R·I·T | KATE GLEASON *College of* ENGINEERING

Graduate Certificate – Supply Chain Management

Overview:

- 3 courses (3 credits each): 2 required courses, 1 elective.
- Required courses:
  - Supply Chain Management (ISEE-703)
  - Manufacturing Systems (ISEE-745) or Global Facilities Planning (ISEE-723)
- Sample electives: (see attachment)
- Course credit is fully transferable to the Product Development (MPD) program, Manufacturing Leadership (MML) program, or other appropriate graduate programs at RIT. Contact specific department for details.
- Timing:
  - See http://sis.rit.edu for RIT course schedule.
- Format:
  - On-line or on-campus – see RIT course schedule.
  - On-site delivery is possible for groups – contact program office.
- Cost:
  - Courses charged at the standard RIT part-time tuition rate, but discounts are available for groups.

Eligibility:

- Non-degree students or students enrolled in the MS in Product Development (MPD) or MS in Manufacturing Leadership (MML).

Admission requirements:

- Bachelor's degree from an accredited university, with a 3.0 cumulative GPA.
- At least two years of experience in a business environment.
- Prerequisite knowledge: probability and statistics at the introductory level, manufacturing processes at the introductory level.
- Exceptions to these criteria will be considered on a case-by-case basis. (No entrance exam).
- No transfer credit is permitted.

Application process:

- Complete a non-degree registration form – contact program office. (A full graduate application is required for students seeking to enter a master's degree program).
- Copy of academic transcript showing cumulative GPA.
- Copy of current resume.
- Gain approval from your manager or HR department.
- Send materials to: ***Chris Fisher, RIT, 111 Lomb Memorial Drive, Rochester, NY 14623-5608, Fax: 475-4080, Email:*** *cxfpd21@rit.edu*.
- Contacts: Chris Fisher (475-7971, cxfpd21@rit.edu) or Mark Smith (475-7102, mark.smith@rit.edu).

Graduation requirement:

- Receipt of the Certificate requires a minimum cumulative GPA of 3.0 ("B" or better). A course grade below a "C" requires the course to be retaken.

Take-aways:

- Certificate of Completion from the Kate Gleason College of Engineering at RIT, issued upon request.
- Graduate credits (three/course), fully transferable to applicable graduate programs.
- Official transcript at RIT will show courses taken and grades received. The certificate name will **not** appear on the official RIT transcript.

Supply Chain Management
(ISEE-703)

Description:
Supply chain management is unique in that it is one of the oldest business activities and yet has been recently discovered as a potentially powerful source of competitive advantage. Supply chain system activities planning production levels, forecasting demand, managing inventory, warehousing, transportation, and locating facilities have been performed since the start of commercial activity. It is difficult to visualize any product that could reach a customer without a consciously designed supply chain. Yet it is only recently that many firms have started focusing on supply chain management. There is a realization that no company can do any better than its supply chain and logistics systems. This becomes even more important given that product life cycles are shrinking and competition is intense. Logistics and supply chain management today represents a great challenge as well as a tremendous opportunity for most firms. (Background in operations management or production systems).

Learning objectives:
- Understand the critical relationships between logistics, supply chain, and value chain. Link to corporate goals and customer needs to drive profitability. Think critically and reach valid conclusions concerning SCM.
- Appreciate supply chain complexity and understand how to execute a global supply chain strategy. Understand how to develop a logistics strategy that delivers customer value while maintaining critical cost advantages.
- Learn to minimize system-wide costs.
- Approach SCM with a global mindset, and understand when and how to partner in a supply chain context.
- Understand the complex role played by IT in SCM, and how to characterize system needs for it.
- Learn and be able to use the concepts, terminology, theory and principles of supply chain management (SCM).
- Learn to use effective tools for modeling logistics and operations.

