

**ITT Technical Institute**  
**IE1410**  
**Human Factors**  
**Onsite and Online Course**

**SYLLABUS**

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**Credit hours:** 4.5


**Contact/Instructional hours:** 56 (34 Theory Hours, 22 Lab Hours)

**Prerequisite(s) and/or Corequisite(s):**

Prerequisite: IE1210 Manufacturing Processes or equivalent

**Course Description:**

This course introduces human factors in the work environment. It focuses on using industrial engineering to improve productivity by adapting the work environment to human capabilities.



## COURSE SUMMARY

### COURSE DESCRIPTION

This course introduces human factors in the work environment. It focuses on using industrial engineering to improve productivity by adapting the work environment to human capabilities.

### MAJOR INSTRUCTIONAL AREAS

1. Anatomy, Anthropometry, Biomechanics, and Worker Physiology
2. Nervous system, human senses
3. Work environment, work schedules
4. Moving/Stationary Work Design, Material Handling

### COURSE LEARNING OBJECTIVES

By the end of this course, you should be able to:

1. Demonstrate an understanding of the basic principles of human performance.
2. Apply the principles of human factors engineering to the design and analysis of products and workstations.
3. Research and investigate solutions to human factors problems.
4. Apply basic knowledge of human factors engineering to various real-world situations.

## COURSE OUTLINE

### MODULE 1: INTRODUCTION TO HUMAN FACTORS

#### COURSE LEARNING OBJECTIVES COVERED

- Demonstrate an understanding of the basic principles of human performance.

#### TOPICS COVERED

- Natural and Engineered Systems
- Engineering for Human Cognition
- Human-Systems Integration

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>Introduction to Humans in Engineered Systems:</i> <ul style="list-style-type: none"> <li>• Chapter 1, pp. 7-12</li> <li>• Chapter 2, pp. 14-34</li> </ul>	No	2 hr
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> <ul style="list-style-type: none"> <li>• The realistic consideration of human factors in model based simulation tools for the air traffic control domain.</li> <li>• Understanding human factors in rail engineering: Re-analysis of detailed, qualitative data on functions and risks.</li> <li>• Rationale for a Model of Human Systems Integration: The Need of a Theoretical Framework.</li> <li>• Projecting Human Potential.</li> </ul>	No	4.5 hr
<b>Lesson:</b> Study the lesson for this module.	No	1.5 hr
<b>Discussion:</b> Participate in the Discussion titled “Alphabetic Vs. Pictographic Script”.	Yes	N/A
<b>Lab:</b> Complete the Lab titled “Human Factors”.	Yes	N/A

Total Out-Of-Class Activities: 8 Hours

## MODULE 2: RESEARCH AND PROBLEM INVESTIGATION METHODOLOGIES AND DESIGN AND EVALUATION METHODS

### COURSE LEARNING OBJECTIVES COVERED

- Research and investigate solutions to human factors problems.

### TOPICS COVERED

- Environmental complexity and its role in human-system performance
- Sources of difficulty in static and dynamic environments
- Communication and coordination consequences of group size
- Quantitative techniques characterizing modern human-system analysis

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>Introduction to Humans in Engineered Systems:</i> <ul style="list-style-type: none"> <li>• Chapter 3, pp. 37–44</li> <li>• Chapter 4, pp. 53–69</li> <li>• Chapter 5, pp. 71–79</li> <li>• Chapter 6, pp. 81–99</li> </ul>	No	6 hr
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> Intermediary objects in the workspace design process: Means of experience transfer in the offshore sector.		2 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Discussion:</b> Participate in the Discussion titled “Signal Detection”.	Yes	N/A
<b>Research:</b> Complete the Research titled “Evolution of Automobile Design”.	Yes	3 hr
<b>Lab:</b> Complete the Lab titled “State Diagrams/Task Analysis”.	Yes	N/A
<b>Quiz:</b> Prepare for Quiz 1.	No	2 hr

Total Out-Of-Class Activities: 15 Hours

### MODULE 3: VISUAL, AUDITORY, AND TACTILE SENSORY SYSTEMS

#### COURSE LEARNING OBJECTIVES COVERED

- Demonstrate an understanding of the basic principles of human performance.

