

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY
SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Human Factors in Aviation
CODE NO. : AVT118-3 **SEMESTER:** One
PROGRAM: Aviation Technology (Flight)
AUTHOR: Brian Stewart
DATE: Aug 2004 **PREVIOUS OUTLINE DATED:** Aug 2000

APPROVED:

_____ **DATE**

DEAN

TOTAL CREDITS: 3

PREREQUISITE(S): None

HOURLY/WEEEK: 3

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For additional information, please contact Colin Kirkwood, Dean
School of Technology, Skilled Trades & Natural Resources

I. COURSE DESCRIPTION:

Human Factors in Aviation is divided into two parts. The first part will help you adapt to life at Sault College, specifically as an aviation student. Students in the aviation technology program are typically very motivated, however for many this is the first time away from home and do not realize the many new responsibilities that are part of the program and life away from home. The second part deals with human physiology and how it fits into aviation. How the human adapts to an environment of less oxygen and pressure are critical to a long career as a pilot.

The semester begins with a brief overview of the aviation industry, the expectations and the demands as an aviation professional. You will learn about the college services that are available and meet the people that provide them. You will assess where you are now, do a time plan, learn techniques to improve your memory, learn some tips on note taking and test writing. You will learn how your life style affects your career as a pilot and countermeasures to improve both the quality and length of your profession. The second half of the semester deals with basic flight physiology. Why human factors are so important, the human anatomy, hearing, vision, altitude physiology, the atmosphere, sleep and circadian rhythms, stress, situational awareness and orientation, acceleration, motion sickness, a health maintenance program and Canadian medical standards.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course the student will demonstrate the ability to:

1) Evaluate and develop his/her personal learning skills

Potential Elements of the Performance:

- self assessment using the discovery wheel
- do a time monitor/time plan
- practical knowledge of techniques to improve your memory, note taking and test writing

2) Evaluate and develop his/her personal life skills

Potential Elements of the Performance:

- tips to maintain your personal and aviation health
- money management

3) Define human factors and it's importance to aviation

Potential Elements of the Performance:

- define human factors and flight physiology
- role in aviation
- the components of human factors described by the "SHEL" model.

4) Describe the basic function of the human body

Potential Elements of the Performance:

- The nervous system
- The body's framework
- The digestive system

- The metabolic system
- The circulatory system

5) Describe the atmosphere

Potential Elements of the Performance:

- Composition and characteristics of the atmosphere
- Atmospheric effect on gases
- Physiological divisions of the atmosphere

6) Understand what is required to maintain your situational awareness

Potential Elements of the Performance:

- What is situational awareness
- What is required to maintain situational awareness
- Signs of losing situational awareness
- Prevention

7) Explain the effect of the atmosphere on the body's functions

Potential Elements of the Performance:

- Respiration
- Hypoxia, types, stages, symptoms, factors affecting your susceptibility, prevention and treatment
- Carbon monoxide poisoning
- Decompression
- Trapped gases
- Evolved gases

8) Explain the role of hearing and the vestibular apparatus and the effect of vibrations

Potential Elements of the Performance:

- Anatomy of the ear
- Sound, hearing and hearing loss
- The effect of vibration on the body
- The relationship of the inner ear and orientation
- Types and causes of disorientation
- Vestibular illusions

9) Explain how the eye works and its role in orientation

Potential Elements of the Performance:

- Anatomy of the eye
- Night vision
- Factors affecting visual acuity
- Scanning for objects
- Visual illusions and their affect on orientation
- Vision and motion sickness
- Eye protection

10) Realize the significance of the role your health plays on the safety of the flight

Potential Elements of the Performance:

- Dangers of self diagnosis
- Over the counter medications
- Caffeine and it's effects
- Smoking, alcohol and drugs

11) Realize the significance of environmental stresses and their effect on performance and flight safety

Potential Elements of the Performance:

- Temperature control, coping with the extremes
- Dehydration and air quality
- Importance of stress
- Types of stress
- Strategies to reduce, prevent or control stress

12) To deal with fatigue, understand the importance of rest and the effects of jet lag for long range flights

Potential Elements of the Performance:

- Sleep
- Circadian rhythms and jet lag
- Fatigue, symptoms and coping

13) Cope with accelerations and motion sickness in flight

Potential Elements of the Performance:

- Situations in civilian flying
- Tolerance to "G" forces
- Causes of motion sickness and some suggestions to reduce your susceptibility

14) Plan your personal health maintenance program

Potential Elements of the Performance:

- Nutrition and diet
- Hypoglycemia
- The importance of exercise
- Canadian medical standards

III. TOPICS:

- 1) Aviation - the industry - pilots - expectations - becoming an aviation professional
- 2) College Services - peer tutoring, learning resource centre, counseling, learning assistance centre, SAC, athletics, financial aid and health facilities.
- 3) Learning Skills - self assessment, time management, memory techniques, test tips
- 4) Life Skills - personal health, money management
- 5) Introduction to human factors
- 6) Basic human anatomy
- 7) Atmosphere

