國立台灣大學生物產業機電工程學系課程內容綱要

課程名稱：高等生物電磁學特論		課程編號：631D2710
英文名稱：Special Topics on Advanced Bioelectromagnetics		
學分數: 3 學分	講演: 3 小時	實習: 小時
修習年級：□ 大學部_2,3,4__年級 □碩士班 ■ 博士班		
預修科目：Basic concept of electro magnetics and/or biomedicine theory		同修科目：
□必修	■選修：所屬領域 □ 機械與系統 ■ 量測與控制 □ 材料與程序 ■ 一般領域 (勾選)	

課程簡介：

The main topic of this course is biosystems with electromagnetic implications. Recently, scientists have found that practically all aspects of living organisms can be affected by electricity and magnetism. Thus, this course is designed specifically for Ph.D. students with biology or electrical engineering background. We will start from the basic concepts and characteristic behaviors of electromagnetic field theory with the spirit of the de-emphasis on mathematics. The topics explain and discuss the effect of electromagnetic field to living organisms is given in the remainder of the course. Detailed course topics are arranged as below:

預定課程內容：

1. Basic concept of bioelectromagnetics.
2. Introduction to electromagnetic fields
   Electric field,
   Magnetic field,
   Maxwell's equations,
   Wave particle duality
1. Electromagnetic field generation and dosimetry
3. Electromagnetic fields encountered in daily environment
4. Electrical properties of biological substances
5. Electric- and magnetic-field interactions with materials
6. Electromagnetic behavior as a function of size and wavelength
   When the wavelength is large compared with the object size
   When the wavelength is about the same size as the object
   When the wavelength is much smaller than the object
7. Image guided electromagnetic medicine
8. Examples of medical applications of electromagnetic fields
   Basic principle of application for pain relief
   Electromagnetic techniques in neural therapy
   Deep brain stimulation for Parkinson's Disease and movement disorders
   Energetic heart

評分標準：

成績計算：1. 作業：20%, 2. 考試與期末報告：80%

考試方式：Closed Book

期末報告：Oral presentation

參考書

教科書

1. Om P. Gandhi, Biological Effects and Medical Applications of

或講義	Electromagnetic Energy, Prentice Hall, 1990. 2. Carl H. Durney and Douglas A. Christensen, Basic introduction to Bioelectromagnetics, CRC Press, 1999. **主要參考書** 1. Lecture Notes 2. Selected Papers
授課教師：江昭皚　教授	
備註：**選修規定：限本系博士班學生，碩士生則需與授課教師面談後決定**	