

• **Course Description (Optical Engineering)**

Introduction to Optics			
Yr. : 1	Sem. : 1	Course Code:	OE0001
<p>Course Description</p> <p>The course provides elementary introduction to geometrical optics and wave optics. The nature of light, reflection, refraction, image formation and simple optical instruments, interference, diffraction and polarization of light are covered.</p>			
Introduction to Optical Engineering			
Yr. : 1	Sem. : 2	Course Code:	OE0002
<p>Course Description</p> <p>This is an introductory course in optical engineering. This course is to introduce the basics of optical engineering in geometric optics, physical optics, laser optics and optoelectronics.</p>			
Geometrical Optics			
Yr. : 2	Sem. : 1	Course Code:	OE0003
<p>Course Description</p> <p>In this course, we study the reflection, refraction of the light with the ray tracing. Also, we study the lens design, aberration theory, and optical systems.</p>			
General Optics Experiment 1			
Yr. : 2	Sem. : 1	Course Code:	OE0004
<p>Course Description</p> <p>The course provides various introductory experiments related to geometrical optics and basic optical instruments. Students will be required to show a good understanding of the physics involved in a series of experiments and to demonstrate proficiency in the reduction and interpretation of data.</p>			
Modern Physics 1			
Yr. : 3	Sem. : 1	Course Code:	OE0005
<p>Course Description</p> <p>This course covers special theory of relativity, wave-particle duality in light and matter, atomic models, and</p>			

elementary quantum mechanics.

Engineering Computer Programming

Yr. : 2

Sem. : 1

Course Code:

OE0006

Course Description

In this subject we learn the computer programs for numerical and graphical analysis. The application programs for special purposes and how to use some programming languages are introduced. We also learn the computer programming languages for graphics or how to use the application programs, including Fortran, C++, Mathematics, Matlab, Mathcad, etc.

Wave Optics

Yr. : 2

Sem. : 2

Course Code:

OE0007

Course Description

In this course, we study the propagation, superposition, interference, and polarization to understand the wave property of the light.

General Optics Experiment 2

Yr. : 2

Sem. : 2

Course Code:

OE0008

Course Description

The course provides introductory experiments related to wave optics. Students will be required to show a good understanding of the physics involved in a series of experiments and to demonstrate proficiency in the reduction and interpretation of data.

Modern Physics 2

Yr. : 3

Sem. : 2

Course Code:

OE0009

Course Description

This course covers the applications of elementary quantum theory to Hydrogen atom, atomic structures, molecular structures and solid-state physics.

Data Acquisition and Control

Yr. : 3

Sem. : 1

Course Code:

OE0010

Course Description

This is an introductory course in data acquisition programming with LabVIEW, which are widely used in engineering and automated systems. We will examine the basics of LabVIEW virtual instrument programming.

Laser Optics			
Yr. : 3	Sem. : 1	Course Code:	OE0011
<p>Course Description</p> <p>In this course, we understand the mechanism of the laser oscillation, and study the electro-optics, magneto-optics, nonlinear optics, and laser application fields.</p>			
Design of Imaging Optical System			
Yr. : 3	Sem. : 1	Course Code:	OE0012
<p>Course Description</p> <p>This course introduces basic concepts of advanced aberration theory, MTF and imaging optics design with optical design S/W (CodeV or Zemax).</p>			
Modern Optics Experiments 1			
Yr. : 3	Sem. : 1	Course Code:	OE0013
<p>Course Description</p> <p>This course help students to understand basic principles of various phenomena in modern optics through various experiments, for example, quantum electronics, fiber optics, Faraday effect, holography and Fourier optics, and so on.</p>			
Electronic Circuits Experiments 1			
Yr. : 2	Sem. : 1	Course Code:	OE0014
<p>Course Description</p> <p>The aim of this course is general electricity and electronics for optical engineers.</p> <p>The topics are the electricity and magnetism, circuit theory, passive elements, active elements, amplifiers, operational amplifier, digital logic circuits and etc.. For each topics, experiments are included.</p>			
Electromagnetism 1			
Yr. : 2	Sem. : 1	Course Code:	OE0015
<p>Course Description</p> <p>After a brief review of vector calculus, this course begins by introducing electrostatics to set up the stage for full electromagnetic theory culminating in the establishment of Maxwell's equations.</p>			

Project Lab 1			
Yr. : 3	Sem. : 2	Course Code:	OE0016
<p>Course Description</p> <p>In this course, students will have opportunities to experience and learn how to solve the real problems researchers in the industry confront, collaborating with faculty members, graduate students, and researchers.</p>			
Optical Instruments			
Yr. : 3	Sem. : 2	Course Code:	OE0017
<p>Course Description</p> <p>In this course, we study the reflection, refraction, absorption, interference, diffraction and polarization of the light from the sun, lamp, and laser. And we study how to make an image of an object consisted of optical elements. We study also the principles and application fields of the optical instruments which are used to analyze the spectrum and characteristics of the objects.</p>			
Illumination Optical System Design			
Yr. : 3	Sem. : 2	Course Code:	OE0018
<p>Course Description</p> <p>This course introduces basic concepts of ghost, flare, light source, related theories for illumination and non-imaging optics design with optical design S/W (LightTools or Zemax).</p>			
Modern Optics Experiments 2			
Yr. : 3	Sem. : 2	Course Code:	OE0019
<p>Course Description</p> <p>This course help students to understand basic principles of various phenomena in modern optics through various experiments, for example, polarimeter, optical fiber communication, interferometer, nodal slider, optical flat fabrication, solid state laser pumped laser diode, fiber coupler, and so on.</p>			
Electronic Circuits Experiments 2			
Yr. : 2	Sem. : 2	Course Code:	OE0020
<p>Course Description</p> <p>The aim of this course is general electricity and electronics for optical engineers.</p>			

The topics are the electricity and magnetism, circuit theory, passive elements, active elements, amplifiers, operational amplifier, digital logic circuits and etc.. For each topics, experiments are included.

