MAJOR COURSES

The major and research methods coursework can only be taken if a student has DMIT admission. Each individual course states specific prerequisites for information purposes.

MIS8013 IT LIFE CYCLE PROCESSES

Catalog Description: A comprehensive perspective of Information Technology life cycle processes is taken as is needed in organizations to lead and manage such processes. Best practices in the field of IT as promoted by international standards organizations are covered. Skills are focused on IT processes in the managerial, contractual, development and operational perspectives. Supporting and organizational processes that support and sustain the primary life cycle processes are examined, including skills to lead, manage design and participate in software process improvement initiatives within the organization.

Prerequisites
- MGT6153 Project Management or equivalent
- Graduate course in Software Requirements Engineering (or equivalent)
- Graduate course in Software Management

Educational goal
The goal is to provide a comprehensive perspective of Information Technology life cycle processes that are needed in organizations, and the skills to lead and manage such processes.

Objectives
After completing the course you should be able to
- Identify, interpret and adopt the best practices in the field of IT as promoted by international standards organizations
- Lead and manage IT processes in the managerial and contractual perspectives
- Manage the IT processes in the development and operational perspectives
- Identify and prescribe supporting processes and organizational processes that sustain other IT life cycle
processes

- Lead, manage and participate in software process improvement initiatives within an organization.

**Syllabus Outline**

1. Overview of IT life cycle processes
   a. Concepts, views, perspectives, process categories,
2. IT process frameworks
3. IT leadership and management (refer MIS8033)
4. Enterprise IT architectures (refer MIS8043)
5. IT process maturity within the organization
6. Quality processes and products
7. IT process views
   a. Contract view
   b. Management view
   c. Operating view
   d. Engineering view
   e. Supporting view
8. Frameworks for IT process improvement
9. Approaches to IT process maturity assessment
10. Methodology for IT process improvement program
11. International IT standards

**MIS8023 ADVANCED DATA MANAGEMENT**

**Catalog Description:** The course covers trends in advanced data management including data mining, data warehouse, OLAP (On-Line Analytical Processing), and object-oriented database. Best practices in the areas object technology are covered and state-of-the-art development tools are used within the context of a business case and group projects.

**Prerequisites:**
MIS 6013 and MIS 6113, or equivalents.

**Educational goal**
The course covers advanced data management areas including data mining, data warehouse, OLAP (On-Line Analytical Processing), and object oriented database.

**Objectives**
After completing the course you should be able to
- Provide a deeper coverage of advanced data and database concept, including the data mining, data warehouse, object data standard, object modeling, object oriented database
- Study the current trend of development and tools for data mining, data warehouse, and object oriented database
- Apply materials covered to a business case for group projects

**Syllabus**

I. Data Mining and Data Warehousing
   1. Data Mining Functionalities
   2. Data Warehouse Architecture and Implementation
   3. From Data Warehouse to Data Mining
   4. Data Integration and Transformation
   5. Data Mining Primitives
   6. Mining Complex Type of Data
   7. Applications and Trends in Data Mining

II. Object Oriented Database
   1. Basic Object Modeling
   2. Advanced Object Modeling
   3. Object Specification Language
   4. Object Query Language
   5. Bindings – C++, Java
   6. Object Oriented Database - Basics
   7. Object Oriented Database - Advanced
MIS8033 IT LEADERSHIP AND MANAGEMENT

Catalog Description: The course gives an advanced treatment of current IT leadership and management issues, including global organization and operations, the role of the chief information officer (CIO) as a change agent, outsourcing as a solution strategy, the impact of emerging technologies, and business process re-engineering.

Prerequisites: Graduate course in management.

Educational goal
In this course you will obtain a mix of theoretical insights and practical knowledge that will allow you to identify requirements for information systems or services, to produce or acquire the needed technologies or personnel, and to manage the adoption and support of these systems or services. Many IT professionals will elect to lead, or be asked to lead, an IT unit. This course focuses on the skills needed to manage today’s IT organization.

