

UTAH STATE UNIVERSITY
AV 4490 - HUMAN FACTORS IN AVIATION
Spring 2009 - MWF 11:30 am - 12:20 pm

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Text: Human Factors for General Aviation, S. Trollip and R. Jensen

Description: This course is an introduction to the human element of the “Man / Machine” interface in modern aviation. Topics will include aviation psychology, flight physiology, error management, crew resource management, man-machine systems or ergonomics, and human factors in maintenance. The course is intended for upper level aviation students pursuing a career in aviation or aviation related fields

- Objectives:**
1. To develop a knowledge of human physiology and to understand the impact of the external environment on the body in the aviation environment.
 2. To develop a knowledge of psychological aspects of aviation and the limitations placed on personnel.
 3. To develop an understanding of crew resource management or teamwork and the application of its concepts in the field of aviation.
 4. To gain an awareness of the importance of man-machine engineering and design of hardware in the interface process.
 5. Realize the significance of error management in maintenance realized through the application of Human Factors.
 6. To demonstrate competency in writing and speaking skills through essays, assignments, and reports.

Exams: Exams will cover all aspects of the course materials, including lectures, videos, and handouts. All exams will consist of a combination of multiple choice, true / false, short answer questions and/or essay questions.

Term Paper: The term paper will be 5 to 7 pages in length, typed, double spaced, 12 point font with one inch margins, with bibliography. The Human Factors text or any Jeppsen texts may NOT be used for resource material. Topics can be chosen from the suggested list at the end of the syllabus or as approved by the instructor.

Assignments: Textbook chapter questions will not be required, however, quizzes and exams will contain one or more of the chapter review questions. There will be articles and accident reports requiring your analysis and comments.

Attendance / Participation: Class attendance and participation is required and is approximately 10% of the overall grade. All readings and assignments should be completed prior to class in order for students to be adequately prepared to participate in class discussions.

Final Grade: The final grades will be based on the following scale:

Readings/Assignments	10%
Exam #1	20%
Exam #2	20%
Exam #3	20%
Term paper	20%
Attendance / Participation	10%

Grading Scale:

94 - 100	A	74 - 76	C
90 - 93	A-	70 - 73	C-
87 - 89	B+	67 - 69	D+
84 - 86	B	64 - 66	D
80 - 83	B-	60 - 63	D-
77 - 79	C+	00 - 59	F

I will utilize Blackboard this semester.

CLASS SCHEDULE

<i>Date</i>	<i>Subject</i>	<i>Reading Assignment</i>
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Jan 5	Introductions, Syllabus, Course mechanics The history and development of human factors	
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Jan 7	The definitions, scope and the models of human factors. How safe is flying?	
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Jan 9	Video: "Why Planes Come Down"	
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PHYSIOLOGY "LIVEWARE/ ENVIRONMENT INTERFACE"

Jan 12	Current events Man's limitation and Human Error	Chapter 1
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Jan 14	<u>Fitness and performance</u> Physical well-being Substance abuse Diet Incapacitation Exercise Aging	
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Jan 16	Accident discussion	
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Jan 19	No Class - Holiday	
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Jan 21	<u>Circulatory and Respiratory Systems & the Atmosphere</u> Oxygen, Hypoxia and hyperventilation Decompression of cabin altitude Carbon Monoxide and Ozone	Chapter 6
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Jan 23	Video and discussion: Payne Stewart Case Study Video: Altitude Chamber	
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Jan 26	Current events in Human Factors <u>Metabolic and Gastrointestinal Systems</u> Gas Laws Trapped Gases, Evolved Gasses	
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Jan 28	<u>Musculoskeletal System</u> <u>Environmental Stress</u> Temperature Noise and Vibration Dehydration Air sickness Radiation Acceleration	
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Jan 30	Video and accident discussion	
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Feb 2	<u>Alertness and Performance</u> Sleep Sleep deprivation Jet lag Body rhythms	
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Feb 4	<u>Fatigue</u>	
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Feb 6	<u>Video of fatigue and discussion</u> Case Study American Airlines, Little Rock	
Feb 9	<u>Vision</u> The anatomy of the eye Process of vision Optics and physics of light Correction of acuity Black holes and white outs Surgery to improve vision	Chapter 4 Night Vision Scanning Factors affecting visual acuity Visual illusions and misperceptions Sunglasses Ultraviolet radiation
Feb 11	<u>Orientation</u> Tolerance to disorientation Definitions Types of disorientation Review	Flicker Vertigo Practice Disorientation Illusions
Feb 13	<u>Video, case study and discussion</u> Visual illusions video Case study, JF Kennedy Jr.	
Feb 17	Review for Exam 1	
Feb 18	Exam 1	
Feb 20	<u>Speaker: Physiological Aspects of Aviation</u>	
	Aviation Psychology – “LIVEWARE”	
Feb 23	<u>Nervous System & The Brain</u> Processing Perception Limitations Motivation Personality	Chapter 5 Perceptual vs. Cognitive Judgment Judgment process Learning Judgment – Decision Making Learning Attitudes
Feb 25	Continued	
Feb 27	<u>Emotional Stress</u>	Chapter 7
Mar 2	<u>Situation Awareness</u>	
Mar 4	<u>Accident Review and Discussion</u> American Airlines at Cali, Columbia	
Mar 6	Exam 2	
Mar 9-13	Spring Semester Break	

