Masters of Physics with a Concentration in Modern Optics

San José State University

Prepare yourself for a high tech career in Silicon Valley and beyond through the Modern Optics concentration offered by the Department of Physics and Astronomy at San José State. All graduate classes are offered after 4 pm to accommodate the schedule of the working student and the convenient location allows for an easy commute from the peninsula, east bay and Livermore area.

Course Requirements for the Optics Concentration

Course and Title		Units
Required Courses		
Phys 205	Advanced Dynamics	3
Phys 230	Methods in Mathematical Physics	3
Phys 210	Electromagnetic Theory	3
Phys 263	Quantum Mechanics	3
Phys 258	Optics	3
Phys 168	Lasers	3
Phys 120c	Advanced Lab: Optics	2
Take 1 out of 3 of the following		
Phys 248	Optical Metrology	3
Phys 208	Intro. to Electro-optics	3
Phys 268	Laser Spectroscopy	3
Take one of 2 labs		
Phys 120d	Advanced Lab: Lasers	2
Phys 220e	Modern Optics Lab	2
Research Project (choose 1*)		
Phys 298	Research and Report	5
Phys 299	Research and MS Thesis	5
Total number of units		30

Institute for Modern Optics

Students get hands on experience through lab courses and research with faculty. The Institute for Modern Optics, conveniently located in the science building, has a wealth of laboratory equipment for student use including:

- Two Raman Spectrometers that enable students to study Raman spectra of various chemicals. Surface Enhanced Raman Spectroscopy (SERS) can also be carried out with these spectrometers.
- A Zygo Interferometer for testing optics.
- A holographic lab equipped with two vibration-free optical tables, several He-Ne lasers and a water-cooled Argon Ion laser.
- Research grade optical tables and laser systems
  - 5 W argon ion laser
  - 500 mW modelocked Ti:sapphire laser with 20 fs pulse duration
  - 10 W Q-switched Nd:YAG, frequency doubled to 532 nm

Optics Course Descriptions

Introduction to Electro-Optics
Physical principles of electro-optics including modulators (electro- and acousto-optic), non-linear optics, semiconductor lasers, optical detection and integrated optics with applications.

Optical Metrology
Partial coherence, classical interferometry, laser speckle method, holographic interferometry, Moir method, roughness measurement and other optical metrology technique.

Optics
Fourier optics, diffraction theory, imaging and image enhancement, holography and information processing.

Laser Spectroscopy
Importance of spectroscopy. Interaction of radiation with matter. Instrumentation for laser spectroscopy. Examples of various techniques, CW and pulsed.

Lasers
Properties of lasers and Gaussian light beams. Principles of laser operation and design. Application of lasers.

Advanced Lab: Lasers
Experiments involving various types of CW and pulsed lasers. Measurements of output characteristics of lasers; study of design parameters and experiments illustrating applications of lasers.

Modern Optics Lab
Experiments in non-linear frequency conversion, spectroscopy, modulation and Fourier optics.

* Students wishing to complete the program without doing a thesis project may instead take one additional class out of Phys. 208, 248 and 268, and complete both Phys 120D and 220E laboratories in lieu of Phys 298 and 299.