

FAA TRAINING PROGRAMS IN AEROSPACE MEDICINE

Office of Aerospace Medicine
Civil Aerospace Medical Institute
Aerospace Medical Education Division

The Aerospace Medical Education Division of the Civil Aerospace Medical Institute (CAMI) offers aeromedical training programs for aviation medical examiners (AMEs), civil aviation pilots, and others in the civil aviation community. These training programs include:

- Basic Aviation Medical Examiner Seminars
- Theme AME Seminars, Multimedia AME Refresher

- Clinical Aerospace Physiology Review for AMEs
- Medical Certification Standards and Procedures Training
- Aviation Physiology Courses
- Global Survival Courses
- FAA International Exchange Visitor Program
- Aerospace and Occupational Medicine Resident rotations

AVIATION MEDICAL EXAMINER TRAINING PROGRAMS

The Federal Aviation Administration has designated established physicians to perform duties as aviation medical examiners (AMEs). These AMEs are located in the private sector, Federal agencies (Air Force, Navy, Army, National Aeronautics and Space Administration, Coast Guard, others) and in countries around the world. AMEs are authorized to perform physical examinations of U.S. airmen to determine their qualifications for the issuance of a medical certificate as required under Title 14 Code of Federal Regulations, Part 67.

In addition to providing an essential service to the aviation community, AMEs ensure that only those applicants who are physically and mentally fit to perform flying duties safely will be issued medical certification. To properly discharge the duties associated with this responsibility, AMEs must have detailed knowledge and understanding of the FAA rules, regulations, policies, and procedures related to the medical standards and the certification process.

Clinical Aerospace Physiology Review for Aviation Medical Examiners Course (CAPAME)

This Internet-based course enables you to recognize the hazards of pilot exposure to self-imposed and environmental stress factors and unsafe practices during the operation of an aircraft that may lead to impairment, incapacitation, or death. CAPAME familiarizes you with the physiological effects resulting from the interaction between humans, the aerospace physical environment, and the aircraft. It is a prerequisite course for new AME-designates prior to attending a Basic Seminar.

You will enhance your knowledge of aerospace physiology and thus improve your ability to assist airmen who experience aviation-related medical problems. In addition, you must possess the necessary knowledge of aerospace physiology to provide appropriate advice to civil aviation pilots regarding the impact of aviation-related stress factors.

The course includes scenarios portraying airmen who have been affected by a variety of problems—hypoxia, hyperventilation, decompression sickness, trapped gases, acceleration

exposure, noise exposure, vibration exposure, laser exposure, spatial disorientation, airsickness, carbon monoxide poisoning, heat stress, and self-imposed stress. After viewing each scenario, you will be required to answer questions that evaluate your knowledge of medical certification standards and aeromedical decision-making skills. (This course is being revised.)

www.faa.gov/other_visit/aviation_industry/designees_delegations/designee_types/ame/ametraining/important/

Medical Certification Standards and Procedures Training (MCSPT)

Completion of this training is one of the mandatory requirements for designation as an aviation medical examiner for the FAA, and it is a pre-requisite for attending a Basic AME Seminar. MCSPT is a computer-based course available online that will familiarize you and your staff with the administrative aspects of the medical certification program. Thus, we strongly encourage your staff members to also take this course.

Basic Aviation Medical Examiner Seminar

This one-week seminar is offered three times per year at a training facility and the FAA Civil Aerospace Medical Institute in Oklahoma City, Oklahoma. Completion of this seminar is one of the mandatory requirements for designation as an AME for the FAA. The Basic Seminar complies with ICAO International Standards on Personnel Licensing, Annex 1 to the Convention on International Aviation, No. 1.2.4.4.

Topics this seminar covers:

- The FAA medical certification program and responsibilities of this program.
- The basis for disqualification of an airman with a medical problem and the conditions necessitating deferral or denial, as outlined in Federal Aviation Regulations.
- The denial process and the steps necessary for certification appeal rights.
- Becoming the local authority in aviation medicine and a resource to medical colleagues in determining who may be able to fly safely.

www.faa.gov/go/ametraining

Theme Aviation Medical Examiner Seminars

To maintain your designation, you are required to complete refresher training every three years. Another way to comply with this training requirement is to attend a 2½-day AME theme seminar. The theme seminars are offered in different locations across the U.S. every year. Each seminar is devoted to a particular medical theme. Available themes are: 1) Cardiology, 2) Neurology, Neuropsychology, 3) Ophthalmology-Otolaryngology-Endocrinology, and 4) Certification.

