課程資訊 (Course Information)					
科號 Course Number	10710IPT 599500	學分 Credit	3	人數限制 Size of Limit	30
中文名稱 Course Title	有機光電材料科學特論				
英文名稱 Course English Title	Special Topics in Materials science for organic optoelectronics				
任課教師 Instructor	大江昌人				
上課時間 Time	M3M4R3	上課教室 Room	台達 210		

課程大綱(Syllabus)

課程內容請依下列項目輸入：

1. Course Description(課程說明)

This course is newly offered constructively for graduate and senior undergraduate students. This course provides materials science related to optoelectronic devices technology and characterization of thin films including analytical probing methods of molecular orientation with related optics and physics. Before we explore the fundamentals of optoelectronic devices*, it is prerequisite for us to have fundamental knowledge on materials and the related areas since optoelectronic devices are composed of interdisciplinary technologies. The first half of this course covers quantum chemistry from atoms to molecules, quantum mechanical frameworks for materials science, physics and chemistry of materials including photo-physical processes of molecules, light-matter interactions, molecule-molecule interactions and other materials related topics. In the second half of the course, however, we will focus on the research area on characterization of thin films including molecular orientation, which is related to optoelectronic devices at surfaces/interfaces and in the bulk of thin films. We will study how properties of thin films influence on devices and how we can probe molecular orientations using linear and nonlinear optical spectroscopy.

* These matters will be provided in “Selected topics in organic optoelectronics: physics, materials and devices” (New course to be offered in the following spring (下) semester); however, the courses in the fall and spring semesters are basically independent.

** It is not required but desirable for students to master “Modern Physics” or other related courses.

*** The course is offered in English.

**** **The first lecture will begin on Sep.13 (Thu), which means we will have no class on Sep.10 (Mon).**

2. Text Books(指定用書)

No textbook.

3. References(參考書籍)

“Concepts of Modern Physics”, sixth edition, by Arthur Beiser (Mc Graw Hill);

“Modern Quantum Mechanics”, by J.J. Sakurai (Addison-Wesley Publishing Company);

“Organic Electro-Optics and Photonics: Molecules, Polymers and Crystals” by L. R. Dalton (Cambridge Univ. Press);

“Optics and Nonlinear Optics of Liquid Crystals”, by Iam-Choon Khoo (World Scientific);

“Nonlinear Optics”, by Robert W. Boyd (Academic Press) …, etc.

4. Teaching Method(教學方式)

Combination of blackboard teaching with power point viewgraphs.

Report presentation by students.

5. Syllabus(教學進度)

Session 0: Introduction – Course guide –

Session 1~8: Materials science for organic optoelectronic devices

- Quantum mechanical descriptions for materials science.
- From atoms to molecules.
- Quantized energy structures.
- Perturbation theory
- Symmetry of molecules
- Photo-physics of molecules
- Ligand field theory.
- Organic semiconductor
- From single molecule to thin film
- Charge transport in organic thin film, …etc.

Session 9: Midterm

Session 10 -16: Molecular orientation and its related topics

- Characterization of thin films
- Molecular orientation and optoelectronic devices
- Probing technology
- Related optics and physics

Session 17: Final

**** The contents and plans will be appropriately changed and adjusted during the course.

6. Evaluation(成績考核)

Midterm exams (30%), Final exam including a report (40%), Homework and class attendance and participation (30%)

7. Webpage(可連結之網頁位址)

No webpage available, but lecture notes and other supplemental materials are uploaded in iLMS.