

BIO 489/589: **Natural and Unnatural Adaptations of Biomolecular Tools**

Innovation transcends parochial disciplines.

With information no longer the limiting resource, knowing how to evaluate, manage and recombine scientific information into new questions or novel applications becomes a core target of any STE2M learning. To gain courage required to innovate, we will delve into what others have garnered at the interfaces of molecular biology with a wide spectrum of other scientific disciplines and engineering technologies. Students will be expected to 1) lead some introductory lectures to select topics, 2) identify and share the relevant peer-reviewed articles, educational videos/lectures, popular literature/blog sites, 3) actively participate in all group discussions, and 4) formulate & express their ethical stance(s) and identify at least one area where that was changed by the newly-learned information.

A topic or two / week:

- Molecular origins of life on Earth
- MDR in bacteria, fungi and cancer
- Pollution in people: how and why and epigenetic impacts
- RNA in membrane-less organelles; biomolecular condensates (LLPS)
- Innate intracellular immunity/inflammasomes, TLRs
- Molecular (DNA/RNA-based) bio-sensors
- Stem cells of the many kinds
- Gene therapy (viral vectors)
- RNA interference (RNAi)
- Genome editing / CRISPR
- DNA-based computation
- Recombinant vaccines
- Bioterrorism
- GMOs
- Genetics of human behavior
- RNA/DNA based drug design (SELEX)
- Ribozymes / *in vitro* (directed) evolution
- Many flavors of DNA mining / bioinformatics
- Phage display (bio-electronic interfaces)
- Artificial nucleic acids and peptides
- Epigenetic imprinting in life and therapeutics
- Molecular timekeepers and counters, telomeres
- Ethics/morality/justice/politics/affordability of biotechnology



Learn the rules so you know how to break them properly.

- **Dalai Lama**