

Fall 2020

## IE 618-101: Engineering Cost and Production Economics

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# New Jersey Institute of Technology

*Course Syllabus – IE 618 Engineering Cost and Production Economics - Fall 2020*

**Instructor:** Ikhmeis, Sufian Ph.D.IE [[si8@njit.edu](mailto:si8@njit.edu)]

**Meeting:** [Friday 06:00 – 09:00 PM] Online (Synchronously)

**Phone:** [ 347.453.4124]

**Office hours:** by appointment, or email

## **COURSE DESCRIPTION**

Cost management of operational activities. This course focuses on capital investment decision making and efficient resource utilization to achieve cost-effective and operationally efficient operations. Topics included in this course are alternative investment evaluation, budgeting activity-based costing, quality costs, life cycle management, and relevant behavioral science. These topics are considered in the context of manufacturing and service industry applications.

## **PREREQUISITE KNOWLEDGE**

A basic understanding of manufacturing, engineering, and economic concepts, along with associated mathematical tools and critical evaluation techniques, are essential to understanding this course.

## **LEARNING OBJECTIVES**

Demonstrate mastery of techniques necessary for cost analysis and control, including standard costs, variance analysis, cost-volume relationships, cost estimation, and utilization of accounting data for control of operations.

## **COURSE ASSESSMENT CRITERIA**

- Homework and Participations, and discussions [**20%**]
- Term Projects [12/11/2020], [**15%**] \* Presentation (10 min) & Term Paper
- Midterm Exam [10/16/2020], [**30%**]
- Final Exam [12/18/2020], [**35%**]

## **Homework**

Homework's are based on the course text and lecture. It is an individual effort and must be done without collaboration. Homework will be submitted to the course Canvas before the day, and time it is due with late submissions counted as a zero.

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## Exams

Exams are based on the course text and lecture. Exams will be during class time, and no make-up exams will be given unless the instructor receives a note from the Dean of Students' office. A missed exam will be counted as a zero. Further instructions will be given during the semester.

Midterm Exam and Final exam will be online

## COURSE STRUCTURE

This course will be delivered via a series of lectures and discussions during class meetings. Students are responsible for reading the associated chapters and assigned cases and reviewing key concepts, terms, definitions, discussion questions, and topics in the chapters. There will be a team project toward the end of the semester that focuses on the covered topics.

## The required text for the course:

*Cornerstones of Cost Management 4th. Edition*

Don R. Hansen (Author), Maryanne M. Mowen (Author)

Publisher: Cengage Learning, ISBN: 13:978-1-305-97066-3

## Canvas

We are going to use Canvas throughout the semester to distribute all course material. Submissions are also going to be collected through Canvas. You can access your Canvas account with your UCID and password.

- Each week's contents are organized through modules.
- A module will include lecture notes, discussions, and homework, and any other resources available for the lecture on hands.

***Provided material on Canvas:*** PowerPoint Slides, Videos, Reading Material, Homework problems

## Students with disabilities

Students with disabilities needing accommodations of any nature so as to have a fair opportunity to perform in the class need to contact the counseling center. Staff at the counseling center will determine what constitutes a reasonable accommodation and inform the instructor of what it is.

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## Academic Integrity

**“Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.**

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing, or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at [dos@njit.edu](mailto:dos@njit.edu)”*

## General Policies:

- No incomplete grade will be given.
- Late submittal of assignments/exams will be penalized at the discretion of the professor.
- Students have a limited time to dispute grades on assignments/exams. All the disputes are to email the professor via Canvas within one week after grading.
- Students must submit all assignments/exams via Canvas only. Assignments attached to emails sent directly to the professor will not be accepted.

## Grading Ranges:

- Students' final grades will be determined based on the summation of points acquired during the semester. The following point spread corresponds with the following grade.

