

Checksheets for the Behrend Physics Major and Minor

Last Revised: D. Williams 21 July 2009

General Education Courses

First Year Seminar	PSU 007	Physics/Chemistry	1 credit	_____
Writing/Speaking (GWS)	ENGL 015	Rhetoric and Composition	3 credits	_____
	ENGL 202C	Technical Writing	3 credits	_____
	CAS 100	Effective Speech	3 credits	_____
Quantification (GQ)	MATH 140	Calculus/Analytic Geom. I	4 credits	_____
	MATH 141	Calculus/Analytic Geom. II	4 credits	_____
8 credits of calculus is a requirement for the major 6 of these 8 credits satisfies the GQ requirement				
Natural Sciences (GN) 8 credits of chemistry is a requirement of the major. 9 credits of natural science courses is needed to satisfy the GN requirement	CHEM 110	Chemical Principals I	3 credits	_____
	CHEM 111	Experimental Chemistry I	1 credit	_____
	CHEM 112	Chemical Principals II	3 credits	_____
	CHEM 113	Experimental Chemistry II	1 credit	_____
	GN ELECTIVE		1 credit	_____
Arts (GA)		ELECTIVE	3 credits	_____
		ELECTIVE	3 credits	_____
Humanities (GH)		ELECTIVE	3 credits	_____
		ELECTIVE	3 credits	_____
Social and Behavioral (GS) Sciences		ELECTIVE	3 credits	_____
		ELECTIVE	3 credits	_____
Health and Physical (GHA) Activity		ELECTIVE	1.5 credits	_____
		ELECTIVE	1.5 credits	_____

United States Cultures (US)	ELECTIVE	3 credits	_____
International Cultures (IL)	ELECTIVE	3 credits	_____

[These courses are sub-requirements within the Gen-Ed curriculum that may be mutually satisfied by select courses from the other Gen-Ed categories. See the Penn State Blue Book <http://www.psu.edu/bulletins/bluebook/gened/> or the Behrend College Schedule of Courses for a listing of courses that satisfy these requirements.]

Minimum Total Credits 46 credits

FLEXIBILITY OF THE BACCALAUREATE DEGREE GENERAL EDUCATION REQUIREMENT
(as posted on <http://www.psu.edu/bulletins/bluebook/gened/>)

Penn State wants students to use General Education to experiment and explore, to take academic risks, to discover things they did not know before, and to learn to do things they have not done before. To that end, the General Education program extends the concept of flexibility to all aspects of the degree program.

Students may, with the permission of their adviser and dean's representative:

1. substitute a 200- to 499-level course in an area of General Education for a course found on the General Education list. For example, a student may take a 400-level course in history and use it to meet the General Education requirement satisfied by a comparable lower-level history course.
2. substitute a foreign language at the twelfth credit level of proficiency, as measured by the Penn State foreign language offerings, for 3 credits in any of the categories of General Education. Baccalaureate degree students may substitute study in a foreign/second language at the twelfth credit level of proficiency or higher for any three credits in any of the categories of general education only if those three credits are in language study beyond their degree requirements.*
3. substitute a third course in one of the Knowledge Domains areas of Arts, Humanities, or Social and Behavioral Sciences for a second course in one of the other areas. For example, a student might take 3 courses in the Arts, two courses in the Humanities, and only one course in the Social and Behavioral Sciences. This substitution is often referred to as the 9-6-3 sequence, representing the 9 credits, 6 credits, and 3 credits completed in place of the specified 6-6-6.*
4. meet the United States Cultures (US) and International Cultures (IL) requirement through completion of an experiential learning program or practicum (one-semester or year long) approved by their College Dean's Office. Approved Penn State Education Abroad Programs may be used to satisfy the International Cultures (IL) requirement.
5. meet the First-Year Seminar (FYS) requirement through completion of a FYS course offered by any unit of the University. Thus, a student who successfully completes a FYS course in one college, prior to transferring to another college, will not be required to complete another FYS. However, since there are various modes of offering a FYS throughout the University, students transferring to a new college may find that a required course that is also a FYS must still be taken.

* Please note: The use of these two substitutions (#2 and #3 above), either alone or in combination, may not lead to the complete elimination of any area in the skills or knowledge domains categories in the student's general education program.