These seminars provide a background in aviation medicine to physicians from various medical specialties to improve their proficiency in their medical practices and improve their capability to medically evaluate airmen. This is accomplished by instructing you in medical specialties and behavioral sciences that will enable you to assess the airman's ability to operate an aircraft with maximum mental and physical proficiency.

Multimedia Aviation Medical Examiner Refresher Course (MAMERC)

The other option to comply with the mandatory AME refresher training requirement is to complete MAMERC. This course can be used as a substitute for Theme AME Seminar attendance on alternate three-year cycles, which extends the time between seminar attendance to six years and reduces travel expenses and time away from the office. MAMERC is a Internet-based training course designed to evaluate and enhance the quality of airman medical certification decisions made by AMEs. AMEs not only have to demonstrate their knowledge of medical certification standards, but how they apply such knowledge to make appropriate aeromedical certification decisions. The course includes scenarios that portray AMEs, FAA physicians, and consulting physicians performing their various duties in the certification process. After viewing each scenario, you will answer questions that evaluate your knowledge of medical certification standards and aeromedical decision-making skills. When you pass the exam, a completion certificate is quickly produced.

AIRMEN TRAINING PROGRAMS

Airmen training programs promote aeromedical knowledge and safety among the civil aviation pilots in the U.S.

Aviation Physiology Course

Physiological training for pilots was introduced in the military in 1942 to prevent and/or reduce the number of incidents, accidents, and fatalities resulting from pilot exposure to the hostile environmental conditions encountered during flight.

Pilots who are knowledgeable about aeromedical facts are certainly better prepared to deal with unexpected and/or expected in-flight events such as:

- loss of cabin pressure (slow or rapid) leading to hypoxia, trapped gas problems, or decompression sickness,
- exposure to an unfamiliar motion environment leading to spatial disorientation,
- exposure to acceleration forces (Gs) leading to gray-out, black-out, or even unconsciousness (GLOC),
- exposure to noise, vibration, or thermal stress leading to impaired performance, and
- exposure to self-imposed stresses which may lead to, and/or aggravate, any of the above mentioned in-flight events.

The U.S. Code of Federal Regulations (CFR), Title 14, Part 61.31 (f)(2)(i), indicates that no person may act as pilot in command of a pressurized airplane that has a service ceiling or maximum operating altitude, whichever is lower, above 25,000 feet MSL unless that person has completed ground training that includes instruction on respiration; effects, symptoms, and causes of hypoxia, and any other high-altitude sicknesses; duration of consciousness without supplemental oxygen; effects of prolonged usage of supplemental oxygen; causes and effects of gas expansion and gas bubble formations; preventive measures for eliminating gas expansion, gas bubble formations,

and high-altitude sicknesses; physical phenomena and incidents of decompression; and any other physiological aspects of high-altitude flight.

The objective of the FAA Aviation Physiology Course is to familiarize pilots with the physiological and psychological stresses of flight including the effects of self-imposed stress (illegal and legal drug use, alcohol consumption, smoking, fatigue, inadequate nutrition, sedentary lifestyle, excessive caffeine consumption, etc.) and their impact on aviation safety.

This course includes practical demonstrations of rapid decompression (8 to 18K feet), hypoxia (25K feet), and night vision, using the safest and most technologically advanced training altitude chamber (Fig. 1) available in the U.S. today.



Figure 1. Altitude Chamber Training Flight

CAMI has the only operational altitude chambers (training and research) in the U.S. that meets the current safety standards in the pressure vessel industry to ensure the protection of occupants, operators, and maintenance staff. This requires that

the design, fabrication, testing, and inspection of the chamber meet the standards of: 1) American Society of Mechanical Engineers, and 2) National Fire Protection Association. The CAMI altitude training chamber is a computer-controlled, man-rated, low-pressure (hypobaric) chamber. It normally accommodates 20 subjects and two inside safety observers. The altitude chamber uses a vacuum pump to remove gas/pressure from the chamber. As the pressure is removed, it simulates the corresponding pressure of a particular altitude.

The **Portable Reduced Oxygen Training Enclosure (PROTE)**, Fig. 2) is a *portable* altitude training system that simulates altitude by reducing the oxygen percentage of the air. Advances in technology have yielded a new generation of commercially available training devices capable of producing hypoxic environments at ground level (normobaric) by altering the fraction of ambient oxygen, thus avoiding some of the risk factors associated with altitude chamber training.



Figure 2. *PROTE training enclosure, shown during initial testing and certification stages.*

The system's operational control is a microprocessor that monitors two oxygen sensors, a carbon dioxide sensor, and an atmospheric pressure sensor. It uses this information to calculate the simulated altitude and, in turn, to control nitrogen-concentrating air units, CO₂ scrubbers, and vents (as needed) to maintain the enclosure at the desired simulated altitude setting. Although it is based at CAMI, the PROTE can be taken to locations wherever needed for your personal hypoxia experience.

