Physiological Factors

Micro-UAS Remote Pilot Course

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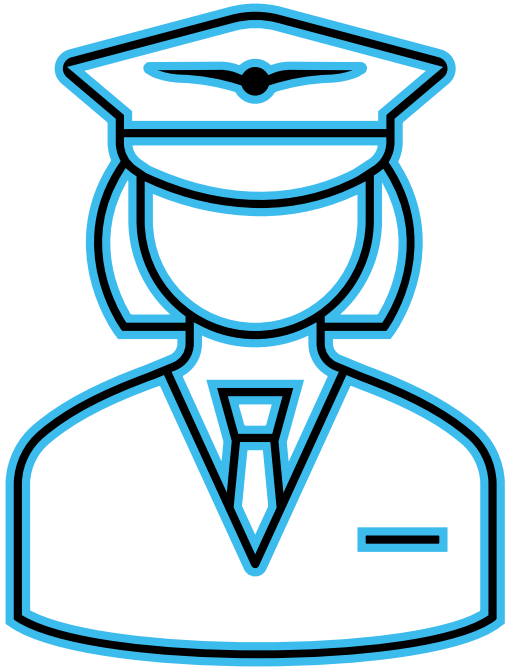
Aim

- Physiological
- Medical factors
- Drug and Alcohol



Why is this important for me!

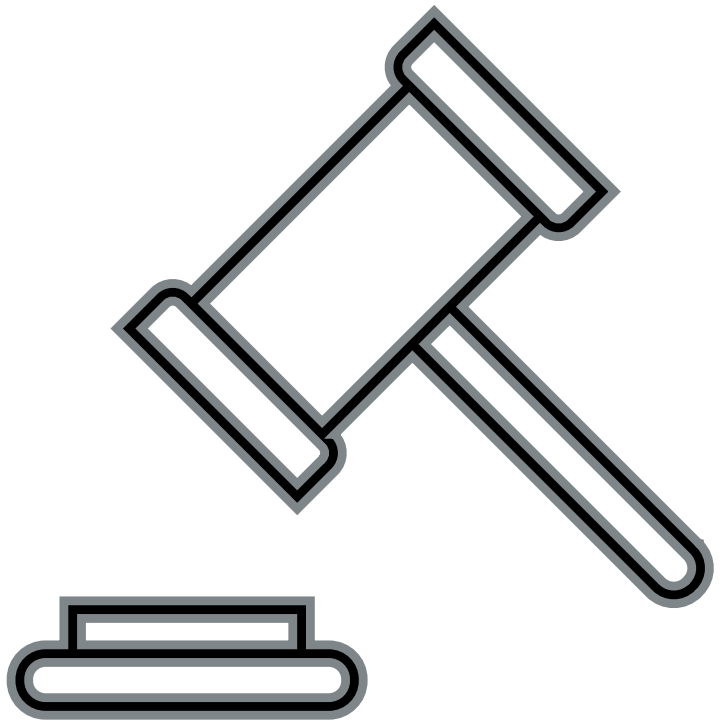
Able to operate MAS safely.

Agenda

1. **Introduction**
2. Physiological / Medical Factors that Affect Pilot Performance
3. Vision and Flight
4. Questions
5. Practice Questions

