Welcome to the Fatigue Awareness and Countermeasures Course. This document has been designed to be used in conjunction with the online course for learners that do not have audio or need additional resources in completing the course.

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Section 1 – Overview

1 Fatigue Basics

Fatigue can have serious consequences both on and off the job. Fatigue is linked to the deterioration of on-the-job performance, accidents, and incidents, but also affects your family life, health and emotional well-being. This course will teach you about fatigue and sleep. And provide you with techniques to help manage the effects of fatigue both at work and at home.

If you need access to the narration text, which also includes screen images, click the Text Version button.

When you’re ready to get started, click Next.

2 Course Navigation

Read through the navigation guidelines shown here. Then, click Next to continue.
3 Course Exam Requirements

At the end of this course, you will be presented with a Course Exam that tests your knowledge on information learned in this course. There will also be a Review at the end of this, and each lesson in the course.

The Review and Key Points from each lesson will help prepare you for the Course Exam.

You must complete all three lessons prior to taking the exam.

A minimum score of 70% on the exam is required for successful completion of the course. Click Next to continue.

4 Lesson Objectives

This lesson describes the basics about sleep. This section will introduce you to some very basic information about sleep.

Read through the lesson objectives listed here. Then click Next to continue.
5 NTSB and Fatigue

Fatigue has been linked to many serious incidents and accidents.

In its April 10, 2007 safety recommendation letter to the FAA, the National Transportation Safety Board (NTSB) stated that their investigations “have provided clear and compelling evidence that controllers are sometimes operating in a state of fatigue because of their work schedules and poorly managed utilization of rest periods between shifts and that fatigue has contributed to controller errors. This evidence and a consideration of the important safety role ATC plays in the National Airspace System (NAS) have prompted the Board to review the issue of controller fatigue and to recommend changes to controller work-scheduling policies and training requirements.”

Click Next to continue.
6 Effects of Fatigue

As an air traffic safety professional, you perform many different kinds of tasks. Many of these are safety related. Fatigue takes a serious toll on your ability to fulfill your job responsibilities, and has been linked to forgetfulness, poor decision-making, slowed reaction time, reduced vigilance, poor communication, and nodding off. Click Next to continue.

7 Possible Consequences

So, imagine, if you are working fatigued, what tasks or activities could have serious consequences if not performed correctly? Could you miss a bad readback/hearback? Assign a wrong altitude? Not staff positions properly? Miscommunicate traffic management initiatives or Special Use Airspace status? Click Next to continue.
Voluntary safety reporting systems, such as the Air Traffic Safety Action Plan (ATSAP), and the Aviation Safety Reporting System (ASRS), are examples of voluntary systems that allow aviation workers to confidentially report near misses and close calls in the interest of improving air safety. The ASRS is run by NASA, a neutral party, since it has no disciplinary authority. The ASRS uses reports to identify system deficiencies, and issues alerting messages to persons in a position to correct them.

These examples illustrate how fatigue can quickly become a hazard on the job. Seemingly small things that are overlooked or forgotten due to lapses in attention provide one example of why fatigue can be so dangerous in your profession.

Roll over each report to read these real-life examples, then click Next to continue.
So… what is fatigue? We all know it when we feel it, right?

Fatigue isn’t easy to define, nor is it easy to measure. It’s important to know fatigue does include that feeling of sleepiness and that urge you may have to go to sleep, but that’s not all there is to it.

Fatigue is a complex state that includes a lack of alertness and a reduced capacity for mental and physical performance. This is in addition to the drowsy, weary, or sleepy feeling you may experience when fatigued.

Fatigue has physical, mental, and emotional consequences that can affect the safe performance of routine and non-routine work activities. Click Next to continue.
10 Recognizing Signs and Symptoms of Fatigue

In the aviation industry, we frequently examine how to recognize signs and symptoms of fatigue and identify how it affects your body, mind and emotions. Aviation workers that are fatigued display signs and symptoms such as lack of energy and slower reaction times; difficulty concentrating and communicating; and increased irritability and low morale. While people often report being fatigued, it’s important to recognize that they are often not fully aware of their own level of fatigue.

Fatigue is usually the result of an extended period of wakefulness, too little or poor quality sleep, or the time of day. To combat the physical, mental and emotional effects of fatigue, you need to get adequate quality sleep. Sleep is the antidote to fatigue and is essential to being a well-balanced individual. When you don’t get enough sleep, fatigue negatively affects all elements of your being.

Click on each button to learn more about the signs and symptoms of fatigue and then click Next to continue.
Fatigue is typically examined in terms of effects, such as forgetfulness; poor decision-making; slowed reaction time; reduced vigilance; poor communication; impaired mood; nodding off; or becoming fixated, apathetic, or lethargic. These signs and symptoms can manifest themselves in the operational environment. Roll over the air traffic controller photograph to learn more about the potential operational impact of controller fatigue.

Recognize that others in the aviation environment may be fatigued as well. Roll over the pilot photograph to learn more about how the potential operational impact of pilot fatigue.

When you are finished, click Next to continue.

12 How Common is Fatigue?

The occurrence of fatigue is more common than some people realize and it can have some very negative consequences for those who experience it.

In a recent study of the U.S. workforce, researchers wanted to find out what percentage of workers experienced fatigue at least once in the last two weeks. What percentage of the people in the general workforce population do you think responded yes, that they had been fatigued at least once in the last two weeks? Use the slider to select your answer then click the Check My Answer button to continue.
13 How Common is Fatigue?

