# 徐尚德老師實驗室

## Part 1 研究主題與核心科學 (Research Focus)

**Q1-1 本實驗室研究主題的核心科學問題是什麼？**

Ans: Quantitative description of the structure-activity relationship (SAR) of important proteins that are involved in post-translational modifications (PTMs), including glycosylation and ubiquitination.

**Q1-2 此研究領域目前的重要性或應用價值為何？**

Ans: Glycosylation and ubiquitination are chemically and structurally heterogeneous, making it challenging for quantitative SAR descriptions at molecular level. Our lab is developing experimental strategies to address this issue through multiplex biophysical and biochemical analyses.

**Q1-3 暑期學生通常會參與什麼樣的研究計畫？會是以獨立小題目或協助既有計畫？**

Ans: Interns will participate protein engineering, recombinant protein production and functional characterizations to validate the computational designs – improved binding affinity, selectivity or enzyme activity

**Q1-4 暑期學生能夠學到什麼專業**

Ans: Protein structure visualization using PyMol/ChimeraX, AI protein designs, and molecular biology, biochemistry and biophysics skills for recombinant protein production and characterizations

## Part 2 實驗室運作與指導方式 (Mentorship)

**Q2-1 暑期學生由誰直接指導？**

Ans: PI will have weekly/monthly meetings with the interns. The daily training will be given by senior lab members, mostly graduate students.

**Q2-2 老師教導研究的方式為何？暑期生的指導人員會以什麼方式帶領？**

Ans: In the first month, interns will have a standardized training scheme for molecular cloning, protein production and biophysical/biochemical characterizations. In the second month, interns will then carry out their assignments (independently with daily supervision from the assigned supervisor(s)).

**Q2-3 每年大約收幾位暑期學生？**

Ans: 2-4

**Q2-4 實驗室對暑期學生的期待為何？**

Ans: Meticulous time management and lab record keeping. Self-driven learning of new knowledge, much of which will be available online and/or in the literature.

**Q2-5 實驗室希望能在這兩個月教導暑期學生研究上什麼樣的觀念或體驗？**

Ans: A clear idea about how structural biology can contribute to molecular understanding of the SARs of our target protein systems, and the basic principles of all the tools that will be used during the internship.

## Part 3 能力需求與錄取評核 (Requirements & Selection)

**Q3-1 申請此專題建議具備哪些基礎課程或學科能力？**

Ans: Sound analytical and numerical skills in molecular biology (essential), biochemistry (essential), physical chemistry (important but not essential) and molecular spectroscopy (optional).

**Q3-2 是否需要已有研究或實驗室經驗？若無經驗是否仍可申請？**

Ans: Prior lab experience is not a requirement, but it will be a plus

**Q3-3 老師評斷一個學生「適合度」的依據為何？**

Ans: Strong motivation, effective communication skills, sound analytical skills

**Q3-4 錄取的評估標準為何？**

Ans: As Q3-3

**Q3-5 是否需要面談？面談中看重的特質為何？**

Ans: A short online interview can be arranged. See Q3-3

**Q3-6 大一或大二學生，或是跨科系背景申請是否會有困難？**

Ans: No. As long as you have the necessary background knowledge (and experience)

**Part 4 技術學習與能力發展 (Skills & Growth)**

**Q4-1 在實習期間可具體學習到哪些實驗技術？**

Ans: Molecular cloning and biochemical experiments for recombinant protein purification followed by biophysical, spectroscopic and structural analysis of the purified proteins. 3D protein structural visualization will be routinely used for AI modeling, SAR analysis and functional interpretation.

**Q4-2 在實習期間具體接觸或觀察高階儀器？**

Ans: High-throughout protein production infrastructure – automated FPLC/HPLC – and industrial standard protein quality control platforms, including SEC-MALS, plus high-throughout protein function assessments in 96/384-well microplate formats. If successful, protein crystallization and/or solution state NMR spectroscopy will be used to analyze the target proteins.

**Q4-3 實習完成後 學生會學到哪些軟實力？**

Ans: Analytical thinking, English presentation skills (our group meetings conducted in English), literature review, from data to information to knowledge.

## 📌 實驗室補充資訊 (Optional)

- 建議修習課程或事前自學建議： AlphaFold, Structural Biology, Glycobiology, Ubiquitin-proteasome system
- 建議閱讀資料（如：特定的 Review 論文）:
- 我們最重視的特質： Teamwork, motivation, and honesty