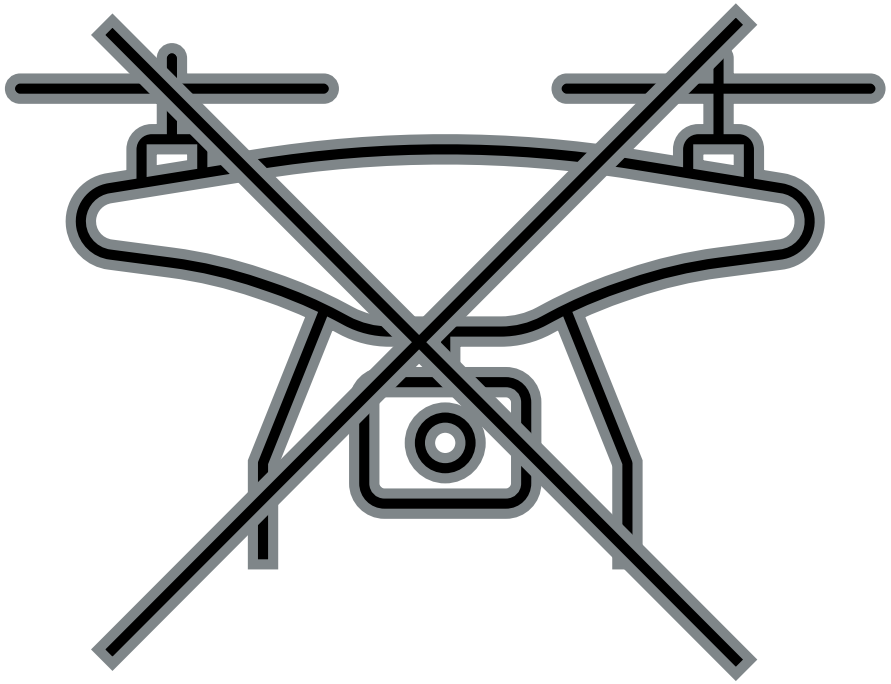
Introduction

- International Regulation (FAA, ICAO)
- Remote PIC
- Drugs and Alcohol
- Over-the-counter (OTC)



Introduction – Regulation

- Alcohol within 8hours
- Influence of alcohol
- Blood > .04
- Drugs
- Medical condition

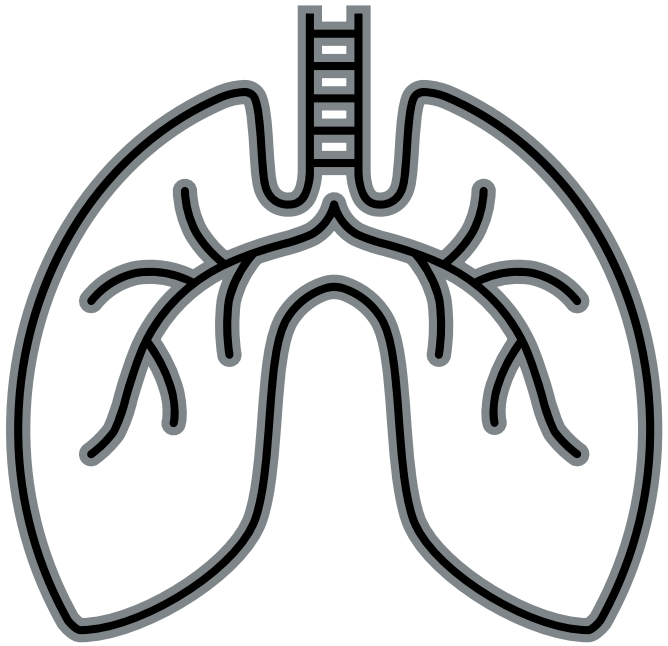


Physiological/Medical Factors that Affect Pilot Performance

- Hyperventilation
- Stress
- Fatigue
- Dehydration
- Heatstroke
- Effects of alcohol and drugs

Hyperventilation

- Visual impairment
- Unconsciousness
- Lightheaded or dizzy sensation
- Tingling sensations
- Hot and cold sensations
- Muscle spasms

