Syllabus
ASEN 4128 Human Factors in Engineering and Design

Human Factors in Engineering and Design Course Description:

In this course we investigate the relationship between human operators and the complex systems they interact with.

Our focus will be: how do we account for human's cognitive and physical limitations when designing a complex system.

We will start with learning some of the basic limitations that we as human possess, as we do this we will review the large variety of accidents that can be attributed to human limitations. The focus is primarily on aviation design and aviation accidents as this field of study highlights the truly tragic ramifications of poor design. That said, the principles addressed in this course are relevant to all CU engineering disciplines.

Students will begin with lectures pertaining to the many HF disciplines and issues involved in designing with human limitations considered. HF issues will be highlighted by reviewing aircraft accidents and focusing on the latent conditions that existed in the design long before the aircraft ever flew.

Students will be able to conduct some basic labs where they conduct task analyses, complete ergonomic, usability and workplace assessments and work towards a group project of designing and assessing a cockpit for a specific aircraft role.

The field of human factors is growing rapidly, across multiple industry sectors. This course will introduce students to the field and may lead to a future as a multi-disciplined engineer, a skill-set that employers find very appealing.

Instructor: Hank Scott, Adjunct Instructor

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Prerequisites: Open to all Engineering majors.

Textbooks:

1. Human Factors in Engineering and Design, 7th Edition, Sanders and McCormick(1993) McGraw-Hill

Grading Breakdown:

Mid-term Exam 20%
Final Exam 20%
Workload Assessment (completed in a small group of 3 – 4 students) 30%
Complex Systems/Cockpit Design Assessment 30%

Required Readings:

Publications:

- Human Factors in Engineering and Design, 7th Edition, Sanders and McCormick (1993) McGraw-Hill

Other Sources:

- Excerpts from Mil-standards:

  1472F Human Engineering,
  1333 Aircrew Station Geometry,
  1787C Aircraft Display Symbology, Interface Standard
  850B Aircrew Station Vision
  UK MOD-STD 00-25 (UK Military HF Standards).

Course Schedule:

Introduction
SHELL/Reason Model/Human Subjects in Research

Module 1 - The Senses
Sight/Depth Perception/Optic Flow
Touch/Smell/Proprioceptors/Vestibular/Hearing

Module 2 - Information Processing
Information Processing/Signal Detection/Perception
Attention/Distraction/Vigilance
Memory/Selection and Decision Making/Human Error

Module 3 - Human Performance Limitations and Work Environment
Heat/Noise/Vibration/Altitude/G Loading/Illumination
Affordability/Compatibility
Workload Measurement

Module 4 - Ergonomics
Controls and Displays/Cockpit Assessment
Reach Zones/Measures/Population

Classroom Behavior
Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Code of Conduct.

Requirements for COVID-19
As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements, and public

health orders in place to reduce the risk of spreading infectious disease. Required safety measures at CU Boulder relevant to the classroom setting include:

- maintain 6-foot distancing when possible,
- wear a face covering in public indoor spaces and outdoors while on campus consistent with state and county health orders,
- clean local work area,
- practice hand hygiene,
- follow public health orders, and
- if sick and