

## Example Objectives

1. **Research Question: What is the potential for survival and adaptation beyond the home planet?**

**Goal:** Identify any natural processes that may spread life from one planet to another.

**Objective 1:** Determine the dynamical lifetimes for interplanetary and interstellar transfer.

**Objective 2:** Determine the minimum number of species, trophic levels and food chains links that must be included for providing a functional ecosystem beyond Earth. The more of these levels and links, the more diverse/complex an ecosystem. A functional ecosystem can harvest energy, incorporate it into biomass, and recycle waste. Nonfunctional ecosystems do not have these processes, especially the last process, recycling.

**Objective 3:** Define the minimal number and level of physical environmental parameters required for organism/ecosystem survival and adaptation beyond Earth.

**Objective 4** Understand the role of gravity in life and ecosystem stability.

[Source: Roadmap: Astrobiology Roadmap Workshop,  
<http://astrobiology.arc.nasa.gov/workshops/1998/roadmap/scienceobjectives.html>]

2. The **project thematic basis** centers on the development of computational methods and processes for solving challenging complex multiphysics problems that span multiple spatial and temporal scales. The thread that runs through the program is the development and integration of computational methods and techniques in modeling and model reduction, parameter estimation, constraint solving, and uncertainty quantification with the aim of transforming solutions to multiphysics problems.

**Goal 2:** To create a progressive interdisciplinary education model that prepares U.S. Ph.D. students, especially those from underrepresented groups, who can collaborate with international partners and work in interdisciplinary teams to solve complex problems that require expertise in computational science.

**Objective 2.1** The investigators will work with the Computational Science Ph.D. program to graduate IGERT-funded students who have deep knowledge in computational methods and processes and broad knowledge across one or more disciplines.

**Objective 2.2** The proposed project will increase the number of students, especially underrepresented minorities, who enter and graduate from the Computational Science program.

**Objective 2.3** The proposed project will require IGERT trainees to participate in an international or national internship.

3. A **goal** of Project CAE to increase the representation of Hispanic girls and women in the sciences, mathematics, engineering, and technology (STEM) programs of study;

**Objective:** To positively impact attitudes of Hispanic girls and women towards STEM studies/careers by developing opportunities for interactive workshops and seminars, using the BEMR Program's model for recruiting and retaining girls and women as project participants.

4. We **hypothesize** that the FJKN system can be used to provide information on resistance selection in humans and that the FJKN system can be used to determine the dose and administration schedule of antiviral compounds and combinations of antiviral compounds that will inhibit the replication of influenza viruses while preventing the emergence of resistance.

The long term **goal** of this research project is to identify the optimal dose and schedule of administration of drugs active against influenza viruses that will prevent and/or cure people with influenza without causing the emergence of resistant viruses.

**Specific Aim #1.** Validate the FJKN system as a model for antiviral drug-induced resistance in humans by demonstrating that: 1) influenza viruses that are resistant to amantadine and oseltamivir carboxylate can be generated in the FJKN system when these antiviral compounds are delivered as monotherapy using the recommended human doses and PKs; and 2) that the resistant strains generated in the FJKN system have similar characteristics as those isolated from clinical settings. Several influenza virus clinical isolates and laboratory strains including the recombinant H5N1 influenza virus, rgA/Vietnam/1203/2004xA/PR/8/34 (a surrogate for H5N1 influenza virus), will be used in these studies.

**Specific Aim #2.** Use these viruses in the FJKN system to optimize the dosing strategy of amantadine and oseltamivir carboxylate to minimize the emergence of drug resistance by performing dose ranging and dose fractionation studies of these drugs in influenza virus-infected cells under monotherapy conditions.

**Specific Aim #3.** Use the FJKN system to determine the pharmacodynamically-linked variables of combinations of amantadine and oseltamivir carboxylate with the aim of suppressing or preventing the emergence of resistance to these drugs in cells infected with these influenza viruses.

5. **Objective:** 100% of science teachers who attended the safety workshop will implement recommended safety practices all of the time after completing the program, as documented by district safety inspector.
6. **Objective:** Half of the teachers attending my math workshops will implement at least one manipulative method for introducing a math concept this year as evidenced by lesson plans, observation, and follow-up on MLP.
7. **Goal:** Students will gain an appreciation and understanding of the value of applying the Writes rubric to their own writing.  
**Objective:** Students will be able to construct a five paragraph essay that follows the guidelines of the Writes rubric within a 45-minute timed writing session in their English class and explain the components in their essay that warrant the highest score.