

Medical Instrumentation

醫學儀器

Instructor: 彭旭霞 (Peng, Hsu-Hsia)
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Lecture time: Wednesday 09:00~12:00
Classroom: BMES R501
Office hour: Tuesday 10:00~12:00 (appointment by E-mail)
Course No.: 11110BMES343100
TA: TBD

建議先修課程 (Prerequisites): No.

參考用書 (Text books/Optional References)

1. John G. Webster, "Medical Instrumentation: Application and Design", 5th Edition, Wiley, 2020
2. John Enderle and Joseph Bronzino, "Introduction to Biomedical Engineering", 3rd Edition, Academic Press, 2012
3. Course materials: eeclass (instruction of eeclass: <https://learning.site.nthu.edu.tw/>)

課程目標 (Course Objectives)

1. Develop basic concepts of medical instrumentation
2. Develop problem-solving and critical thinking skills
3. Learn to integrate and apply various concepts to a single problem

成績考核 (Evaluation): 報告繳交當天"開始上課前"請置於講桌上，不接受遲交補交

1. Quiz (close book): 70%

- 兩次 (35%+35%): 當天一開始上課就考
- 可帶一張手寫 A4-size 雙面大抄
- 可使用計算機

2. Final term paper: 30%

- 分組: 每組 2~3 人 (最多 5 組)
- Journal paper (一篇主要論文+兩篇以上參考論文)
 - 建議: 尋找 Nature、Science 或其所屬之系列的國際期刊; **2019** 年之後的文章
 - 主題: 與醫學儀器、生醫工程、生醫資訊相關之新知
 - 必須是"發表論文", 請勿選擇"科學報導"(可事先詢問): 通常發表論文會有 Introduction, M&M, Results, Discussion, References 等部分
- Abstract (4%)
 - Two-page A4 以內 (字型:12; single space; 中英文不拘)
 - 內容
 - (1) 基本資料: 題目、出處(期刊名、卷期、頁數、年份)、組員(姓名系級學號)
 - (2) Abstract
 - (3) 說明與醫學儀器、生醫工程、生醫資訊之相關性
- Midterm report (6%)
 - Four-page A4 以內 (字型:12; single space; 中英文不拘)
 - 內容
 - (1) 基本資料: 題目、出處(期刊名、卷期、頁數、年份)、組員(姓名系級學號)
 - (2) 說明主要論文各段落重點 (請勿抄襲或翻譯原文)

(3) 可放入圖片說明

- Final presentation (20%): 報告當天請印一份投影片講義
 - 15 min presentation + 5min Q&A
 - 書面報告: Six-page A4 (可放圖片; 字型:12; single space; 中英文不拘)
 - 當天無故遲到或缺席者, final presentation 以零分計算

課程內容 (Course Topics):

1. The physiological signals of the body
2. Electricity: heart, ECG
3. Electricity: neuron, EEG
4. Non-electrical measurements
5. Biomedical sensors; Biopotential amplifier
6. Medical imaging system: evaluation of image quality: resolution, contrast, SNR
7. Medical imaging systems: X-ray
8. Medical imaging systems: CT
9. Medical imaging systems: NM, SPECT, PET
10. Medical imaging systems: MRI
11. Medical imaging systems: Ultrasound
12. Radiotherapy