Electromagnetism 2

Yr. : 2

Sem. : 2

Course Code:

OE0021

Course Description

This course applies electromagnetic theory to various important topics including transmission lines, wave guides, and electromagnetic radiation.

Project Lab 2

Yr. : 4

Sem. : 1

Course Code:

OE0022

Course Description

In this course, students will have opportunities to experience and learn how to solve the real problems researchers in the industry confront, collaborating with faculty members, graduate students, and researchers.

Optics of Thin Film and Design

Yr. : 4

Sem. : 1

Course Code:

OE0023

Course Description

This course introduces basic concepts of reflection and refraction of light, Fresnel equations, characteristic matrices, AR coating, HR, coating and optical filters.

Opto-mechanical System

Yr. : 4

Sem. : 1

Course Code:

OE0024

Course Description

This course covers the basic principles necessary for the design of opto-mechanical systems. Characteristics of optical materials, theory of thermal deformation, and the design of various mounts for optical components including lenses, mirrors are covered.

Optoelectronic Semiconductor Engineering and Experiments

Yr. : 4

Sem. : 2

Course Code:

OE0025

Course Description

This course is to introduce the optoelectronics and measurement techniques widely used in experiments to

engineering students. The operation principles and the characteristics of LED, Laser Diode(LD), photo diode and Solar cell with their applications are studied.

* Related subjects: Optical Materials Science and Engineering, Electromagnetism 1&2, Modern Physics 1&2

Special Topics in Optical Engineering

Yr. : 4

Sem. : 1

Course Code:

OE0026

Course Description

We introduce the current hot topics in the optics. We provide the wide viewpoints to the students for the current interesting topics in the optics.

Optical Measurement and Optical Inspection

Yr. : 4

Sem. : 1

Course Code:

OE0027

Course Description

In this course, we study the principles of the optical measurements such as laser diagnostics in combustion, holographic interferometry, Moire methods, Speckle methods, photoelasticity, fringe analysis, and fiber optics in metrology.

Laser Application

Yr. : 4

Sem. : 2

Course Code:

OE0028

Course Description

In this course, we understand the laser principles and operational characteristics. Also, we study the utilizations of all sorts of lasers and the front edge laser systems.

Optical Information Engineering

Yr. : 4

Sem. : 2

Course Code:

OE0029

Course Description

This course covers guiding principle, dispersion and loss in optical fibers, principles of optical signal processing like modulation and demodulation, and principles and characteristics of devices like light sources and sensors.

Optical Material Science and Engineering

Yr. : 4

Sem. : 2

Course Code:

OE0030

Course Description

This course is an introductory course in optical materials. Basics of physics and chemistry will be applied to understand the properties of optical materials. Thermal, mechanical, electrical and optical properties of materials will be studied to apply to optical design.

* Related subjects: General Physics 1&2, Modern Physics 1&2

Medical Optics

Yr. : 4

Sem. : 2

Course Code:

OE0031

Course Description

In this course, we study the classification of medical lasers, photobiology of laser, interaction mechanism of laser to biological tissue. And we study the medical applications of laser to endoscopic therapy ophthalmology, dermatology, aesthetic plastic surgery, and PDT in neurosurgery.

Display Engineering

Yr. : 4

Sem. : 1

Course Code:

OE0032

Course Description

This is an introductory course in display engineering. Basic principles and structures of flat panel displays such as TFT-LCD and OLED will be studied. Manufacturing processes will be also covered in this course.

* Related subjects: Electronic Circuits Experiments 1&2, Modern Physics1&2

Introduction to Optical Engineering Design

Yr. : 1

Sem. : 2

Course Code:

OE0034

Course Description

In this course, we study the methods of inventive problem solution based on the elementary knowledges in science and engineering.

Data Acquisition and Control Experiments

Yr. : 3

Sem. : 2

Course Code:

OE0035

Course Description

This is an introductory course on sensors and data acquisition experiments with LabVIEW which are widely used in engineering and are an integral part of commercial products and automated systems. We will examine the measurement techniques with LabVIEW using various sensors and computer aided data acquisition and also study the methods of programming instrument control.

Industry-University Collaborative Research

Yr. : 4

Sem. : 2

Course Code:

OE0036

Course Description

In this course, students will participate in the research project conducted by faculty members on the topics in the industry to gain research experiences in our industry.

Basic Optics Design

Yr. : 2

Sem. : 2

Course Code:

OE0037

Course Description

This course introduces basic concepts of advanced geometrical optics, optical elements, ray trace, aberration of lens and evaluation of optical system with EXCEL.

Convergence Approach to Optical Engineering Design 2(Capstone Design)

Yr. : 4

Sem. : 2

Course Code:

OE0042

Course Description

In the Creative System Design course, students work in teams to design, build, and test prototypes with industrial applications. This course will provide students the opportunity to work with real-world challenges in industrial projects. They will learn how to apply the engineering design process systematically. At the end of the semester, students will have opportunities to present their results at the student expo held at the KIT.

Convergence Approach to Optical Engineering Design 1(Capstone Design)

Yr. : 4

Sem. : 1

Course Code:

OE0050

Course Description

In the Creative System Design course, students work in teams to design, build, and test prototypes with industrial applications. This course will provide students the opportunity to work with real-world challenges in industrial projects. They will learn how to apply the engineering design process systematically. At the end of the semester, students will have opportunities to present their results at the student expo held at the KIT.