

L. Hesselink  
Spring '03-'04

DATE: March 31, 2004

EE347: OPTICAL METHODS IN ENGINEERING SCIENCE

Instructor:                   **Professor Lambertus Hesselink**  
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Class Location:           **Room 540-108**  
Time:                         **Mon/Wed 8:30am to 9:45am**

**(Depending on class size and student approval, an accelerated schedule will be followed to deliver the class lectures so that more time is available for the final lens design project)—see separate lecture schedule.**

Topics to be covered:

- See attached schedule

Grading: **20% homework; 80% Project**

Recommended Texts:

"Lens Design" by Milton Laikin published by Marcel Dekker, Inc., 1991

"Modern Optical Engineering" by Warren J. Smith, published by McGraw Hill, 1990

"Fundamentals of Optics," by Jenkins & White, McGraw Hill, 4th Edition, 1965

**OBJECTIVE:**

To introduce the basic concepts of lens design in class through lectures and hands-on experience with a computer ray trace program.

The students will gain experience with modern lens design programs by carrying out a complete design of an optical device through a class project.

Approach:

- Theoretical concepts taught in early part of class using accelerated schedule
- Class project:
  - preliminary design presentation (40%)
  - 90% design presentation
  - final presentation

By unanimous consent, most lectures will be taught during the first three weeks of the term, followed by bi-weekly design meets.

<b><u>Topic #</u></b>	<b><u>Description</u></b>
1	Lens aberration Third order aberration Spherical aberration Single lens
2	Coma Aplanatic surfaces Petzval Sum Astigmatism
3	Curvature of field Distortion
4	Chromatic aberration Code V, lens design program
5	Image evaluation Wavefront analysis Aberration tolerances Aberration correction and residuals
6	Ray intercept curves
7	Design process Novel materials, gradient index Components, prisms, elements of revolution
8	Diffraction gratings Holographic optical elements Optical instruments
9	Case Study
10	Project Presentation