The University of Maine

Development and Teaching of Aerospace Engineering Curriculum

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The anticipated courses and associated semester schedules are shown in Table 1 below.

Table 1. Anticipated Course Schedules
INITIAL SEMESTER COURSE TITLE CREDITS LEVEL Fall 2009 Astronautics 3 Junior/Senior
3 Junior/Senior Fall 2010 Aeronautics 3 Junior/Senior Fall 2011Flight Dynamics, Modeling and C
of Aircraft and Space Vehicles 3 Senior/Grad For students within the MEE Department, the set of three courses will constitute a Concentration in Aerospace Engineering. For students from other departments, the set of courses will constitute a Minor in Aerospace Engineering. Descriptions for the three courses are as follows:

Astronautics – This course provides an introduction to the design and operation of spacecraft systems. Specific examples, including the Global Positioning System (GPS) and the NASA Space Shuttle, will be described as applications in the context of the course material. Topics will include kinematics and relative orientations of different coordinate systems as well as fundamental orbital mechanics – orbit design, maneuvers and transfers. The space environment and the associated external forces and torques affecting the spacecraft in addition to basic propulsion concepts related to orbital design will be covered. Course material will be integrated into the development of a spacecraft simulation, demonstrating a key method of satellite system design and analysis.

Aeronautics – This course provides an introduction to the dynamics and performance of aircraft flight. Topics will include the primary in-flight aerodynamic forces and torques, stability and trim concepts, aircraft control surfaces and actuation and propulsion basics. Course material will be discussed in the context of several key examples including fixed-wing aircraft, steerable parachutes, the reentry (atmospheric) phase of a reusable launch vehicle (RLV) and particularly to Unmanned Aerial Vehicles (UAVs), a critical, state-of-the-art technology in the modern-day aerospace and defense industry. Modeling and simulation of a selected UAV system will provide an exciting and comprehensive application of the skills developed in the course.

Flight Dynamics, Modeling and Control of Aircraft and Space Vehicles - This course will cover flight dynamics, modeling and fundamental control aspects of aerospace vehicles. The course is divided into two halves -- a spacecraft flight vehicle component and an atmospheric flight vehicle component. The first half of the course includes rigid-body attitude dynamics, attitude determination and attitude control concepts for spacecraft systems. The second half deals with dynamics, stability and control of aircraft. This course is intended as the "capstone" to the Aerospace Engineering Minor/Concentration and will provide the student with a thorough and robust skill set necessary for a wide range of engineering and aerospace applications.