- 8) Situational awareness
- 9) Altitude physiology
- 10) Hearing and vibrations
- 11) Vision
- 12) Orientation
- 13) Stress - medical stress and environmental stress
- 14) Sleep
- 15) Acceleration and motion sickness
- 16) Health maintenance program
- 17) Canadian medical standards

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

- 1) Becoming a Master Student - Ellis
- 2) Basic Flight Physiology - Reinhart

V. OTHER RESOURCES/TEXTS/MATERIALS:

- 1) From the Ground Up
- 2) A.I.P. - aeronautical information publication
- 3) Human Factors for Flight – Frank H Hawkins (Second Edition)
Ashgate ISBN # 1-85742-135-3
- 4) Human Factors for General Aviation – Stanley Trollip & Richard Jensen
Jeppesen Sanderson ISBN # 0-88487-138-X
- 5) Aviation Safety Programs
Jeppesen Sanderson ISBN # 0-88487-236-X
- 6) Human Factors in Aviation
Earl L Wiener, David C Nagel
- 7) Pilot Judgement and Crew Resource Management
Richard S Jensen
- 8) Human Factors in Multi Crew Operations
Harry W Orlandy
Flight Safety – A Primer for General Aviation Pilots
Alexander T Wells
- 9) Human Factors for Aviation - Basic Handbook - Transport Canada
- 10) Pilot – Mental and Physical Performance
David C Edwards
- 11) Beyond Aviation Safety Human Factors
Daniel E Maurino, James Reason, Neil Johnston, Rob B Lee
- 12) Flightdeck Performance - Stanley Roscoe
- 13) Redefining Airmanship – Tony Kern
- 14) Flight Discipline – Tony Kern

Internet Access

<http://www.psy.utexas.edu/psy/helmreich/nasaut.htm>

<http://www.hf.faa.gov/>

<http://www.crm-devel.org/resources/human.htm>

http://flightsafety.org/human_factors.html

<http://www.tc.gc.ca/aviation/general/human/litrev/hfflt1e.htm>

VI. EVALUATION PROCESS/GRADING SYSTEM:

The student will be assessed by a combination of attendance and department, quizzes, tests and a final exam. Weighting of each will be as follows: 30% for quizzes, 30% for all tests prior to the final exam and 40% for the final exam. A minimum mark of 70% is required to pass the course. Make-up tests are not permitted except in accordance with section VI of this outline.

Unexcused absences will result in 2% deduction of the final mark for each occurrence, arriving for class late will result in a 1% deduction of the final mark for each occurrence, and violations of the dress code will result in a 1% deduction of the final mark for each occurrence. Refer to the SOP GEN 1.3 for dress code policies and SOP GEN 1.6.7 for policy regarding absence from classes

Quizzes will be given without prior notice.

If it is necessary to write a second final exam in order to pass the course, the highest grade achievable will be a "C". (See make-up policy in section VI)

Students may request a deferment of a test for compassionate reasons.

Compassionate Grounds for deferment will include but not be limited to death of an immediate family member, personal illness, or recent diagnosis of a serious illness of a family member. **Make-ups will not be permitted after the fact for compassionate reasons.**

"F" grades in any subject at the end of a semester will result in termination from the Aviation program.

Although attitude, co-operation, etc., are not graded, students may be terminated based on their performance in this area (see section VI). These attributes are also considered in the selection of the Air Canada Award and other scholarships.

Dates of tests will be announced at least 1 week in advance.

A classroom code of conduct can be found in the SOP General section, and will be adhered to.

The following semester grades will be assigned to students in this course:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 -100%	4.00
A	80 - 89%	3.00
B	70 - 79%	2.00
C	assigned if a make-up exam was required to complete the course	0.00
F (Fail)	below 70%	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

VII. SPECIAL NOTES:

Attitude and Conduct

Attitude plays an important role in your ability to exercise good judgement. Although attitude is not being graded, it affects your ability to learn as well as your safety as a student and future as a professional pilot. Students who display a strong tendency towards any of the five hazardous attitudes pose a grave risk to themselves and others. For this reason, students exhibiting one or several hazardous attitudes will be counselled and if necessary, will be put on a behavioural contract. If this is ineffective in modifying unacceptable behaviour, then the student will be withdrawn from the program.

The five hazardous attitudes are identified as Anti-authority, Impulsivity, Invulnerability, Machismo, and Resignation. These hazardous attitudes are described in "Human Factors for Aviation – Basic Handbook" on pages 151 and 152.

Make-up Policy

No make-ups on tests occurring prior to final exams.

No make-ups on quizzes.

If the final grade achieved for this course is less than 70%, a second final exam may be written at the discretion of the professor for this course. The second exam will be averaged with the first exam to determine the resulting exam mark, and the final grade will then be calculated.

In the event that a second final exam is required, the highest achievable overall grade for this course will be a C

Any student that requires 100% or greater on a make-up exam to pass the course will not be allowed to write a make-up exam.

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course outline amendments:

The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

VIII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

IX. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.