TRINEONLINE

Course Mapping

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(Systems Engineering Analysis SYS 5013)

Course Description:

This course provides learners a foundation in the practice of systems engineering (SE) tools, processes and related analyses. Students will be challenged to design, develop, and analyze complex systems in a variety of technical disciplines using industry-standard SE concepts and methods. Post-processing tools and techniques are covered to analyze and present outcomes to “what if” type scenarios.

Learning Outcomes:

- Assess systems engineering theories, processes, and applications. (LO1)
- Analyze existing systems using systems engineering principles and concepts. (LO2)
- Develop systems engineering lifecycle models, processes and governance structures. (LO3)
- Model complex systems engineering problems to determine quantitative solutions. (LO4)
- Determine post-processing tools and techniques that answer "what if" type questions. (LO5)

Week One: LO1,2	
Learning Activities and Materials	**Assessments**

• **Read**: Chapter 1 of the textbook, which provides an overview of systems analysis and design and discusses the concepts of systems and systems analysis, and introduce the systems development life cycle (SDLC). (LO1 & LO2) • **Reading Comprehension Activity**: After reading Chapter 1 of the textbook answer some comprehension questions. (LO1 & LO2) • **Multimedia resources**: Students will watch additional multimedia resources related to systems analysis and design, such as videos or podcasts. (LO1 & LO2) Systems Analysis and Design (5:32)	• Infographic assignment: Students will create an original infographic using the resources available on the Canva website, and illustrate what the most common roles and responsibilities in the Systems Engineering Lifecycle. (LO1, LO2) • Discussion forum: Discuss the concepts covered in Chapter 1 of the textbook. Students must to share their thoughts and ask questions. (LO1 & LO2)
Week Two: LO3,4	
Learning Activities and Materials	**Assessments**
• Read: Chapters 2 and 3 of the textbook, which cover the topics of modeling organizational systems and project management. (LO3 & LO4) • Reading Comprehension Activity: After reading Chapters 2 and 3 of the textbook, answer some comprehension questions. (LO3 & LO4) • Multimedia resources: Students will watch additional multimedia resources related to modeling organizational systems and project management, such as videos or podcasts. (LO3 & LO4) ○ "Programming with Mosh" titled "UML Class Diagram Tutorial." This video provides a clear explanation of UML class diagrams, which is an important modeling technique covered in Chapter 2. Link: UML Class Diagram Tutorial (10:16) ○ "Database Design 1 - Introduction to ER Diagrams" by Caleb Curry: Entity Relationship Diagram (6:57)	• Modeling exercise: Students will create a model of an organizational system using one of the modeling techniques discussed in Chapter 2 and submit it for evaluation. (LO3) • H5P crossword puzzle: Students will complete the H5P crossword puzzle regarding SE basics and definitions. (LO1, LO2, LO3) • Discussion forum: Discuss the importance of modeling techniques in representing organizational systems and the phases of project management in successful systems development. Students must share their thoughts and ask questions. (LO3 & LO4)

Week Three: LO1,2	
Learning Activities and Materials	**Assessments**

• Read: Chapters 4 and 5 of the textbook, which cover the topics of information gathering using interactive and unobtrusive methods. (LO1 & LO2)
• Reading Comprehension Activity: After reading Chapters 4 and 5 of the textbook, answer some comprehension questions. (LO1 & LO2)
• Multimedia resources: Students will watch additional multimedia resources related to interactive and unobtrusive methods for information gathering, such as videos or podcasts. (LO1 & LO2)
  ○ Information Gathering: Interactive Models (34:02)
  ○ Data Gathering: Unobtrusive Measures (2:31)
	• Information gathering exercise: Students will be given a case study and asked to identify appropriate interactive and unobtrusive methods for information gathering. They will need to explain their choices and submit it for evaluation. (LO1 & LO2)
	• Teach back assignment: Students will create an original presentation teaching back the practices and methods of effective data gathering in the Systems Engineering lifecycle. A teach back is an opportunity for the student to relay information learned about a subject in their own voice. The presentation should be no longer than 10 minutes and contain audio narration of the slides. The student may record themselves speaking if desired, and will upload a PowerPoint presentation file or utilize Panopto to complete this assignment. (LO1, LO2)
	• Discussion forum: Discuss the importance of interactive and unobtrusive methods for information gathering in systems analysis and design. Students must share their thoughts and ask questions. (LO1 & LO2)

Week Four: LO1-5	
Learning Activities and Materials	**Assessments**
• Read: Chapters 6 and 7 of the textbook, which cover the topics of Agile modeling and prototyping, and using Data Flow Diagrams (DFD) to represent system requirements. (LO1, LO3, LO4, & LO5) • Reading Comprehension Activity: After reading Chapters 6 and 7 of the textbook, answer some comprehension questions. (LO1, LO2) • Multimedia resources: Students will watch additional multimedia resources related to Agile modeling and prototyping, and using	• Agile modeling exercise: Students will be given a case study and asked to apply Agile modeling and prototyping techniques to develop a working prototype. They will need to submit their prototype and explain their methodology. (LO3, LO4, & LO5) • DFD exercise: Students will be given a case study and asked to create a DFD to represent system requirements. They will need to explain their choices

