

## PHYSICS MINOR

### Can I get a minor in one year?

You can, but only if you already have completed the introductory course Physics for Scientists and Engineers (PSE) . Otherwise, it will normally take two years--one year for PSE and another year for ten additional physics credits.

### If I want to get secondary teaching certification, what will a Physics Minor do for me?

The Physics Minor is approved by the State of Michigan for a physics teaching certificate when accompanied by an approved major, area of concentration, and professional education coursework at appropriate GPA levels, as well as area exams, recommendations, clearances, and other non-academic requirements. These may be found in the Bulletin under the School of Education, Teacher Certification Procedures.

Total PHYSICS credits required ..... 20 CR


Total COGNATE credits required ..... 8 CR

Total COGNATE credits recommended but not required..... 3-4 CR

Freshman Year		Total Credits	32CR
PHYS277	PHYSICS COLLOQUIUM		0 CR
MATH141,142	CALCULUS I, II		4,4 CR
PRMY	Primary major requirements, including Gen. Education		24 CR

Sophomore Year		Total Credits	32CR
PHYS241,242	PHYSICS FOR SCIENTISTS AND ENGINEERS		4,4 CR
PHYS271,272	PHYSICS FOR SCIENTISTS AND ENGINEERS LAB		1,1 CR
PHYS277	PHYSICS COLLOQUIUM		0 CR
MATH*	RECOMMENDED MATHEMATICS ELECTIVE		3-4 CR
PRMY	Primary major requirements, including Gen. Education		18-19 CR

Junior Year		Total Credits	32CR
PHYS277	PHYSICS COLLOQUIUM		0 CR
PHYS411**	THEORETICAL MECHANICS I		2.5 CR
PHYS***	PHYSICS ELECTIVES		2.5 CR
PRMY	Primary major requirements, including Gen. Education		27 CR

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Senior Year		Total Credits	28CR
PHYS277	PHYSICS COLLOQUIUM		0 CR
PHYS***	PHYSICS ELECTIVES		5 CR
PRMY	Primary major requirements, including Gen. Education		23 CR

<b>Total Needed for Graduation:</b>	124 CR
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This is a suggested course outline only. It may not be necessary or possible to take these courses in the order shown, and in some cases, petitions may be considered for substitutions. While a physics academic advisor will advise you in this regard., each student bears full responsibility for meeting all program requirements as spelled out in the University Bulletin or to procure appropriate variances by petition.

*\*Selected from the the following mathematics electives:*

MATH240	CALCULUS III .....	4 CR
MATH286	DIFFERENTIAL EQUATIONS .....	3 CR

*\*\*Engineering students may substitute ENGR285 ENGINEERING DYNAMICS for PHYS411, so long as they take PHYS412 THEORETICAL MECHANICS II as well.*

*\*\*\*Selected from the following physics electives:*

PHYS350	OPTICS .....	2.5 CR
PHYS377	ADVANCED LABORATORY I .....	1 CR
PHYS412	THEORETICAL MECHANICS II .....	2.5 CR
PHYS416	BIOPHYSICS .....	2.5 CR
PHYS420	TOPICS IN RELATIVATIY .....	2.5 CR
PHYS430	THERMODYNAMICS .....	2.5 CR
PHYS431#	ELECTRICITY AND MAGNETISM I .....	3 CR
PHYS432	ELECTRICITY AND MAGNETISM II .....	3 CR
PHYS445	PARTICLE PHYSICS .....	2.5 CR
PHYS475	SENIOR REVIEW .....	2.5 CR
PHYS477	ADVANCED LABORATORY .....	1 CR
PHYS481	QUANTUM MECHANICS .....	3 CR
PHYS482	QUANTUM MECHANICS II .....	3 CR
PHYS495	RESEARCH .....	1–2 CR

*#Engineering students may substitute ENGR435 ELECTROMAGNETIC FIELDS for PHYS431.*