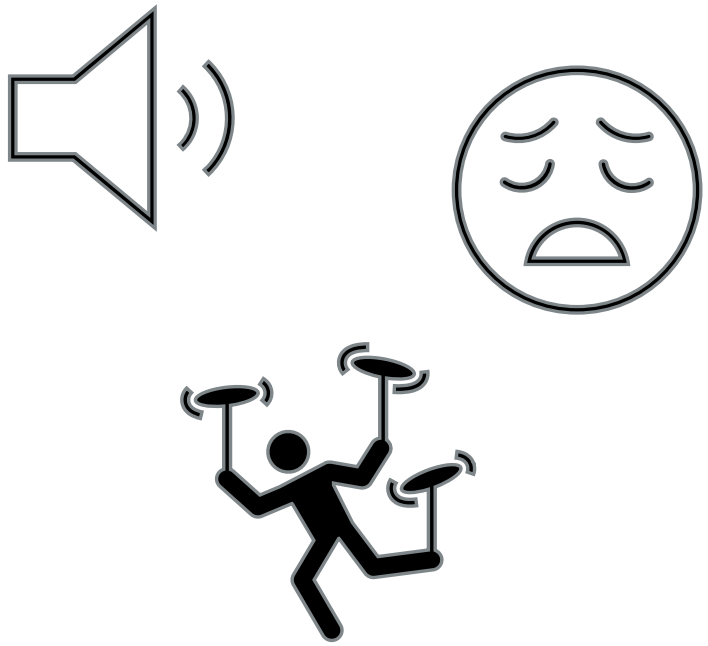


Stress

- Chemical hormones
- Increase
  - Blood sugar,
  - Heart rate,
  - Respiration,
  - Blood pressure
  - Perspiration

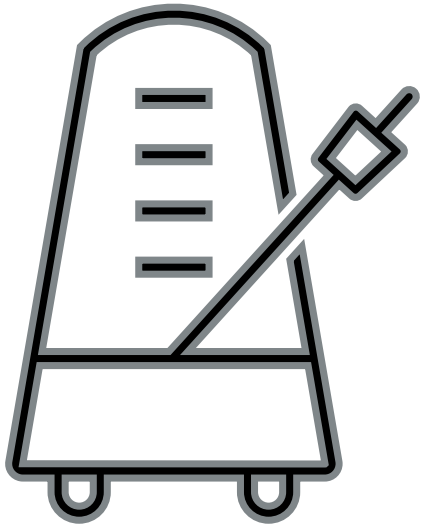
Stressors

- Physical
- Physiological
- Psychological



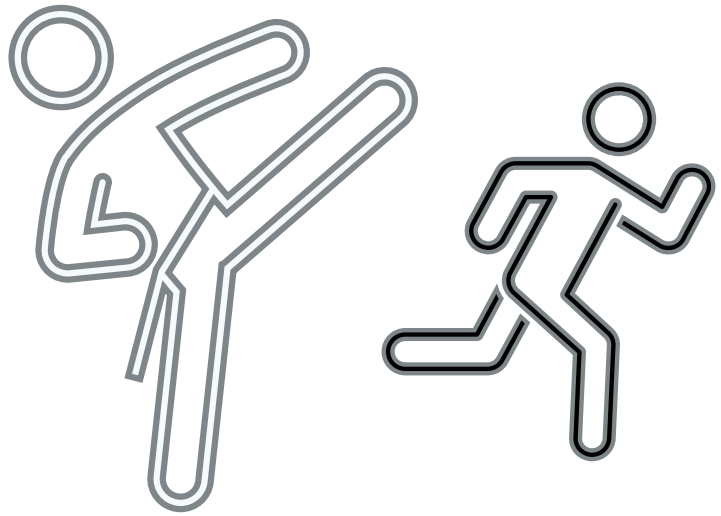
Stress Category

- Acute (short term)
- Chronic (long term)



Acute Stress

- Flight or Flight
- Healthy - Cope
- Leads to Chronic



Chronic Stress

- Exceed the ability to cope
- Performance falls rapidly
- No airman privileges
- Consult a Physician

Fatigue

- Effect
  - Degradation of attention and concentration,
  - Impaired coordination,
  - Decreased ability to communicate.
- Physical fatigue
  - sleep loss
  - Exercise
  - Physical work.

Fatigue

- Acute
- Chronic

Acute Fatigue

Skill Fatigue

- Timing disruption
- Disruption of the perceptual field

Acute Fatigue Cause

- Mild hypoxia (oxygen deficiency)
- Physical stress
- Psychological stress
- Depletion of physical energy resulting from psychological stress
- Sustained psychological stress

Chronic Fatigue Cause

- Extends over a long period of time
- Can be physiological or disease related.
- Consult a physician

Chronic Fatigue

Presents itself in the form of

- Weakness
- Tiredness
- Heart palpitation
- Breathlessness
- Headaches
- Irritability

