

Training Course on Human Factors in Aviation Systems Design

Professional Development Training Course Outline

Category	Aviation and Airport Management	Duration	5 Days
Base Fee	\$1,500 USD	Delivery Mode	Online / On-site Hybrid

Course Introduction

The **aviation industry** operates within an inherently complex and high-risk environment where human interaction with sophisticated **aviation systems** is paramount. Despite technological advancements, **human error** remains a significant contributing factor to incidents and accidents. Training Course on Human Factors in Aviation Systems Design is meticulously crafted to address this critical challenge by equipping aviation professionals with a deep understanding of how human capabilities and limitations influence **system performance, safety, and operational efficiency**. By integrating **human-centered design principles** from the outset, we aim to proactively mitigate risks, optimize **human-machine interface**, and foster a robust **safety culture** across all facets of **aerospace operations**.

This program delves into the intricate interplay between human cognition, perception, and behavior, and the design of **cockpit environments, air traffic control systems, maintenance procedures, and aviation training**. Participants will gain actionable insights into identifying potential **human factor risks**, implementing effective **error management strategies**, and applying **human factors engineering** to create more resilient and intuitive aviation systems. Our focus is on practical application, leveraging **real-world case studies** and **interactive simulations** to ensure participants can translate theoretical knowledge into tangible improvements in their respective roles, ultimately contributing to a safer and more efficient global aviation landscape.

Programme Curriculum

Training Course on Human Factors in Aviation Systems Design

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Course Objectives

1. Grasp foundational **human factors** concepts, **ergonomics**, and their critical role in **aviation safety management systems (SMS)**.
2. Learn to recognize various types of **human error**, differentiate between **latent and active failures**, and understand their causal pathways in **aviation incidents**.
3. Master the principles of **human-centered design (HCD)** and **user experience (UX)** in the development of **aviation systems** and **human-machine interfaces (HMI)**.
4. Develop strategies for improving **situational awareness** in complex **operational environments** and mitigating its degradation under stress.
5. Analyze cognitive biases and heuristics impacting **decision-making** in aviation, and apply models for effective **cognitive load management**.
6. Foster effective **communication, teamwork, and leadership** through advanced **Crew Resource Management (CRM)** techniques.
7. Identify the impact of **fatigue, stress**, and other **physiological factors** on human performance and implement **fatigue risk management systems**.
8. Understand the challenges and opportunities of **automation dependency** and the integration of **AI in aviation**, focusing on human supervision and control.
9. Acquire skills in conducting **human factors accident investigation** and **root cause analysis (RCA)** to prevent recurrence.
10. Design and evaluate **human factors training programs** that incorporate **simulation-based training** and **performance assessment**.
11. Analyze the influence of **organizational culture, safety culture**, and management practices on **human performance** and **system safety**.
12. Understand specific **human factors in aviation maintenance** and engineering, including the **Dirty Dozen** and **error trapping**.
13. Explore concepts of **resilience engineering** to build robust aviation systems capable of adapting to unexpected events and managing complexity.

Organizational Benefits

- Significant reduction in incidents, accidents, and **human error**, leading to a safer operational environment.
- Optimized **human-machine interaction** and streamlined procedures reduce delays, waste, and improve overall productivity.
- Decreased accident rates, lower insurance premiums, reduced legal liabilities, and efficient resource utilization contribute to substantial cost savings.
- Fosters a proactive, **just culture** where employees feel empowered to report hazards and contribute to continuous safety improvement.
- Ensures adherence to national and international **aviation safety regulations** and standards, including ICAO and FAA guidelines.
- Improved working conditions, reduced stress, and a focus on human well-being lead to higher job satisfaction and lower turnover.
- Demonstrates a commitment to **safety leadership** and innovation, enhancing reputation and market standing.
- Develops a systematic approach to identifying, assessing, and mitigating **human factor risks** across the organization.

Target Audience

1. Pilots & Flight Crew
2. Air Traffic Controllers
3. Aviation Maintenance Technicians (AMTs) & Engineers
4. Aviation System Designers & Developers.
5. Safety Managers & Quality Assurance Professionals.
6. Airline & Airport Operations Managers.
7. Regulators & Investigators
8. Aviation Training Instructors & Course Developers

Course Outline

Module 1: Foundations of Human Factors in Aviation

- Definition and Historical Evolution of Human Factors in Aviation.
- Key Human Factors Models: SHELL Model, Reason's Swiss Cheese Model.
- The Link between Human Factors, Safety, and Efficiency.
- Introduction to Aviation Safety Management Systems (SMS) and Human Factors Integration.
- Ethical Considerations and the "Just Culture" Concept.
- **Case Study:** Tenerife Airport Disaster (1977) - *Analysis of communication breakdowns, crew resource management failures, and organizational pressures.*

Module 2: Human Performance and Limitations

- Cognitive Processes: Perception, Attention, Memory, and Information Processing.
- Physiological Factors: Fatigue, Stress, Circadian Rhythms, and Environmental Stressors.
- Psychological Factors: Motivation, Personality, and Individual Differences.
- Workload Management and Human Information Processing Limitations.
- Human Error: Taxonomy of Errors (Slips, Lapses, Mistakes) and Error-Producing Conditions.
- **Case Study:** Air France Flight 447 (2009) - *Examination of pilot fatigue, startle effect, automation surprise, and degraded performance under stress.*

