

## **Introduction—Context of the UROP Project**

ESG is one of MIT's freshman programs. It is a learning community featuring small interactive classes in which student participation is important and encouraged. The classes are small and interactive.

For the last two years the spring 18.02 class has featured presentations researched by the students and delivered in class. The presentations have necessarily been on topics directly taught in 18.02, but they have used the skills learned by students in the course. The presentations required students to do some extra reading on topics outside the 18.02 syllabus, and then to present the material to the class. Thus extra skills are developed: the students learn how to communicate and deliver a report on their work. The projects have been used as an opportunity for students to use the mathematics learned in 18.02 and apply it to different areas of mathematics. This both broadens the students' knowledge and deepens their understanding of the 18.02 material, and is instructive in showing them the applicability of the knowledge and skills they are engaged in learning. Each student picks a topic in mathematics, science or engineering that is related to but outside the 18.02 syllabus. They need to do some research, prepare a talk and present it in class. This helps them develop their communication skills. It also both broadens the students' knowledge and deepens their understanding of the 18.02 materials, and is instructive in showing them the applicability of the knowledge and skills they are engaged in learning.

## **Responsibilities**

Working directly with Dr Gabrielle Stoy, the 18.02 instructor, I will develop some project material for the 18.02 ESG students on Energy Related topics. I will be focusing on producing areas for students to work on as an 18.02 project. My work will be to produce a list of topics in Energy Related areas and for each of these to prepare a bibliography for the students.

## **Work plan**

This will involve finding and detailing different topics for the projects, and assessing for each of the topics whether they are appropriate for an 18.02 student and use skills learned in 18.02. Then for each topic to identify the background material the students will need from other branches of mathematics and physics. Following this analysis, to produce a full project proposal and a bibliography which can be given to students so that they can work on the project.

## **Resource**

I will be using some energy problems already developed through ESG resources. These problems are on the <http://web.mit.edu/lcevens/www/Energy> website. The goal in assembling these problems was to use them for teaching students important concepts in energy, as well as teaching about fundamentals of mathematics and physics. They have been produced by a TA in the Mathematics Department; Prof Alex Slocum,

the Director of ESG, is a member of the Energy Initiative Committee in MIT, and the TA is a result of his involvement. They have been monitored by an ESG group of which Dr Stoy is a member. I will concentrate on problems first in the area of wind energy, and then heat energy; and I aim to use these problems as defining possible areas for student projects.

I anticipate being able to help with the supervision of the students during the projects. Thus, using the information gathered by supervising the students, I will be able to modify and improve the projects. The final aim will be to put these energy projects on the 18.02 class website, so that they can be used and added to over time.

With the current importance of energy issues this is a timely initiative. It is hoped that the Energy projects so developed will be exciting and interesting for the students, and encourage them to look at the Energy minor, currently under active preparation.

### **Personal**

I am very interested in doing this as I have served as an undergraduate TA for this course for the previous semesters, and I am doing so again this semester. I had contact with the students doing projects in spring 2008, and I am excited about being more formally and closely involved.