# AE 6210 Advanced Dynamics

## Homework 1

Consider a satellite orbiting a planet or a planet orbiting a sun.

1. Derive the equations for the orbital motion in an inertial frame using a Cartesian coordinate system.
2. Numerically simulate the equations of motion to compute the position as a function of time
3. Verify the simulation results and confirm that the errors are within acceptable limits.
   - You can simulate a testcase for which you have an exact solution or calculate an invariant, (e.g., energy) and show that it is conserved.
4. Study the problem and present interesting results.
   - You can discuss the effect of initial conditions or the effect of a third body or the effect of forcing, etc.
   - I am interested in the plot(s) of your results. Please spend some time on it.
5. Peer review two other HWs.

The report should be **2**-**5** pages including figures. You should submit the code as a separate file.