

APS1028 Operations and Production Management - 10 Half Day Spring (over 3 weeks)

Course Outline

Operations Management is the systematic approach and control of the processes that transform inputs (eg: human resources, facilities, materials, Information systems etc.) into finished goods and services. The operations function consists of the core wealth creation processes of a business and helps an organization to efficiently achieve its mission while constantly increasing productivity and quality. This course focuses on the role of operations management as a strategic element of the total organization. We will cover classic and up-to-date tools and concepts used to support operational managerial decisions. **The course is tailored for engineers that aspire to senior management positions starting as departmental / functional managers of operations or engineering, and then progressing to directors, VP Operations, VP Manufacturing and eventually becoming a Chief Operations Officer (COO) of a small to large scale enterprise.**

Now there are three pathways in APS1028 (NOTE: you can't mix them)

- 1) **Introduction to OPM (Core Modules) (90% of Students)–for those that have no background or experience in OPM-this pathway is Mandatory – no debate.**
- 2) **Business Process Management-Specialist Path - students with deep OPM experience**
- 3) **Advanced Manufacturing Systems-For those with experience in 1) and 2) above**

Course Objectives

Upon course completion, the participants will be able to:

- 1) To gain an understanding and appreciation of the principles and applications relevant to the planning, design, and operations of manufacturing/service firms.
- 2) To develop skills necessary to effectively analyze and synthesize the many inter-relationships inherent in complex socio-economic productive systems.
- 3) To reinforce analytical skills already learned, and build on these skills to further increase your "portfolio" of useful analytical tools for operations tasks.
- 4) To gain some ability to recognize situations in a production system environment that suggests the use of certain quantitative methods to assist in decision making on operations management and strategy.
- 5) To understand how Enterprise Resource Planning and MRPII CAD / CAM/CIM and automated factory systems are used in managing operations
- 6) To understand the managerial responsibility for Operations, even when production is outsourced, or performed in regions far from corporate headquarters.

Learning outcomes

Knowledge and Comprehension:

- Understand the core features of the operations and production management function at the operational and strategic levels, specifically the relationships between people, process, technology, productivity and quality and how it contributes to the competitiveness of firms.
- Explain the various parts of the operations and production management processes and their interaction with other business functions (strategy, engineering, finance, marketing, HRM, project management and innovation)

Intellectual Skills (Analysis and Synthesis)

- Students will develop an integrated framework for strategic thinking and decision making to analyze the enterprise as a whole with a specific focus on the wealth creation processes
- **Be prepared to engage in a career path into senior operational management that can eventually lead to a C-Level role in a small to very large enterprise**

Practical Skills (Application and Evaluation) Students will be able:

- Develop the ability to identify operational methodologies to assess and improve an organizations performance
- Assess the OPM function performance and capabilities in various organizations
- To communicate effectively through discussion in seminars, teamwork and writing in discussion board, critiques and a project report
- To gather, organize and deploy evidence, data and information to make decisions.
- To plan and carry out work independently and to be self-disciplined and self-directed.
- To develop the skills of insight and critical evaluation.

Course Grading: The components of the final course grade will be weighted as follows:

Final Team Report (5% Charter and Summary ppt 10%)	40%
In Class Participation (team presentations and discussions)	30%
Critical Review of Academic Paper (CR1)	10%
Written Discussion and Inclass (CR2)	20%

In Class Participation will determine 30% of the grade. **A Rubric and discussion samples are available on the course web site that details best practice techniques for engaging in discussions.** 40% of the grade will be determined by the team project. And 10% will be one written CR1 paper - a **special interest topic** (between 1,000-1,500 words). **It is absolutely essential that students have a working level ability of English – Reading, Writing and Verbal. 20% will be written discussions.**

Class Participation The course will be taught through a combination of video lectures (40-50 minutes), live in-class lectures, critical review presentations, in-class and online discussions. Because of this style of teaching, **regular class attendance is mandatory. Please don't underestimate this requirement your learning experience will - be enhanced through**

participation and teamwork. I understand, though, that occasions do arise where you have to miss a class. Therefore, I will allow each student *one unexcused absence without any penalty*. In all cases, I greatly appreciate advanced notice if you will not be in class. Showing up is necessary but not sufficient, however, to achieve success in the class preparation for interaction in each class is vital.

Critical Review papers, presentations or discussions. Critical reviews are written papers or discussions (800 – 1500 words –**depends on the context**). Online students will produce a 6-minute video presentation. Critical reviews will be reactions to lectures and also consist of readings from each theme. The critical review readings can be from scholarly papers listed in the assignment reading list and on the course web site – there are lots of choices. There are three prime books; “*Operations Management*” Heizer & Render. 7th, 8th, 9th or 10th Edition,” Pearson (2011), “*Strategic Operations Management*” Brown, Bessant, Lamming. Routledge, 3rd Edition, (2013), “*Operations Management, Integrating Manufacturing and Services*” Davies & Heinke, McGraw Hill (2005). It is not mandatory to buy these books but they can be a good reference in the future. There are other texts available in the library that we will refer to throughout the course. They are listed in the reading assignment document. It is important that you think critically – what are the benefits and pitfalls of the author’s views?