Topics:
- Introduction Supply Chain Management
- Logistics Management
- Introduction to Software Tools: Excel Solver
- Transportation: fundamentals, transportation decision making
- Location Strategy: facility location, network planning
- Supply Chain Integration
    - Push, pull and push-pull systems
    - Demand driven strategies
    - Distribution strategies
    - Centralized vs. decentralized control
    - Central vs. local facilities
- Strategic Alliances: third party logistics, retailer-supplier partnerships
- Procurement and Outsourcing Strategies:
    - Outsourcing benefits and risks
    - Framework for make/buy decisions
- Global Issues in Supply Chain
    - Global forces
    - Risks and advantages of international supply chains
    - Regional differences in logistics

Manufacturing Systems
(ISEE-745)

Description:
This course will provide an introduction to concepts and techniques in the design and analysis of production systems. A blend of traditional and modern approaches is brought into the classroom. At the end of the quarter, the student will be able to assess and analyze the performance of a given manufacturing system as well as to provide a framework for system redesign and improvement. Modern aspects such as lean manufacturing and setup time reduction are included in the context of the course.

Learning objectives:
- Understand how to design, analyze, and improve a manufacturing system.
- Understand manufacturing systems and production control in the context of business and organizational goals, relative to other functions within the enterprise.
- Appreciate the complexity of global manufacturing.
- Understand alternative manufacturing systems and best practices.
- Learn how to characterize manufacturing systems: dynamics, system parameters, worst case performance, bottleneck rates & cycle times, flow and variability, measures of performance, etc.
- Learn how to improve and redesign manufacturing systems: lean, waste-flow-pull, pull vs. push, value stream mapping, SMED techniques, visual factory systems & 5 sigmas, Kanbans, synchronous manufacturing, cellular mfg., mass customization.
- Understand lean manufacturing, at the plant level.
- Understand and gain hands-on experience with manufacturing technologies need for a wide range of production systems, from job shop to continuous flow.
- Understand how to develop short- and long-term aggregate production plans.
- Understand inventory and inventory control, at the plant level.
- Understand manufacturing philosophies: push, pull, JIT, MRP, lean, agile, etc.

Topics:
- Introduction to manufacturing systems:
    - Fundamental relationships in manufacturing
    - Inventory theory and management
    - Taxonomies of manufacturing systems
    - Group technology
    - Cellular manufacturing
    - Capacity analysis
    - Lead time reduction
- Characterizing manufacturing systems:
    - Factory physics
    - Production line behavior
    - Manufacturing descriptors: best case, worst case, practical worst case
    - Variability in manufacturing systems
- Improving and redesigning manufacturing systems:
    - Lean manufacturing
    - Takt time
    - Setup time reduction (SMED)
    - Pull and push production systems
    - Conwip and Kanbans
- Production control:
    - Forecasting
    - Inventory policies and inventory management
    - Inventory models (stochastic and deterministic)

Global Facilities Planning
(ISEE-723)

Description:
Facilities planning determines how an activity's tangible fixed assets best support achieving the activity's objective. This course will provide knowledge of the principles and practices of facility layout, material handling, storage and warehousing, and facility location for manufacturing and support facilities. Tools for sizing the resources needed, planning, design, evaluation, selection, and implementation will be covered. The focus of the course will cover both management and design aspects, with the focus being more heavily on the management aspects.

Learning objectives:
- Appreciate the complexity of global manufacturing and distribution. Understand regulatory issues and established norms.
- Understand how and where to locate production facilities, distribution facilities, and service functions to meet customer and market objectives, consistent with corporate strategy.
- Understand how the tangible assets associated with a facility best support the objectives of the firm and the facility: strategic aspects, product design and life cycle considerations, process design considerations.
- Understand concepts and tools applied to facilities design: affinity diagrams, interrelationship graphs, tree diagrams, prioritization matrix, process decision program chart, activity network diagram.
- Understand approaches and tools for plant layout at the plant, department, and work-center level.
- Understand material handling systems design: unit loads, container design, equipment selection & evaluation, systems design & layout.
- Understand warehouse functions and design.
- Understand and apply the principles of facility layout, material handling, storage, warehousing, and asset location for manufacturing and supporting functions.
- Utilize lean concepts in facilities planning: value stream mapping, takt, flow, pull, lean line design, kaizen.
- Understand challenges associated with process technology transfer to domestic and international locations.

