

MCELLBI N184L IGI CRISPR Undergraduate Summer Laboratory

Course Description: This 3 week lab course will focus on applications of CRISPR technology as a platform for genome editing and functional genomics. The program will consist of a hands-on laboratory experience demonstrating how CRISPR systems work in situ, as well as use genome editing both in vitro and in vivo. Students will utilize fundamental molecular biology techniques and learn additional protocols specific to genome editing. Two bioinformatics based lessons will cover the essential programs and analyses used in the genome editing field.

This course requires concurrent enrollment in a lecture component (MCELLBI N184), where lecturers will address topics in genome editing and CRISPR-Cas9 research, including basic and enhanced CRISPR methods, cellular repair mechanisms, regulation of gene expression, bioinformatics, applications to various organisms, and bioethics.

Class Format: 3.5 hours of lab per day. 4 days/wk for 3 weeks; MTuWTh 2pm-5:30 pm

Prerequisites: MCB 110L, 133L, 140L, 150L or 160L or equivalent lab experience

Grading Option: P/NP

There is no final exam or paper, but your grade will be determined by lab reports (80%) and class participation/lab citizenship (20%).

To obtain a passing grade for the class, your overall grade should be 70% or above.

Absences

If you are ill or have an unplanned absence, please work with your lab partner to review any lectures or lab procedures that you missed. Extended unplanned absences may result in a NP grade.

Final or other assessment format:

Units: 1

Co Instructors:

Dirk Hockemeyer

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Office Hours: by appointment

Lab TAs: TBD

Guest Lecturers: TBD

Resources and Readings:

TBD, will include:

All protocols for lab work

Rubric for grading lab reports

Resources for understanding lab protocols

<https://www.youtube.com/watch?v=fCd6B5HRaZ8>

<https://github.com/aryeelab/guideseq>

<https://github.com/tsailabSJ/circleseq>

<https://software.broadinstitute.org/software/igv/>

Week	Day	Date	Topics
Week 1: Acquisition Assay	Monday	July 29	Welcome, Course Introduction, Lab Safety. Transformation of Cas1 and Cas2 plasmids, plating of bacteria, take initial sample
	Tuesday	July 30	Take additional samples, PCR of CRISPR locus, run agarose gel, pick colonies for overnight cultures
	Wednesday	July 31	Miniprep cultures and send for sequencing
	Thursday	August 1	Analyze sequencing results and present
Week 2: Vitro Cleavage Assay	Monday	August 5	PCR, run agarose gel, set up IVT overnight
	Tuesday	August 6	RNA purification, run RNA gel to check product
	Wednesday	August 7	In vitro cleavage assay
	Thursday	August 8	Presentation of results. Bioinformatics Practical: gRNA design
Week 3: In Vivo Editing	Monday	August 12	Transformation of control RFP expression plasmid, Transformation of Cas9 gRNA RFP editing plasmid, Plate cells.
	Tuesday	August 13	Observe results, pick colonies, inoculate overnight cultures with and without selection.
	Wednesday	August 14	Plate cultures
	Thursday	August 15	Colony PCR to confirm integration

Safe, Supportive, and Inclusive Environment

Whenever a faculty member, staff member, post-doc, or GSI is responsible for the supervision of a student, a personal relationship between them of a romantic or sexual nature, even if consensual, is against university policy. Any such relationship jeopardizes the integrity of the educational process. Although faculty and staff can act as excellent resources for students, you should be aware that they are required to report any violations of this campus policy. If you wish to have a confidential discussion on matters related to this policy, you may contact the Confidential Care Advocates on campus for support related to counseling or sensitive issues. Appointments can be made by calling (510) 642-1988.

The classroom, lab, and work place should be safe and inclusive environments for everyone. The Office for the Prevention of Harassment and Discrimination (OPHD) is responsible for ensuring the University provides an environment for faculty, staff and students that is free from discrimination and harassment on the basis of categories including race, color, national origin, age, sex, gender, gender identity, and sexual orientation. Questions or concerns? Call (510) 643-7985, email ask_ophd@berkeley.edu, or go to <http://survivorsupport.berkeley.edu/>.