THE UNIVERSITY OF ARIZONA
COLLEGE OF ENGINEERING
Systems & Industrial Engineering

SIE 502 - ONTOLOGICAL MODELING AND ANALYSIS FOR SYSTEMS ENGINEERING

COURSE DESCRIPTION

This course covers **ontology-based methods** for developing information-intensive engineering applications. It focuses on creating a common vocabulary to improve collaboration, streamline development, and enable efficient modeling, analysis, and integration of engineering solutions.

EXPECTED LEARNING OUTCOMES

- Explain how the fundamental concepts and principles of ontological modeling and analysis can be leveraged to support the development of an engineered system.
- Develop ontological vocabularies that represent engineering domain-specific knowledge with precision and clarity.
- Use vocabularies to model, analyze, and review information in a specific engineering domain.
- Check consistency of information using a logical reasoner and leveraging validation rules and queries for an engineered system.
- Develop viewpoints that facilitate the authoring and reporting of information in engineering development.
- Federate, integrate, and configuration manage information to enable different collaboration workflows for engineering development.

COURSE FORMAT

- The course will use a flipped classroom instructional approach. The student will read the required material and attempt to complete the homework on their own before coming to class.
- Students will be expected to familiarize themselves with the toolset and resolve problems independently.
- Remote students must also use a drawing-enabled device so that they can contribute to group discussions and with the class in virtual whiteboards.

PROGRAM DIRECTOR
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ENROLLMENT
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COURSE SCHEDULE

SESSION 0.5

- Course introduction and Overview
- Overview of ontology-based domain engineering

SESSION ONE

- Information Representation
  - Basic features of Ontological Modeling Language (OML)
  - Advanced features of OML
  - Application of OML

SESSION TWO

- Information Reasoning
  - Create ontology bundles
- Information Querying
  - Answering domain questions with SPARQL queries

SESSION THREE

- Information Manipulation
  - Generate documentation
  - Develop reductions
  - Generate reports (gate products)
  - Generate code

SESSION FOUR

- Information Configuration
- Information Integration

SESSION FIVE

- Information Adaptation
- Information Federation

SESSION SIX

- Information Viewpoints

SESSION SEVEN

- Enablers and obstacles of implementing ontologies in an organization
- Emerging trends in ontology-based engineering

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Bridge Theory & Practice

Hands-on Virtual Lab

Distinguished Faculty

MASTERING DISRUPTIVE TRANSFORMATION & **LEADING THE FUTURE** OF SYSTEMS ENGINEERING