



## Undergraduate Summer Internship in Systems Biology

---

### Internship Project Description: Summer 2018

**Project Title:** Protein Engineering for Targeted Steroid-Based Immunosuppression

**Supervisor Name:** Emma Spady

**Lab PI Name:** Pamela Silver

**Project Description:** Autoimmune diseases are currently treated using synthetic glucocorticoids, which mimic natural steroids to suppress the immune system. However, these drugs have serious side effects due to their action in other tissues. To prevent this, we are engineering antibody fusion proteins that carry glucocorticoids exclusively to leukocytes. Our protein's steroid-binding domain will only release glucocorticoid inside leukocytes, where the steroid binds its cytoplasmic receptor and triggers immunosuppressive responses. We use pharmacokinetics, immunology, and structure modeling to choose and design protein features. After the proteins are expressed in mammalian tissue culture, we assay them in vitro to determine their biochemical properties, and in leukocyte culture to determine anti-inflammatory potential. We are looking for an organized and highly motivated student interested in learning a wide variety of biochemistry and molecular biology techniques such as tissue culture, protein purification, immunofluorescence assays, and biolayer interferometry kinetics assays. This project will involve thinking and working independently, while also contributing to a protein engineering team.