Total	>59.9	<60	<70	<75	<80	<85	<90
Grade	F	D	C	C+	B	B+	A

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## Course Lectures

### Course Lectures

[09/04/2020] Session 1, “**Cost Management Concepts.**”

- Describe cost management and explain how it differs from financial accounting
- Identify the current factors affecting cost management.
- Describe how management accountants’ function within an organization
- Understand the importance of ethical behavior for management accountants
- Identify the three forms of certification available to internal accountants.
- Describe a cost management information system, its objectives, and its major subsystems, and indicate how it relates to other operating and information systems
- Explain the cost assignment process
- Define tangible and intangible products, and explain why there are different product cost definitions
- Prepare income statements for manufacturing and service organizations.
- Explain the differences between traditional and contemporary cost management systems
  - **Reading**
    - Chapter 1 pp. 01 to pp. 17
    - Chapter 2 pp. 27 to pp. 54

[09/11/2020] Session 2 “**Cost Behavior and Activity Based Costing.**”

- Define and describe fixed, variable, and mixed costs
- Explain the use of resources and activities and their relationship to cost behavior
- Explain how several methods of cost estimation can be used
- Separate mixed costs into their fixed and variable components using the high-low method, the scatterplot method, and the method of least squares
- Describe the basics of plantwide and departmental overhead costing
- Explain why plantwide and departmental overhead costing may not be accurate.
- Provide a detailed description of activity-based product costing
- Explain how A BC can be simplified
  - **Reading**
    - Chapter 3 pp. 77 – pp. 116
    - Chapter 4 pp. 143 – pp. 179

[09/18/2020] Session 3 “**Product and Service Costing.**”

- Differentiate the cost accounting systems of service and manufacturing firms and unique and standardized products
- Discuss the interrelationship of cost accumulation, cost measurement, and cost assignment
- Identify the source documents used in a job-order costing.

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- Describe the cost flows associated with job-order costing, and prepare the journal entries
- Explain how activity-based costing is applied to the job-order costing
- Explain how spoiled units are accounted for in a job-order costing system
- Describe the basic characteristics of process costing, including cost flows, journal entries, and the cost of production report
- Describe process costing for settings without work-in-process inventories
- Describe process costing for settings with ending work-in-process inventories
- Prepare a departmental production report using the F I F O method.
  - **Reading**
    - Chapter 5 pp. 211 – pp. 241
    - Chapter 6 pp. 262 – pp. 295

[09/25/2020] Session 4, “**Allocating Cost and Budgeting.**”

- Describe the difference between support departments and producing departments
- Calculate charging rates, and distinguish between single and dual charging rates
- Allocate support center costs to producing departments using the direct method, the sequential method, and the reciprocal method
- Calculate departmental overhead rates
- Identify the characteristics of the joint production process, and allocate joint costs to products.
- Define budgeting, and discuss its role in planning, controlling, and decision making
- Prepare the operating budget, identify its major components, and explain the interrelationships of the various components.
- Identify the components of the financial budget, and prepare a cash budget.
- Define flexible budgeting, and discuss its role in planning, control, and decision making
- Define activity-based budgeting, and discuss its role in planning, control, and decision making
- Identify and discuss the key features that a budgetary system should have to encourage managers to engage in goal-congruent behavior.
  - **Reading**
    - Chapter 7 pp. 320 – pp. 361
    - Chapter 8 pp. 383 – pp. 427

[10/02/2020] Session 5 “**Standard Costing and Decentralization.**”

- Describe how unit input standards are developed, and explain why standard costing systems are adopted
- Explain the purpose of a standard cost sheet
- Compute and journalize the direct materials and direct labor variances, and explain how they are used for control
- Compute overhead variances three different ways, and explain overhead accounting
- Calculate mix and yield variances for direct materials and direct labor

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- Define responsibility accounting, and describe the four types of responsibility centers
- Explain why firms choose to decentralize
- Compute and explain the return on investment (ROI), residual income (RI), and economic value added (EVA)
- Discuss methods of evaluating and rewarding managerial performance
- Explain the role of transfer pricing in a decentralized firm
- Discuss the methods of setting transfer prices
  - **Reading**
    - Chapter 09 pp. 454 – pp. 490
    - Chapter 10 pp. 514 – pp. 553

[10/09/2020] Session 6 “**Strategic Cost / Activity-Based Management.**”

