



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

## Senior Design Project Description

<b>Company Name</b>	<i>Ameresco, Inc.</i>	<b>Date Submitted</b>	<i>11/5/18</i>
<b>Project Title</b>	<i>Design of Experiments to use Plug Load Controllers to Develop Energy Savings recommendations (AMER_PLUG)</i>	<b>Planned Starting Semester</b>	<i>Spring 2019</i>

### Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	1	Electrical	2
Computer		Systems	1
Other ( )			

### Company and Project Overview:

Ameresco is an energy engineering company that provides performance contracting services for our customers. Performance contracting is a way for our customers to get facility upgrades (lighting, building controls, heating and cooling equipment) that are ultimately funded by the energy/utility cost savings, resulting from the installation of more efficient equipment.

The office equipment on the UNC Charlotte campus span decades of technology, and much of the equipment lacks or has limited features to reduce energy consumption. For example, various types of printers have some amount of energy consumption even when in the sleep or stand-by mode. These “phantom plug loads” (equipment that appear to be off but are still drawing power) contribute to much of the electricity consumption in buildings during unoccupied periods. There are devices available, like plug load controllers, that can be implemented to turn off the power to printers, during unoccupied periods, when occupants are not using the equipment.

### Project Requirements:

This project will study current inventories (collected by the UNC Charlotte Sustainability Office; contact is Dr. Michael Lizotte) of the different types of office equipment in use in various administrative areas, as well as classroom and lab areas, and other types of “plug loads” such as desk lamps, refrigerators, coffee makers, etc. in use throughout the campus. Students will learn how to deploy “plug load controllers” to determine the baseline energy use for various types of office equipment and other devices. After the baseline energy use is determined, students will then enable the scheduling feature to shut off these devices, during unoccupied periods to assess potential energy savings.



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Students will create a cost-benefit model for adopting improved technologies in campus buildings and for reducing energy use by enabling the scheduling feature of the plug load controllers. Preliminary studies should include a base case developed for the office equipment currently in use on campus, as well as alternatives proposing new or different technologies. It must include costs for installation and operation. A cost benefit analysis is required, with benefits including both electricity savings and monetary savings. The UNC Charlotte Sustainability Office will have survey data regarding staff interest in removing or replacing office equipment that may be relevant to the cost/benefit analysis.

**Expected Deliverables/Results:**

- *Bullet list of all deliverables that the team is to provide to the supporter at the end of the project.*
  - A digital report that includes the options analyzed and a cost benefit analysis for the preferred system.
  - Well-documented spreadsheet should be provided for the inventory and cost-benefit analysis and to demonstrate that coverage criteria have been met.

**Disposition of Deliverables at the End of the Project:**

Hardware developed is the property of the Industry Supporter. Typically the work product is displayed at the last Expo then immediately handed over to the supporter unless arrangements have been made to deliver at a future date. Please confirm your expectation in this section.

**List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):**

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