
SYLLABUS

Date/ Revision 03 August 2016

Faculty Engineering

Approval

SUBJECT : SENSOR AND INSTRUMENTATION TECHNOLOGY

1. Identification of Subject:

Name of Subject :Sensor and Instrumentation Technology
Code of Subject :SENS-2100
SKS / ECTS :3/
Semester :4
Study Program :B-AVE
Lecturer :Neno Ruseno, S.T., M.Sc.

2. Competency

After having the course, students are expected to:

- a) Understand the characteristics of atmospheric environment for understanding the operation of aerospace sensors
- b) Familiar with the membranous aneroid and other atmospherically-based instruments
- c) Know radio altimeters and other autonomous radio sensors for motional parameters
- d) Understand the concept of accelerometers and gyroscope of various kinds
- e) Understand the different aspect of magnetic, gyro-magnetic, and electronic compass
- f) Know the engine parameter information collection system
- g) Understand the principles and example of sensor integration

3. Description of Subject:

This course analyzed the basic techniques for the efficient numerical solution of problems in science and engineering. Topics spanned root finding, interpolation, approximation of functions, integration, differential equations, direct and iterative methods in linear algebra.

Numerical analysis is the story of how functions, derivatives, integrals, and differential equations are handled as strings of numbers in the computer. At the heart of numerical analysis is an understanding of the speed of convergence of Taylor, Fourier, and other series expansions. Most scientists and engineers are sooner or later faced with computing tasks that require some knowledge of numerical analysis.

4. Learning Approach

Approach	: Combination of Expository - inquiry and collaborative
Method	: Discussion, question answer, sample problem, group work
Student Task	: Home work, group report, group presentation
Media	: LCD projector, slide.

5. Evaluation

a) Absence maximum	: 25%
b) Participation in discussion	: 5 points
c) Homework, Classwork	: 5 points
d) Presentation, Simulation	: 10 points
e) Daily Quiz	: 20 points
f) Final Examination	: 60 points
Total	: 100 points

6. Contents/ Topics of Lecturing:

Week	Content/ Topics of Lecturing	Text Book Chapter	Remark
1	Introduction: General Considerations; Characteristics and Challenges of the Atmospheric Environment.	Ch1[1]	
2,3	Air Pressure-Dependent Sensors: Basic Aircraft Instrumentation; Fundamental Physical Properties of Airflow; Altitude Conventions; Barometric Altimeters; Airspeed Conventions; The Manometric Airspeed Indicator; The Vertical Speed Indicator; Angle of Attack and Slip.	Ch2[1]	
4	Radar Altimeters: Pulse Radar Altimeters; Continuous Wave Radar Altimeters; Phase Precise Radar Altimeters.	Ch3[1]	
5	Autonomous Radio Sensors for Motion Parameters: Doppler Sensors for Ground Speed and Crab Angle; Airborne Weather Sensors; Collision Avoidance Sensors;.	Ch4[1]	
6,7	Devices and Sensors for Linear Acceleration Measurement: Types of Accelerometers; Accelerometer Parameters; Float Pendulous Accelerometer; Micromechanical Accelerometers.	Ch5[1]	
8	Group presentation: Groups of students will present their assignment in front of class to challenge by other students.		Group presentation
9,10	Gyroscopic Devices and Sensors: Single Degree of Freedom Gyros; The TDF Gyro in Gimbal Mountings; The Gyroscopic Integrator for Linear Acceleration; Contactless Suspension Gyros; The Fiber Optic Gyro; The Ring Laser Gyro; Dynamically Tuned Gyro; Solid Vibrating Gyros;	Ch6[1]	

	Micromechanical Gyros; .		
11	Compasses: Magnetic Compasses; Fluxgate and Gyro-Magnetic Compasses.	Ch7[1]	
12	Propulsion Sensors: Fuel Quantity Sensors; Fuel Consumption Sensors; Pressure Sensors; Engine Temperatures; Tachometry; Vibration Sensors.	Ch8[1]	
13	Principles and Examples of Sensor Integration: Sensor Systems; Fundamentals of Integrated Measuring System Synthesis; Example of Two-Component Integrated Navigation Systems.	Ch9[1]	
14	Rehearsal and Tutorial: Rehearsal of all subject and students can ask for more detail.		
15	Final Examination		

7. Book Reference:

- a) **Main Text Book:** [1] "Aerospace Sensors, 1st Edition, 2013", Authors: Alexander V. Nebylov, Publisher: Momentum Press
- b) **Supplement Textbooks:**