

**ITT Technical Institute**  
**IE2799**  
**Industrial Engineering Technology**  
**Capstone**  
**Onsite Course**

**SYLLABUS**

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**Credit hours:** 4.5


**Contact/Instructional hours:** 60 (30 Theory Hours, 30 Lab Hours)

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

Prerequisites: Completion of a minimum of 75 credits earned in the program of study including IE1320 Lean Manufacturing or equivalent and IE2515 Facilities Design or equivalent

**Course Description:**

This course provides an opportunity for students to work on a comprehensive project that includes designing or improving an integrated system. The project is designed to combine elements courses in the program of study.



## COURSE SUMMARY

### COURSE DESCRIPTION

This course provides an opportunity for students to work on a comprehensive project that includes designing or improving an integrated system. The project is designed to combine elements of courses in the program of study.

### MAJOR INSTRUCTIONAL AREAS

1. Fundamental review of the basics of industrial engineering
2. Research of current and emerging technology
3. Project management techniques

### COURSE LEARNING OBJECTIVES

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

1. Apply concepts of project management to an industrial engineering project.
2. Use Microsoft Project to plan and manage an industrial engineering project.
3. Analyze the requirements for an industrial engineering project using the seven steps of the systematic approach.
4. Integrate the knowledge acquired in the program to provide effective technological solutions for given problems.
5. Demonstrate the ability to manage a project timeline effectively, making adjustments as necessary while ensuring adherence to functionality.
6. Demonstrate the ability to use team-oriented problem solving techniques for a large-scale project.
7. Demonstrate the ability to document solutions to a problem by applying critical reading, analytical thinking, and resolution skills.
8. Demonstrate the ability to present and defend a proposal.
9. Demonstrate the skills and knowledge of industrial engineering technology through comprehensive skills assessment.

## COURSE OUTLINE

### MODULE 1: GATHERING PROJECT REQUIREMENTS

#### COURSE LEARNING OBJECTIVES COVERED

- Apply concepts of project management to an industrial engineering project.

#### TOPICS COVERED

- Project Life Cycle
- Project Management Techniques
- Project Introduction

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>ITT Tech Virtual Library&gt; Basic Search&gt; PMP Project Management Professional Study Guide, fourth edition&gt; Chapter 2</i>	No	3.5 hours
<b>Lesson:</b> Study the lesson for this module.	No	1 hour
<b>Discussion:</b> Participate in the discussion titled “Managing a Project.”	Yes	N/A
<b>Project:</b> Read and begin the project.	No	1 hour
<b>Project:</b> Start work on Project Part 1.	No	3 hours

Total Out-Of-Class Activities: 8.5 Hours

## MODULE 2: PREPARING THE PROJECT PROPOSAL

### COURSE LEARNING OBJECTIVES COVERED

- Use Microsoft Project to plan and manage an industrial engineering project.
- Demonstrate the ability to manage a project timeline effectively, making adjustments as necessary while ensuring adherence to functionality.
- Demonstrate the ability to document solutions to a problem by applying critical reading, analytical thinking, and resolution skills.

### TOPICS COVERED

- Components of a Project
- Microsoft Project
- Project Scheduling
- Project Costs
- Project Part 1 Tips and Tricks

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> <ul style="list-style-type: none"> <li>• <i>PMP Project Management Professional Study Guide, fourth edition&gt; Chapters 3 and 4</i></li> <li>• <i>Fundamentals of Project Management&gt; Chapter 6 and 7</i></li> </ul>	No	9 hours
<b>Reading:</b> ITT Tech Virtual Library> School of Study> School of Business> Tutorial links> Microsoft Office Tutorials> Project	No	2 hours
<b>Lesson:</b> Study the lesson for this module.	No	1 hour
<b>Quiz:</b> Prepare for Quiz 1.	No	1.5 hours
<b>Discussion:</b> Participate in the discussion titled “Components of a Project.”	Yes	N/A
<b>Quiz:</b> Take Quiz 1.	Yes	N/A
<b>Project:</b> Submit Project Part 1.	Yes	3 hours
<b>Project:</b> Start work on Project Part 2.	No	2 hours

Total Out-Of-Class Activities: 18.5 Hours

### MODULE 3: DETERMINING OPERATING AND FINANCIAL COST

#### COURSE LEARNING OBJECTIVES COVERED

- Apply concepts of project management to an industrial engineering project.
- Use Microsoft Project to plan and manage an industrial engineering project.
- Analyze the requirements for an industrial engineering project using the seven steps of the systematic approach.

