

**2009 Spring – Course Syllabus**  
**ECSE-6962: “Light Emitting Diodes and Solid-State Lighting”**

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**Course materials:** Textbook: *Light Emitting Diodes* 2nd edition, 2006. To purchase book, please see Gina Moore or buy from Amazon.

**Lecture time and location:** Wednesday’s 9:00 AM – 11:50 AM in the JEC 4304

**Office hours:** Immediately following the lecture.

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**Description:** Light emitting diodes (LEDs) are devices that are used in a myriad of applications, such as indicator lights in instruments, signage, illumination, and communication. This course covers all aspects of the technology and physics of infrared, visible-spectrum, and white-light-emitting diodes (LEDs) made from III-V semiconductors. It reviews elementary properties of LEDs such as the electrical and optical characteristics, as well as advanced device physics including high-efficiency device designs, light extraction, radiative and non-radiative recombination dynamics, spontaneous recombination in resonant-cavity structures, and packaging. It introduces related areas such as human vision, photometry, colorimetry, and color rendering. Application of infrared and visible-spectrum LEDs in silica fiber, plastic fiber, and free-space communication is discussed. Extensive semiconductor material data, device design data, and analytic formulas governing LED operation are provided. Exercises and illustrative examples are included and an introductory chapter reviews the historical developments and milestones of LED research and development. This course will be of interest to scientists and engineers working on LEDs, and to graduate students in electrical engineering, applied physics and materials science.

**Level:** The course is intended for graduate students

**Pre-requisite:** “Semiconductor Devices and Models 1” or equivalent **and** “Microelectronics Technology” or equivalent **and** basic knowledge of electrical engineering, physics, and chemistry

**Homework:** Please present homework to TA before mid-term and final exam. TA will verify that you did homework and keep your score. Homework score shall be on an **effort basis** (in contrast to performance basis).

**Grading:** The final grade is composed of the following contributions: Midterm exam 40 %; Final exam 40 %; Homework 10 %; Project 10 %. The completion of your homework will be verified before the midterm exam and before the final exam.

### Mandatory statement on academic dishonesty:

- Copying from a neighbor in an exam or turning in someone else's homework / reports / term papers as one's own constitutes academic dishonesty.
- The compilation, *ad verbatim* reproduction, or paraphrased reproduction of someone else's work in a written or oral report without citation of original source constitutes academic dishonesty.
- **What is plagiarism?** This is the use of someone else's work without crediting the source.
- **What is an "ad verbatim" reproduction?** This is an exact word-by-word reproduction.
- **What is paraphrased reproduction?** This is a reproduction using very similar words and phrases.
- **What is a phrase?** This is a sequence of two or more words.
- What is the penalty for academic dishonesty? The penalty is reduced or no credit and may result in failing the course.
- **Note:** Teamwork during class exercises and homework and use of other resources (calculators, books, etc.) are, of course, allowed.
- **Note:** If something is well known (common knowledge), the original reference does not need to be cited. Example: We can use Newton's second law ( $F = ma$ ) without citing Sir Isaac Newton. We can discuss transistors without crediting William Shockley for this invention.

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