

RE: Undergraduate Research in Protein Design / Biophysics / Bioengineering

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Description:

The Mravic Lab at Scripps focuses on membrane protein structure and function through the lens of computational design, molecular engineering, and data-driven modelling. Our research aims to **(1)** define biophysical “rules” for protein folding and specificity within lipid bilayers, **(2)** engineer software and molecular approaches to pro-actively probe membrane protein mechanism, and **(3)** elucidate key molecular events in cell signaling to target for therapeutic intervention.

Our group is seeking one or more undergraduate students to perform independent research using protein engineering to pro-actively regulate, and thus study, the mechanism of cross-membrane signaling for different cell surface receptors which are important therapeutic targets.

The engineering design principles focus on the receptor’s transmembrane region structure and chemistry – (1) building tool molecules to target proteins from within the bilayer and (2) studying synthetic receptors constructed *in silico* with unique building blocks to investigate how signals are conformationally transmitted across lipid bilayers to the inside the cell.

The project will focus on expressing computationally designed transmembrane proteins and characterizing their functional impact using reporter cell lines and basic biochemical techniques. The project should provide mentored training in the following areas in the wet lab:

- Mammalian cell culture & transfection of synthetic genes
- High-throughput cell-based assays for signaling pathway activation
- Molecular biology, DNA cloning: protein engineering
- Western blot, immunofluorescence staining, microscopy: analytical cell biology

Research interns will focus on wet lab methods, practicing DNA cloning combined with cell biology techniques to support the lab’s work in protein design and the study of membrane surface receptor proteins in disease/medicine. Computational opportunities may arise for those w/ coding skills. Interns will be supported for course credit, with potential to transition to part- or full-time paid positions (including summer). Intended start date is Spring quarter ‘24.

Please apply via email with a CV and brief statement (<250 words) describing one’s interest in these areas, including experience with the techniques described. Position is in-person.

Qualifications:

Practical understanding of molecular biology and protein chemistry. Lab course or equivalent experience in basic biology/biotechnology (DNA, protein, bacteria) is required. No GPA cutoff or specific major. *Having done previous independent laboratory research (especially in DNA cloning or cell culture) is preferred, but not required.*

Welcoming applicants of any race, religion, national origin, gender identity, caregiver and family commitments, political affiliation, sexual orientation, and eligible age or ability.