Fall 2020 Syllabus: ASTE 577
Entry and Landing Systems for Planetary Surface Exploration

Course Instructor: Dr. Anita Sengupta
Email: anita.aerospace@gmail.com

COURSE SCOPE AND OBJECTIVES

Space exploration missions that land robotic platforms on the surfaces of other planetary bodies are some of the challenging and most rewarding from a scientific and engineering perspective. The design and development of systems that enter, descend, and safely land these platforms must pull from all disciplines of engineering to decelerate, house, control, power, and transmit data back to Earth. The disciplines that will be covered in this course include aerothermodynamics, propulsion, structural mechanics, multi-body dynamics, telecommunications, and planetary science. This course will cover the theory, system sizing, and technology options to facilitate the landing and exploration of three classes of destinations: small airless bodies, planetary bodies without atmospheres, and planetary bodies with atmospheres. The scientific and commercial basis for these classes of missions will be presented. Guest lectures by experts in the field and tours of relevant local industrial suppliers will be organized

Date	Week	Topic	Industry/Expert Guest Lecture (TBC)
8/24/2020	1	Introduction to EDL	
8/31/2020	2	Airless Body Landed Missions: Case Studies (Rosetta, Hayabusa, OSIRIS REX)	
9/7/2020	2	**Labor Day (no class)**	
9/14/2020	3	Atmospheric Flight Mechanics	
9/21/2020	4	Aerothermodynamics and Heat Shields	
9/28/2020	5	Aerodynamic Decelerators	*Robert Sinclair, Airborne Systems*
10/5/2020	6	Guidance, Navigation and Control	*James Montgomery, JPL*
10/12/2020	7	Propulsion: technologies and aerodynamics	
10/19/2020	8	Structures and Mechanisms, Landing Attenuation Systems	
10/26/2020	9	EDL Telecom	
11/2/2020	10	Case Study 1: Earth Entry - human and robotic	*M. Hughes, JPL*
11/9/2020	11	**Midterm**	
11/16/2020	12	Science Payload and Engineering Sensors	*Dr. Ken Nealson*
11/23/2020	13	Case Study 3: Venus and Titan EDL, Class Presentations	
11/30/202	14	Study Period	

0		
12/7/2020	15	**Final Exam**

COURSE GRADING

Homework		25%
Mid-term Exam		25%
Final		25%
Term Project		25%
	Total	100%

Term Project: Will develop an end to end entry system architecture and sizing based on assigned mission objective/science target

Class Tour: Visit Airborne systems and/or HITCO

REQUIRED TEXT AND MATERIALS :

There is no required text, online course notes and optional texts will be provided.

STATEMENT FOR STUDENTS WITH DISABILITIES

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

STATEMENT ON ACADEMIC INTEGRITY

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.