



# Engineering and Technology Management

## COURSE SYLLABUS

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**Course Number:** E M 568

**Course Name:** Risk Assessment and Management

**Instructor:** Luna Magpili

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**Semester Credits:** 3

**Prerequisites:** None

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### Course Description and Objectives:

Risk assessment and management is the identification, analysis, and prioritization of risks; as well as the coordinated treatment of risk to prevent, minimize, monitor, and control the probability and/or impact of undesirable events and consequences. This graduate course covers the principles and applications of risk assessment and management in the context of engineering management and systems engineering. This course is about the systematic approach to the management of risk as applied to engineering, operations, and management decisions. The goal of the course is to engage students in active discovery of risk assessment and management concepts and tools. Students will be prepared to function in a business environment, developing an awareness of the challenges, the tools, and the process of designing and implementing risk assessment and management strategies. In addition to specialized topics in risk, this course will also discuss topics in economics, statistics, decision science, social science and other fields related to managing risks, in order to provide relevant basis to the methodological development of the risk body of knowledge.

### Course Topics:

- Introduction, Fundamentals of Risk
- Risk Planning, Assessment and Management Process and the Systems Approach
- Risk Identification
  - Historical data, comparative analysis, and checklists
  - Taxonomy based, risk breakdown structure, HHM, SWOT, root cause analysis, influence diagram
  - Expert/ user/ stakeholder-based elicitation (Delphi, brainstorming, interview), Scenario-based, experience-based, objective-based analysis
- Risk Analysis
  - Preliminary Hazard Analysis (PHA)
  - Hazards and Operability Analysis (HAZOP), Job Safety Analysis (JSA)
  - Failure Modes and Effects Analysis (FMEA)
  - Fault Tree Analysis (FTA), Event Tree Analysis (ETA), Decision Trees
  - Cause-Consequence Analysis (CCA)
- Risk Prioritization
  - Risk Probability and Impact Assessment, Risk Index and Risk Ranking
  - Risk Matrix, EV Analysis, Sensitivity and Tradeoff Analysis, Modeling and Simulation
  - Risk Attitude and Risk Tolerance, As Low As Reasonably Practicable (ALARP)
- Risk Treatment
  - Avoidance, Separation, Reduction, Transfer, Acceptance
  - Detection, Control, Response and Recovery
  - Performance Monitoring
- Special topics and Application
  - ISO3100, Quality and Reliability
  - Supply Chain Risk Management
  - Project Risk Management
  - Positive Risk/ Opportunities Management
  - Risk and TOC

**Grading:** Mid-Term Exam: 15%, Case Study: 30%, Final Exam 15%, Homework: 30%, Participation: 10%