Final Project Report. Students will form into teams. Teams will be formed in week 1 (by day 4 for the 10 day course). For 13-week course - a list of project topics will be generated by week 2 and finalized by week 3 or 4. For the final project report you are free to select a topic in OPM that interests you. The goal of the final project report is not to do original field research, but to demonstrate to me your ability to do research on a topic and synthesize into a cohesive body of knowledge. The final report should be double-spaced, 12 point font, (approximately 1500 - 2000 words per student). Timing is very important in OPM! **A hard copy and a soft copy of the paper** (Adobe Acrobat PDF) must be delivered electronically no later than **???? at 4pm** - the hard copy to be given to the mechanical & industrial engineering graduate office
Please note: for guidance purposes summaries of team project reports from other courses team projects (2010 – 2023) classes are available at the following link:
<http://amgimanagement.com/founder/teaching.html>

Office Hours. Because I am part time faculty it will be difficult to meet all of you individually in a timely manner because of the class size but I will endeavor to answer email queries.

Important Dates: TBD each semester – check the course web site in Quercus

First Seminar (Mod 0 & Mod1): Orientation – Overview, Planning, and Reading Assignments and OM Introduction

Team Charter Due- Submit physical copy in class CR1 Due (Hand In / Online)

Last Seminar and submission of Special interest paper or Book Review

Final Report Summary PPT Presentation

Final Report Submit to Engineering Reception 44 St George St

Mid July– All coursework grades submitted

APS1028 Introduction-Core Modules Structure & Content:

Operations and Production Management is divided into 3 themes and 13 modules:

Part I – Operations and Production Management in Context

Mod 0: Orientation, instructor background, syllabus overview

- Overview of the entire course
- Grading structure (Critical Reviews, Book Review, Discussions, Projects)
- Web site layout and operation
- Project team formation and operation – Review past projects
- Critical Thinking and Performance Rubric
- Course Value in Career Planning – Levels of Management Thinking

Mod 1: Operations and Production (OPM) Introduction

- What is Operations and Production Management?
- Organizing To Produce Goods and Services
- Why Study OPM?
- What Operations and Production Managers do – Careers
- The Professional Engineer and OPM
- Where are the OPM Jobs?
- Operations in the Service Sector
- New Trends and Operation and Production Management
- The Productivity Issue

Important Link to My Company Web Site (Advanced Manufacturing Systems Projects)

- This is a link to real practical work that I performed on employer / client projects over 30 years. You can choose an area that you are interested in as a team project or to do a special interest topic or even to do a critical review. They are quite narrow specialized in depth topics (real expert practitioner oriented - not abstract theoretical). I will send you the paper (if I have it). These are very much focused on the advanced manufacturing systems-varies by industry sectors. Please ignore the Business Transformation section - this is included in the APS1012 – Management of Innovation and Change.

<http://www.amgimanagement.com/online.html>

Mod 2: OM Strategy Development and Implementation

- **Developing Mission and Strategies:** (Mission and Strategy)
- **Achieving Competitive Advantage Through Operations** (Competing on Differentiation, Competing on Cost, Competing on Response)
- **Ten Strategic OM Decisions**
- **Issues in Operations Strategy** (Research, Preconditions, Dynamics)

- **Strategy Development and Implementation** (Identify Critical Success Factors, A Global view of Operations Cultural and Ethical Issues, Build and Staff the Organization, Integrate OM with Other Activities)
- **Global Operations Strategy Options** (International Strategy, Multi-domestic Strategy, Global Strategy, Transnational Strategy)

Mod 3 (Role of Technology in Operations and Manufacturing)

- Types of information systems that exist in an organization.
- How technology can add value to the operations function within an organization.
- Identify the ways technology can be used in a manufacturing company.
- Enterprise resource planning (ERP) systems and how they can affect an organization.
- CAD/CAM/CAE/CIM
- Demonstrate the ways technology can be integrated into service operations.
- Present a framework for defining the types of e-services currently being offered

Part 2 – Designing and Building the Operations Function

Mod 4: Product Design

- Goods and services selection
- Generating new products
- Product development
- Issues for product design
- Time-based competition
- Defining the product
- Documents for production
- Service design

Mod 5: Process Design and Plant Layout

- Four Process Strategies
- Process Analysis and Design
- Service Process Design
- Selection of Equipment and Technology
- Production Technology
- Technology in Service Industry
- Environmentally Friendly Processes
- Business Process Reengineering