- Explain what strategic cost management is and how it can be used to help a firm create a competitive advantage
- Discuss value-chain analysis and the strategic role of activity-based customer and supplier costing
- Tell what life-cycle cost management is and how it can maximize profits over a product’s life cycle.
- Identify the basic features of JIT purchasing and manufacturing.
- Describe the effect JIT has on cost traceability and product costing
- Describe how activity-based management and activity-based costing differ
- Define process value analysis
- Describe activity-based financial performance measurement
- Discuss the implementation issues associated with an activity-based management system
- Explain how activity-based management a form of responsibility accounting is, and tell how it differs from financial-based responsibility accounting
- **Reading**
  - Chapter 11 pp. 580 – pp. 613
  - Chapter 12 pp. 644 – pp. 670

[10/16/2020] Session 7           **Mid Term Exam**

- **The Exam will include all material covered from 9.4.2020 until 10.09.2020**

[10/23/2020] Session 8 “**Strategic Control and Quality Management.**”

- Compare and contrast activity-based and strategic-based responsibility accounting systems.
- Discuss the basic features of the Balanced Scorecard
- Explain how the Balanced Scorecard links measures to strategy
- Describe how an organization can achieve strategic alignment
- Define quality, describe the four types of quality costs, and discuss the approaches used for quality cost measurement

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- Prepare a quality cost report, and explain its use.
- Explain why quality cost information is needed and how it is used
- Describe and prepare three different types of quality performance reports
  - Reading
    - Chapter 13 pp. 692– pp. 712
    - Chapter 14 pp. 727– pp. 759

[10/30/2020] Session 9, “**Productivity and Lean Accounting.**”

- Describe the basic features of lean manufacturing
- Describe lean accounting
- Discuss and define productive efficiency and partial productivity measurement
- Explain what total productivity measurement is, and describe its advantages
  - **Reading**
    - Chapter 15 pp. 790 – pp. 813

[11/06/2020] Session 10, “**Cost Volume and Profit.**”

- Determine the number of units and amount of sales revenue needed to break even and to earn a target profit
- Determine the number of units and sales revenue needed to earn an after-tax target profit
- Apply cost-volume-profit analysis in a multiple-product setting
- to be able to construct and interpret contour plot and response surface plots
- Prepare a profit-volume graph and a cost-volume-profit graph, and explain the meaning of each
- Explain the impact of risk, uncertainty, and changing variables on cost-volume-profit analysis
- Discuss the impact of non-unit cost drivers on cost-volume-profit analysis
  - **Reading**
    - Chapter 16 pp. 835 – pp. 867

[11/13/2020] Session 11 “**Tactical Decision Making and Pricing and Profitability.**”

- Describe the tactical decision-making model
- Define the concept of relevant costs and revenues
- Explain how the activity resource usage model is used in assessing the relevancy
- Apply the tactical decision-making concepts in a variety of business situations
- Discuss basic pricing concepts
- Calculate a markup on cost and a target cost
- Discuss the impact of the legal system and ethics on pricing
- Explain why firms measure profit and calculate measures of profit using absorption and variable costing
- Compute the sales price, sales volume, contribution margin, contribution margin volume, sales mix, market share, and market size variances

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- Discuss the variations in price, cost, and profit over the product life cycle
- Describe some of the limitations of profit measurement
  - **Reading**
    - Chapter 17 pp. 891 – pp. 914
    - Chapter 18, pp. 935 – pp. 971

[11/20/2020] Session 12, “**Capital Investment.**”

- Describe the difference between independent and mutually exclusive capital investment decisions
- Explain the roles of the payback period and accounting rate of return in capital investment decisions
- Calculate the net present value (NP V) for independent projects
- Compute the internal rate of return (I R R) for independent projects
- Tell why NP V is better than I R R for choosing among mutually exclusive projects.
- Convert gross cash flows to after-tax cash flows
- Describe capital investment for advanced technology and environmental impact settings
  - **Reading**
    - Chapter 19 pp. 998 – pp. 1022

[11/27/2020] “**No Classes Thanksgiving Recess.**”

[12/04/2020] Session 13, “**Inventory Management.**”

- Describe the just-in-case inventory management model
- Discuss just-in-time (JIT) inventory management
- Explain the basic concepts of constrained optimization
- Define the theory of constraints, and tell how it can be used to manage inventory
  - **Reading**
    - Chapter 20 pp. 1046 – pp. 1072

[12/11/2020] Session 14, “**Project Presentations and Course Review.**”

[12/18/2020] Session 15 “**Final Exam.**”