PHILIP EMMANUELE

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EDUCATION

University of California, San Diego **La Jolla, CA**
B.S. in Bioengineering: Biotechnology *June 2023*

- **Major GPA:** 3.96/4.00
- **Relevant Coursework:** Organic Chemistry, General Chemistry Laboratory, Experimental Techniques (signal processing, Arduino circuitry, error analysis), Probability for Bioengineers, Fluid Mechanics, Genetics, Biomolecular Engineering (biotechnology techniques), Bioengineering Mass Transfer, Biomaterials, Bioreactor Engineering, Tissue Engineering, Biotechnology Laboratory.

SKILLS

Laboratory: Molecular cloning, gel electrophoresis and extraction, PCR, miniprep, sterile technique, bacterial and mammalian cell culture, bacterial transformation (heat shock, electroporation), autoclave operation, Golden Gate assembly, Gibson assembly, spheroid culture, bacteria-spheroid co-culture, microfluidics, soft lithography, microfabrication, microfluidic chip design, bacterial conjugation, algal cell culture, guide RNA design, CRISPR-Cas9.

Software: Microsoft Powerpoint, Microsoft Excel, MATLAB, Python, Java, AutoCAD, FIJI, Flutter.

RESEARCH PROJECTS

Development of a Standardized Set of Inducible Promoter Systems in Yeast **La Jolla, CA**
UCSD Biodynamics Laboratory (PI: Jeff Hasty) *July 2022 - Present*

- Helped design, create, and transform three different inducible promoter systems into *S. cerevisiae.*
- Used a microplate reader to characterize expression of the inducible systems in the presence of different concentrations of inducer.
- Built multiple systems with maximal expression levels greater than those of the strong constitutive TDH3 promoter and **fold changes as high as nearly 300.**
- **Work currently under review for ACS Synthetic Biology**, "*A standardized set of MoClo-compatible inducible promoter systems for tunable gene expression in yeast*"

Discovery and Characterization of Inducible Promoter System in Diatoms **La Jolla, CA**
J. Craig Venter Institute *June 2022 - Present*

- **Leading a team of four undergraduates** to design, build, and test **the first completely orthogonal inducible promoter system** known in *P. tricornutum.*
- Using **bioinformatic analyses** based on RNA-seq data of *P. tricornutum* to find promoter motifs and construct synthetic promoters.
- Using bacterial conjugation to insert recombinant DNA into *P. tricornutum* with a reporter gene of GFP to characterize expression of natural and synthetic promoters.

Quantifying Bacterial Growth on a Microfluidics Platform **La Jolla, CA**
UCSD Biodynamics Laboratory (PI: Jeff Hasty) *August 2021 - Present*

- Designed, assembled, and transformed a genetic circuit into *E. coli* to quantify bacterial growth rates on a microfluidics platform under different conditions (media, temperature, etc…).
- Used **FIJI** and **Python** to analyze fluorescence and find the exact replication time of the bacteria on a microfluidics chip.
- Validated method by comparing results with well established data on bacterial doubling times.

Engineered *E. Coli* Nissle as Cancer Therapy **La Jolla, CA**
UCSD Biodynamics Laboratory (PI: Jeff Hasty) *July 2021 - Present*

- **Evolved *E. coli* Nissle metabolic mutants which had increased growth rates in the harsh tumor microenvironment** via adaptive laboratory evolution
- **Identified synchronized lysis circuit (SLC) mutants that exhibited strong and consistent lysis events** in evolved *E. coli* Nissle by creating and characterizing a library of SLC using directed mutagenesis
- **Developed a protocol** to coculture *E. coli* Nissle and CT26 spheroids for the bacterial delivery of cancer therapy *in-vitro*.
- **Presented and fielded questions** about my work at the **2022 Student Research Conference** at UCSD.

PERSONAL DEVELOPMENT

UCSD Biomedical Engineering Society (BMES) **La Jolla, CA**
Outreach Chair/Mentor *September 2019 - Present*

- Hold weekly committee meetings to **plan and execute visits and presentations about bioengineering and STEM topics to economically underprivileged students** in an effort to **increase diversity** in STEM fields.
- **Sought out volunteering opportunities and coordinated 30+ volunteers at once** to help make 3 different charity events a success
- **Mentoring two undergraduate bioengineering students** on how to succeed in college, get involved in research, and plan for life beyond college.

3rd Grade Lesson Leader **San Diego, CA**
Synthetic Biology Institute *September 2022 - Present*

- Working with 3rd grade teachers to **cultivate STEM lessons for the economically underprivileged, deaf and hard of hearing students** at Lafayette Elementary School.
- **Leading weekly STEM lessons** that taught the 3rd grade students about the **inclusivity and interdisciplinary nature of STEM**.
- Operating as program manager to coordinate 8 Ph.D. students to assist in weekly lessons.

PUBLICATIONS AND CONFERENCE PRESENTATIONS

O'Laughlin, R, Tran, Q, Lezia, A, **Emmanuele, P**, Hao, N, & Hasty, J (2022), 'A standardized set of MoClo-compatible inducible promoter systems for tunable gene expression in yeast', *ACS Synthetic Biology.* Under review.

Emmanuele, P (2022, August 11-12). *Engineering Bacteria for Cancer Therapy* [Conference Presentation]. 2022 UCSD Student Research Conference, La Jolla, CA, United States.

ADDITIONAL INFORMATION

Awards and Honors: Provost Honors (6x)

2022 UCSD Biotechathalon Runner Up **La Jolla, CA**
Bioscholars at UCSD *April 2022*

- Worked with 3 other students to research the optimal vaccine platform, epitope target, and vaccine delivery method in a research sprint to theorize the best universal influenza vaccine.
- Created a go-to-market strategy that outlined the R&D, pre-clinical testing, clinical trials, and manufacturing processes to estimate timeline, costs, and adoptability by the general public for our proposed vaccine.
- **Presented to a panel of industry and academic experts** who served as judges and was awarded **2nd place** with a cash prize while competing against 21 other teams.

Hobbies: Photography (focusing on climate change and astrophotography), Biking, Running