Mod 6: Plant Location

- **Global company profile:** Federal Express
- **The strategic importance of location**
- **Factors affecting location decisions** (Labor Productivity, Exchange Rates and Currency Risks, Costs, Attitudes, Proximity to Markets, Proximity to Suppliers, Proximity to Competitors (Clustering))

- **Methods of evaluating location alternatives** (The Factor-Rating Method, Location Break-Even Analysis, Center-of-Gravity Method, The Transportation Method)
- **Service Location Strategy** (How Hotel Chains Select Sites, The Telemarketing Industry, Geographic Information Systems)

Mod 7: Work System and Job Design

- **Human resource strategy for competitive advantage**
- **Labor Planning** (Employment-Stability Policies, Work Schedules, Job Classifications and Work Rules)
- **Job Design** (Labor Specialization, Job Expansion, Psychological Components of Job Design, Self-Directed Teams, Motivation and Incentive Systems, Ergonomics and Work Methods)
- **The visual workplace**
- **Labor standards**

Part 3 – Operations Planning, Execution, & Control

Mod 8: Inventory Management

- **Functions Of Inventory** (Types and classifications of Inventory)
- **Inventory Management** (ABC Analysis, Record Accuracy, Cycle Counting, Control of Service Inventories)
- **Inventory Models** (Independent Versus Dependent Demand, Holding, Ordering, And Setup Costs)
- **Inventory Models For Independent Demand** (Basic Economic Order Quantity (EOQ) Model, Minimizing Costs, Reorder Points, Production Order Quantity Model, Quantity Discount Models)

Mod 9: Advanced MFging Systems–Tailored to Class Interest

- **MRP, MRPII, ERP Structure**
- **MRPII, ERP Management** (MRP Dynamics, MRP and JIT)
- **Lot-Sizing Techniques**
- **Extensions of MRP** (Material Requirements Planning, MRP II, Closed-Loop MRP, Capacity Planning)
- **MRP In Services** (Distribution Resource Planning - DRP)
- **Enterprise Resource Planning - ERP** (Advantages and Disadvantages of ERP Systems, ERP in the Service Sector)
- **Computer Integrated Manufacturing** - CAD/CAM/CAE/Factory Automation

Mod 10: Lean and JIT

- **Global Company Profile: Toyota Motor Corporation**
- **Just-in-Time, the Toyota Production System, and Lean Operations** (Eliminate Waste, Remove Variability, Improve Throughput)
- **Just-in-Time** (JIT Partnerships, Concerns of Suppliers)

- **JIT Layout** (Distance Reduction, Increased Flexibility, Impact on Employees, Reduced Space and Inventory)
- **Just-in-Time** (JIT Partnerships, Concerns of Suppliers)
- **JIT Layout** (Distance Reduction, Increased Flexibility, Impact on Employees, Reduced Space and Inventory)
- **JIT Inventory**
- **Reduce Variability** (Reduce Inventory, Reduce Lot Sizes, Reduce Setup Costs)
- **JIT Scheduling** (Level Scheduling, Kanban system)
- **JIT Quality**
- **Toyota Production System** (Continuous Improvement, Respect for People, Standard Work Practices)
- **Lean Operations** (Building a Lean Organization)
- **Lean Operations in Services**

Mod 11: Project Management in Engineer To Order Operations

- **Engineer to Order Manufacturing Companies**
- **The importance of project management**
- **Project Planning** (The Project Manager, Work Breakdown Structure)
- **Project Scheduling**
- **Project Control**
- **Project Management Techniques: PERT AND CPM** (Network Diagrams and Approaches, Activity on Node Example)
- **Determining the Project Schedule** (Forward Pass, Backward Pass, Calculating Slack Time and Identifying the Critical Path)

Mod 12- Maintenance Management

- **The strategic importance of maintenance and reliability)**
- **Reliability** (Improving Individual Components, Providing Redundancy)
- **Maintenance** (Implementing Preventive Maintenance, Increasing Repair Capability)
- **Total Productive Maintenance**
- **Techniques for establishing maintenance policies**

Mod 13: Total Quality Management

- **Quality and Strategy**
- **Defining quality** (Implications of Quality, Malcolm Baldrige National Quality Award, Cost of Quality (COQ))
- **International Quality Standards**
- **Total Quality Management** (Continuous Improvement, Employee Empowerment, Benchmarking, Just-in-Time (JIT), Taguchi Concepts, Knowledge of TQM Tools)
- **Tools of TQM** (Check sheets, Scatter Diagrams, Cause-and-Effect Diagram, Pareto Charts, Flow Charts, Histograms, Statistical Process Control (SPC))
- **TQM in services**

Optional Course Pathway on Business Process Management

– Running in Parallel with Core APS1028 Modules (**NOTE** – YOU can only choose one path or the other – you can't MIX pathways)

