

# → Syllabus - Fatigue Risk Management (FRM) Training

# Syllabus

## Fatigue Risk Management

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# 1 Day 1

<b>1.1 Module FRM01: Development of FRM</b>		
<b>Objectives</b>	<b>Contents of module</b>	<b>Practical Training/Discussion</b>
Objective 1: Get familiar with the approach of FRM and its aim  Objective 2: Know the definition of fatigue in aviation  Objective 3: Understand the requirement of FRM (ICAO, FAA, EASA)  Objective 4: Be able to compare different approaches of FRM	<b>1. FRM – Why?</b>	Discussion about fatigue related Air Canada accident
	<b>2. Fatigue in Aviation</b>	
	<b>3. ICAO - Definition of FRM</b>	
	<b>4. FAA &amp; EASA recommendations and requirements</b>	

<b>1.2 Module FRM02: Principles of FRM</b>		
<b>Objectives</b>	<b>Contents of module</b>	<b>Practical Training/Discussion</b>
Objective 5: Understand the key elements of FRM  Objective 6: Understand how FRM can be adapted to the needs of an airline	<b>1. Basic principles</b>	Discuss examples of FRM reports
	<b>2. Elements of FRM</b>	
	<b>3. Content of an FRM Report</b>	Group work: What do you expect from a FRM report?
	<b>4. Conclusions</b>	

### 1.3 Module FRM03: Sleep

Objectives	Contents of module	Practical Training/Discussion
Objective 7: Understand the high importance of sleep for a pilot  Objective 8: Understand that clear procedures for sleep of flight crews onboard aircrafts have to be adopted	<b>1. Basic Facts about Sleep</b>	Exercise on Power Nap
	<b>2. Impaired Sleep</b>	Exercise on In-flight rest
	<b>3. Improvement of Normal Sleep</b>	
	<b>4. Power Nap, Controlled Cockpit Rest/Sleep, In-Flight Rest/Sleep</b>	

### 1.4 Module FRM04: Scientific Basis

Objectives	Contents of module	Practical Training/Discussion
Objective 9: Understand what research into fatigue and sleep has been able to achieve to build a basis for FRM  Objective 10: Understand how science can support FRM	<b>1. Measurement of Fatigue</b>	Discussion: What would you like to learn from science about your operations?
	<b>2. Transmeridian Flights, Layover Sleep</b>	
	<b>3. Short-Haul Operations</b>	
	<b>4. What could Science do for Your Flight Operations?</b>	
	<b>5. Ultra-long Range Operations</b>	
	<b>6. Conclusions</b>	

## 2 Day 2

<b>2.1 Module FRM05 (Part 1), FRM 06 (Part 2): Integration of FRM into SMS</b>		
<b>Objectives</b>	<b>Contents of module</b>	<b>Practical Training/Discussion</b>
Objective 11: Understand the relationship between FRM and SMS  Objective 12: Get to know the relevant FRM definitions  Objective 13: Be able to perform an FRM gap analysis  Objective 14: Integrate your FRM into an existing SMS  Objective 15: Understand the FRM safety risk management  Objective 16: Perform FRM safety assurance	<b>1. FRM and SMS (Part 1)</b>	Conduct a FRM gap analysis according to Doc 9966 appendix C  Discussion "What is risk?"  Perform an initial FRM hazard identification
	<b>2. Gap Analysis (Part 1)</b>	
	<b>3. FRM Safety Risk Management (Part 2)</b>	
	<b>4. FRM Safety Assurance (Part 2)</b>	

## 2.2 Module FRM07: Body Clock, Fatigue and Countermeasures

Objectives	Contents of module	Practical Training/Discussion
<p>Objective 17: Understand the behavior of the body clock after transmeridian flights.</p> <p>Objective 18: Understand how the body clock can be set by exposure to light and darkness.</p> <p>Objective 19: Understand the causes and consequences of pilot fatigue</p> <p>Objective 20: Learn about countermeasures against pilot fatigue</p>	<b>1. Non-visual perception of light</b>	<p>Questionnaire on Chronotype</p> <p>Exercise on time zone adaption</p>
	<b>2. Circadian clock and Chronotype (morning versus evening type)</b>	
	<b>3. Jet lag and the phase response curve to light</b>	
	<b>4. Introduction to fatigue in the cockpit</b>	<p>Individual work: My signs of fatigue</p> <p>Drawing of an individual daily profile of fatigue</p> <p>Exercise: Causes of fatigue</p> <p>Exercise: Fatigue in the cockpit</p>
	<b>5. Causes of fatigue</b>	
	<b>6. Countermeasures</b>	

## 2.1 Module FRM08: Fatigue-Related Accidents

Objectives	Contents of Module	Practical Training/Discussion
<p>Objective 21: Participants develop an idea how fatigue may contribute to aircraft accidents</p> <p>Objective 22: Understand which operations may be riskier than others</p>	<b>1. Some historical remarks</b>	<p>Evaluation of accident reports by the participants</p>
	<b>2. Swiss cheese model of human error (James Reason)</b>	
	<b>3. Accident analysis by Jeffrey Goode (FAA)</b>	
	<b>4. Regulatory impact analysis conducted by the FAA</b>	
	<b>5. List of other fatigue-related accidents</b>	

## 2.2 Module FRM09: Implementation of FRM Part 1

Objectives	Contents of module	<i>Practical Training/Discussion</i>
<p>Objective 23: Learn how to implement an FRM</p> <p>Objective 24: Be able to identify FRM hazards</p>	<b>1. FRM Hazard Identification</b>	<p>Refine the initial FRM hazard identification</p>
	<b>2. FRM Safety Risk Evaluation (Part 2)</b>	
	<b>3. FRM Tasks (Part 2)</b>	

## 3 Day 3

<b>3.1 Module FRM10: FRM Software Solutions</b>		
<b>Objectives</b>	<b>Contents of Module</b>	<b>Practical Training/Discussion</b>
Objective 25: Understand the importance of software solutions for FRM  Objective 26: Learn how to implement and work with an FRM software solution	<b>1. The Alert algorithm by the German Aerospace Centre</b>	Practical presentation of software tools
	<b>2. Integration of FRM into crew scheduling software</b>	
	<b>3 Implications for the planning processes and optimisation</b>	
	<b>4 Motivation and next steps</b>	
	<b>5 Demonstration of software</b>	
	<b>6. Analysis of accidents using fatigue prediction software</b>	
	<b>7. Conclusions</b>	

<b>3.1 Module FRM11: Implementation of FRM Part 2</b>		
<b>Objectives</b>	<b>Contents of module</b>	<b>Practical Training/Discussion</b>
Objective 27: Perform an FRM related risk assessments and develop mitigation measures  Objective 28: Get to know the tasks required to run an FRM	<b>1. FRM Hazard Identification (Part 1)</b>	Perform an FRM-SRE using the previous risk assessment
	<b>2. FRM Safety Risk Evaluation</b>	
	<b>3. FRM Tasks</b>	



<b>3.1 Module FRM12: Course Summary and Test</b>		
<b>Objectives</b>	<b>Contents of Module</b>	<b>Practical Training/Discussion</b>
Objective 29: Get an overview over all modules Objective 30: Participants check their knowledge with an open book test	<b>1. Summary</b>	Test consists of twenty open questions
	<b>2. Open Book Test</b>	