Topics:
- Facilities planning: objectives, strategy, tactics
- Facility location strategy and decision making: strategic issues and historical considerations, global multi-site production and operations, network planning)
- Product, process, and schedule design: costs, life-cycle considerations, technical components; flow charting, BOM structure, operations sequencing, process scope; demand, capacity analysis
- Facilities design: affinity diagrams, interrelationship graphs, tree diagrams; prioritization matrix, process decision program chart; matrix diagram, activity network diagram
- Plant Layout: material flow; layout approaches, layout tools (plant, department, and work-center level)
- Lean concepts and their application to facilities planning: value stream mapping; concepts of takt, flow, pull; lean line design, kaizen
- Storage & handling systems design: unit loads, container design; taxonomy of material handling equipment, selection & evaluation; systems design and layout
- Warehouse design: warehouse functions; receiving and shipping operations; storage and order picking; layout
- Quantitative tools for identifying and selecting options: facility location selection models (single- and multi-site); simulation as a design and analysis tool
- Evaluating and selecting facilities plans – economic aspects
- Implementation aspects – organizational structure, project leadership, inter-organizational management, logistics/supply chain control.
- Customs and regulatory issues
- Process technology transfer and intellectual property

Sample Elective Courses

ISEE-682 Lean Six Sigma Fundamentals

This course presents the philosophy and methods that enable participants to develop quality strategies and drive process improvements that are linked to and integrated with business plans. The principles of Lean Six Sigma are presented, making the course a prerequisite for Lean Six Sigma Black Belt certification.

ISEE-601 Systems Modeling and Optimization

An introductory course in operations research focusing on modeling and optimization techniques used in solving problems encountered in industrial and service systems. Topics include deterministic and stochastic modeling methodologies (e.g., linear and integer programming, Markov chains, and queuing models) in addition to decision analysis and optimization tools. These techniques will be applied to application areas such as production systems, supply chains, logistics, scheduling, healthcare, and service systems. (MATH-233 Linear Systems and Differential Equations or equivalent) (fall)

ACCT-603 Accounting for Decision Makers

A graduate-level introduction to the use of accounting information by decision makers. The focus of the course is on two subject areas: (1) financial reporting concepts/issues and the use of general-purpose financial statements by internal and external decision makers and (2) the development and use of special-purpose financial information intended to assist managers in planning and controlling an organization's activities. Generally accepted accounting principles and issues related to International Financial Reporting Standards are considered while studying the first subject area and ethical issues impacting accounting are considered throughout.

MGIS-711 Managing Service Systems

Service science is a new, interdisciplinary field that addresses the shift to the service and information-based economy. Students in this course investigate the nature of services and the need for interdisciplinary approaches to services innovation. Students will explore the role of information technology in the design, management, delivery and evaluation of services and apply these concepts to a specific industry, such as health care, IT services or financial services. (fall)

MGIS-760 Integrated Business Systems

This course focuses on the concepts and technologies associated with Integrated Business Information Systems and the managerial decisions related to the implementation and ongoing application of these systems. Topics include business integration and common patterns of systems integration technology including Enterprise Resource Planning (ERP), Enterprise Application Integration (EAI) and Data Integration. The key managerial and organizational issues in selecting the appropriate technology and successful implementation are discussed. Hands-on experience with the SAP R/3 system is utilized to enable students to demonstrate concepts related to integrated business systems. (spring)

BUSI-710 Project Management

Addresses project management from a multidisciplinary perspective, covering the fundamental nature of and techniques for managing a broad range of projects—public, commercial, and non-profit. Topics include Project Environment, Planning, Conflict Resolution, Budgeting, Scheduling, Resource Allocation, Monitoring /Controlling, and Project Termination. Addresses the behavioral and quantitative facets of project management. Incorporates the use of spreadsheets, project management software, and simulation for risk analysis software. Introduces the Framework and 9 Knowledge Areas of A Guide to the Project Management Body of Knowledge (PMBOK®Guide) as defined by the Project Management Institute (PMI). Students should have elementary management experience. Prerequisites: MGMT-160 World of Business or MGMT-215 Organizational Behavior; STAT-145 Introduction to Statistics I or MTSC-311 Business Statistics; or permission of instructor.

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