

# PREMEDICINE, B.S.

**Begin Campus:** Any Penn State Campus

**End Campus:** University Park

## Program Description

This major provides a broad foundation necessary to the understanding of the basic subjects of modern medical studies. The curriculum, which offers a good balance between science and nonscience courses, constitutes an excellent preparation for admission to medical school. It also gives students the freedom to tailor the program to meet their individual needs by permitting a generous number of supporting courses. Specific admission requirements or recommendations of a particular medical school, not already in the required courses of the major, may be included among the supporting courses. Many students also use their supporting courses to pursue a minor.

## What is Premedicine?

The Premedicine major is designed to enable students to gain a strong science foundation in chemistry, biochemistry, physics, biology, as well as breadth in ethics and social science, that is necessary for advanced study in the field of medicine. The Premedicine major has a life science focus but integrates knowledge and practices across multiple disciplines to prepare students to think deeply and critically.

## You Might Like This Program If...

- You like and are interested in studying several areas of science.
- You want to gain in-depth knowledge in core science disciplines.
- You want to use your science expertise to work and make a difference with people.
- You aspire to a clinical career in medicine.

## Entrance to Major

In order to be eligible for entrance to the Premedicine major, a student must have

1. attained at least a 3.20 cumulative grade-point average; and
2. completed BIOL 110, BIOL 230W, CHEM 110, CHEM 111, CHEM 112, CHEM 113, CHEM 210, MATH 140, MATH 141 and earned a grade of C or better in each of these courses.

## Three-Year Alternative

A student may also become eligible for the Bachelor of Science degree in this major upon satisfactory completion of

- a. A total of 96 credits, including General Education credits in Writing/Speaking, Health Sciences and Physical Education, and Arts, Humanities, and Social and Behavioral Sciences; 8 credits in a single foreign language; BIOL 110, BIOL 230W, CHEM 110, CHEM 111, CHEM 112, CHEM 113, CHEM 210<sup>1</sup>, CHEM 212<sup>1</sup>, CHEM 213<sup>1</sup>, MATH 140, MATH 141, PHYS 211<sup>1</sup>, PHYS 212<sup>1</sup>, PHYS 213<sup>1</sup>, and PHYS 214<sup>1</sup>.
- b. The first year of an accredited medical or dental postgraduate program.

<sup>1</sup> A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

## Degree Requirements

For the Bachelor of Science degree in Premedicine, a minimum of 126 credits is required, with at least 18 credits at the 400 level:

Requirement	Credits
General Education	45
Requirements for the Major	105

**24 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; 6 credits of GS courses; 3 credits of GHW 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 2.00 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 (<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>).

Code	Title	Credits
<b>Prescribed Courses</b>		
HPA 101	Introduction to Health Services Organization	3
PHIL 432	Medical and Health Care Ethics	3
PSYCH 100	Introductory Psychology	3
SOC 1	Introductory Sociology	3
<i>Prescribed Courses: Require a grade of C or better</i>		
BIOL 110	Biology: Basic Concepts and Biodiversity	4
BIOL 230W	Biology: Molecules and Cells	4
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
CHEM 112	Chemical Principles II	3
CHEM 113	Experimental Chemistry II	1
CHEM 210	Organic Chemistry I	3
CHEM 212	Organic Chemistry II	3
CHEM 213	Laboratory in Organic Chemistry	2
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
NUTR 251	Introductory Principles of Nutrition	3
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
PHYS 213	General Physics: Fluids and Thermal Physics	2
PHYS 214	General Physics: Wave Motion and Quantum Physics	2

### Additional Courses

STAT 200 or STAT 250	Elementary Statistics Introduction to Biostatistics	3-4
Select one of the following:		4-5
BIOL 220W	Biology: Populations and Communities	
BIOL 240W	Biology: Function and Development of Organisms	
MICRB 201 & MICRB 202	Introductory Microbiology and Introductory Microbiology Laboratory	
<i>Additional Courses: Require a grade of C or better</i>		
Select one of the following:		4-5
BIOL 421	Comparative Anatomy of Vertebrates	
BIOL 437	Histology	
BIOL 472 & BIOL 473	Mammalian Physiology and Laboratory in Mammalian Physiology	
MICRB 412 & MICRB 422	Medical Microbiology and Medical Microbiology Laboratory	
Select 5-6 credits from the following:		5-6
BMB 400	Molecular Biology of the Gene	
BMB 401	General Biochemistry	
BMB 402	General Biochemistry	
CHEM 450 & CHEM 452	Physical Chemistry - Thermodynamics and Physical Chemistry - Quantum Chemistry	
<b>Supporting Courses and Related Areas</b>		
Select 0-8 credits in a foreign language <sup>1</sup>		0-8
Select 18-30 credits from program list <sup>2</sup>		18-30

<sup>1</sup> Proficiency demonstrated by examination or coursework to the level of the second semester; if fewer than 8 credits are needed to reach the required proficiency, students choose selections from program list to total 8 credits.