Objectives
Students will
• Develop skills and techniques in the areas of strategic planning, budgeting and finance, human resources administration, vendor relationships, and leadership.
• Explore alignment of IT initiatives with business objectives, simultaneous management of operational and development environments, and the impact on the organization’s IT infrastructure and services.
• Define and discuss the roles of IT in today’s organizations
• Apply budgeting and financial principles to specific IT scenarios
• Apply human resources management principles to specific IT organization and staffing issues
• Discuss characteristics of IT leadership and to apply these characteristics to specific scenarios
• Identify and use available information resources to research specific topics related to IT

At the conclusion of this course, students should successfully demonstrate the ability to:
• Define and discuss the roles of IT in today’s organizations
• Apply budgeting and financial principles to specific IT scenarios
• Apply human resources management principles to specific IT organization and staffing issues
• Discuss characteristics of IT leadership and to apply these characteristics to specific scenarios
• Identify and use available information resources to research specific topics related to IT

Syllabus
1. IT Organizations and Current Issues
   a. The Evolving Role of Information Systems and Technology in Organizations
2. IT Budget and Finance
   a. Budgeting and Finance Basics
   b. Models and Metrics
3. IT Organizational and Human Resources Issues
   a. Managing IT Vendor Relationships
   b. Outsourcing IT Services
   c. IT and Institutional Leadership
4. Technology Futures and Scenarios
5. Strategic Information Systems Planning: What Is Involved in Establishing a Planning Process
   b. Strategic Analysis
   c. Assessing and Understanding the Current Situation.
   d. Determining the Future Potential
   e. Determining the Business Information Systems Strategy.
   f. Managing the Applications Portfolio.
   g. Strategic Management of IS/IT: Organization and Resources.
   h. Strategies for Information Management.
   i. Managing Information Systems and Technology Investments.
   j. Managing Application Development.
   k. Strategies for Managing the Technology Infrastructure.
MIS8043 IT SYSTEMS ARCHITECTURE

Catalog Description: A comprehensive architectural approach is presented to develop and enhance the enterprise architecture incorporating a hierarchy of architectures. The approach includes a framework for interpreting trends, drivers and initiatives when determining and changing the strategic direction of the enterprise. The information technology (IT) strategy is the basis for architectural projects that study the viewpoints of concern for IT and system architectures. A methodology for modeling the views of the IT architectures, and the structure and behavior of the systems is followed. Skills are developed to use automated tools to design architectures.

Prerequisites
Technical core courses in the MSIS Program or equivalent:
• MIS6113 Database models
• MIS6123 Analysis and Design of complex systems
• MIS 6143 Telecommunications
• MGT Project Management

Educational goal
The goal in this course is to provide a comprehensive framework for interpreting trends and drivers of information technology (IT) that influence the systems architectures of an organization, and the skills to model such architectures.

Objectives
After completing the course you should be able to
• Interpret trends and drivers in IT as they impact on the acquisition of such technologies.
• Understand the context of information systems and software in the IT architecture.
• Use notations and representation schemes for modeling static structure and dynamic behavior of systems within the enterprise
• Apply a methodology for designing architectural views.
• Use appropriate automated tools to model the architectural views.

Syllabus
1. Introduction: the business context
2. IT architecture
3. Enterprise IT frameworks
4. Enterprise IT architecture methodologies and notations
5. Configuration management
6. Architecture design for maneuverability
7. Trends and drivers of IT

MIS8053 ADVANCED TOPICS IN INFORMATION SYSTEMS (TOPIC: GENERIC)

Catalog Description: Advanced and emerging topics in information technology (IT) and IT management are studied this course. Several instances of this course are envisaged, influenced by student interest in such advanced and emerging topics. Examples are Data Warehousing, Object-oriented System Development for Complex Systems, Internet Technologies, and Globalization and International Business (taught as a course blended with an international seminar).

Prerequisites
DMIT Major Track coursework

Educational goal
The goal of this course is to cultivate and awareness and add to your knowledge regarding advanced and emerging topics in IT.

Objectives
• To examine the concepts and techniques for mastering the complexity of IT systems
• To study the principles relevant to the field under study
• To apply the theories to practice as relevant to the field under study.

Syllabus
1. Specific to the field under study
MIS8053 ADVANCED TOPICS IN INFORMATION SYSTEMS
TOPIC: INTERNET-BASED COMPUTING (This an instance of an emerging field in IT)

Prerequisites:
MIS 6013, MIS 6113, and MIS 7613 or equivalent

Educational goal
The course covers contemporary Web services, middleware (including Web application server), and distributed database topics in the IT field. Two contemporary technology bases behind these topics are Java on SunONE (including database interface JDBC) and C#/VBScript on Microsoft.NET (including database interface ADO.)