#### TOPICS COVERED

- Acuity and Retinal Eccentricity
- The Human Auditory System
- Visual Monitoring
- Tactile Sensory System

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>Introduction to Humans in Engineered Systems:</i> <ul style="list-style-type: none"> <li>• Chapter 9, pp. 127–157</li> </ul>	No	2 hr
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> <ul style="list-style-type: none"> <li>• Continuous theta-burst stimulation modulates tactile synchronization.</li> <li>• Design and technical construction of a tactile display for sensory feedback in a hand prosthesis system.</li> <li>• Design and fabrication of a novel tactile sensory system applicable in artificial palpation.</li> </ul>	No	3 hr
<b>Lesson:</b> Study the lesson for this module.	No	2.5 hr
<b>Discussion:</b> Participate in the Discussion titled “Visual Acuity and Color Vision”.	Yes	N/A
<b>Research:</b> Complete the Research titled “Tactile Sensory System”.	Yes	3 hr
<b>Lab:</b> Complete the Lab titled “Fire Alarm Siren”.	Yes	N/A
<b>Quiz:</b> Take Quiz 1.	Yes	N/A

Total Out-Of-Class Activities: 10.5 Hours

## MODULE 4: COGNITION AND ENGINEERING AND ANTHROPOMETRY

### COURSE LEARNING OBJECTIVES COVERED

- Demonstrate an understanding of the basic principles of human performance.

### TOPICS COVERED

- Human Error and System Error
- Cognitive Processing
- Central Bottleneck Theory
- Timesharing Strategies and the Control of Processing

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>Introduction to Humans in Engineered Systems:</i> <ul style="list-style-type: none"> <li>• Chapter 2, pp. 20–21</li> <li>• Chapter 9, pp. 157–171</li> <li>• Chapter 10, pp. 181–205</li> <li>• Chapter 11, pp. 210–230</li> <li>• Chapter 14, pp. 284–301</li> <li>• Chapter 15, pp. 313–316</li> </ul>	No	7 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Discussion:</b> Participate in the Discussion titled “Bottleneck Theory”.	Yes	N/A
<b>Analysis:</b> Complete the Analysis titled “Case Study: The Vincennes Incident”.	Yes	3 hr
<b>Analysis:</b> Complete the Analysis titled “Categorizing Human Errors”.	Yes	3 hr
<b>Lab:</b> Complete the Lab titled “Information-Processing System”.	Yes	N/A
<b>Quiz:</b> Prepare for Quiz 2.	No	2 hr

Total Out-Of-Class Activities: 17 Hours

## MODULE 5: BIOMECHANICS OF WORK AND WORKSPACE DESIGN

### COURSE LEARNING OBJECTIVES COVERED

- Apply the principles of human factors engineering to the design and analysis of products and workstations.
- Apply basic knowledge of human factors engineering to various real-world situations.

### TOPICS COVERED

- Contextual Factors Affecting Human-System Performance

MODULE LEARNING ACTIVITIES	GRADED	OUT-OF-CLASS TIME
<b>Reading:</b> <i>Introduction to Humans in Engineered Systems:</i> <ul style="list-style-type: none"> <li>• Chapter 15, pp. 307–327</li> <li>• Chapter 17, pp. 360–377</li> </ul>	No	4 hr
<b>Reading:</b> ITT Tech virtual Library> Basic Search> <ul style="list-style-type: none"> <li>• Distressed, Immobilized, or Lacking Employer Support? A Sub-classification of Acute Work-Related Low Back Pain.</li> <li>• Human factors identification and classification related to accidents' causality on hand injuries in the manufacturing industry.</li> <li>• Effective interventions for cumulative trauma disorders of the upper extremity in computer users: Practice models based on systematic review.</li> <li>• Quebec Research on Work-related Musculoskeletal Disorders: Deeper Understanding for Better Prevention.</li> </ul>	No	4 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Discussion:</b> Participate in the Discussion titled “Designing Alarms”.	Yes	N/A
<b>Lab:</b> Complete the Lab titled “The Ladbroke Grove Rail Incident”.	Yes	N/A
<b>Research:</b> Complete the Research titled “Workspace Strategies”.	Yes	3hr
<b>Quiz:</b> Take Quiz 2.	Yes	N/A
<b>Final Exam:</b> Prepare for the Final Exam.	No	5 hr

Total Out-Of-Class Activities: 18 Hours

## MODULE 6: WORK PHYSIOLOGY AND STRESS AND WORKLOAD

### COURSE LEARNING OBJECTIVES COVERED

- Apply basic knowledge of human factors engineering to various real-world situations.

### TOPICS COVERED

- Defining and Measuring Workload
- Physiological Indices of Workload
- Subjective Ratings of Workload

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>Introduction to Humans in Engineered Systems:</i> <ul style="list-style-type: none"> <li>• Chapter 15, pp. 307–320</li> </ul>	No	1.5 hr
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> <ul style="list-style-type: none"> <li>• Workload Variability and Social Support: Effects on Stress and Performance.</li> <li>• Workload control dynamics in practice.</li> <li>• Relationship among workload, health complaints, and depressive state of workers as revealed using a questionnaire survey.</li> </ul>	No	4 hr
<b>Lesson:</b> Study the lesson for this module.	No	2 hr
<b>Lab:</b> Complete the Lab titled “Workload and Stress”.	Yes	N/A
<b>Final Exam:</b> Take the Final Exam.	Yes	N/A

