

EE 420 – Electro-Optics: Principles and Devices

Designation: EE elective course for electrical engineering majors.

University Bulletin Description: EE 420: (3) Diffraction, Fresnel-Kirchhoff theory, partial coherence theory, linear and nonlinear holography, white-light holography, applications of holography.

Prerequisite: EE 320.

Prerequisites by Topics:

1. Understanding of the electro-magnetic field.
2. Understanding of the general concept of wave propagation phenomena.
3. Understanding of the linear system theory.

Textbook/Required Materials:

Introduction to Fourier Optics, J. W. Goodman, Roberts and Company Publishers, 2005

Optical Signal Processing, Computing and Neural Networks, F. T. S. Yu, and S. Jutamulia, Wiley-Interscience, New York, 1991

Learning Outcomes:

This course is to introduce basic concepts, techniques and application of optical signal processing to seniors and graduate students in electrical engineering. Application examples of real world problems will also be discussed in class to give student a broader view of the field. The objectives will be complemented by class lectures and homework assignments.

Topics:

1. 2D Fourier transform
2. Diffraction
3. Fourier transform lens
4. Holography
5. Novel photonic materials
6. Special topics and lab demos

Class/laboratory schedule: Two 75-minute lectures per week.

Computer usage:

ANGEL system is used to distribute course materials (e.g., notes, homework and solutions).

Contribution to Meeting the Requirements of Criterion 5. Curriculum:

This course contributes to both the engineering topics and design components.

This is designed as an elective course to provide seniors and graduate students in electrical engineering with basic concepts of Fourier optics, which could lead them to the basic understanding of optical information systems.

Relationship to Program Outcomes:

- O.1.1. Graduates will possess mathematics skills necessary for electrical engineering.
- O.1.2. Graduates will have a theoretical and practical background in both physics and chemistry.
- O.2.3. Graduates will understand the basic concepts of linear systems and how they interact with continuous-time signals.
- O.2.4. Graduates will understand fundamental electricity and magnetism concepts and be able to use them in applications.
- O.3.1. Graduates will have in-depth technical knowledge in one or more areas of specialization.

- O.3.2. Graduates will have practical understanding of the major electrical engineering concepts and demonstrate application of their theoretical knowledge of the concepts.
- O.4.2. Graduates will develop an appreciation of continuing educational and professional development.

Updated by: Zhiwen Liu

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