

## IPT 521000 雷射工程 Laser Engineering

### **Course Description:**

雷射與現今科技及生活息息相關，其應用廣及電機、物理、生物、機械、材料等領域。本課程講授雷射各部件之基本原理及特性，並介紹脈衝雷射光之產生機制。課程內容由淺而深，適合相關領域研究生及大學部高年級學生選修。

### **Course Syllabus:**

#### *Part I. Background*

0. Introduction
1. Ray Tracing in an Optical System
2. Gaussian Beams

#### *Part II. Optical Cavity*

3. Optical Cavities
4. Resonant Optical Cavity

#### *Part III. Laser Oscillation and Amplification*

5. Atomic Radiation
6. Optical Absorption and Amplification
7. Population Inversion and Optical Gain
8. Laser Oscillation
9. Gain Saturation

#### *Part IV. Laser Dynamics*

10. Q-switching
11. Gain-switching
12. Cavity dumping
13. Modelocking

#### *Part V. Laser Applications*

<b>Grades:</b>	Quiz and Homework	10%
	Midterm Exam	40%
	Final Exam	40%
	Presentation	10%

**Text Book:** Laser Electronics, Joseph T. Verdeyen (3rd Edition)

**References:** A.E. Siegman, Lasers (University Science Books, Mill Valley, CA, 1986).  
W.T. Silfvast, Laser Fundamentals (Cambridge University Press, New York, 1996).  
C.C. Davis, Lasers and Electro-Optics (Cambridge University Press, New York, 1996).  
P.W. Milonni and J.H. Eberly, Lasers (Wiley, New York, 1988).  
M.J.F. Digonnet, Rare Earth Doped Fiber Lasers and Amplifiers 2nd ed. (Marcel Dekker, New York, 2001)