

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

Email: hank.scott@colorado.edu

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 Symbolology, 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/Distracton/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

Aerospace Engineering Sciences & University Policies

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 [classroom behavior](#) policy, the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

Requirements for COVID-19

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. CU Boulder currently requires COVID-19 vaccination and boosters for all faculty, staff and students. Students, faculty and staff must upload proof of vaccination and boosters or file for an exemption based on medical, ethical or moral grounds through the MyCUHealth portal.

The CU Boulder campus is currently mask-optional. However, if public health conditions change and masks are again required in classrooms, students who fail to adhere to masking requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the "Accommodation for Disabilities" statement on this syllabus.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the Public Health Office (contacttracing@colorado.edu). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the Public Health Office (contacttracing@colorado.edu). {Faculty: insert your procedure here for students to alert you about absence due to illness or quarantine. Because of FERPA student privacy laws, do not require students to state the nature of their illness when alerting you. Do not require "doctor's notes" for classes missed due to illness; campus health services no longer provide "doctor's notes" or appointment verifications.}

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include, but are not limited to: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution (honor@colorado.edu); 303-492-5550). Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the [Honor Code website](#).

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, protected-class discrimination and harassment, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these policies, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email cureport@colorado.edu. Information about university policies, [reporting options](#), and support resources can be found on the [OIEC website](#).

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of any issues related to these policies regardless of when or where they occurred to ensure that individuals impacted receive information about their rights, support resources, and resolution options. To learn more about reporting and support options for a variety of concerns, visit [Don't Ignore It](#).

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, Hank Scott.

See the [campus policy regarding religious observances](#) for full details.