

MS IN PHYSICS - CONCENTRATION IN PHOTOVOLTAICS

This National Professional Sciences Master's Association (NPSMA) recognized degree program is designed for students who want to work in the photovoltaics (PV) industry upon graduation. It prepares master's students with a strong foundation in the fundamentals of PV science and technology. It complements science education through management course work directly relevant to business aspects of manufacturing. It exposes students to a range of research activities on the UToledo campus in laboratories of world-expert faculty in PV. Placement of students as interns in PV manufacturing facilities for six months to enhance their practical training and employability is a critical part of the program. There is no thesis requirement for this degree.

The Photovoltaics concentration is designed for students with an undergraduate degree in Physics, Chemistry, an Engineering discipline (e.g. Electrical, Chemical, or Mechanical), or an otherwise related field.

Code	Title	Hours
PHYS 6280	Photovoltaic Materials And Device Physics Laboratory	3
PHYS 6630	Semiconductors I	3
PHYS 6640	Fundamentals of Solar Cells	3
PHYS 6940	Industrial Internship	6
PHYS 6960	M.s. Thesis Research	3-5
PHYS 6990	Independent Study	3
Select two of the following:		6-8
PHYS 6250	Classical Electrodynamics I	
PHYS 6320	Quantum Mechanics I	
PHYS 6520		
PHYS 6540	Structure, Defects And Diffusion	
PHYS 6550	Thermodynamics And Phase Transformations In Condensed Systems	
PHYS 6980	Special Topics	
Select two of the following:		6
BUAD 6400	Results-Based Management	
BUAD 6600	Supply Chain Management	
CHEE 6010	Green Engineering Principles	
CIVE 5690	Sustainability Engineering	
EFSB 6590	New Venture Creation	
EFSB 6690	Strategic Management of Innovation	
GNEE 6700	Management of Projects and Technological Innovation	
INFS 6560	Business Systems Analysis and Design	
OSCM 5520		
PHYS 6980	Special Topics	

No thesis is required; however, students are expected to make an oral presentation based on research and independent study.

- PLO 1: Students will analyze and solve (using the appropriate analytical techniques) any advanced graduate problem of relevance to photovoltaics (condensed matter physics, semiconductors, materials science, materials characterization, and device physics).
- PLO 2: Students will analyze and critique the appropriateness of various manufacturing techniques used in the production of solar cells. Our students must also be able to determine the correct experimental methods to be used in analyzing the manufacturing techniques.
- PLO 3: Students will critique any publication from the area of solar cells.
- PLO 4: Students will demonstrate oral and written communication skills appropriate to the study of photovoltaics.
- PLO 5: Students will analyze which physical processes are relevant to a given system.
- PLO 6: Students will assess cause and effect in physical systems by formulating evidence-based logical arguments.
- PLO 7: Students will perform research procedures relevant to photovoltaic materials and device development and industrial implementation.
- PLO 8: Students will identify and evaluate relevant informational resources appropriate to their field of study.
- PLO 9: Students will demonstrate ethical scientific and academic conduct.
- PLO 10: Students will demonstrate collaboration skills in a scientific context, in particular, with the M.S. advisor, research group members, and at their internship.