<sup>2</sup> A maximum of 12 credits of Independent Study [296, 496] may be applied toward credits for graduation. Students may apply 6 credits of ROTC.

## 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

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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

Fall	Credits	Spring	Credits
BIOL 110 <sup>**†</sup>	4	BIOL 230W <sup>*#</sup>	4
CHEM 110 <sup>**†</sup>	3	CHEM 112 <sup>**†</sup>	3
CHEM 111 <sup>**†</sup>	1	CHEM 113 <sup>**†</sup>	1
ENGL 15, 30, or ESL 15	3	MATH 141B or 141 <sup>**††</sup>	4
MATH 140B or 140 <sup>*†††</sup>	4	PSYCH 100 <sup>†</sup>	3
PSU 16	1		
	16		15

#### Second Year

Fall	Credits	Spring	Credits
CHEM 210 <sup>**</sup>	3	BIOL 240W (consult with an advisor for alternative options)	4
HPA 101	3	CHEM 212 <sup>*</sup>	3
PHYS 211 <sup>*</sup>	4	PHYS 212 <sup>*</sup>	4
SOC 1 <sup>†</sup>	3	General Education Course	3
STAT 250 (consult with an advisor for alternative options)	3	Supporting course (consult with an academic advisor for options)	3
	16		17

#### Third Year

Fall	Credits	Spring	Credits
BMB 401 <sup>*</sup>	3	BIOL 472 (consult with an advisor for alternative options) <sup>*</sup>	3
CHEM 213W <sup>*</sup>	2	BIOL 473 (consult with an advisor for alternative options)	2
PHIL 432	3	BMB 402 (consult with an advisor for alternative options) <sup>*</sup>	3
PHYS 213 <sup>*</sup>	2	NUTR 251 <sup>**†</sup>	3
PHYS 214 <sup>*</sup>	2	ENGL 202C, 202A, 202B, or 202D <sup>†</sup>	3
General Education Course	3		
	15		14

#### Fourth Year

Fall	Credits	Spring	Credits
CAS 100A, 100B, or 100C <sup>†</sup>	3	General Education Course	3
General Education Course	3	World Language Level 2 (consult with an academic adviser for options)	4
Supporting course (consult with an academic adviser for options)	3	Supporting course (consult with an academic adviser for options)	3
Supporting course (consult with an academic adviser for options)	1	Supporting course (consult with an academic adviser for options)	3
World Language Level 1 (consult with an academic adviser for options)	4	400 - Level Supporting/ Elective Course (consult with an academic adviser for options)	3
400 - Level Supporting/ Elective Course (consult with an academic adviser for options)	3		
	17		16

Total Credits 126

\* 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.

All incoming Schreyer Honors College first-year students at University Park will take ENGL/CAS 137 in the fall semester and ENGL/CAS 138 in the spring semester. These courses carry the GWS designation and replace both ENGL 30 and CAS 100. Each course is 3 credits.

Foreign language proficiency must be demonstrated to the level of the second semester; if fewer than 8 credits are needed to reach the required proficiency, students choose electives from the Program list to total 8 credits.

### 2+2 Premedicine

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
BIOL 110 <sup>*#†</sup>	4 CHEM 112 <sup>*†#†</sup>	3
CHEM 110 <sup>*†#†</sup>	3 CHEM 113 <sup>*†#†</sup>	1
CHEM 111 <sup>*#†</sup>	1 MATH 141B or 141 <sup>*†#†</sup>	4
ENGL 15, 30, or ESL 15 <sup>†</sup>	3 PSYCH 100 <sup>†</sup>	3
MATH 140B or 140 <sup>*†#†</sup>	4 PHYS 211 <sup>*</sup>	4
PSU 16	1	
	16	15