#### TOPICS COVERED

- Project Cost
- Operational Costs
- Project Finance and Budget
- Project Part 2 Tips and Tricks

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> <i>PMP Project Management Professional Study Guide, fourth edition&gt; Chapter 5</i>	No	3 hours
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> Browse> Browse by Format> Books> Books24x7> <i>A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition&gt; Chapter 2 and 7</i>	No	3 hours
<b>Lesson:</b> Study the lesson for this module.	No	1 hour
<b>Quiz:</b> Prepare for Quiz 2.	No	1.5 hours
<b>Discussion:</b> Participate in the discussion titled “Applying Project Management Techniques.”	Yes	N/A
<b>Quiz:</b> Take Quiz 2.	Yes	N/A
<b>Project:</b> Submit Project Part 2.	Yes	4 hours
<b>Project:</b> Start work on Project Part 3.	No	4 hours

Total Out-Of-Class Activities: 16.5 Hours

## MODULE 4: TRACKING MATERIAL FLOW AND WORKFLOW

### COURSE LEARNING OBJECTIVES COVERED

- Analyze the requirements for an industrial engineering project using the seven steps of the systematic approach.
- Integrate the knowledge acquired in the program to provide effective technological solutions for given problems.
- Demonstrate the ability to use team-oriented problem solving techniques for a large-scale project.

### TOPICS COVERED

- Material Handling and Workflow
- Plant Layout
- Project Part 3 Tips and Tricks

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> <i>Facilities Planning (course textbook for IE2515):</i> <ul style="list-style-type: none"> <li>• Chapter 5</li> <li>• Chapter 6</li> </ul>	No	7 hours
<b>Reading:</b> ITT Tech Virtual Library> School of Study> School of Business> Tutorial links> Microsoft Office Tutorials> Visio	No	1.5 hours
<b>Lesson:</b> Study the lesson for this module.	No	1 hour
<b>Quiz:</b> Prepare for Quiz 3.	No	1.5 hours
<b>Discussion:</b> Participate in the discussion titled “Improving Material Handling and Workflow.”	Yes	N/A
<b>Quiz:</b> Take Quiz 3.	Yes	N/A
<b>Project:</b> Submit Project Part 3.	Yes	2 hours
<b>Project:</b> Start work on Project Part 4.	No	3 hours

Total Out-Of-Class Activities: 16 Hours

## MODULE 5: ASSESSING PRODUCTION COST AND HAZARDS

### COURSE LEARNING OBJECTIVES COVERED

- Analyze the requirements for an industrial engineering project using the seven steps of the systematic approach.
- Integrate the knowledge acquired in the program to provide effective technological solutions for given problems.
- Demonstrate the ability to use team-oriented problem solving techniques for a large-scale project.
- Demonstrate the ability to document solutions to a problem by applying critical reading, analytical thinking, and resolution skills.

### TOPICS COVERED

- Production Plan and Industrial Hazards
- Cost Estimates
- Project Part 4 Tips and Tricks

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> ITT Tech Virtual Library> Basic Search> Browse> Browse by Format> Books> Books24x7> <i>A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition&gt; Chapter 12</i>	No	1.5 hours
<b>Reading:</b> <i>Industrial Safety and Health Management (course textbook for IE2510)</i>	No	4 hours
<b>Lesson:</b> Study the lesson for this module.	No	1 hour
<b>Quiz:</b> Prepare for Quiz 4.	No	1.5 hours
<b>Discussion:</b> Participate in the discussion titled “Material Procurement.”	Yes	N/A
<b>Quiz:</b> Take Quiz 4.	Yes	1 hour
<b>Project:</b> Submit Project Part 4.	Yes	3 hours
<b>Project:</b> Start work on Project Part 5.	No	3 hours

Total Out-Of-Class Activities: 15 Hours

## MODULE 6: PRESENTING PROJECT IMPLEMENTATION

### COURSE LEARNING OBJECTIVES COVERED

- Apply concepts of project management to an industrial engineering project.
- Use Microsoft Project to plan and manage an industrial engineering project.
- Analyze the requirements for an industrial engineering project using the seven steps of the systematic approach.
- Integrate the knowledge acquired in the program to provide effective technological solutions for given problems.
- Demonstrate the ability to manage a project timeline effectively, making adjustments as necessary while ensuring adherence to functionality.
- Demonstrate the ability to use team-oriented problem solving techniques for a large-scale project.
- Demonstrate the ability to document solutions to a problem by applying critical reading, analytical thinking, and resolution skills.
- Demonstrate the ability to present and defend a proposal.
- Demonstrate the skills and knowledge of industrial engineering technology through comprehensive skills assessment.

