

Bachelor of Science in Electrical Engineering

Concentration in Photonics

The Michigan Tech Department of Electrical and Computer Engineering is pleased to offer a **Concentration in Photonics**, within the degree Bachelor of Science in Electrical Engineering.

Similar to electronics, which involves the control of electrons, photonics deals with the control of photons for generating and harnessing light and other forms of radiant energy. The range of applications of photonics extends from energy generation, to defense and aerospace, to communications and information processing.

The fields of photonics and electro-optics offer many exciting career opportunities including: telecommunications, nanotechnology, laser engineering, optical material engineering, digital processing, medical imaging, biophotonics, optical metrology, optical sensing, and satellite design.

Graduates in photonics and related technologies are in high demand globally, and have access to exciting, rewarding, and highly paid careers.



To complete the BSEE with a concentration in Photonics a student must include the following coursework:

EE 2190 Introduction to Photonics	3
EE 3190 Optical Sensing and Imaging	3
EE 3290 Photonic Materials, Devices and Applications	4
EE 4490 Laser Systems and Applications	4
AND 6 credits from the following:	6
EE 4252 Digital Signal Processing and its Applications	
EE 4253 Real Time Signal Processing	
EE 4290 Optical Communications	
BE 4250 Biomedical Optics	
MY 4292 Light and Photonic Materials	
PH 4510 Introduction to Solid State Physics	
Total credits	20



Michigan Tech

Michigan Technological University

**Department of
Electrical and Computer Engineering**

121 EERC Bldg., 1400 Townsend Drive

Houghton, Michigan 49931-1295

906-487-2550

mtu.edu/ece

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This suggested plan applies to students entering in Academic Year 2018-2019 who are ready for calculus.

Semester 1			Semester 2		
MA1160 ¹	Calculus with Technology 1	4	MA2160	Calculus with Technology 2	4
ENG1101	Engineering Analysis	3	ENG1102	Engineering Modeling & Design	3
CH1150&1151	Univ. Chemistry I & Lab I	4	PH2100&1100	Univ. Physics I Mechanics	4
CH1153	Prob. Solv. Chem. I :optional	1	EE1110	Essential Math for EE's	1
UN1015	Composition	3	EE1111	Intro. to Elec. & Comp. Engg.	1
			UN1025	Global Issues	3
Total		14/15	Total		16
Semester 3			Semester 4		
MA2321 ²	Linear Algebra	2	EE2112	Electric Circuits II	4
MA3521 ²	Differential Equations	2	MA3160	Multi-variable Calculus	4
EE 2111	Electric Circuits I	3	EE2190	Introduction to Photonics	3
CS 1111	Intro to Programming in C/C++	3	EE 2174	Digital Logic and Lab	4
PH2200&1200	Univ. Physics 2-Elec&Magnetism	4		Critical/Creative Thinking crse ⁷	3
	Soc Resp/Ethical Reasoning crse ⁷	3	Total		18
Total		17	Total		18
Semester 5			Semester 6		
EE3140	Electromagnetics	3	EE3901	Design Fundamentals	2
EE3160	Signals and Systems	3	EE3131	Electronics and Lab	4
EE3190	Optical Sensing & Imaging	3	EE3180	Probability – Signal Analysis	3
	HASS Comp/Comm. ⁷	3	EE3290	Phot. Materials, Devices & Appls	4
	HASS EC/PSY/SS elective ⁷	3		Approved electives ^{4b}	3
Total		15	Total		16
Semester 7			Semester 8		
EE4901 ⁵	ECE Design Project 1 (part 1)	2	EE4910 ⁵	ECE Design Project 2 (part 2)	2
EE3250	Communication Theory	3	EE4490	Laser Systems and Applications	4
	Photonics elective ^{3,8}	3		Photonics elective ³	3
	SELECT approved elective ^{4a}	3		EE electives ^{6,8}	3
EE3261	Control Systems	3		HASS HU/FA elective ⁷	3
	HASS elective ⁷	3	Total		15
Total		17	Total		15
Total			128 Credits		

Students must add 3 units of co-curricular activities (such as Physical Education, Pep Band or music lessons)

Follow pre-requisites and semester offerings. This is a 'suggested' plan which can vary by individual student; shows best route through system to avoid conflicts. Students who begin in a pre-calculus course will take ENG1001 and ENG1100 in place of ENG1101 in first year.

1. MA1160 may be replaced by MA1161
2. MA2320 and MA3520 may replace MA2321 and MA3521
3. Photonics Electives: 6 credits from approved list of Photonics Concentration electives.
4. SELECT Approved Elective: 3 credits (4a) from a "SELECT approved list", topics recommended by industry professionals; plus 3 cr. (4b) from Approved electives list: CH1153 may apply. Reduce 4b by 2 cr. w/ enterprise design opt.
5. Approved Engineering Design courses or Enterprise courses may replace EE4901, and EE4910. See advisor for details
6. EE Electives: 3 credits EE course not listed here and not EE3805, EE4805, EE4901, EE4910.
7. HASS = Humanities, Arts and Social Sciences. Follow university requirements for general distribution electives.
8. Up to six credits "EE" level 4000+ may be double-counted toward an ECE accelerated master's program.