Dehydration

Causes by

- Hot temperatures
- Wind
- Humidity
- Diuretic drinks

Dehydration

Presents itself in the form of

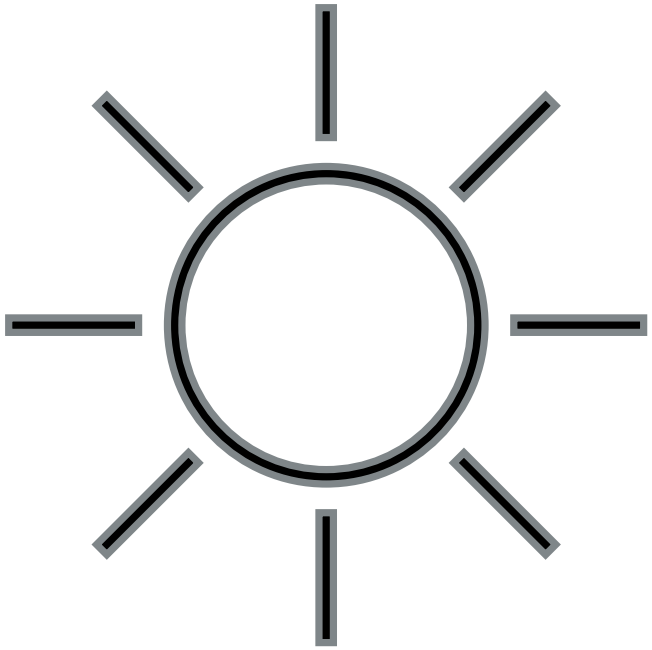
- Headache
- Fatigue
- Cramps,
- Sleepiness
- Dizziness.

Dehydration

- Drink 2-4 quart [liter] / Day
- Don’t wait until you are thirsty
- Stay ahead and drink periodically.
- Limit daily intake of caffeine and alcohol.

Heatstroke

- **In severe heat stress:** drink one liter / hour
- **In moderate heat stress:** drink half liter / hour