Total Out-Of-Class Activities: 7.5 Hours



## EVALUATION AND GRADING

### EVALUATION CRITERIA

The graded assignments will be evaluated using the following weighted categories:

CATEGORY	WEIGHT
Discussion	10%
Lab	30%
Analysis	10%
Research	15%
Quiz	10%
Final Exam	25%
TOTAL	100%

### GRADE CONVERSION

The final grades will be calculated from the percentages earned in the course, as follows:

GRADE	PERCENTAGE
A (4.0 )	90–100%
B+ (3.5 )	85–89%
B (3.0 )	80–84%
C+ (2.5 )	75–79%
C (2.0 )	70–74%
D+ (1.5 )	65–69%
D (1.0)	60–64%

)	
F (0.0 )	<60%

## LEARNING MATERIALS AND REFERENCES

### REQUIRED RESOURCES

#### COMPLETE TEXTBOOK PACKAGE

- Remington, R., Boehm-Davis, D., & Folk, C. (2012). *Introduction to humans in engineered systems (1st ed.)*. Hoboken, NJ: John Wiley.

### RECOMMENDED RESOURCES

- Other References
  - Anthropometry:  
Definition:  
<http://www.britannica.com/EBchecked/topic/27531/anthropometry>  
YouTube Video:  
<http://www.youtube.com/watch?v=37YY5W4dJ4A>  
Document:  
<http://cms.allsteeloffice.com/SynergyDocuments/ErgonomicsAndDesignReferenceGuideWhitePaper.pdf>
  - Cumulative Trauma Disorders:  
<http://www.amtrustnorthamerica.com/Risk-Management/General%20Workplace/CumulativeTraumaDisorders.pdf>
  - Human Errors; Why We Make Mistakes and how we can avoid them:  
<http://www.youtube.com/watch?v=oxc0u-C0XEY>
  - Human Factors Basics (in aviation):  
<http://www.youtube.com/watch?v=4VIYIxTowq8>
  - Low Back Problems:  
[http://www.ninds.nih.gov/disorders/backpain/detail\\_backpain.htm](http://www.ninds.nih.gov/disorders/backpain/detail_backpain.htm)
  - Manual Lifting:  
<http://www.ergo-plus.com/healthandsafetyblog/ergonomics/niosh-lifting-equation-single-task/>
  - Work-related Musculoskeletal Disorders (WMSDs) Risk Factors:  
<http://www.ccohs.ca/oshanswers/ergonomics/risk.html>
  - Workspace Design:

<http://www.hok.com/thought-leadership/workplace-strategies-that-enhance-human-performance-health-and-wellness/>

- Tactile/sense of touch:

<http://www.hometrainingtools.com/skin-touch/a/1388/>

## INSTRUCTIONAL METHODS AND TEACHING STRATEGIES

The curriculum employs a variety of instructional methods that support the course objectives while fostering higher cognitive skills. These methods are designed to encourage and engage you in the learning process in order to maximize learning opportunities. The instructional methods include but are not limited to lectures, collaborative learning options, use of technology, and hands-on activities.

To implement the above-mentioned instructional methods, this course uses several teaching strategies, such as tutorial videos, online research, and group discussions and exercises. Your progress will be regularly assessed through a variety of assessment tools including discussion, lab, analysis, research, quiz, and final exam.

## OUT-OF-CLASS WORK

For purposes of defining an academic credit hour for Title IV funding purposes, ITT Technical Institute considers a quarter credit hour to be the equivalent of: (a) at least 10 clock hours of classroom activities and at least 20 clock hours of outside preparation; (b) at least 20 clock hours of laboratory activities; or (c) at least 30 clock hours of externship, practicum or clinical activities. ITT Technical Institute utilizes a “time-based option” for establishing out-of-class activities which would equate to two hours of out-of-class activities for every one hour of classroom time. The procedure for determining credit hours for Title IV funding purposes is to divide the total number of classroom, laboratory, externship, practicum and clinical hours by the conversion ratios specified above. A clock hour is 50 minutes.

A credit hour is an artificial measurement of the amount of learning that can occur in a program course based on a specified amount of time spent on class activities and student preparation during the program course. In conformity with commonly accepted practice in higher education, ITT Technical Institute has institutionally established and determined that credit hours awarded for coursework in this program course (including out-of-class assignments and learning activities described in the “Course Outline” section of this syllabus) are in accordance with the time-based option for awarding academic credit described in the immediately preceding paragraph.

**ACADEMIC INTEGRITY**

All students must comply with the policies that regulate all forms of academic dishonesty or academic misconduct. For more information on the academic honesty policies, refer to the Student Handbook and the School Catalog.

**INSTRUCTOR DETAILS**

Instructor Name	
Office Hours	
Contact Details	

*(End of Syllabus)*