Module 3: Human-Centered Design (HCD) & Ergonomics in Aviation

- Principles of User-Centered Design and Human-Machine Interface (HMI) Design.
- Display and Control Design: Legibility, Usability, and Standardization.
- Anthropometry and Workspace Design for Cockpits and Control Towers.
- Automation and Autonomy: Levels of Automation, Trust, and Human Supervision.
- Usability Testing and Evaluation Methods for Aviation Systems.
- **Case Study:** Boeing 737 MAX Accidents (Lion Air & Ethiopian Airlines) - *Focus on MCAS design, human-automation interaction issues, and alarm management.*

Module 4: Crew Resource Management (CRM) & Teamwork

- Evolution of CRM: From Cockpit to Multi-Crew and Organizational CRM.
- Effective Communication: Active Listening, Assertiveness, and Cross-Cultural Communication.
- Leadership, Followership, and Decision-Making in Team Environments.
- Conflict Resolution and Error Trapping within Teams.
- Threat and Error Management (TEM) in Operational Contexts.
- **Case Study:** United Airlines Flight 232 (Sioux City) (1989) - *Illustrates exceptional CRM, improvisation, and teamwork in a critical engine failure scenario.*

Module 5: Situational Awareness & Decision Making

- Components of Situational Awareness (Perception, Comprehension, Projection).
- Factors Affecting Situational Awareness: Workload, Distraction, and Cognitive Biases.
- Naturalistic Decision Making (NDM) in High-Stakes Environments.
- Heuristics and Biases in Aviation Decision-Making (e.g., Confirmation Bias, Availability Heuristic).
- Strategies for Enhancing Decision Quality under Pressure.
- **Case Study:** American Airlines Flight 965 (1995) - *Analysis of breakdown in situational awareness, cognitive tunneling, and erroneous decision-making during approach.*

Module 6: Human Factors in Aviation Maintenance & Ground Operations

- The "Dirty Dozen" Human Factors in Maintenance Errors.
- Maintenance Resource Management (MRM) and Error Prevention Strategies.
- Tool Control, Housekeeping, and Environmental Factors in Maintenance.
- Documentation, Procedures, and Communication in Maintenance Operations.
- Impact of Organizational Factors on Maintenance Safety.
- **Case Study:** Aloha Airlines Flight 243 (1988) - *Focus on structural maintenance failures, inspection effectiveness, and organizational influences on safety.*

Module 7: Accident Investigation & Risk Management

- Principles of Human Factors Accident and Incident Investigation.
- Root Cause Analysis (RCA) Techniques: Bow-Tie Analysis, SHELL Model Application.
- Hazard Identification, Risk Assessment, and Mitigation Strategies.
- Proactive vs. Reactive Safety Management Approaches.
- Safety Culture Assessment and Improvement.
- **Case Study:** Colgan Air Flight 3407 (2009) - *Examination of pilot training deficiencies, fatigue, and stick shaker activation leading to a stall.*

Module 8: Future Trends & Advanced Topics in Aviation Human Factors

- Human Factors in Unmanned Aerial Systems (UAS) and Autonomous Operations.

- Integration of Artificial Intelligence (AI) and Machine Learning (ML) in Aviation.
- Cybersecurity and Human Factors in Aviation Systems.
- Human Factors in Space Exploration and Future Air Mobility (UAM/AAM).
- Continuous Learning, Resilience Engineering, and Future Challenges.
- **Case Study:** Development of Urban Air Mobility (UAM) Systems - *Discussion on human factors challenges in new operational concepts, remote piloting, and passenger experience.*

Training Methodology

Our training methodology for "Human Factors in Aviation Systems Design" is highly **interactive, experiential**, and designed for **maximum knowledge transfer and practical application**.

- **Instructor-Led Presentations:** Engaging sessions delivered by **aviation human factors experts** with extensive industry experience.
- **Interactive Discussions & Group Activities:** Fostering peer-to-peer learning and diverse perspectives.
- **Real-World Case Studies & Accident Scenarios:** In-depth analysis of actual aviation incidents and accidents to understand human factors contributions.
- **Simulation-Based Training (where applicable):** Utilizing **flight simulators, ATC simulators, or HMI prototypes** for hands-on experience and skill development in controlled environments.
- **Practical Exercises & Workshops:** Applying theoretical concepts to design challenges, risk assessments, and error management scenarios.
- **Video Analysis & Multimedia:** Incorporating visual aids to illustrate complex concepts and real-world examples.
- **Guest Speakers:** Industry professionals sharing their practical insights and experiences.
- **Question & Answer Sessions:** Dedicated time for addressing participant queries and fostering deeper understanding.
- **Personalized Feedback:** Constructive feedback on individual and group performance during practical sessions.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call +254769199797

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

- a. The participant must be conversant with English.

- b.** Upon completion of training the participant will be issued with an Authorized Training Certificate
- c.** Course duration is flexible and the contents can be modified to fit any number of days.
- d.** The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.
- e.** One-year post-training support Consultation and Coaching provided after the course.
- f.** Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
21 Sep 2026	25 Sep 2026	Online	\$1,000
21 Sep 2026	25 Sep 2026	Physical	\$1,500
21 Sep 2026	25 Sep 2026	Physical	\$0
21 Sep 2026	25 Sep 2026	Physical	\$0
21 Sep 2026	25 Sep 2026	Physical	\$0
21 Sep 2026	25 Sep 2026	Physical	\$0
21 Sep 2026	25 Sep 2026	Physical	\$0
21 Sep 2026	25 Sep 2026	Physical	\$0

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