Instructor Info  
Dr. Kamran Turkoglu  
Office Location: ENG 272C  
Office Hours: Monday 4:00pm – 6:30pm  
Email: kamran.turkoglu@sjsu.edu

Credit  
3 units

Class Days / Time  
Tuesday, 6:00pm – 8:45pm

Classroom  
CL 222

Prerequisites  
BSc degree in Aerospace Engineering

TA:  
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Description

Engineering analysis and control; Linear algebra; Ordinary differential equations; Laplace Transformation; Complex analysis; Singular values; Matrix perturbations; and observability; Feedback stabilization; H2 and H-infinity optimization.

Goals

- Outline engineering analysis problems with emphasis on advanced level mathematics and control theory and aerospace systems.
- Investigate of aerospace systems that evolve with time. Typically these systems have inputs and outputs; it is of interest to understand how the input affects the desired output).
- In particular, concentrate on systems that can be modeled by Ordinary Differential Equations (ODEs), and that satisfy certain linearity and time-invariance conditions.

Learning Objectives

Students completing AE200 should be able to:

- Outline analysis skills in real and functional analysis, complex analysis methods.
- Investigate the response of these systems to inputs and initial conditions from the control theory perspective.
- Analyze systems obtained as interconnections (e.g., feedback) of two or more other systems.
- Derive (control) systems (and properties) that ensure desirable properties (e.g.,
controllability, observability, stability, performance) of the interconnection.

- Analyze least squares solutions to linear problems.
- Explain singular values and matrix perturbations.
- Derive solutions to state space models.
- Derive input output relationships and transfer functions between systems.
- Analyze input output stability of control systems.
- Use Bode's sensitivity integral to outline robust stability.
- Formulate reachability and observability.
- Use minimal and balanced realizations.
- Outline H2 and Hinf. optimization in control systems.

**Midterm Exam(s):**
*There will be 2(two) 120min in-class written exams, and 4(four) 25min written Quizzes.*

*Quizzes and (final) exams cannot be made up without a valid, documented excuse.*

*There is *NO* make up exam policy!!*

**Final Exam:**
*There will be a final take-home exam/project with a due date of Dec 15th, 2015 Tuesday at 5.15pm. Delivery will be online in CANVAS.*

**(Recommended) Text Book(s):**
Classnotes
Handouts

**(Recommended) Reference(s):**
Exams:
- 2(Two) 120 minutes –inclass Mid-term exams.
- Final project.

Grading:
- Homework 15%
- 4(four) Quizzes 15%
- Two 120min Exams 40%
- Final Project 30%

Important !!
All exams must be taken to receive a passing grade.

Grading Policy
100 - 95%  A
94.99 - 90%  A-
89.99 - 85%  B+
84.99 - 80%  B
79.99 - 76%  B-
75.99 - 72%  C+
71.99 - 68%  C
67.99 - 64%  C-
63.99 - 61%  D+
60.99 - 57%  D
56.99 - 53%  D-
< 53%  F

Important !!
This is only a rough scale. This scale may be adjusted depending on the performance of the class. Any adjustments to the scale will only lower the cut-offs to achieve a specified grade; cut-offs will not be raised beyond those listed here.
Schedule

Important
*If you miss a lecture, please make sure that you obtain the notes of that specific class from your class-mates.
'I did not know how to do this problem, because I missed lecture the day this material was covered' is, unfortunately, NOT a valid excuse!*

- Week-1:
  - (08/25, 2015) Tuesday:
    - HW_01 Out !!
    - Introduction to engineering analysis and control
    - Ordinary differential equations (1/2)
- Week-2:
  - (09/01, 2015) Tuesday:
    - NO Class !
- Week-3:
  - (09/08, 2015) Tuesday:
    - Ordinary differential equations (2/2)
    - Laplace Transformation (1/2)
- Week-4:
  - (09/15, 2015) Tuesday:
    - Quiz_01 !!
    - HW_01 in !!
    - HW_02 out !!
    - Laplace Transformation (2/2)
- Week-5:
  - (09/22, 2014) Tuesday:
    - HW_02 in !!
    - Linear algebra review (2/2)
    - Partial differential equations
- Week-6:
  - (09/29, 2015) Tuesday:
    - HW_02 in !!
    - Fundamentals of complex analysis
    - Review questions!
- Week-7:
  - (10/06, 2015) Tuesday:
    - Exam_01 !!
    - HW_03 out !!
- Week-8:
  - (10/13, 2015) Tuesday:
    - Quiz_02 !!
    - Least Squares Estimation
AE 200 – Engineering Analysis and Control of Aerospace Systems

- Week-9:
  - (10/20, 2015) Tuesday:
    - HW_03 in !!
    - Singular values and matrix perturbations
- Week-10:
  - (10/27, 2015) Tuesday:
    - HW_04 out !!
    - State space models and ODE solutions in Aerospace Systems
- Week-11:
  - (11/03, 2015) Tuesday:
    - Transfer functions and input/output stability
- Week-12:
  - (11/10, 2015) Tuesday:
    - Quiz_03 !!
    - HW_04 in !!
    - Bode's sensitivity integral and Robust Stability
- Week-13:
  - (11/17, 2015) Tuesday:
    - Exam_02 !!
- Week-14:
  - (11/24, 2015) Tuesday:
    - HW_05 out !!
    - Reachability and Observability
    - Minimal and Balanced Realizations
- Week-15:
  - (12/01, 2015) Tuesday:
    - Quiz_04 !!
    - Feedback stabilization
- Week-16:
  - (12/08, 2014) Tuesday:
    - HW_05 in !!
    - H2 optimization & H-infinity optimization