Objectives
• To provide an up to date coverage of Web services, middleware, and distributed database.
• To study how SunONE and Microsoft.NET are used in the architecture of contemporary Web based application.
• To study the implementation of the architecture by using tools such as Java as front end and IPlanet Application Server as middleware for the database backend. In parallel also consider Microsoft’s .NET approach of using C#/VBScript as front end and ASP/XML as middleware for the database backend
• To apply materials covered to a business case for group projects

Syllabus
2. Web Services Overview
3. Web Application Architecture Based on Web Services
4. XML Premier
5. Simple Object Access Protocol
6. Creating Web Services
7. Using Web Services for E-Business
8. Developing Web Application on SunONE Platform

Prescribed and recommended materials
• Standards
• Frameworks
• Tools
• Templates
• Journals
• IT Magazines
• Websites
• Books
• Articles

RESEARCH METHODS COURSES

MIS7813 INFORMATION TECHNOLOGY RESEARCH METHODOLOGY

Catalog Description: Scientific methods of research including methods of investigation, hypothesis formulation, modeling and notations, model verification and validation as relevant to research in information technology are covered. Included is the formulation of a research proposal, determining appropriate methods of investigation and methods of validation.

Prerequisites: none

Educational goal
The goal of the course is to study scientific methods of research including methods of investigation, hypothesis formulation, modeling and notations, model verification and validation as relevant to research in information technology.

Objectives
• To examine scientific methods of research as relevant to IT
• To enable the formulation of a proposal
• To determine appropriate methods of investigation
To select appropriate research validation methods

Syllabus
1. Scientific methods of research
   a. Empirical approaches
   b. Modeling approaches and taxonomies
   c. Theoretical approach
   d. Qualitative approach and techniques
2. Proposal formulation
   a. Problem statement
   b. Scope determination
   c. Hypotheses and axioms
   d. Methods of investigation
   e. Validation of hypotheses
3. Methods of investigation
   a. Problem analysis
   b. Review, analysis, decomposition, evaluation, interpretation, synthesis
      i. Analogy
      ii. Heuristic reasoning
      iii. Induction
      iv. Testing by dimension
   c. Identifying a variation of the problem
   d. Experimental and quasi-experimental design
   e. Survey design, sampling
   f. Theory development and conceptual modeling
4. Demonstration of concept, prototyping
   a. Prototyping planning, design, implementation and evaluation
5. Approaches to research validation

MIS7823 QUANTITATIVE METHODS I

Catalog Description: This is a second course in probability and statistics. It covers probability and statistical techniques used in managing, manipulating and interpreting data and information in the IT field. Topics include statistical distributions, frequency distributions, Pareto distribution, analysis of variance, standard deviation, correlation, significance, numerical integration, tests of normality, linear regression, prediction interval, multiple regression, multiple regression interval, Gaussian method, sampling distributions, decision analysis, statistical inference, probabilities, Bayesian theory and time series analysis. A range of applications exemplify these methods and techniques as relevant to IT projects.

Prerequisites: Introductory course in Statistics.

Educational goal
The goal of the course is to explore quantitative methods and statistical techniques used in managing, manipulating and interpreting data and information in the IT field.

Syllabus
1. Statistical distributions
2. Frequency distributions
3. Pareto distribution
4. Analysis of variance, standard deviation
5. Correlation, significance
6. Numerical integration
7. Tests of normality
8. Linear regression, prediction interval
9. Multiple regression, multiple regression interval
10. Gauss’s method
11. Sampling
12. Decision analysis
13. Statistical inference
14. Probabilities
15. Bayesian theory
16. Time series analysis

Applications to include:
- Risk analysis
- Cost estimation
- Time estimation
- Forecasting
- Time series analysis
- Assessing uncertainty
- Decision-making with prior probability, Bayesian decision-making
- Decision analysis with sampling
- Single and multiple attribute utility models

MIS7833 QUANTITATIVE METHODS II

Catalog Description: Advanced quantitative methods and statistical techniques used in managing, manipulating and interpreting data and information in the IT field are the topics of focus in this course. In particular deterministic and stochastic analytical tools and concepts are studied that can be used to make optimal decisions in the pursuit of organizational goals, such as cost efficiency, service delivery, and where appropriate profit. Analytic concepts include probability theory, statistics, and utility theory. Analytic tools include game theory, linear models, linear programming, network analysis and other management science techniques.

Prerequisites
Students should possess a basic knowledge of statistics, such as might be acquired through MIS7813, Quantitative Methods I, or its equivalent.

Educational goal
The second of two courses which are focused on quantitative methods and statistical techniques used in managing, manipulating and interpreting data and information in the IT field.

