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

Graduate Certificate – Systems Engineering

Overview:

- 3 courses (3 credits each): 2 required courses, 1 elective.
- Required courses:
  - Engineering of Systems I (ISEE-771)
  - Engineering of Systems II (ISEE-772)
- Recommended 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 (BS) or graduate degree in an engineering-related field from an accredited university, with a 3.0 minimum cumulative GPA.
- At least two years of experience in a product development or related environment.
- 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.

Engineering of Systems I&II
(ISEE-771, 772)

ISEE-771 Engineering of Systems I

This course covers the principles of product, manufacturing process and supply chain development in an integrated fashion. It will examine the methodologies and tools to systematically define, develop and produce world-class products. Students will work on a project to put these methodologies and tools into practice. Major topics include: product planning and definition, characterization of user value, lean product development, product requirements and benchmarking, concept generation, design for "X" (manufacturing/ assembly/ service/ environment, etc.), sustainable design, design for lean six sigma.

ISEE-772 Engineering of Systems II

The engineering of a system focuses on the overall concept, performance, requirements and behavioral aspects of the system. This course builds on the concepts discussed in Engineering of Systems I. Topics include concept generation and innovation techniques, outsourced product development, requirements engineering and management, critical parameter management, robust design and latitude development, quality by design, advanced product development project management, and lean product development. Students will learn several systems analysis techniques and may include a team based project.

Learning objectives:

- Understand architecture as strategy.
- Learn to identify waste and understand lean thinking applied to product and process development.
- Learn to think systemically, and how to apply engineering skills to the holistic design of systems.
- Learn how to translate stakeholder requirements into critical system performance parameters. Learn to partition and trade critical performance parameters among subsystems.
- Learn how to influence the design of a system to achieve essential transcendental performance parameters, such as life cycle cost, technical risk, reliability, power consumption and environmental impact.
- Learn to integrate, coordinate, and synthesize subsystems into larger systems. Learn to verify and validate the achievement of critical system performance parameters.
- Understand the role of systems engineering in managing complexity.

Topics – EOS I

- Overview of systems and the case for integrated product & process design
    - Lean manufacturing review and lean product development overview
    - Models for product & process design and development
- Seeing waste in product development
    - Development as a design factory
    - Lean development system overview
- Systemic thinking, methodologies and modeling
    - Why product development projects fail
    - Role of product definition
    - System engineering standards
- Value analysis, needs assessment, sustainable development
- Benchmarking, QFD, requirements analysis
- Requirements management
- Functional analysis
- Costing, materials & process selection
- Design for assembly in the context of product design
- Cost-worth analysis
- Design for the environment & life-cycle analysis

Topics – EOS II

- Ownership quality, FMEA, design for service
- Modularity and architecture analysis, design for variety
- Effective innovation
- Concept generation and selection (including set-based methods)
- TRIZ
- Design for lean six sigma, critical parameter management
- Robust design in product development
- Quality by design and mistake-proofing
- Supplier's role in product development

Sample Elective Courses

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.

ISEE-751 Decision and Risk-Benefit Analysis

This course addresses decision making in the face of risk and uncertainty. Various methodologies will be introduced that are useful in describing and making decisions about risks, with particular emphasis on those associated with the design of products. Students will be exposed to issues related to balancing risks and benefits in situations involving human safety, product liability, environmental impact, and financial uncertainty. Presentations will be made of risk assessment studies, public decision processes, and methods for describing and making decisions about the societal risks associated with engineering projects. Topics include probabilistic risk assessment, cost-benefit analysis, reliability and hazard analysis, decision analysis, portfolio analysis, and project risk management.

ISEE-745 Manufacturing Systems

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.

MKTG-761 Marketing Concepts & Commercialization

This course examines the processes involved in the creation, distribution and sale of products and services. The objectives of the course are to introduce students to the tasks and decisions facing marketing managers and to the elements of marketing analysis including customer analysis, competitor analysis, and company analysis. The course is structured around the managerially controllable elements of product, price, promotion & distribution, plus the interrelationships of these elements, within the context of a changing business environment.

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.

MGMT-740 Organizational Behavior and Leadership

This course examines why people behave as they do in organizations and what managers can do to improve organizational performance by influencing people's behavior. Students will learn a number of frameworks for diagnosing and dealing with managerial challenges dynamics at the individual, group and organizational level. Topics include leadership, motivation, team building, conflict, organizational change, cultures, decision making and ethical leadership.

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