Spatial Disorientation. The Aviation Physiology Course also includes a practical demonstration of spatial disorientation using a General Aviation Spatial Disorientation Demonstrator (GYRO), the General Aviation Trainer (GAT 2), the General Aviation Trainer-Helo (GAT 2-Helo), or the Virtual Reality Spatial Disorientation Demonstrator (VRSDD). Each of these devices provide similar spatial disorientation experiences with slightly different environmental factors. The critical importance of this type of practical demonstration is evidenced by aircraft accident investigation reports indicating that in-flight spatial disorientation is a causal or contributing factor in about 10% of all general aviation accidents. Furthermore, it has been reported



Figure 3. *GYRO, spatial disorientation demonstration*

that up to 90% of the total number of general aviation accidents involving in-flight spatial disorientation are fatal.

The GYRO (Fig. 3) is the prototypical spatial disorientation device that provides 360-degree continuous yaw motion as well as plus or minus 15 degree pitch and 30 degree roll, which, in conjunction with a computerized imaging system, results in a realistic simulation of flight. The GYRO provides civil aviation pilots, aviation medical examiners, and FAA flight crews with the opportunity to experience vestibular and visual illusions (spatial disorientation) that occur during IFR conditions in an inherently safe environment. The programmed flight in the GYRO does not require an instructor—only an external safety observer. The pilot receives a 2-minute orientation and then takes the controls. The 6-minute flight progresses from VFR, with “out-the-window” scenes on a monitor, to IMC conditions.

Global Survival Course. The Global Survival Course provides the necessary knowledge and skills for coping with various common survival scenarios, including desert, arctic, and water environments following an emergency aircraft landing, ditching, or a crash. Practice sessions are conducted using a thermal chamber, a ditching tank, and an emergency evacuation aircraft simulator. In addition, this course teaches how to easily assemble and use a personal survival kit.

www.faa.gov/pilots/training/airman_education/

Figure 4. *Personal survival kit (sample)*





Figure 5. Fire starting demonstration in the thermal chamber

The thermal chamber (Fig. 5) is used to practice survival techniques and procedures in a cold (20° F), windy (15-20 mph), and dark (simulated night) environment.



Figure 6. Ditching Tank

The ditching tank (Figs. 6 & 7) is used to practice techniques and procedures for emergency egress from a Rockwell Sabreliner or a Beechcraft King Air, as well as water survival techniques, the use of flotation devices, and rescue procedures (using a helicopter hoist). The water temperature in the ditching tank is maintained around 80° F.

The emergency evacuation simulator (Fig. 8) consists of a section of fuselage of a passenger aircraft that is elevated and then filled with non-toxic smoke (glycerin) to provide a practical and very realistic simulation of an emergency evacuation scenario with smoke in the cabin.



Figure 7. Emergency egress practice in the ditching tank



Figure 8. Emergency Evacuation Simulator



Figure 9. Starting a fire without matches or a lighter



Figure 10. Survival practice in the Oklahoma wilderness

Global Survival Video Course

This course familiarizes civil aviation pilots with the basic survival methods and techniques to increase their survival chances following an aircraft emergency landing, ditching, or crash. Topics covered in this video course include: will to survive, cold land survival, hot land survival, water survival, jungle survival, survival medicine, survival signaling, and appropriate survival kits.

www.faa.gov/pilots/training/airman_education/aircrewsurvivalvideos/

Aviation Physiology Video Course

The objective of this course is to familiarize civil aviation pilots with the physiological effects of flight stress factors and self-imposed stress, as well as the appropriate preventive and protective measures. This distance education course is available to every civil aviation pilot who requests a copy and to anyone interested in promoting aviation safety.

Topics covered in this video course include: physics of the atmosphere, respiration and circulation, hypoxia, hyperventilation, trapped gases, decompression sickness, oxygen equipment, cabin pressurization, motion sickness, fitness for flight, spatial disorientation, self-imposed stress, thermal stress, fatigue, vision in aviation, noise and vibration, and acceleration.

www.faa.gov/pilots/training/airman_education/physiologyvideos/



Figure 11. Scene in night vision lab

Night Vision Imaging Systems Laboratory

This state-of-the-art laboratory (Fig. 11) is formally used jointly with FAA Flight Standards to teach maintenance inspectors the FAA policy and physiologic issues associated with night vision imaging systems. This laboratory is also used to orient aviation medical examiners and general aviation pilots to the specific strengths and shortfalls associated with night vision imaging systems. This lab undergoes continuous updates with features not seen elsewhere.