Data Flow Diagrams (DFD) to represent system requirements, such as videos or podcasts. (LO3, LO4, & LO5) ○ What is Agile Methodology (6:22) ○ Data Flow Diagrams (4:13) ○ Agile Modeling and Prototyping (48:49)	and submit it for evaluation. (LO3, LO4, & LO5) • Point/Counterpoint podcast: The student will create a podcast comparing and contrasting Agile and Traditional methods of PM/SE. The podcast should be a minimum of eight minutes, with a maximum of ten minutes. This is a group activity of 2- the instructor will provide a list of names for each group as well as their assigned role (Agile or Traditional). (LO3, LO4, LO5) • Discussion forum: Discuss the importance of Agile modeling and prototyping, and using Data Flow Diagrams (DFD) to represent system requirements. Students must share their thoughts and ask questions. (LO1, LO2, & LO3)
Week Five: LO4-5	
Learning Activities and Materials	**Assessments**
• Read: Chapters 8 and 9 of the textbook, which cover the topics of analyzing systems using data dictionaries and process specifications and structured decisions. (LO4 & LO5) • Reading Comprehension Activity: After reading Chapters 8 and 9 of the textbook, answer some comprehension questions. (LO4 & LO5) • Multimedia resources: Students will watch additional multimedia resources related to data dictionaries and process specifications and structured decisions, such as videos or podcasts. (LO4 & LO5) ○ Process Specification and Structured Decisions (6:03)	• Data dictionary exercise: Students will be given a scenario and asked to create a data dictionary for the system. They will need to explain their choices and submit it for evaluation. (LO4 & LO5) • Data dictionaries infographic: Students will create an original infographic using the resources available on the Canva website, and illustrate what the most common roles and responsibilities in the Systems Engineering Lifecycle. (LO4, LO5) • Discussion forum: Discuss the importance of data dictionaries and structured decisions in systems analysis and design. Students must share their thoughts and ask questions. (LO4 & LO5)

Week Six: LO4,5	
Learning Activities and Materials	**Assessments**
• Read: Chapters 10 and 11 of the textbook, which cover the topics of object-oriented systems analysis and design using UML and designing effective outputs. (LO4 & LO5) • Reading Comprehension Activity: After reading Chapters 10 and 11 of the textbook, answer some comprehension questions. (LO4 & LO5) • Multimedia resources: Students will watch additional multimedia resources related to object-oriented systems analysis and design and effective output design, such as videos or podcasts. (LO4 & LO5) ○ UML Use Case and Sequence Diagrams Made Simple (7:48)	• Case study analysis: This is a case study related to systems analysis and design. You will need to analyze the case study using the SDLC, and present your findings in the single post discussion forum. (LO1 & LO2) • UML exercise: Students will be given a scenario and asked to create a UML diagram for the system. They will need to explain their choices and submit it for evaluation. (LO4 & LO5) • Discussion forum: Discuss the importance of object-oriented systems analysis and design and effective output design in systems development. Students must share their thoughts and ask questions. (LO4 & LO5)
Week Seven: LO1-5	
Learning Activities and Materials	**Assessments**
• Read: Chapters 12 and 13 of the textbook, which cover the topics of designing effective inputs and designing databases. (LO1, LO2, LO3, LO4, & LO5) • Reading Comprehension Activity: After reading Chapters 12 and 13 of the textbook, answer some comprehension questions. (LO1, LO2, LO3, LO4, & LO5) ○ Database Design Process (11:19)	• Input design exercise: Students will be given a scenario and asked to design an effective input system for a business process. They will need to explain their design choices and submit it for evaluation. (LO1, LO2, LO3, LO4, & LO5) • Database design exercise: Students will be given a scenario and asked to design a database for a business process. They will need to create an ER diagram and explain their design choices, then submit it for evaluation. (LO1, LO2, LO3, LO4, & LO5) • Discussion forum: Discuss the challenges and considerations in designing effective input systems and databases for a business process. Students must share their thoughts and ask questions. (LO2, LO3, LO4, & LO5)

Week Eight: LO1-5	
Learning Activities and Materials	**Assessments**

• Read: Chapters 14, 15, and 16 of the textbook, which cover the topics of human-computer interaction, designing accurate data entry procedures, and quality assurance and implementation. (LO1, LO2, LO3)
• Reading Comprehension Activity: After reading Chapters 14, 15, and 16 of the textbook, answer some comprehension questions. (LO1, LO2)
• Multimedia resources: Students will watch additional multimedia resources related to human-computer interaction, designing accurate data entry procedures, and quality assurance and implementation, such as videos or podcasts. (LO1, LO2, LO4, LO5)
  ○ Human Computer Interaction is… (3:55)
  ○ Role of Quality Assurance in Agile Scrum (10:58)
	• Design exercise: Students will design a user interface for a system using the principles of human-computer interaction covered in Chapter 14. They will submit their design for evaluation. (LO13)
	• Data entry procedure exercise: Students will design a data entry procedure for a system that is accurate and efficient, based on the concepts covered in Chapter 15. They will submit their design for evaluation. (LO1, LO2, LO3, LO4, & LO5)
	• Final Exam: A cumulative exam covering all the topics covered in the course. This will help to assess the overall understanding of the material. (LO1 & LO2)
	• Discussion forum: Discuss the importance of human-computer interaction, accurate data entry procedures, quality assurance, and implementation strategies in successful systems development. Students must share their thoughts and ask questions. (LO1, LO2, LO3, LO4, & LO5)