Objectives
The general objective of the course is to develop and enhance the student's problem solving and decision-making capabilities in an administrative environment. Specifically, the student when confronted with a management problem should be able to:
- Conceptualize the problem within an analytical framework;
- Understand basic analytic models;
- Assess and use appropriate analytic results in the decision-making process; and
- Identify the capabilities and limitations of various management science techniques.

Syllabus
1. Linear Programming
   a. Graphical
   b. Computer Solution
2. Applications
3. Transportation Problem
4. Assignment Problem
5. Transshipment
6. Integer Programming
7. PERT/CPM
8. Queuing Theory
9. Computer Simulation
10. Decision Theory
11. Markov Processes
12. Multicriteria Decisions
13. Dynamic Programming
14. Network Models

MIS7843 MODELING AND SIMULATION
Catalog Description: This course covers processes and methods for modeling and discrete event simulation of proposed solutions to business and information technology based problems using appropriate software technologies. Approaches include the design and building of models to simulate behaviors, and designing of prototypes to demonstrate concepts. Skills are developed to apply automated tools in project case studies.

Prerequisites
Students should possess a basic knowledge of statistics, such as might be acquired through MIS7823 Quantitative Methods I, or its equivalent.

Educational goal
This course deals with methods for the modeling and simulation of proposed solutions using appropriate software technologies.

Objectives
Simulation is a numerical technique in which a computer is used to imitate the behavior of complicated systems. The general objective of the course is to develop and enhance the student's problem solving and decision-making capabilities in a business and IT environment. The objective is to gain insight into system behavior by measuring the performance characteristics of proposed new systems or the effects of modifications proposed for existing systems. Students will be able to identify situations in which use of simulation is appropriate, design and conduct fundamental simulation experiments, and critically evaluate decision-support results produced by simulation professionals. Students apply a methodology and professional simulation language/package to conduct simulations of various business and/or IT systems.

Syllabus
I. INTRODUCTION TO SIMULATION
   I.1 Systems, Models, and Simulation
   I.2 Types of Simulation Models
   I.3 Principles of Discrete Event (Systems) Simulation
   I.4 Simulation Software
   I.5 The Simulation Methodology/Process
      1. Define or Formulate Problem
      2. Establish objectives and overall project plan
      3. Collect and Analyze Data
      4. Develop a Conceptual Model of the System/Process
      5. Build the Simulation Model
      6. Verify and Validate the Model
      7. Design and Perform the Simulation Experiments
      8. Analyze and Interpret the Simulation Results
      9. Document and Present Simulation Results
   I.6 Benefits and Limitations of Simulation
II. INPUT DATA ANALYSIS FOR SIMULATION
   II.1 Distribution fitting of empirical data
   II.2 Commonly Used Probability Distributions to Represent Data
   II.3 Determining How Representative the Fitted Distributions Are?
      Goodness-of-fit tests
   II.4 Distribution fitting with Crystal Ball
   II.5 Selecting Input Data Models without Data
III. BUILDING SIMULATION MODELS USING WITNESS SOFTWARE
   III.1 Introduction to WITNESS
   III.2 Model Building Using the Basic Elements
   III.3 Modeling System Randomness in Witness
   III.4 Adding Functionality to your Model
   III.4 Actions and Further logical Elements
   III.5 Enhancing the Models
   III.5 Simulation Examples:
      - A Phone Support Help Desk Simulation Model
      - A local Area Network Simulation Model
IV. STATISTICAL ANALYSIS OF SIMULATION OUTPUT
   IV.1 Types of Simulations with Respect to Output Analysis
   IV.2 Stochastic Nature of Output Data
IV.3 Measures of Performance and Their Estimation
IV.4 Output Analysis for Terminating Simulations
IV.5 Output Analysis for Steady-State Simulations
IV.6 Verification and Validation of Simulation Models

V. EXPERIMENTATION AND COMPARISON OF ALTERNATIVE SYSTEMS
  V.1 Experimentation
  V.2 Comparison of Two Systems
    Example 1: Border Gateway network Architectures
  V.3 Comparison of Several Systems
    Example 2: A Phone Support Help Desk System

VI. CASE STUDIES OF THE SIMULATION OF BUSINESS OR IT SYSTEMS
  VI.1 Border Gateway network Architecture Validation Using Simulation
  VI.2 Health Care Company’s Call Center Simulation
  VI.3 Supplier Suggestion Process Simulation