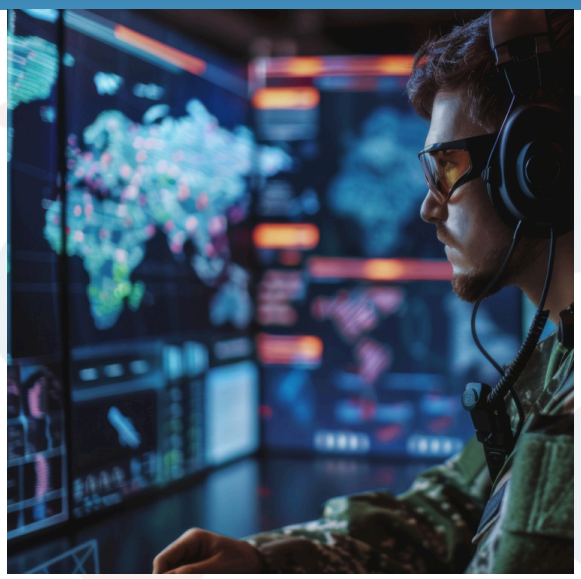
THE UNIVERSITY OF ARIZONA
COLLEGE OF ENGINEERING
Systems & Industrial Engineering

SIE 516 - MISSION ENGINEERING

COURSE DESCRIPTION

This course explores **mission engineering and systems of systems**, addressing mission threads, architectures, governance, safety, security, cost estimation, risk analysis, and modeling. Students will learn to tackle modern engineering challenges and ensure mission success.



EXPECTED LEARNING OUTCOMES

- Understand the foundational concepts of Mission Engineering and System-of- Systems.
- Identify and overcome the limitations of traditional engineering analysis and planning methods.
- Utilize mission threads to articulate operational needs and inform system requirements.
- Develop and govern mission architectures that are safe, secure, integrated, and interoperable.
- Estimate costs, analyze risks, and conduct effective experimentation within ME and SoS contexts.
- Apply advanced modeling and simulation techniques to support mission planning and execution.

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.

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ENROLLMENT
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COURSE SCHEDULE

SESSION 0.5

- Course introduction and Overview
- Mission engineering in the context of system of system development and integration

SESSION ONE

- Foundational concepts of mission engineering and systems of systems

SESSION TWO

- Limitations of traditional engineering methods to develop and integrate systems of systems

SESSION THREE

- Mission threads and the articulation of operational needs

SESSION FOUR

- Fundamental concepts of mission architecture
- Guiding principles for establishing a mission architecture
- The role of systems and platforms to architect a mission

SESSION FIVE

- Intentional design of governance structures in mission engineering
- Governance decision making

SESSION SIX

- Cost estimation, risk analysis, and experimentation for missions

SESSION SEVEN

- Advanced modeling and simulation techniques for mission engineering
- Test and evaluation in the context of mission engineering

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