

## Optical Information Processing (광정보처리) Syllabus

- **Spring Semester, 2015, School of Electrical Engineering, Seoul National University**
- **Lecture by :** Byoung-ho Lee, Professor (Bldg. 301 Rm 1106, Tel: 02-880-7245, [byoung-ho@snu.ac.kr](mailto:byoung-ho@snu.ac.kr) , <http://oeqelab.snu.ac.kr>)
- **Class :** Mon. & Wed. 9:30 ~ 10:45, Room 302
- **Textbook :**  
J. W. Goodman, *Introduction to Fourier Optics*, 3rd ed., Roberts & Company, Englewood, Colorado, USA, 2005.  
  
Other materials will also be used.
- **Reference :**  
B. E. A. Saleh and M. C. Teich, *Fundamentals of Photonics*, 2nd ed., John Wiley & Sons, New York, USA, 2007.
- **Grade :** Midterm(40%), Final(40%), Homework(20%)
- **Introduction**  

In this class, we deal with Fourier optics and optical information processing. First, the principle and characteristics of lasers are reviewed and speckle applications will be explained. Then, diffraction theories are explained, followed by discussion on implementation methods of optical Fourier transform using lenses. Various methods of incoherent or coherent image processing will be overviewed. Especially, the theory of hologram and its applications will be discussed. We will also overview three-dimensional display techniques and diffractive optics for nanophotonics.
- **Schedule(tentative)**
  - 1st week(3/2-3/8): Introduction, Principle and Characteristics of Lasers, Speckles
  - 2nd week(3/9-3/15): Speckle Imaging, Mobile Healthcare
  - 3rd week(3/16-3/22): Analysis of Two-dimensional Signals and Systems, Foundations of Scalar Diffraction Theory
  - 4th week(3/23-3/29): Fresnel and Fraunhofer Diffraction
  - 5th week(3/30-4/5): Wave-optics Analysis of Coherent Optical Systems
  - 6th week(4/6-4/12): Frequency Analysis of Optical Imaging Systems
  - 7th week(4/13-4/19): Wavefront Modulation, Midterm Exam.
  - 8th week(4/20-4/26): Phase Unwrapping, Holography
  - 9th week(4/27-5/3): Holography, Coupled-Wave Analysis
  - 10th week(5/4-5/10): Three-Dimensional Display and Imaging
  - 11th week(5/11-5/17): Geometrical Optics, Lenses
  - 12th week(5/18-5/24): Perception of Vision
  - 13th week(5/25-5/31): Holiday (make-up class), Diffractive Optics for Nanophotonics
  - 14th week(6/1-6/7): Practical Applications
  - 15th week(6/8-6/14): Others, Final Exam.