



## **UNC-Charlotte Senior Design Project Description for Fall 2016**

### **Title: NASA University Student Launch Initiative Project (USLI\_COMP2)**

Supporter: Solicited Supporters/COE/NASA Space Grant

Supporter Technical Representative: ASSIGNED

Faculty Mentor: ASSIGNED

Single Team  Dual Team  (check one)

Personnel (EN/ET): 2 E, 1 Cp,      Cv, 10 M, 1 SE

Expected-hours: (250 MH per student)

#### **Description of Project:**

As described by the NASA SLI handbook, “The NASA University Student Launch Initiative (USLI) involves students in designing, building, and testing reusable rockets with associated scientific payloads. This unique hands-on experience allows students to demonstrate proof-of-concept for their designs and gives previously abstract concepts tangibility. (SLI Handbook)

#### **Project Requirements:**

This project requires the design and construction of a re-useable dual deployment rocket capable of carrying a designated payload to a designated altitude. Rocket motor thrust will be tested extensively using the 49er Rocketry Club’s rocket motor test stand, and the team will generate and interpret the rocket motor thrust curves. The payload will have a scientific value relevant to NASA’s mission, which may include performing a task and taking measurements. Several half scale launches will be conducted prior to competition in April. Prior to launch the rocket will be tested on the shaker table that was developed during a previous senior design project.

The team will be separated into three sub groups: Payload Team, Launch Vehicle Team and MAV team.

#### **Expected Deliverables/Results:**

1. All course deliverables
2. All competition deliverables
3. System Block Diagram
4. System Math Model, including stress analysis and dynamic performance
5. Payload concept ideation sketches
6. System detailed drawings
7. System assembly drawings and procedure
8. System transport configuration drawings
9. System preflight procedure and checklist
10. System launch procedure and checklist
11. Flyable Hardware
12. Transition Plan for knowledge retention for Tier 2 competition



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

Student should have an interest in one or more of the following:

Fluids, Compressible Flow, Instrumentation and Controls, Wireless Communication, Circuit Design, Dynamic Systems, Carbon Fiber Construction, Rocketry Design and Construction

Knowledge of the following software:

CAD - Pro/e and/or Solidworks

Matlab, Mathcad

Labview

C programming (for microcontrollers)

Java programming (for GUI)

Microsoft Project