

COURSE SYLLABUS

AUMT 1370 (4:2:8)

ENGINEERING DESIGN FOR SUSTAINABILITY

Automotive Service Technology

Industrial Technology Department

Technical Education Division

Levelland Campus

SOUTH PLAINS COLLEGE

Course Developer

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Office Hours: 10:00 —11:00 PM or by Appointment

Course Description

This course will provide students an awareness of world energy and environmental issues and an understanding of the opportunities that engineers have to change the world for the betterment of mankind. Students will learn through the fundamentals of engineering design processes how to think creatively and critically to solve problems. The course will show that what may appear to be a problem is also an opportunity for change.

Students will work in teams on topical research papers.

Students will work in teams on projects to conceptualize and design sustainable transportation systems and/or building systems for the future.

Student teams will present the results of their research and design projects orally and in technical papers.

Course Prerequisites

None

Course Goals

This course will provide students the opportunity to

- o **Develop creative and critical thinking processes** — the design process requires first the synthesis of ideas and then the critique or analysis of those ideas, usually in an iterative process.
- o **Develop an understanding and appreciation of the need for sustainability** — sustainable design is based on minimizing resources consumed by the manufacture, use and disposal of products and the utmost respect for the environment.
- o **Learn and apply engineering design processes to develop sustainable products and systems** — the world's population continues to increase, thus, resources (materials, energy, water, etc.) must managed (conserved, recycled, replaced, etc.) to provide a sustainable environment in which we can maintain comfortable and economically feasible lifestyles.
- o **Appreciate that opportunities for a sustainable future abound** —the future will be what we, through our creativity and innovation, design it to be.
- o **Develop a compelling desire to question and learn to provide a basis for change** — it is not sufficient for engineers to merely respond to needs, they must continuously seek opportunities to introduce changes which provide sustainability.

Expected Learning Outcomes

Upon completion of this course, students will be able to do the following.

- o Understand and appreciate energy and environmental issues.
- o Understand how current transportation systems and buildings affect the environment and energy consumption.
- o Understand what is meant by sustainability with respect to transportation and buildings.
- o Use engineering design processes to develop new products and processes.
- o Think both creatively and critically.
- o Develop an entrepreneurial approach to life.

Assessment Methods

- o Topical research papers
- o Team design projects
- o Oral presentations
- o Final exam

Course Outline

- o Current energy and environmental issues
- o History and impact of transportation systems
- o History and impact of buildings
- o Creativity and creative thinking processes
- o Transportation and vehicle fundamentals
- o Internal combustion engines
- o Building systems fundamentals
- o Engineering design processes
- o Developing sustainable energy sources
- o Reducing carbon footprints

Text

Too be determined

Assorted reference books and papers

Topical Research Reports

Teams of students will conduct library and internet searches for information on energy and environmental issues and transportation and building technologies. The team members will read and discuss the materials discovered and form a team position on the issue. Each team will document their findings and their positions in a technical paper.

Design Projects

Student teams will apply engineering design processes to develop models for sustainable building and transportation systems. Results will be reported in technical papers which include graphical representations of the concepts developed.

Presentations

Student teams will present their work on research papers and design projects orally to the class and invited guests.

Grading

A total of 1000 points is available as indicated below.

Research Papers	250	points
Design Projects	400	
Presentations	250	
Final Exam	100	
Total	1000	points

A	900	—	1000	points
B	800	—	899	points
C	700	—	799	points
D	600	—	699	points
F	0	—	599	points

Class Policies

- o Students are expected to come to class alert and ready to participate. Sleeping, reading newspapers, and doing homework for other classes is not allowed during class.
- o Students are expected to assist in maintaining a classroom environment that is conducive to learning. Inappropriate behavior in the classroom shall result, minimally, in a request to leave the class.
- o It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and a high standard of integrity. The attempt of students to present as their own any work that they have not honestly performed is regarded by the faculty and administration as a serious offense and renders the offenders liable to serious consequences, possibly suspension.
- o Students absent from class for the observance of a religious holiday shall be allowed to take an exam or complete an assignment within a reasonable time after that absence if, no later than the 15th day after the 1st day of the semester, the student gives prior notification to the instructor.
- o Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405.

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