Project Course for Umair Ashraf

Project Title: Testing and updating the AUTO package.

Outline of the Project: AUTO is a package that uses highly sophisticated algorithms for the numerical analysis of bifurcation phenomena in differential equations. It is used in widely different areas of science and engineering, such as population dynamics, biological systems, laser dynamics, aircraft dynamics, and n-body problems. The multi-processsor platforms on which AUTO is used include Linux and Mac-OS (Unix). The highly optimized numerical algorithms are programmed in Fortran, as controlled from Python scripts. Over the years AUTO has grown in complexity, and its installation has become more difficult, in part due to the fact that AUTO requires several supporting packages, including Python, Open-GL (AUTO has three different graphics programs), and basic Linear Algebra routines.

The project includes:

(1) Testing the installation of AUTO on various machines.
(2) Keeping a detailed record of installation problems.
(3) Fixing installation problems as much as possible.
(4) Testing AUTO on a various machines, by running a carefully chosen selection of the very large number of existing AUTO "demos".
(5) Keeping a detailed record of problems encountered running the demos.
(6) Fixing run-time problems of the demos as much as possible.
(7) Making specific improvements in the graphics programs, including better coloring choices, and similar improvements.

Frequency of meetings: Weekly on Fridays at 2pm.

Grading scheme: Based on the extent and the quality of the work, and the final project report.

Milestones: The seven objectives listed above.