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**El Camino College  
Industry Driven Regional Collaborative  
For  
Aerospace Manufacturing Engineering**

**Production Systems, Management, and Economics**

**Course Outline; Production Systems, Management, and Economics**

This class is designed to introduce shop floor personnel, CAD designers, estimators, planners, purchasing agents, and low-and-mid level managers to different production systems, management ideologies, and manufacturing economics. Its' intent is to give basic data so that the individual will recognize the differences, advantages, and limitations of various production systems, management philosophies, and the business of running a manufacturing concern.

This course will assist the student in preparation for certification as a Certified Manufacturing Technologist sponsored by the Society of Manufacturing Engineers.

Suggested Time;        24 hours (8 weeks @ 3 hours per week)  
Suggested Credit;      1.5 semester units

In addition to the requirement of attending classes each student will be required to submit a 5-7 page paper on a manufacturing process of interest to the individual. The instructor must approve the subject matter. The student will be required to make a five minute presentation to the class on his chosen subject.

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Course Content:

1. Traditional Production Planning and Control
2. Lean Production
3. Process Engineering
4. Materials Management
5. Management Introduction
6. Labor, Safety, and Human Factors
7. Engineering and Manufacturing Economics
8. Review



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# Production Systems, Management, and Economics; Week 1

## Traditional Production Planning and Control

Production Environments

- Manufacture-to-Stock
- Assemble-to-order
- Manufacture-to-order
- Engineer-to-order

Forecasting

Aggregate Planning

Master Scheduling

Requirements and Capacity Planning

Scheduling and Production Control

- First-In/First-Out Priority
- Start Date Priority
- Due Date Priority

Critical Ratio

- Examples

Material Planning

Manufacturing Resource Planning

# Production Systems, Management, and Economics; Week 2

## Lean Production

Mass Production

Toyota Production System

Essential Components of Lean Production

- Value Stream Analysis

- Takt Time

- Kanban

- Kaizen

- Visual Control

- Total Productive Maintenance

- One-Piece Flow

- Error Proofing

- Standardization

- Autonomation

- Production Leveling

- Problem-Solving Circles

- 5S Strategy

Just-In-Time

- Pull systems

# Production Systems, Management, and Economics; Week 3

## Process Engineering

### Process Planning

- Process Selection
- Equipment Selection

### Computer-Aided Process Planning

### Jigs/Fixtures/Locating

- Locating Devices
- Clamping

### Assembly Methods

- Single-Station Assembly
- Synchronous Assembly
- Non-Synchronous Assembly
- Continuous-Motion assembly
- Dial (Rotary) Assembly

### Facility Layout

- Process Layout
- Product-Process (cellular) Layout
- Fixed (stationary) layout
- Layout Optimization

### Maintenance

- Corrective Maintenance
- Preventative Maintenance
- Predictive maintenance

### Methods Engineering and Work Measurement

- Examples

# Production Systems, Management and Economics; Week 4

## Materials Management

Inventory Management

Demand

Inventory Replenishment

ABC Analysis

Just-in-Time (JIT) Inventory

Supply Chain Management

# Production Systems, Management, and Economics; Week 5

## Management Introduction

Communication

Engineering Ethics

Manufacturing Supervision and Management

- Supervision
- Management
- Leadership
- Planning
- Budgeting
- Control
- Centralization-Decentralization
- Line-and Staff
- Span of management
- Project Management
  - Critical Path Method
  - Gantt Chart
  - PERT
  - Problem Solving

Organizational/Industrial Psychology

Teams

Participatory management

Goal Setting

Continuous Improvement

Deming's 14 Points

- Create Constancy
- Adopt new philosophy
- Cease dependence on inspection
- Minimize total cost, not individual price
- Improve constantly
- Institute training on the job
- Institute Leadership
- No Fear
- Break Down Barriers
- Eliminate targets for productivity
- Eliminate work standards
- Remove barriers to pride of workmanship
- Institute education and self-improvement
- It's everybody's job

# Production Systems, Management and Economics; Week 6

## Labor, Safety, and Human Factors

Labor Relations

Safety

- Hazard Awareness
- Automated Operations
- Lost-time Accidents
- Material Safety and Data Sheets (MSDS)
- Environment
- Product Liability

Human Factors

- Engineering Anthropometry
- Lighting and Workplace Effectiveness
- Noise
- Vibration
- Repetitive Motion



# Production Systems, Management, and Economics; Week 7

## Engineering and Manufacturing Economics

Time Value of Money

Cash Flow Patterns

    P-Pattern

        Examples

    F-Pattern

        Examples

    A-Pattern

        Examples

Comparison Based on Annual Cost

    Examples

Cost Estimating

    Fixed Costs

    Variable Costs

    Semi Fixed Costs

    Direct Labor

    Direct Material

    Indirect Labor

    Indirect Manufacturing Cost

    General and Administrative Costs

    Tooling and Test Equipment Costs

Value Engineering

# Production Systems, Management, and Economics; Week 8

## Review

Week 1	Traditional Production Planning and Control
Week 2	Lean Production
Week 3	Process Engineering
Week 4	Materials Management
Week 5	Management Introduction
Week 6	Labor, Safety, and Human Factors
Week 7	Engineering and Manufacturing Economics