Nearly 38% of the U.S. workforce reported having experienced fatigue within the previous two weeks. Of those, 9% will have lost productive work time as a consequence of fatigue. This translates into billions of dollars per year! Some of the lost time comes from work absence, but by far the largest part of it is a result of impaired concentration that leads to increased time to complete tasks. These statistics don’t specifically account for non-traditional work schedules, such as night shifts or extended shifts that render workers even more vulnerable to fatigue.

A 2001 study of Aviation Maintenance Technicians, or AMTS, found that on average AMTS were getting about 5 hours of sleep per night. In other words, AMTs typically operate with too little sleep since people generally need 7.5-8.5 hours of sleep per night.

In a survey of aviation safety inspectors for maintenance, 82% of ASIs thought fatigue was a safety issue. Another survey of maintenance personnel found that 30% believed fatigue was a factor that negatively affected work performance.

How do you suppose these statistics translate to the air traffic safety professionals in your own work environment? Click Next to continue.
Fatigue can be physiological or subjective.

Physiological fatigue is a biological process that depends on the interaction between sleep loss and the circadian clock. The circadian clock is your body’s internal clock and it plays a role in programming a number of your body’s functions, including when you sleep and feel fatigued. It approximates a 24 hour cycle and it is set primarily by daylight. Together, these factors contribute to the body’s response to the physiological need for sleep, which is to try to sleep. The only way to reverse physiological fatigue is by getting sleep.

Subjective fatigue on the other hand is based on how you feel and how fatigued you report feeling. In a sense, this is still physiological fatigue, but can often be masked by motivation, caffeine, physical activity, and environmental stimulation. These factors influence the level of fatigue that is reported, but not the underlying physiological fatigue that is present.

Fatigue is very difficult for people to reliably estimate, especially when they are fatigued! Often subjective measures of fatigue are much more optimistic than physiological measures. This means that on average, you are probably more fatigued than you realize and therefore, a bigger safety threat than you realize.

Click Next to continue.
Section 4 – Fatigue Hazards

15 Fatigue as a Health Hazard

Fatigue can be detrimental in your personal life and is often correlated with increased health issues, impaired driving performance, and difficulties handling your home and social life.

Working non-traditional hours may have negative implications for worker health. When compared to daytime workers, those working shifts or extended hours tend to have a higher number of health complaints, greater use of sick leave, and more visits to the doctor. Workers with non-traditional shifts also report greater stress, higher alcohol and drug use, greater weariness, and a lower sense of overall well-being.

Roll over on the highlighted parts of the figure below to learn more about the specific health issues associated with fatigue. When you are finished, click Next to continue.
Fatigue can also be detrimental in the workplace, impairing judgment and the ability to think clearly. This means that people are more likely to commit errors and engage in risky behavior when they are fatigued. Fatigue also compromises the ability to react quickly to situations and to communicate effectively. In the event that a situation arises, someone who is fatigued is less likely to be able to respond immediately or communicate important information effectively.

Another threat of fatigue is microsleeps. These are brief periods of sleep that may come on unexpectedly when someone has not received adequate rest. This abrupt nodding off is the body’s way of inducing much needed rest and is especially dangerous because it may occur without warning. As many as 80% of workers who work round-the-clock shifts have experienced microsleeps.

Click Next to continue.
The effect of fatigue on cognitive performance closely resembles the effects of alcohol. Generally, the longer an individual has been awake, the more their performance is impaired.

After approximately 17 hours awake, cognitive performance is consistent with someone with a .05 blood alcohol concentration. DOT Order 3910.1C (Drug and Alcohol-Free Departmental Workplace), states that “A covered employee is prohibited from reporting for duty or remaining on duty while having an alcohol concentration of 0.04 or greater on a confirmation test.”

After approximately 24 hours awake, cognitive performance is consistent with a 0.10 blood alcohol concentration, a level which is beyond the limit at which a person is considered legally drunk and too impaired to safely operate a vehicle.

Even two hours of sleep loss below eight hours may decrease cognitive performance.

Consider the potential impact of performing operational duties when you are fatigued. Click Next to continue.
Section 5 – Common Misconceptions

18 Common Misconceptions

People hold several misconceptions when it comes to fatigue. Read each statement presented, and check whether you agree or disagree with it. When you are finished, click Next to continue.
Section 6 – Fatigue Contributors

19 Primary Contributors to Fatigue

There are a variety of factors that can produce fatigue; however, it’s often the result of a combination of factors. Primary contributors to fatigue are considered to be direct causes and actually make fatigue unavoidable.

The primary contributors to fatigue are presented below. Click each contributor to learn more about it. When you are finished, click Next to continue.

20 Secondary Contributors to Fatigue

While primary contributors are considered to be direct causes of fatigue and actually make fatigue unavoidable, secondary contributors don’t necessarily result in fatigue, but they are very likely to lead to fatigue - especially if you experience more than one factor or if they occur in combination with one or more primary contributors.

The secondary contributors to fatigue are presented below. Click on each contributor to learn more about it. When you are finished, click Next to continue.
Section 7 – Review

Section 8 – Summary

Well done! You have completed the Sleep Basics lesson.

Here is a summary of what you have learned…

Since the questions in the Course Exam are based on the content presented in all three lessons of this course, be sure that you have completed and have a thorough understanding of each section before moving forward. To review any section of this lesson, click on Lesson Menu, then select the topic you want to review.

To return to the Main Menu, where you can click to navigate to other lessons, click Next.

Remember, you must complete all three lessons prior to taking the course exam.