

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: Human Factors in Aviation

CODE NO. : AVT119-2 **SEMESTER:** One

PROGRAM: Aviation Technology (Flight)

AUTHOR: Brian Stewart

DATE: August/14 **PREVIOUS OUTLINE DATED:** May/14

APPROVED: _____ *[Signature]* **CHAIR** *[Signature]* **DATE** *Sept. 19, 2014*

TOTAL CREDITS: 2

PREREQUISITE(S): None

HOURS/WEEK: 2

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I. COURSE DESCRIPTION:

The focus of this introductory course is the function of the body in a unique and sometimes hostile environment. We will define human factors and the role they have played and continue play in flight safety. You will learn the effect altitude has on your bodily functions, the link between fitness, nutrition and your aviation medical, why sensory conflicts can be disorientating, potential visual and vestibular illusions, how to deal with accelerations, about stress and the role it plays in your performance , and the challenges of a pilot becoming pregnant.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Define human factors and explain its importance in aviation.

Potential Elements of the Performance:

- Definition, where flight physiology fits
- Role in aviation, why now
- Historical perspective on the development of human factors
- A simple model of pilot performance
- Four basic human factor principles

2. Explain your role in learning.

Potential Elements of the Performance:

- Learning styles – active versus passive
- Techniques to improve learning
- Student/Instructor relationship

3. Outline the role your brain plays in flying an aircraft.

Potential Elements of the Performance:

- The parts and how they work
- The brain's role in information processing
- The brains capabilities

4. Describe the basic function of the human body.

Potential Elements of the Performance:

- 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. Explain the effect the atmosphere has 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

7. Realize the significant role your health plays in a safe flight and a safe career.

Potential Elements of the Performance:

- Importance of diet
- The importance of hydration
- Benefits of physical fitness
- Caffeine and its effects
- Effects of smoking, drugs and alcohol on physical fitness and ultimately flight safety
- Dangers of self diagnosis
- Over the counter medications
- Total and partial incapacitation

8. Appreciate, comprehend and develop strategies to deal with environmental stresses.

Potential Elements of the Performance:

- Fatigue, sleep and circadian rhythms
- Noise
- Temperature extremes
- Air quality
- Anaesthetics
- Blood donations
- IMSAFE checklist

9. Explain how the eye works, how to maintain an effective scan and its role in orientation.

Potential Elements of the Performance:

- Optical, depth, and distance illusions
- The light spectrum
- Visual terminology – focal vision, ambient vision, myopia, presbyopia, hyperopia, astigmatism, refractive error, accommodation, depth of field
- Anatomy of the eye
- Night vision
- Blind spots
- Factors affecting vision in flight
- Scanning for objects
- Factors affecting visual acuity
- Effects of hypoxia and smoking
- Fixation and motion
- Visual illusions according to phase of flight and their affect on orientation
- Eye protection
- Minimizing your susceptibility to illusions
- Meaning of design eye reference

10. Explain the role hearing plays in effective communication.

Potential Elements of the Performance:

- How we hear, anatomy of the ear, impediments to hearing
- Sound, hearing loss, hearing protection
- Interpretation of the sound
- Expectancy
- Active listening
- Proper phraseology

11. Explain the role the vestibular apparatus plays in orientation.

Potential Elements of the Performance:

- The physiological senses used for orientation
- How the ears (vestibular system) provide orientation
- Illusions resulting from angular accelerations
- Illusions resulting from linear accelerations
- Actions which can reduce your susceptibility to illusions

12. Understand the significant effect stress can have on your performance, flight safety and your health.

Potential Elements of the Performance:

- What is stress
- Types of stress
- Effect of stress
- How stressed are you
- Managing and/or preventing stress

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. Understand the effect pregnancy has on one's ability to fly.

Potential Elements of the Performance:

- Background knowledge
- Challenges when flying
- The rules

III. TOPICS:

1. Introduction to human factors
2. Learning to fly
3. The brain, its role in decision making
4. Basic human anatomy
5. Atmosphere
6. Altitude physiology
7. Vision
8. Hearing
9. Orientation
10. Stress
11. Acceleration and motion sickness
12. Pregnancy

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

1. Human Factors for Aviation – Basic Handbook – Transport Canada

V. OTHER RESOURCES/TEXTS/MATERIALS:

Your Sault College Library is an excellent resource!

Web Links:

A.I.M. – aeronautical information manual

<http://www.tc.gc.ca/eng/civilaviation/opssvs/aviationsafety-menu.htm>

<http://www.faa.gov/pilots/safety/pilotsafetybrochures/>

<http://flightsafety.org/>

<http://www.airforce.forces.gc.ca/en/flight-safety/index.page>

http://www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_91346

VI. EVALUATION PROCESS/GRADING SYSTEM:

The student will be assessed by a combination of attendance and deportment, quizzes, tests and a final exam. Weighting of each will be as follows: 15% for quizzes, 15% for classroom assignments and activities, 20% for all tests prior to the final exam and 50% for the final exam. A minimum mark of 70% is required to pass this course. No re-write or make-up tests will be permitted except for compassionate reasons as described below.

- Unexcused absences may result in 2% deduction of the final mark for each occurrence, arriving for class late may result in a 1% deduction of the final mark for each occurrence, and violations of the dress code may result in a 1% deduction of the final mark for each occurrence. Refer to the SOP GEN 1.3.1.8 for dress code policies and SOP GEN 1.3.1.13 for the policy regarding absence or tardiness.
- Quizzes will be given without prior notice.
- 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.**
- 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:

Grade	Definition	Grade Point <u>Equivalent</u>
A+	90 -100%	4.00
A	80 - 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
F (Fail)	49% and below	
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in non-graded subject area or flight training.	
U	Unsatisfactory achievement in non-graded subject area or flight training.	
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:

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session. *Refer to section VI Evaluation Process/Grading System of this course outline for further details on specific attendance requirements for this course.*

VIII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal, form part of this course outline.