Prescribed Courses

CMPS 121	Introduction to Programming Techniques	3 credits	_____
MATH 220	Matrices	2 credits	_____
MATH 230	Calculus and Vector Analysis	4 credits	_____
MATH 251	Ordinary and Partial Differential Equations	4 credits	_____
PHYS 211	General Physics: Mechanics	4 credits	_____
PHYS 212	General Physics: Electricity and Magnetism	4 credits	_____
PHYS 213	General Physics: Fluids and Thermal Physics	2 credits	_____
PHYS 214	General Physics: Wave Motion/Quantum Physics	2 credits	_____
PHYS 237	Introduction to Modern Physics	3 credits	_____
PHYS 400	Intermediate Electricity and Magnetism	3 credits	_____
PHYS 419	Theoretical Mechanics	3 credits	_____
PHYS 420	Thermal Physics	3 credits	_____
PHYS 421W	Research Methods in Physics (writing intensive)	3 credits	_____
PHYS 458	Intermediate Optics	4 credits	_____
PHYS 494	Physics Research Project	3 credits	_____
PHYS 495	Physics Internship	3 credits	_____

General Physics Option

PHYS 410	Introduction to Quantum Mechanics	3 credits	_____
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Computational Physics Option

MATH 455	Introduction to Numerical Analysis I	3 credits	_____
PHYS 402	Electronics for Scientists	4 credits	_____

Notes:

1. 6 credits maximum of PHYS 494 or 495 may be applied to the major.
2. Students must earn a grade C or higher in all 200-level PHYS courses.
3. Students must complete the degree with a cumulative GPA above 2.00 and earn a C grade or better in all 300- and 400-level courses within the Prescribed, Additional, and Supporting courses. If a student receives a grade below C, he/she must repeat the course or a School-Approved alternative, and earn a grade of C or better.

Additional Courses (select 12 credits from)

General Physics Option

MATH 421	Complex Analysis	3 credits	_____
MATH 455	Introduction to Numerical Analysis I	3 credits	_____
PHYS 402	Electronics for Scientists	4 credits	_____

Computational Physics Option

EE 352	Signals and Systems	4 credits	_____
EE 450	Signal and Image Processing	3 credits	_____
EE 453	Digital Signal Processing	3 credits	_____
ME 410	Heat Transfer	3 credits	_____
ME 428	Applied Computational Fluid Dynamics	3 credits	_____
PHYS 410	Introduction to Quantum Mechanics	3 credits	_____

Either Option

MATH 456	Introduction to Numerical Analysis II	3 credits	_____
PHYS 414	Solid State Physics	3 credits	_____
PHYS 446	Year in Physics Seminar	1 credit	_____
PHYS 494	Physics Research Project	1-3 credits	_____
PHYS 495	Physics Internship	1-3 credits	_____

Supporting Courses

General Physics Option – select one of two tracks

Track A

CMPSC 122 Intermediate Programming	3 credits	_____
And select 3 credits from		
CMPSC 465 Data Structures and Algorithms	3 credits	_____
CMPSC 474 Operating Systems and Systems Programming	3 credits	_____
CMPSC 459 Scientific Visualization	3 credits	_____
And 7 elective credits from School Approved List		_____

Track B

Foreign Language Elective I	4 credits	_____
Foreign Language Elective II	4 credits	_____
And 5 elective credits from School Approved List		_____

Notes:

13 credits from this track is required

Students may substitute School-approved elective credits for Foreign-Language credits once they have demonstrated proficiency in a language through Level 2

Computational Physics Option

CMPSC 122 Intermediate Programming	3 credits	_____
And select 3 credits from		
CMPSC 465 Data Structures and Algorithms	3 credits	_____
CMPSC 474 Operating Systems and Systems Programming	3 credits	_____
CMPSC 459 Scientific Visualization	3 credits	_____
And 3 elective credits from School Approved List	3 credits	_____

Physics Minor

PHYS 211	General Physics: Mechanics	4 credits	_____
PHYS 212	General Physics: Electricity and Magnetism	4 credits	_____
PHYS 213	General Physics: Fluids and Thermal Physics	2 credits	_____
PHYS 214	General Physics: Wave Motion/Quantum Physics	2 credits	_____
PHYS 237	Introduction to Modern Physics	3 credits	_____

And 7 credits of 400-Level PHYS excluding PHYS 494, 495, 496, 497 and more than 1 credit of PHYS 446

400-Level PHYS Elective	_____
400-Level PHYS Elective	_____
400-Level PHYS Elective	_____

School Approved Courses

- ASTRO 291 or higher
- BIOL 110 or higher
- CHEM 202 or higher
- CMPSC 200 or higher
- All 300-level and 400-level MATH or STAT courses

The following *may not* be used for the physics major or minor:

- MATH courses below MATH 140
- PHYS courses below PHYS 211
- PHYS 250 and PHYS 251