UNIVERSITY OF NOTRE DAME  
Department of Aerospace and Mechanial Engineering  

AME 60637  
Ionization and Ion Transport  
Room: Fitzpatrick Hall 370  
Time: Monday/Wednesday/Friday 8:10-9:00 a.m.

Instructor: Dr. David B. Go  
Department of Aerospace and Mechanical Engineering  
370 Fitzpatrick Hall  
Phone: 574-631-8394  
Email: dgo@nd.edu  
Website: http://www.nd.edu/~dgo/ 

Office Hours: By appointment  
Email Contact: I will respond to any email sent during the week within 24 hours. I cannot 
guarantee my email availability on weekends, but will respond as soon as 
possible.

Course Website: http://www3.nd.edu/~sst/teaching/AME60637/index.htm  
Course Text: The primary text (and one of the best resources on plasma science) is  
Principles of Plasma Discharges and Materials Processing, M. A.  
Lieberman & A. J. Lichtenberg, Wiley. A second recommended text is  
Gas Discharge Physics, Y. P. Raizer, Springer-Verlag. Other  
recommended texts are included on the course website. In addition to 
these published texts, a set of course notes is also included on the course 
website.

Final Exam: None  
Course Objectives: This course aims to do three things: (1) Introduce the student to the  
fundamental physics of gaseous ionization and ion transport. (2) Introduce  
the student to low-temperature, non-equilibrium gas discharges including  
how they are formed and their basic properties. (3) Introduce the student  
to various applications of interest and fields of active research.

Course Organization: This course is organized into three parts as follows.  
Part 1: introduction to discharges, the generation of charged particles, the  
motion of charged particles in a gas  
Part 2: introduction to the ignition of discharges, equations to describe  
discharges, and their subsequent properties focusing on glow discharges  
Part 3: survey of various types of discharges (corona, dielectric barrier,  
radio frequency), applications, and fields of active research

Learning Goals: At the conclusion of the course, the student should be able to:  
1. Estimate basic properties and expected values for a low-temperature,  
non-equilibrium gas discharge.
2. Identify and understand the important physical mechanisms in a low-temperature, non-equilibrium gas discharge.
3. Understand recent developments and areas of high activity in gas discharge research.

**Course Grade:**

Final grades will be based on homework/reading assignments, quizzes, projects, and class participation/engagement in the course. The final division of scores has not been determined, but will likely be similar to the following:

- Homework: 25%
- Quizzes: 25%
- Project Presentation: 25%
- Class Participation: 25%

**Homework:** Homework problems will be assigned sporadically throughout the semester and will be due on the following Friday during class. Late solutions will be accepted by 5 P.M. on the Friday the assignment is due. (Please place any late solutions in Dr. Go’s mailbox in the AME office.) All homework assignments with due dates will be posted on the course web site prior to being assigned. Homework solutions must be legible or they will not be graded.

Articles from the literature and other homework reading will also be assigned regularly throughout the semester. A summary of the reading (not to exceed one page per article) will be due the class following that in which a particular article is assigned. The summary **must be typed** and will be graded on a scale of 0 to 2. The articles and summary due dates will be posted on the website. Occasionally, students will be able to suggest an article to the class and these will follow the normal assignment guidelines.

**Project:** There will be one project for this course. The deliverable for the project will be a 30-35 minute presentation on some aspect of the student’s research related to plasma science.

**Assistance:** Dr. Go will be available throughout the semester to answer questions; feel free to call or email Dr. Go to set up a time to meet.

**Course Policies:**

**Class Attendance and Excuses:**

Students are expected to attend and be engaged in every class. Though attendance will not be taken, a pattern of coming late or missing class will affect the class participation portion of your grade. If you do happen to miss a class, it is your responsibility to obtain the class note from a friend or colleague. Distractions during class, including text messaging, typing on laptops, and cell phones, are not tolerated, and you will be asked to leave the classroom. Please be respectful of both your classmates and me.
**Re-Grade Policy:** There will be no re-grades of homework or quizzes.

**Honesty:** You are all expected to follow the Academic Honor Code of the University, which states “**As a member of the Notre Dame community, I will not participate in or tolerate academic dishonesty.**” ALL aspects of every homework and project MUST be the original work of the authors. If you have questions about the University’s honesty policy – do not assume, ask!

**Disclosure:**  
I retain the right to modify the contents/requirements/deliverables for this course throughout the semester. The students retain the right for adequate notice of any changes via email or in-class announcements.