

CASPER COLLEGE COURSE SYLLABUS-4

Revised April 28, 2011

Course Number and Title: ES 1100

INTRODUCTION TO ROCKETRY

Semester/Year: SPRING 2011

Lecture Hours: 1 **Lab Hours:** 2

Credit Hours: 2

Class Time: 3:15 – 4:45 PM

Days: T, Th

Room: PS 209

Instructor's Name: John Wickman

Instructor's Office #: None

Phone: 265-5895 (Work)

Email: jwickman@wickmanspacecraft.com

Class Web Site: www.space-rockets.com/es1100

Office Hours: I can arrange to meet with you after class or other times that are convenient for you. I am here to help you so please make arrangements to meet with me if you need help.

Course Description:

First semester course in rocketry will provide an overview of various rocket propulsion concepts such as solid, hybrid, liquid, nuclear and antimatter. It will focus on composite solid rocket motors and cover their design, ballistic analysis, structural analysis and thermal analysis. The course will discuss the design, analysis and construction of rocket bodies including structural analysis, flight stability and recovery systems. During the last half of the semester, students will design, build and fly their own rocket.

Statement of Prerequisites:

DVST Pre-Algebra Arithmetic

General Objectives:

To provide the opportunity for the students:

- a) To develop positive attitudes toward the students professional development including awareness of the need to think clearly, analytically, critically, and objectively about a wide range of subjects.
- b) To acquire a basic knowledge and understanding of rocketry principles and to develop his or her abilities and skills in Engineering, Physics or other sciences.

Specific Objectives (Outcomes):

Acquire a knowledge of impulse and momentum, solid propellant formulation, solid rocket motor design, aerodynamics, thermal analysis and stress analysis.

- a) To actually design, build and test a solid rocket motor.
- b) To design, build and fly a rocket capable of flying several thousand feet in altitude.

Methodology:

Lecture, demonstrations, labs, and problem solving

Evaluation Criteria:

Hour Exams	40% - 4 exams @ 10% each
Final Exam	10%
Homework	10%
Attendance	10%
Complete Motor for Flight	15%
Complete Rocket for Flight	15%

Final Grade	A	85% - 100%
	B	70% - 84%
	C	55% - 69%
	D	40% - 54%
	F	< 40%

Required Text, Readings, Materials:

None.

Last Date to Change to Audit Status or Withdraw with a W Grade:

Friday, Feb. 1 (UW students have to follow UW rule)

Student Rights and Responsibilities: Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

Tentative Calendar or Schedule Indicating Course Content:

DAY	TOPICS
Jan. 18	Course overview and orientation
Jan. 20	Propulsion principles and designing rocket engines
Jan. 25	Designing rocket engines
Jan. 27	Solid rocket motor design principles
Feb. 1	Advanced propulsion concepts, “warp drive” and time travel experiment with student
Feb. 3	Solid propellant formulation and propellant mixing procedures
Feb. 8	Rocket motor heat transfer and structural principles
Feb. 10	Exam 1
Feb. 15	Rocket flight stability
Feb. 17	Rocket flight stability and software for designing rocket motor
Feb. 22	Rocket motor testing
Feb. 24	Start rocket motor design process
Mar. 1	Continue student rocket motor design, learn flight program
Mar. 3	Rocket motor static test firing at WSPC facilities
Mar. 8	Examine static test results, review student rocket motor and rocket designs
Mar. 10	Exam 2
Mar. 14	<i>Spring Break</i>
Mar. 18	<i>Spring Break</i>
Mar. 22	Rocket and motor design process
Mar. 24	Rocket and motor design process
Mar. 29	Finish rocket and rocket motor design process

Mar. 31	Start building rockets
Apr. 5	Continue building rockets
Apr. 7	Finish fins, install bulkheads, install timer wiring
Apr. 12	Finish bulkheads, glue launch lugs
Apr. 14	Exam 3
Apr. 19	Make nozzles & bulkheads, measure weights, CG – <i>rockets go home for painting</i>
Apr. 21	Prepare cartridges for casting
Apr. 26	Mix and cast propellant for rocket motors
Apr. 28	Trim propellant grains, assemble motors
May 3	Finish motor assembly (Need rockets back at the shop)
May 5	Install thrust bolt, motor retention, pack chutes for launch
May 7 (Sat)	Saturday – Launch student rockets
May 12 (Thurs)	10:10am - Final Exam & Exam 4 , Collect launch videos and photos to be mailed out

Yellow highlighted areas indicate class will meet at Wickman Spacecraft & Propulsion Co. facilities at the airport. Map and directions to are provided at: www.space-rockets.com/map.html