animals or BIOL 472 Mammalian Physiology</td>
<td>3</td>
</tr>
<tr>
<td>STAT 200 or STAT 250</td>
<td>Elementary Statistics or Introduction to Biostatistics</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Select 3 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGBM 101</td>
<td>Economic Principles of Agribusiness Decision Making</td>
<td>3</td>
</tr>
<tr>
<td>ECON 102</td>
<td>Introductory Microeconomic Analysis and Policy</td>
<td>1</td>
</tr>
<tr>
<td>ECON 104</td>
<td>Introductory Macroeconomic Analysis and Policy</td>
<td>1</td>
</tr>
</tbody>
</table>

Select 4 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 220W</td>
<td>Biology: Populations and Communities</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 230W</td>
<td>Biology: Molecules and Cells</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 240W</td>
<td>Biology: Function and Development of Organisms</td>
<td>4</td>
</tr>
<tr>
<td>BMB 251</td>
<td>Molecular and Cell Biology I</td>
<td>4</td>
</tr>
</tbody>
</table>

Select 6-8 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 210 &amp; CHEM 212 &amp; CHEM 213</td>
<td>Organic Chemistry I and Organic Chemistry II and Laboratory in Organic Chemistry</td>
<td>6-8</td>
</tr>
</tbody>
</table>

Select 6 credits of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMB 211 &amp; BMB 212 &amp; BMB 221</td>
<td>Elementary Biochemistry and Elementary Biochemistry Laboratory and Applied Biochemistry</td>
<td>6</td>
</tr>
<tr>
<td>BMB 401 &amp; BMB 402</td>
<td>General Biochemistry and General Biochemistry</td>
<td>6</td>
</tr>
</tbody>
</table>

**Supporting Courses and Related Areas**

**Supporting Courses and Related Areas: Require a grade of C or better**

Select 9 credits of 400-level courses from department list

### 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 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy)

### University Park

#### Lester C. Griel Jr.

Professor of Veterinary Science

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814-865-1321

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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 2019-20 academic year. To access previous years’ suggested academic plans, please visit the archive (http://bulletins.psu.edu/undergraduate/archive) to view the appropriate Undergraduate Bulletin edition (Note: the archive only contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin).

### 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

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGBM 101, ECON 102, or ECON 104</td>
<td>3</td>
<td>CHEM 112</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>3</td>
<td>CHEM 113</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note:* The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2019-20 academic year. To access previous years’ suggested academic plans, please visit the archive (http://bulletins.psu.edu/undergraduate/archive) to view the appropriate Undergraduate Bulletin edition (Note: the archive only contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin).
CHEM 111 or 140B
MATH 140 or 140B
VBSC 50 (or First-Year Seminar)
General Education Course

Second Year

Fall
Credits
Biol 110
CHEM 202 or 210
PHYS 250
CAS 100, 100A, 100B, or 100C
General Education Course

Credits
3
3-5
4
4
3
3

Third Year

Fall
Credits
ANSC 301
STAT 250 or 200
BMB 401 or 211 and 212
Biol 222
General Education Course

Credits
3
3-4
2-3
3
3

Fourth Year

Fall
Credits
VBSC 421
VBSC 403
Supporting Course 400 Level
Supporting Course 400 Level
Elective

Credits
4
3
3
3
3

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 University 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.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of "C" or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

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.

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
AGBM 101, ECON 102, or ECON 104
CHEM 110
CHEM 111
MATH 140
General Education Course
First-Year Seminar

Credits
3
3
1
4
3

Second Year

Fall
Credits
BIOL 110
CHEM 202 or 210
PHYS 250
CAS 100, 100A, 100B, or 100C

Credits
3-4
3-5
4
3
### General Education Course

3

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### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 250 or 200</td>
<td>3-4</td>
<td>MICRB 201</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 201†</td>
<td>4</td>
<td>MICRB 202</td>
<td>2</td>
</tr>
<tr>
<td>BMB 401 or 211 and 212</td>
<td>3</td>
<td>BMB 402 or 221</td>
<td>2-3</td>
</tr>
<tr>
<td>BIOL 222†</td>
<td>3</td>
<td>VBSC 211</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td>ENGL 202C††</td>
<td>3</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 301*</td>
<td>3</td>
<td>BIOL 472 or ANSC 423</td>
<td>3</td>
</tr>
<tr>
<td>VBSC 421</td>
<td>3-4</td>
<td>Supporting Course 400 Level†</td>
<td>3</td>
</tr>
<tr>
<td>VBSC 403*</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Supporting Course 400 Level*</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>Supporting Course 400 Level†</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

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 University 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.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of ‘C’ or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

### Advising Notes:

- 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

DEPARTMENT OF VETERINARY AND BIOMEDICAL SCIENCES
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https://vbs.psu.edu/