AE 259 Aug 3:0

Navigation, Guidance and Control

Instructor

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Department: Aerospace Engineering

Course Time: Mon-Wed-Fri 10-11 am

Lecture venue: AE 105

Detailed Course Page:

Announcements

Brief description of the course

This is graduate level introductory course on guidance, navigation and control discipline of aerospace

engineering. This is a core course for M. Tech students joining the aerospace engineering department. The

course content is divided as two/thirds for control systems and one third for navigation and guidance.

Prerequisites

None

Syllabus

Navigation and guidance: continuous waves and frequency modulated radars, MTI and Doppler radars; types

of navigation; LORAN, Decca, Omega, VOR, INS GPS; guided missiles, guidance laws: pursuit, LOS and PN

laws.

Control: Control systems â€" classical linear time invariant control systems, transfer function representations,

stability, time domain characteristics, frequency domain characteristics, root locus, Nyquist and Bode plots,

Exposure to state space analysis

Course outcomes

The students get a thorough introduction to classical control theory, including analysis and design. The concepts are applied to aircraft autopilot design emphasizing the relevance of the topics discussed in the class. The course also introduces modern control theory which can be useful in taking advanced courses offered in the controls stream. The course also provides a detailed introduction to radar theory and applications, navigation principles and guidance laws.

Grading policy

45% (3 Monthly Tests)

45% Final Exam

10% Assignments

Assignments

Assignments primarily include analytical and numerical problems on the topics discussed in the class.

MATLAB simulations exercises are also included for relevant topics.

Resources

Skolnik, M.I., Introduction to Radar Systems, McGraw-Hill, 1982.

Zarchan, P., Tactical and Strategic Missile Guidance, AIAA, 2004.

Nise, N., Control Systems Engineering, Wiley, 4th Ed., 2004.

Kayton, M., and Fried, W.R., Avionics Navigation Systems, John Wiley.

Bryson, A.E., and Ho, Y-C, Applied Optimal Control, Taylor and Francis, 1975.

Lin, C-F, Advanced Control Systems Design, Prentice Hall, 1994.

Lecture notes