1.0 PROGRAM OVERVIEW
We will make a low cost student-built satellite to take pictures of the earth’s atmosphere and land masses so that we can post pictures on Purdue University’s website for public relations purposes. This document describes the requirements for the student built satellite.

2.0 PAYLOAD
The payload for the satellite will consist of a space hardened CCD camera with at least a resolution of 1km, and a frame grabber system capable of capturing images from the camera and compressing the images to a downloadable format. Power supply is roughly 10 Watts, and the camera will not be used at minimum power levels. The operating temperature will be roughly 0° to 32° C.

3.0 MISSION DESIGN
The mission of the student built satellite is to take pictures of the earth for public relations. The date of launch and the orbital characteristics are dependent on the launch vehicle.

4.0 LAUNCH VEHICLE
The desired spacecraft launch weight is less than 50 kg, so that the opportunities for a donated ride to low earth orbit will be maximized. This goal should be achievable as there are many similar mission satellites that weigh much less than 50 kg. The satellite will be designed to be as simple of a secondary payload as possible. There will be no sensitive materials or special care needed, which should increase possibilities of launch. The spacecraft will be designed to be compatible with the most common American launch vehicles such as, Atlas, Delta, Titan, and Space Shuttle.

The mounting of the spacecraft to the launch vehicle will depend heavily on the primary payload. Therefore, it will be difficult for exact dimensions to be known, however our spacecraft will be easily attached to the upper stage since the spacecraft bus is a cube.

5.0 MISSION LIFE
The mission of the satellite will take no more than 2 months to complete. However, the satellite will be able to operate well after this short initial mission objective. The overall life of the satellite will depend on the efficiency of the solar panels and reliability of the critical components.

6.0 PROPULSION
The spacecraft will remain in the orbit that it is released from the launch vehicle. No propulsion system will be necessary to achieve the mission.
7.0 ATTITUDE CONTROL
The attitude control system shall provide the ability to stabilize the satellite and point it such that the camera can view desired ground targets when needed. Otherwise, the satellite can tumble freely when not required to take pictures. Therefore there are two states to attitude control, active control for pointing the camera and passive control when the camera is not needed. The system shall maintain active control only long enough to take pictures and return to a passive tumble when done. Passive components may include (but are not limited too) hysteresis rods, ballast, and magnets. Active components may include reaction wheels and magnetorquers.

8.0 POWER
The main power system will consist of Ni-Cd batteries. These batteries will power the satellite systems during the primary mission. As a secondary power system the satellite will have solar panels on all sides of the satellite. The solar panel’s power will be used to power the satellite during a powered down period while recharging the batteries. During the full power operation of the satellite the roughly 16-18 watts will be generated by the solar panels, compared to the 3 watts needed during standby operation, which is supplied by the Ni-Cd batteries.

9.0 THERMAL CONTROL
The spacecraft will have all sides of the cube covered in solar panels so that a sufficient amount of power and therefore mission life can be achieved. Therefore the thermal control will be a small part of the overall design. The spacecraft will use a controlled roll during powered down mode to evenly distribute the temperature over the whole spacecraft. The thermal control system will keep the temperature within 5 to 20 °C, so that all electronics and hardware will be within operating range.

10.0 TELECOMMUNICATION
The satellite and ground station should handle different types of data, such as attitude, command and housekeeping data. Once the orbit of the satellite is established, it will be able to determine coverage area of the Earth surface, capacity, and signal strength. The type of antenna, bandwidth, location of the ground station and availability will also be determined.

11.0 COMMAND AND DATA HANDLING
All the subsystems described above will have to be controlled and managed throughout the satellites lifetime by the Command & Data Handling System(C&DH). This system will also be used to store the images, and then transmit data to the ground station. It will also control when the satellite will be at full or standby power. This system will more than likely just be an off the shelf system.