Overview: CRISPR-Cas9 has recently emerged as a powerful tool for genome editing in organisms ranging from bacteria to monkeys. This course will review the attributes and natural roles of CRISPR systems and how they are applied to specifically edit DNA sequences, with a focus on mammalian cells. At the conclusion of this course, students will be comfortable designing, performing, and evaluating targeted gene editing with CRISPR-Cas9.

Lectures:
1. Introduction to CRISPR systems, genome editing
2. Attributes of Cas9 and small guide RNAs
3. Genome editing with CRISPR-Cas9
4. Evaluating editing efficiency
5. Predicting and mitigating off-target effects
6. Performing high-throughput screens
7. Other CRISPR technologies

Labs:
1. Culturing and transfecting HEK293T cells. (weeks 1-2)
2. Designing guide RNAs for targeted gene editing. (week 2)
3. Transfecting plasmid DNA encoding cas9 and guide RNAs. (weeks 3-4)
4. Evaluating editing efficiency and the resulting sequences. (weeks 4-5)
5. Predicting and evaluating off-target sites. (week 6)