The College of Optical Sciences has a long legacy of pushing the boundaries of scientific knowledge and translating that knowledge into industrial value. In celebration of our 50th anniversary, and in furtherance of our industrial collaboration, the college has launched a new program to allow for industrial participation in our collective mind-share.

Started in 2014, we offer a series of on-campus and distance learning educational seminars on a variety of topics including applied optical design and theory. For a fee, our Industrial Affiliates members can access these seminars via our distance learning platform on a non credit basis via our new Industry Access Program. Taught by professors highly respected in their field of expertise, the series will focus on applied optical theory related to lens design, computational photography, applied mathematics and diffractive element theory among other topics.

The courses, representing 40 hours of world-class instruction, will be available for the upcoming academic semester and be taken on an as-needed basis via distance learning.

For information on how to enroll, contact:

Justin Walker
Associate Dean for Business
Development and Administration
College of Optical Sciences
520-621-0207
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See back for Course Descriptions
Fall Courses

OPTI 501, Electromagnetic Waves  
Professor Masud Mansuripur  
This course will delve into vector fields, Maxwell’s equations, electromagnetic field energy, wave equations, freespace solutions, box modes, Fresnel equations, scalar and vector potentials, gauge transformations, Lorentz model for dielectric media, metal optics, crystal optics, dipole radiation, mathematical formalism of polarized light.

OPTI 502, Optical Design & Instrumentation I  
Professor John Greivenkamp  
This course will cover rays and waves, Snell’s Law, mirror and prism systems, Gaussian imagery and cardinal points, paraxial raytracing, stops and pupils, radiometric transfer, vignetting, elementary optical systems (objectives, telescopes, illumination systems, projectors, photographic systems), optical materials, dispersion, achromats.

OPTI 506, Radiometry, Sources & Detectors  
Professor John Koshel  
This course focuses on radiometric concepts, symbols, units and nomenclature. Radiative transport in free space and through optical systems. Effect of material properties on radiative transport. Blackbodies and other radiation sources. Fundamentals of radiation detectors, including principles of operation, noise and figures of merit.

OPTI 528, Adaptive Optics & Imaging through Random Media  
Professor Michael Hart  
This course provides an overview of adaptive optics fundamentals. The course consists of lectures and team projects. For each of the three team projects during the semester, astronomy and optics students will work together to design an instrument, using material presented during the lectures. Each team project will result in an oral presentation.

OPTI 647, Photonic Quantum Information Processing (NEW!)  
Professor Saikat Guha  
This course will be aimed at developing a principled understanding of the quantum description of light, its manipulation and detection. This course will be valuable for graduate students who intend to partake theoretical or experimental research in any area of photonic quantum information processing, such as quantum communications, sensing and computation.

Spring Courses

OPTI 503A, Mathematical Methods for Optics & Photonics  
Professor Masud Mansuripur  
This course covers the basic mathematics needed for an in-depth understanding of the science and technology of fiber optical communication systems. Every mathematical tool/technique developed in this course will first be motivated by the relevant application. The course will cover complex analysis, Fourier transform theory, method of stationary phase (in the context of optical diffraction), vector algebra, linear algebra, ordinary and partial differential equations (e.g., Maxwell’s electrodynamics, wave equation, diffusion equation), special functions (e.g., Bessel functions needed to study the guided modes of optical fibers), and probability theory (needed for understanding various sources of noise in communication systems, photodetection theory, digital communication via noisy channels, information theory, etc.).

OPTI 567, Nanophotonics  
Professor Euan McLeod  
This course will cover the interaction of light with nano-scale features on objects. Ways to focus light and image objects beyond the diffraction limit will be presented. The course will include mathematical foundations, including those of plasmonics and metamaterials, as well as a review of applications of nanophotonics and recently-published progress in the field.

OPTI 585, Illumination Engineering  
Professor John Koshel  
Fields: illumination, nonimaging and concentrators; sources: incandescent, fluorescent, LED, HID, modeling and experimental measurement; modeling: ray tracing, radiometry and photometry, color, polarization, and scattering; theory: radiometry, photometry, étendue, skew invariant and concentration; design methods: edge ray, flow line, tailored edge ray, non-edge ray and imaging; optics: reflectors, lightpipes, couplers, films and hybrids; applications: displays, automotive, solar, sources and lighting; special topics: software modeling, optimization, tolerancing and rendering.