Drug

- Drugs
- OTC drugs
  - antihistamines or decongestants

https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/pharm/dni_dnf/

I’M SAFE

I – Illness

M- Medication

S- Stress

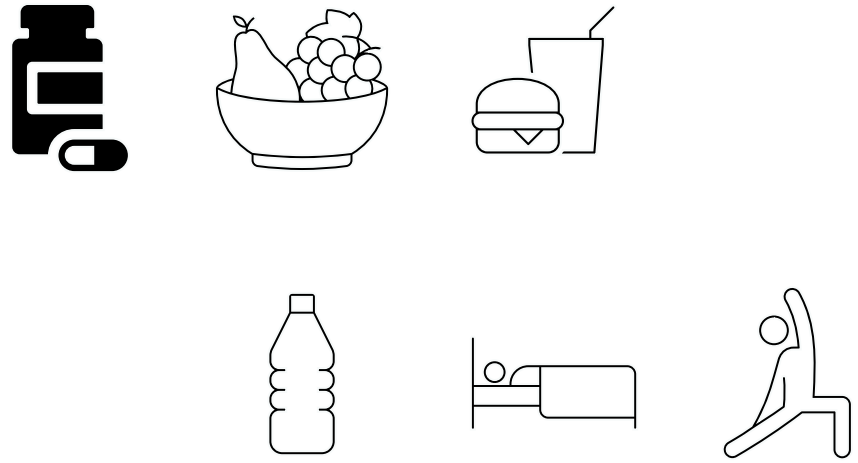
A- Alcohol

F- Fatigue

E- Emotion

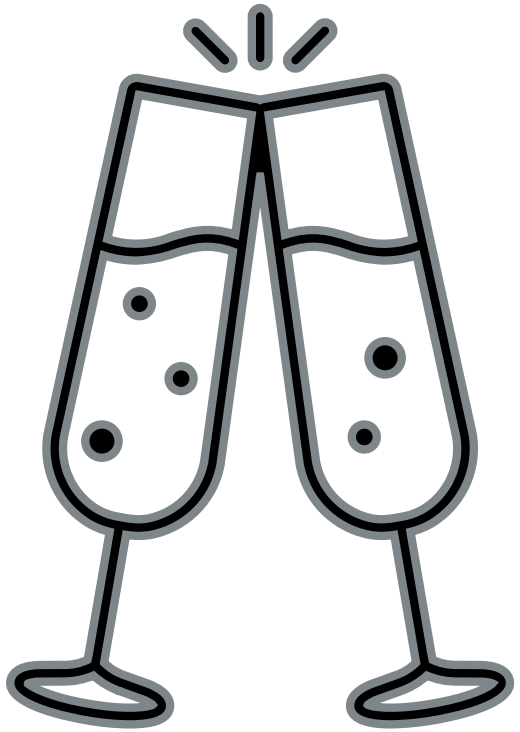
Pilots Consideration

- No Elective Med
- Balance Meal
- Snack
- Good Hydration
- Sleep
- Physically Fit



Alcohol

- Impaired judgement
- Decreased sense of responsibility
- Decreased coordination
- Constricted visual field
- Diminished memory
- Reduced reasoning ability
- Lower attention span



https://www.faa.gov/pilots/safety/pilotsafetybrochures/media/alcohol.pdf

Impairment scale with alcohol use

- 0.01-0.05% (10-50mg) Average individual
- 0.03-0.12 % (30-120)
  - mild euphoria
  - Talkativeness
  - Decreased inhibitions
  - Decreased attention
  - Impaired judgement
  - Increased reaction time
- >0.09 = ?

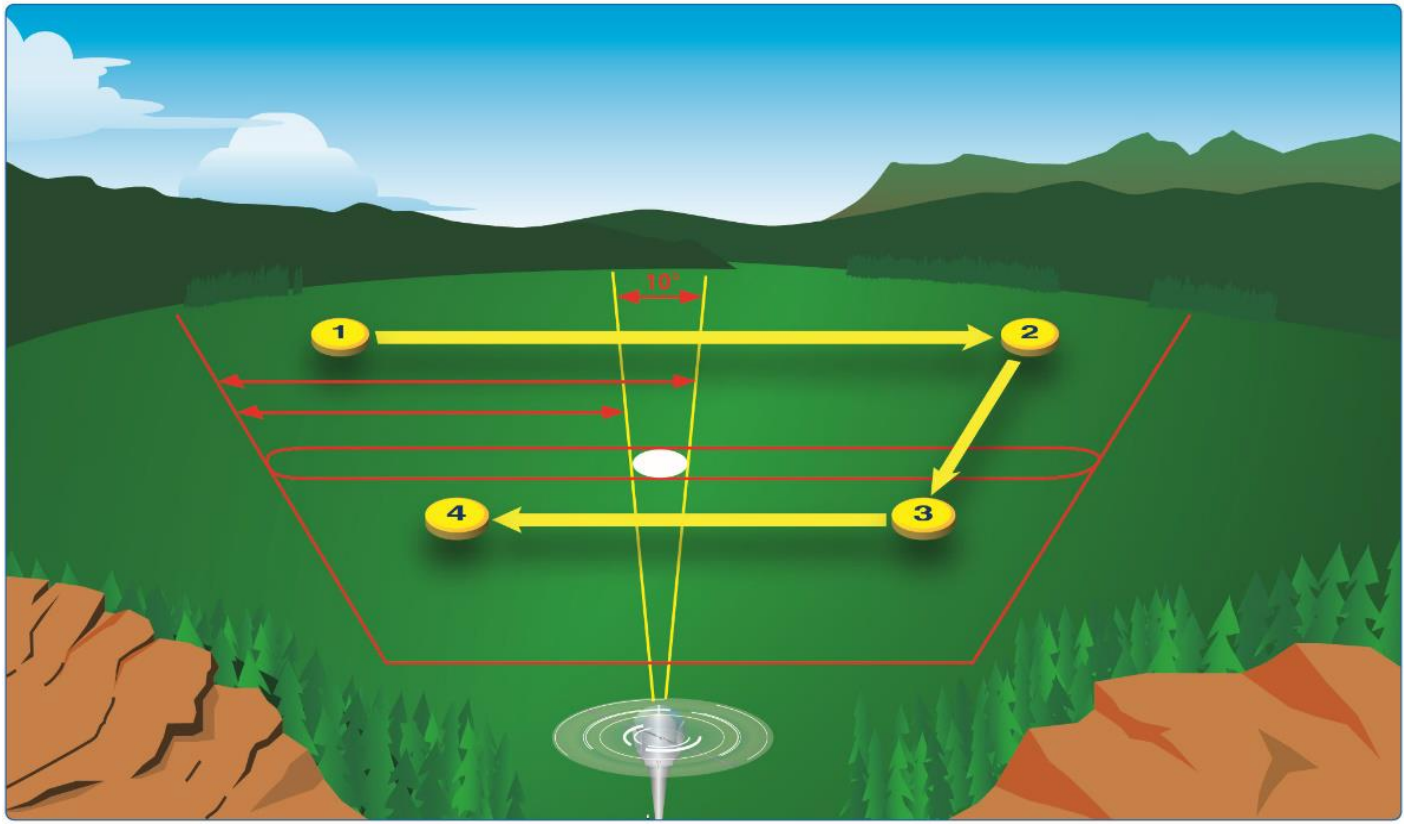
Type Beverage	Typical Serving (oz)	Pure Alcohol Content (oz)
Table wine	4.0	.48
Light beer	12.0	.48
Aperitif liquor	1.5	.38
Champagne	4.0	.48
Vodka	1.0	.50
Whiskey	1.25	.50