Aeromedical Publications

High-quality publications are produced to fulfill the diverse aeromedical information needs of FAA personnel, AMEs, civil aviation pilots, pilot schools, and others in the civil aviation community interested in the promotion of aviation safety.

The Federal Air Surgeon's Medical Bulletin

The *Bulletin* is a quarterly publication that is intended for AMEs and others in the aviation medical community. It features the following information:

1) **The Federal Air Surgeon's Column**—Updates on Office of Aerospace Medicine's programs, goals, objectives, policies, and procedures,

2) **Aeromedical Certification Cases**—Discussion of special aeromedical certification cases involving pilots,

3) **Aviation Medicine Research Update**—Description of aerospace medical and human factors research accomplishments of relevance to aviation safety,

4) **Aviation Medical Examiner Program News**—AME education programs updates, and

5) **Letters and Articles From AMEs** (opinions, suggestions, experiences, etc.).

www.faa.gov/go/fasmb/



Medical Facts for Pilots

Medical Facts for Pilots are pilot safety brochures designed to provide essential information to civil aviation pilots regarding potential aeromedical hazards and how to prevent or cope with them to ensure flight safety. Available titles include: Alcohol and Flying, Altitude Decompression Sickness, Spatial Disorientation, Hearing and Noise, Hypoxia, Laser Eye Surgery, Over-the-Counter Medications, Pilot Vision, Seat Belts and Shoulder Harnesses, Smoke, Sunglasses for Pilots, Deep Vein Thrombosis and Travel, and Carbon Monoxide.

www.faa.gov/pilots/safety/pilotsafetybrochures/



FAA Office of Aerospace Medicine Technical Reports

Office of Aerospace Medicine Technical Reports are publications used to disseminate the results of aerospace medical and human factors research conducted by the FAA Office of Aerospace Medicine. To date about 1,200 technical reports have been published on a wide range of subjects, from Angular Acceleration to Workload Effects on Complex Performance. www.faa.gov/go/oamtechreports



Aeromedical Library Services

CAMI has one of the finest specialized libraries in aviation medicine and human factors in the world. Library services to patrons include 1) interlibrary loans through memberships in two automated networks that provide access to the collections of approximately 29,000 participating libraries; 2) literature searches using online databases 3) reference services; 4) selection, acquisition, and cataloging of books, journals, and other

special collection items; and 5) digitized archives. The specialized library is networked with several other libraries so that the unique materials may be shared. These materials, many of which have been digitized for open access, include 7,000 books, 200 current journal titles, 13,800 cataloged technical reports, 1150 archival documents, a basic reference collection, and numerous CD and DVD titles.

www.faa.gov/go/aeromedlibrary/

OTHER AEROMEDICAL EDUCATION SERVICES

International Outreach Program

The Civil Aerospace Medical Institute supports foreign requests for assistance in civil aviation medicine and aviation human factors. The support provided includes: participating in the design, development, implementation or evaluation of international training activities in aviation medicine; presenting formal lectures; facilitating discussions; and providing technical advice and information. These international activities help promote aviation safety by discussing FAA medical standards, policies, and procedures with professionals in foreign countries who are involved in the organization and development of their own civil aviation programs.



Former international participants

- FAA policies and procedures
- U.S. standards and equipment while avoiding unnecessary duplication of research efforts.

Participants in this program:

- learn the functions and responsibilities of the FAA Office of Aerospace Medicine as they relate to the promotion of aerospace safety,
- participate in the day-to-day work activities at CAMI,
- share their specialized knowledge and skills with FAA specialists in support of various operational programs, and
- receive the benefits of interacting with FAA professionals and technical personnel at a leading civil aerospace medical institute.

FAA International Exchange Visitor Program

CAMI supports international programs that promote interaction between aviation medicine professionals, enable exchange of scientific information, and promote FAA's leading role in civil aviation medicine worldwide.

One such program is the International Exchange Visitor Program, which allows qualified specialists from foreign civil aviation organizations to enter the U.S. to conduct studies and/or exchange information and expertise at FAA facilities and at a minimum cost to the agency. The main objective of this program is to promote:



International Exchange Visitor participant (center) from Turkey

- global aviation safety through international cooperative activities



Residents in Aerospace Medicine and faculty during rotation at CAMI

FAA Civil Aerospace Medicine Residency Rotations

CAMI provides tailored rotations for both aerospace medicine and occupational medicine residents. Generally these rotations last two to four weeks and provide advanced instruction in aeromedical decision-making in civil aviation. The rotations also provide experiences in physiology, survival, and a look at civil aerospace medical research.

For more information

For additional information about any of these training programs and services, please contact:

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