

**Department of Mechanical & Materials Engineering
COLLEGE OF ENGINEERING & APPLIED SCIENCE**

**SUMMER RESEARCH OPPORTUNITIES
FOR UNDERGRADUATE WOMEN**

APPLICATION DEADLINE: March 9, 2015

The IMS Center in the Department of Mechanical & Materials Engineering is pleased to offer the following research project for the summer of 2015. Interested students are urged to contact the faculty member(s) directing the project that most interests them. By contacting the faculty member, you can discover more about the project, learn what your responsibilities will be and, if possible, develop a timetable for the twelve-week research period.

Design and Development of an Advance Computing Cluster

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Project Description

Students accepted to this WISE program can expect to participate in the development, design, construction, configuration, and management of an advanced computing cluster that will be built in the Department of Mechanical & Materials Engineering. The purpose of this cluster is to better serve the faculty and student researchers in the department in the areas of data analysis, data mining, big data analytics, computational fluid dynamics, modeling and simulation, among others. The selected WISE student will work closely with the department IT manager, as well as the faculty and students in the department to complete the following tasks:

1. Install and integrate Hardware for an Advanced Computing Cluster
2. Install and configure Open Stack software
 - a. Front end – Manages User Accounts
 - b. Compute Node Module – Provides Virtual Machine Services
 - c. Data Storage Module – For Data Storage
 - d. Network Module – Manages Connections
3. Add user accounts and virtual images with appropriate software for: data analysis, data mining, big data analysis (HADOOP), cloud computing, computational fluid dynamics, modeling, simulation, etc.
4. Investigate applications and solutions for on-demand, autonomous virtual image creation and resource management.
 - a. Provide options for off-the-shelf solutions (if such solutions exist)
 - b. Provide options for in-house development if off-the-shelf solutions are not available

- c. Investigate options for processing data and serving visualizations and results to users/researchers
- 5. Investigate options for scaling up the cluster based on unmet needs:
 - a. Additional computing nodes
 - b. Additional data storage
 - c. Other software not currently supported