Week 1 -Mod 1 – Introduction to Business Process Management

- BPM Architecture and Integrated Enterprise
- BPM linked to Strategy?
- BPM - Value Chains?
- BPM - Linking Strategy to Action?
- How do we achieve an integrated systems approach via Business Process Management?
- Case Study

Part 2 – Integrated Enterprise Methodology

Week 2- Mod 2 - Enterprise Methodology and Strategic Direction

- Integrated Enterprise Modeling
- Voice of the Customer
- Customer Process output
- Comparing Value to Cost (Customer and Company)
- Case Study

Week 3 Mod 3 –Performance Measurements

- Business Process Metrics
- Supply Chain (SCOR) Framework Metrics
- Business Process Performance Management
- Reflection & Practices
- Case Study

Part 3 Business Process Analysis

Week 4 -Mod 4 - BPM Organizational Approach

- Establishing Process Improvement Teams – Mission Goals and Charters
- PIT Work plans
- Team and Project Communications
- PIT - Early Wins to Build Support and Momentum
- Reflection & Practices
- Case Study

Week 5 - Mod 5–Business Process Analysis Methodology

- Business Process Analysis (BPA) Approach and Method
- BPA Problem Analysis

- BPA Problem Types – Workflow and Control Issues
- Reflection & Practices
- Case Study

Week 6- Mod 6 – BPM, TQM, and Six Sigma

- General Problem-Solving Approach and Tools
- Relationship of BPA with Six Sigma
- BPA and Lean Six Sigma –DMAIC
- BPM v Six Sigma v Lean
- Reflection & Practices
- Case Study

Part 4 Business Process Improvement

Week 7 - Mod 7 – Business Process Design, and Visioning

- BPR Approach
- Developing a Process Vision
- Reflection & Practices
- Case Study

Week 8 - Mod 8 - Value Engineering and Optimization (Time Cost)

- Business Process Activity Time and Cost-Process Time v Cycle Time
- Business Process Cost Analysis – Cost of Quality
- Value Added Versus Non-Value Added
- Reflection & Practices
- Case Study

Week 9- Mod 9 - Lean Enterprise Thinking

- Lean Thinking and Principles – Sources of Waste
- Lean Activity Analysis
- Lean Aerospace Enterprise Initiative
- Lean Case Study
- Reflection & Practices

Week 10- Mod 10 - Role of IT in Business Process Design

- Fundamental Impact of IT on Business Processes
- Efficiency and Productivity Impact
- Knowledge Management Systems
- Integrating Process Management with IT Software Functionality
- Reflection & Practices
- Case Study
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Part 5 Transforming and Sustaining The Lean Enterprise

Week 11 - Mod 11 - Managing Innovation and Organizational Change

- Principles of Organizational Change – Business Psychology
- Managing the impact of org change on the employee
- Reflection & Practices
- Case Study

Week 12- Mod 12 - Transforming the Enterprise (TTE)

- Approach to Enterprise Wide Transformation
- Socio-Political Management
- Governance and Cascading Communications
- Waves of Change
- Reflection & Practices
- Case Study

**Other Optional Modules – Focus on Advanced
Manufacturing Systems Pathway**

Mod 1. Applied Computer Integrated Manufacturing (CAD/CAE/CAPP/FMS)

Mod 2. Aggregate Production Planning

Mod 3. Sales and Operational Planning

Mod 4. Forecasting for OPM

Mod 5: Masters Production Scheduling (MPS)

Mod 6. Bills of Material Structuring and Management

Mod 7. Work Centre and Routing Management

Mod 8. Distribution Resource Planning (DRP)

Mod 9. Rough Cut Capacity Planning (RCCP)

Mod 10. Material Requirement Planning

Mod 11. Short Term Scheduling

Mod 12. Capacity Requirements Planning

Mod 13. Purchasing Management

Mod 14. Production Activity and Shop Floor Control

Mod 15. Manufacturing Strategy

Mod 16: Planning, developing, implementing an ERP Manufacturing system

- Mod 17. MRPII / ERP Performance Measurement**
- Mod 18. ERP History (MRP – MRP II – ERP – ERP II)**
- Mod 19. Supply Chain Management and ERP**
- Mod 20. 16 Steps to ERP Success**
- Mod 21. ERP ABCD Best Practice Checklist**
- Mod 22. ERP Cost Benefit Analysis**
- Mod 23. Achieving Data Accuracy**
- Mod 24. Business Process Management / Process Reengineering**
- Mod 25. Product Data / Life Cycle Management**
- Mod 26. OPM and the Management of Innovation**
- Mod 27. Systems Engineering Approach in OM**
- Mod 28. Applying Concurrent Engineering / DFM in OM**
- Mod 29. New Product Development Management**
- Mod 30. Management of Technology**