**Second Year**

Fall	Credits Spring	Credits
BIOL 230W <sup>*#</sup>	4 BIOL 240W (consult with an adviser for alternative options)	4
CHEM 210 <sup>*#</sup>	3 CHEM 212 <sup>*</sup>	3
HPA 101	3 CHEM 213W <sup>*</sup>	2
PHYS 212 <sup>*</sup>	4 PHYS 213 <sup>*</sup>	2
SOC 1 <sup>†</sup>	3 PHYS 214 <sup>*</sup>	2
	General Education Course	3
	17	16

**Third Year**

Fall	Credits Spring	Credits
BMB 401 <sup>*</sup>	3 BIOL 472 (consult with an adviser for alternative options) <sup>*</sup>	3
PHIL 432	3 BIOL 473 (consult with an adviser for alternative options) <sup>*</sup>	2
STAT 250	3 BMB 402 (consult with an adviser for alternative options) <sup>*</sup>	3
General Education Course	3 NUTR 251 <sup>†</sup>	3
Supporting course (consult with an academic adviser for options)	3 ENGL 202C, 202A, 202B, or 202D <sup>†</sup>	3
	15	14

**Fourth Year**

Fall	Credits Spring	Credits
CAS 100 <sup>†</sup>	3 General Education Course	3
General Education Course	3 400 - Level Supporting/ Elective Course (consult with an academic adviser for options)	3
World Language Level 1 (consult with an academic adviser for options)	4 World Language Level 2 (consult with an academic adviser for options)	4
400 - Level Supporting/ Elective Course (consult with an academic adviser for options)	3 Supporting course (consult with an academic adviser for options)	3

Supporting course (consult with an academic adviser for options)	3 Supporting course (consult with an academic adviser for options)	3
Supporting course (consult with an academic adviser for options)	1	
	17	16

Total Credits 126

- \* 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).

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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.

Foreign language proficiency must be demonstrated to the level of the second semester; if fewer than 8 credits are needed to reach the required proficiency, students choose Supporting Course to total 8 credits.

**BS/MBA**

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
BIOL 110	4 CHEM 112	3
CHEM 110	3 CHEM 111	1
MATH 140	4 MATH 141	4
ENGL 15	3 Life Science Option/Writing Across the Curriculum	3
PSU 16	1 ECON 102	3

General Education Course (GHW)	1.5	
	15	15.5

**Second Year**

Fall	Credits Spring	Credits Summer	Credits
PHYS 250	4 PHYS 251	4 SC 295	2
Other Science	3 STAT 250	3	
ECON 104	3 Other Science	3	
CMPSC 203	4 ACCTG 211	4	
CHEM 113	1		
General Education Course (GHW)	1.5		
	16.5	14	2

**Third Year**

Fall	Credits Spring	Credits Summer	Credits
World Language Level 1	4 SC 395	3 SC 495	2
400 Science	3 ENGL 202A	3	
General Education Course	3		
400 Science	3		
	13	6	2

**Fourth Year**

Fall	Credits Spring	Credits
General Education Course	3 General Education Course	3
General Education Course	3 Supporting Course	3
World Language Level 2	4 CAS 100	3
400 Science	3 Supporting Course	3
Supporting Course	3	
	16	12

**Fifth Year**

Fall	Credits
BA 533	2
BA 511	2
BA 515	2
BA 531	2
BA 501	2
BA 512	2
	12

Total Credits 124

## Career Paths

Penn State students who complete the BS in Premedicine become physicians, medical research scientists, or enter related medical professions including dentistry, optometry, or podiatry.

## Careers

Graduates of the Premedicine major typically either move directly into a post-graduate healthcare school – medicine (MD or DO) is most common - or take a gap period to broaden and enrich their relevant non-academic experiences.

## Opportunities for Graduate Studies

Sometimes students in the Premedicine major desire a meaningful post-graduate research experience before entering a professional curriculum. The balanced science components in this major prepare students well for graduate studies in medically-related fields of research.

## Professional Resources

- Association of American Medical Colleges (<https://www.aamc.org>)
- American Association of Colleges of Osteopathic Medicine (<https://www.aacom.org>)
- American Dental Education Association (<http://www.adea.org>)
- Association of Schools and Colleges of Optometry (<https://optometriceducation.org>)
- American Association of Colleges of Podiatric Medicine (<http://www.aacpm.org>)

## Contact

### University Park

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