### TOPICS COVERED

- Project Part 5 Tips and Tricks

MODULE LEARNING ACTIVITIES	GRADE D	OUT-OF- CLASS TIME
<b>Reading:</b> ITT Tech Virtual Library> School of Study> School of Business> Tutorial links> Microsoft Office Tutorials> PowerPoint	No	1 hour
<b>Lesson:</b> Study the lesson for this module.	No	1 hour
<b>Final Exam:</b> Prepare for the final exam.	No	5 hours
<b>Project:</b> Submit Project Part 5.	Yes	2 hours
<b>Final Exam:</b> Take the final exam.	Yes	N/A

Total Out-Of-Class Activities: 9 Hours



## EVALUATION AND GRADING

### EVALUATION CRITERIA

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

CATEGORY	WEIGHT
Quiz	20%
Discussion	10%
Project	50%
Final Exam	20%
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%
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## LEARNING MATERIALS AND REFERENCES

### REQUIRED RESOURCES

#### COMPLETE TEXTBOOK PACKAGE

- Asfahl, C. R., & Rieske, D. W. (2010). *Industrial safety and health management (6th ed.)*. Upper Saddle River, NJ: Pearson Education Inc.
- Tompkins, J. A. (2010). *Facilities planning (4th ed.)*. Hoboken, NJ: John Wiley & Sons, Inc.

\* Note-These textbooks were issued in a previous course.

### RECOMMENDED RESOURCES

- ITT Tech Virtual Library (accessed via Student Portal | <https://studentportal.itt-tech.edu>)
- Basic Search>
  - Bittencourt, R. S., & de M.Guimarães, L. B. (2012). A Conceptual model for barrier free facilities planning. *Work*, 411394-1402.
  - Cooke, Helen, & Tate. (2011). *The McGraw-Hill 36-hour course: Project management (2nd ed.)*. New York, NY: The McGraw-Hill Companies, Inc.
  - Farhan, B., & Murray, A. T. (2006). Distance decay and coverage in facility location planning. *Annals of Regional Science*, 40(2), 279-295. doi: 10.1007/s00168-005-0041-7.
  - Kim, J., & Kim, Y. (2000). Layout planning for facilities with fixed shapes and input and output points. *International Journal of Production Research*, 38(18), 4635-4653. doi:10.1080/00207540050205550.
  - Kowalski, T. (n.d). *Planning and managing school facilities [electronic resource]* Theodore J. Kowalski. Westport, Conn. Bergin & Garvey 2002.
  - Lingard, H., & Rowlinson, S. M. (2005). *Occupational Health and Safety in Construction Project Management*. London: Spon Press.
  - Levy, B. S. (2011). *Occupational and Environmental Health: Recognizing and Preventing Disease and Injury*. New York: Oxford University Press.

- McKendall, A. R., & Liu, W. (2012). New Tabu search heuristics for the dynamic facility layout problem. *International Journal of Production Research*, 50(3), 867-878. doi:10.1080/00207543.2010.545446.
- Mewborn, A. (2013). Engineering better healthcare facilities. *Industrial Engineer: IE*, 45(3), 22.
- Owens, R. (2011). Advancing facility planning. *Industrial Engineer: IE*, 43(11), 45.
- Penzghong, L. (2011). *Supply chain management*. New York, NY: InTech.
- Randolph, A.W., & Posner, B.Z. (1992). *Getting the job done! Managing project teams and task forces for success*. Upper Saddle River, NJ: Prentice Hall.
- Ritzman, L., Bradford, J., & Jacobs, R. (1979). *A Multiple Objective Approach to Space Planning for Academic Facilities*. *Management Science*, 25(9), 895-906.
- Summers, D. (2011). *Lean Six Sigma*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Ursiny, T, DeMoss, G., & Morel, J. (2007). *The top performer's guide to speeches and presentations: Essential skills that put you on top*. Naperville, Illinois: Sourcebooks, Incorporated.
- Wong, C. K., Fung, I. H., & Tam, C. M. (2010). Comparison of Using Mixed-Integer Programming and Genetic Algorithms for Construction Site Facility Layout Planning. *Journal of Construction Engineering & Management*, 136(10), 1116-1128. doi:10.1061/(ASCE)CO.1943-7862.0000214.
- Other References
  - Occupational Safety & Health Administration  
<https://www.osha.gov/>
  - The National Institute for Occupational Safety and Health  
<http://www.cdc.gov/niosh/>



## 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 critical thinking, industrial research, and lessons. Your progress will be regularly assessed through a variety of assessment tools including discussion, quiz, project, and a 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)*