Ergonomics

“LIVEWARE/HARDWARE INTERFACE”

Mar 16 : Man-Machine Systems **Chapter 3**
Displays and Controls Automation
Design of work space

Mar 18 Continued

Mar 20 Accident Review and Discussion

Crew Resource Management “LIVEWARE/LIVEWARE INTERFACE”

Mar 23 Enhancements to Performance
Preparation Training
Communication Team Building

Mar 25 Decision Making Task Management
Situation Awareness Workload Management

Mar 27 Accident Review and Discussion
Midlands 737

Mar 30 Leadership
Relationships Verses Tasks

Apr 1 Continued

Apr 3 Continued

Apr 6 Additional crew enhancement areas **“LIVEWARE#SOFTWARE”**
National and Company Culture
Checklists Standardization
Navigation Charts Procedures
Flight Manuals Operation Specifications

Apr 8 Human Factors in Maintenance

Apr 10 Continued

Apr 13 Continued

Apr 15 ***Papers due/reports begin***

Apr 17 Reports continue

Apr 20 Reports continue

Apr 22 Reports Completed

Apr 24 Review

Apr 27 ***Final Exam***

Documentation

Handout CRM

The written paper will be due on April 15th. The format should comply with research paper criteria. Cite evidence that either supports your hypothesis or discredits it. Cite accident statistics or case studies which give support to your conclusion. The hypothesis below are suggestions or you may create your own. Try to find leading edge research by going to many sites, such as NASA, FAA, AOPA, Safety foundations, etc. In class beginning on Apr 15, you may report your findings and evidence to the rest of the class.

Hypothesis:

1. A pilot will be able to recognize when fatigue is too great to continue a flight.
2. The odds of a fatal crash increase dramatically at night.
3. Tolerance to vertigo or disorientation is different for each individual.
4. When pilots are rushed they compromise safety.
5. Increased experience leads to apathy.
6. A zero accident rate is not achievable.
7. Pilot error is not always the fault of the pilot.
8. Most accidents occur in the landing phase because pilot's workload increases.
9. If the NTSB had the authority to implement their accident investigation recommendations, the delay and sometimes lack of implementation would not become a factor in addition accidents.
10. Some aviators decrease their performance in the cockpit by self-induced actions.
11. Some aviators increase their performance in the cockpit by self-induced actions.
12. There are personality types who should not consider a career as a pilot.
13. Attitudes can be changed for the good.
14. Decision making is a process which pilots lose in a crisis.
15. The enhanced technology of automation will decrease the accident rate.
16. Pilots will always be required in the cockpit regardless of the increases in technology.
17. All pilots can fall prey to disorientation and illusions.
18. Self-induced stress to do a good job or accomplish a mission can lead to compromising safety.
19. Human factor accidents are not only caused by pilots.
20. The education of aviation safety by studying accidents leads to a negative process.
21. The major cause of accidents is the pilot not knowing his limits.
22. Radiation at high altitude flight is a serious concern to the pilot due to exposure of Infrared and Ultraviolet Rays.
23. Synthetic vision will greatly enhance pilot performance in the future
24. " " will or will not decrease the importance of Instrument training

Special Accommodation

If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats, i.e., large print, audio, diskette, or Braille.

Academic Honesty

Plagiarism and other forms of academic dishonesty will result in assignment of a grade of "F" for the course. Consult the instructor if you have any questions concerning what constitutes plagiarism or academic dishonesty. You are expected to understand the rules concerning quotation, citation, and attribution in writing.