0.01–0.05% (10–50 mg)	average individual appears normal
0.03–0.12%* (30–120 mg)	mild euphoria, talkativeness, decreased inhibitions, decreased attention, impaired judgment, increased reaction time
0.09–0.25% (90–250 mg)	emotional instability, loss of critical judgment, impairment of memory and comprehension, decreased sensory response, mild muscular incoordination
0.18–0.30% (180–300 mg)	confusion, dizziness, exaggerated emotions (anger, fear, grief), impaired visual perception, decreased pain sensation, impaired balance, staggering gait, slurred speech, moderate muscular incoordination
0.27–0.40% (270–400 mg)	apathy, impaired consciousness, stupor, significantly decreased response to stimulation, severe muscular incoordination, inability to stand or walk, vomiting, incontinence of urine and feces
0.35–0.50% (350–500 mg)	unconsciousness, depressed or abolished re exes, abnormal body temperature, coma, possible death from respiratory paralysis (450 mg or above)

* Legal limit for motor vehicle operation in most states is 0.08 or 0.10% (80–100 mg of alcohol per dL of blood).

Vision and Flight

- Scan from left to right or right to left.
- Start from the greatest distance and move inward.
- Scan 10 degrees at a time for 2-3 seconds



References

Chapter 9: Physiological Factors (Including Drugs and Alcohol) Affecting Pilot Performance

Remote Pilot – Small Unmanned Aircraft Systems Study Guide

https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/media/remote_pilot_study_guide.pdf

Chapter 17 Aeromedical Factors

Pilot's Handbook of Aeronautical Knowledge

https://www.faa.gov/sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/phak/19_phak_ch17.pdf

Questions?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PEACE OPERATIONS

Pick the wrong answer: A PIC should be able to overcome the symptoms of hyperventilation by

a) Breathing rapidly to fill the lung with oxygen

b) Breathing slowly

c) Breathing in a bag

d) Talking aloud

Rapid breathing while using oxygen can cause a condition known as

a) Hypertension

b) Hyperventilation

c) Hyperreactions

In stressful situation is encountered in flight, an abnormal increase in the volume of air breathed in and out causes

a) Hypertension

b) Hyperventilation

c) Hyperreactions

Why is fatigue hazardous to flight safety?

a) Fatigue may not be apparent to a pilot until serious error is made.

b) The PIC rushes to get things done.

c) Fatigue is not hazardous.

Which technique should a remote pilot use to scan for traffic? A remote pilot should:

a) Systematically focus on different segment of the sky for short interval

b) Continuously scan the sky in all direction.

c) Use your peripheral vision to detect relative movement of objects.