ENG ME 202 Introduction to Spacecraft Performance

2008-2009 Catalog Data:

ENG ME 202 Introduction to Spacecraft Performance Prereq: ENG EK 301; coreq: CAS MA 226. Introduction to fundamental engineering concepts in astronautics, including rocket and extra-atmospheric propulsion, the atmosphere and space environments, spacecraft subsystem, and spacecraft design parameters. 2 cr.

Class/Lab Schedule: 2 lecture hours per week

Status in the Curriculum: Required for Aerospace Program

Textbook(s) and/or Other Required Material: Michael D. Griffin and James R. French, Space Vehicle Design, American Institute of Aeronautics and Astronautics, 2004.

Coordinator: Raymond J. Nagem, Associate Professor of Mechanical Engineering

Prerequisites by topic:

- 1. College Physics I and II
- 2. Elementary differential equations
- 3. Engineering Mechanics I

Goals:

The goal of this course is to introduce the major engineering issues associated with spacecraft performance and design. Students will study the operation of spacecraft subsystems and apply engineering analysis to idealized problems. Students will apply computational techniques to simple problems in orbital mechanics, and study the concepts of numerical accuracy and efficiency in the context of these problems.

Course Learning Outcomes:

As an outcome of completing this course, students will:

- i. Understand the function of major spacecraft subsystems.
- ii. Be able to apply engineering analysis to idealized spacecraft models.
- iii. Be able to apply numerical computation methods to problems in orbital mechanics.
- iv. Understand and be able to apply the basic concepts of probabilistic analysis and reliability estimation.

Course Learning Outcomes mapped to Program Outcomes:

Program:	А	В	С	D	Е	F	G	Н	Ι	J	Κ	L	Μ	Ν
Course:	iv	i	i	i	iv	i	ii	ii	iii	ii	iii			
Emphasis:	5	1	1	2	5	1	2	1	2	3	3	3	1	1

Topics (time spent in weeks):

- 1. The space environment (1)
- 2. Orbital mechanics (2)
- 3. Propulsion (2)
- 4. Re-entry dynamics (2)
- 5. Attitude dynamics (2)
- 6. Structural analysis (1)
- 7. Thermal analysis (2)
- 8. Reliability analysis (2)

Contribution of Course to Meeting the Professional Component:

Engineering topics: 100%

Status of Continuous Improvement Review of this Course:

Date Last Reviewed: April 1, 2008Reviewed by: Thermal/Fluids CommitteePrepared by: Raymond J. NagemDate: April 10, 2009