College of Engineering  
Summer Research Experience for Undergraduates Program  

Request for an Engineering Student for Summer 2013 Research

Faculty Name ______Erin Baker________________________________________________

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Department __MIE___________________Email: ____edbaker@ecs.umass.edu_______

Brief description of Summer Research Project (please explain the interdisciplinary nature of this project).

This project is part of the NSF IGERT: Offshore Wind Energy Engineering, Environmental Impacts, and Policy. The student will collaborate with a policy PhD student who is putting together an online GIS system intended to help a variety of stakeholders visualize the many aspects of an offshore wind farm. This specific project will use wind speed values and electricity demand data to calculate the “capacity value” of wind at different offshore locations in the Northeast.

Brief description of what the student will be doing:
The student will gather data about (1) windspeed in different locations; and (2) electricity demand profiles in different locations. Using engineering specifications, the students will translate windspeed into wind energy generated. Then, using a formula, the student will calculate the capacity value of this energy. That is, the energy has greater value if it generated during times of peak demand, and lesser value if it is generated is times of lower demand, such as during the night. The student will find the correlation between the energy generated and the demand for electricity and use that to calculate capacity values. The student will then work with a graduate student to get this data into the GIS system.

Is this a CASA-related project?  Yes ___ No _X__

Preferred background of student (major(s), class, GPA, pre-requisites, etc.): The student should be interested in wind energy. Any engineering, physical science, math, or CS major is fine. At least one class in probability is strongly preferred.

Did you mentor a student last summer in the College REU Program?  
Yes__X__   No ____  (The student was funded by me, but participated in the program)

If yes, please describe the outcomes for that student (i.e. Honor’s thesis, conference presentations, manuscripts, papers, etc.  Describe accomplishments to date as well as plans for the spring semester if the work has continued):

I have worked with a number of undergraduates on research projects, including two NSF-funded REUs, one FEEM-funded student, two with the UMass College of Engineering REU program, two UMass Commonwealth College honors theses, two independent studies, and two freshmen who worked on independent research projects. The NSF-funded students worked on earlier versions of this project during summers 2011 and 2012. In 2011, the student collected the data from other teams and performed calculations allowing us to do an initial comparison the results from solar and CCS. She prepared a poster that I presented at a workshop held in Venice September 2011. In 2012,
the student did extensive work generating probability distributions from the data and combining them into aggregated distributions. She prepared a poster, and contributed importantly to a presentation I gave at Snowmass in August 2012. The FEEM-funded student worked with data from more recent elicitations, using @risk software to generate probability distributions from the elicited data. This also resulted in a poster and has been helpful in writing a paper on the results. The first student funded under the college REU worked in conjunction with a Master’s student and ISO-New England, the Independent System Operator in charge of electricity markets in New England. He performed experiments using an agent-based model designed by the Master’s student. These experiments indicated the benefits that could be gained from real-time pricing by reducing market power of large generators. That project culminated in a written report that was provided to ISO-NE. This student has gone on to pursue a PhD. The second student funded under the REU was a female engineering student from Smith College, the only women’s college to have an engineering program. She developed an excel-based tool that created projections of future energy prices in the pioneer valley, based on past data and using finance theory. This tool provided the basis for a Sustainability Decision Tool [http://www.pvsustain.org/initiatives/sustainability-decision-tool](http://www.pvsustain.org/initiatives/sustainability-decision-tool) that was developed under a grant from the US EPA. The other projects have resulted in reports and presentations that have been useful for research and/or for organizations. One of the freshmen I worked with on an independent study just came by to report that he will be finishing his PhD this summer, and thanking me for introducing him to research.

Please return this form to: lrobidou@ecs.umass.edu by February 1, 2013