

MECH3680 Avionics Systems (Spring 22-23)

Note: Any and all parts of this syllabus are subject, at any time to alteration, deviation or omission, according to the needs and/or progress of the class.

Course Code: MECH 3680	Course Title: Avionics Systems
Required Course Or Elective Course: Required	Terms Offered (Credits): Spring (3 credits)
Faculty In Charge: Hongyu Yu	Pre/Co-Requisites: Pre-requisites: ELEC2420 Co-requisites:
Course Structure: Lecture – 2 lectures per week, TTh. 10:30-11:50PM, Tutorial: Th. 12:00-12:50PM *Note: since we have flight simulation labs, the lectures and tutorials on April 13,20,27th and May 4th will be rearranged accordingly.	
Textbook/Required Material: Collinson, R.P.G., Introduction to Avionics Systems, 3 rd Edition, Springer, 2011 (available online through HKUST library)	
Bulletin Course Description: 1. Required course for BEng in Aerospace Engineering 2. Subsystems for avionics: electrical system, flight control system, display and interface, navigation and sensor system, and data communication and management system.	
Course Topics: (1) Electronic and electrical systems (2) Navigation systems and other sensors (3) Radar system (4) Human-machine interface with an emphasis on display (5) Data systems (6) Flight control system	
Course Objectives: (correlated program objectives)	1. fundamental understanding on avionics systems for MAE students to partially fulfill Program Objectives (P-O1) and (P-O5).
Course Outcomes: (correlated course objectives and program outcomes)	On successful completion of this course, students will be able to: A. Understand basic concepts of avionics and its system structure (POC1, POC3, POC4, POC5); B. Analyze basic requirements and specs for individual avionics systems (POC1, POC3, POC4, POC5); C. Recognize basic applications and integration of different avionics systems (POC1, POC3, POC4, POC5); D. Envision future trends of avionics development (POC9, POC10);
Assessment Tools: (correlated course outcomes)	Learning activities: <u>Lectures:</u> Introduce key concepts and theories, and teach analysis skills with application examples. (A-D)

	<u>Projects:</u> Train students to be familiar with avionics systems and their functions <u>Assessment:</u> ♦ Homework sets (15%, including 5-6 Homework), Midterm (30%), Flight simulation (12%), Final exam (40%), Attendance (3%): to test whether students have achieved outcomes A-D.	
Tentative course schedule	Topics	lecture
	1, Intro to avionics and its functions	1-2
	2, Display and interface	3-4
	2, RADAR+GPS navigation	5-8
	3, Inertial sensors and navigation	9-11
	Midterm	12
	4, Electrical+battery+EV plane	13-15
	5, Air sensors + Air Data	16-17
	6, Flight simulation lab project	18,20,22,24
	7, Payload + SLAM	19,21
	8, Fly by wire, communication + system engineering	23, 25

Policy

1, All communications will go through Canvas. You should check your emails, which are associated with your Canvas account, regularly at least once daily. Or you can log in to your Canvas account regularly at least once a day. You are responsible for accepting and responding to the instructor and TA's communication in time.

2- Exams: Except for a conflict with another examination (which must be given at the time listed for it in the time schedule), or for students who have 3 or more exams on the same day, no changes can be made to the examination schedule without prior approval of the Dean. I will not support such requests unless they involve circumstances beyond a student's control. Airline reservations and work schedules are within the student's control.

3- Exams: There are no make-up tests. If you miss a test, you will get a zero. If you miss a test due to a medical reason, please provide a note from your doctor.

4- NO Late Homework and assignments. If you miss a deadline for homework or other assignments due to medical reasons, please provide a note from your doctor.

5- DO NOT SEE the TA for correction or mistakes in HW grading, please contact Prof. Yu directly.

6- Attendance is required. We will have 10 times random attendance checking during lectures and tutorials. If the record shows 8-10 times attendance, the student will receive the full 3% mark, 6-7 times: 2.5%, 5 times: 2%, 4 times: 1.5%, 3 times: 1%, 2 times: 0.5%, 0-1 times: 0%. If you have a special reason and cannot attend the class, please send me an email asking permission before the class. Attendance for flight simulation labs will be counted toward the lab score.

ACADEMIC DISHONESTY! ZERO tolerance

Academic honesty is expected of all students in all examinations, papers, reports, homeworks and academic transactions and records. There will be zero tolerance for dishonesty in this class. Formal procedure will be triggered automatically once a suspected behavior has been discovered. For more information, see <http://acadreg.ust.hk/generalreg.html>

BEng in Aerospace Engineering (4-year program)

Program Objectives:

- P-O1. Be able to communicate and perform as an effective engineering professional in both individual and team-based project environments,
- P-O2. Have an international outlook with clear perspectives on the Pearl river Delta and Greater China,
- P-O3. Be able to research, design, develop, test, evaluate and implement engineering solutions to problems that are of complexity encountered in professional practice and leadership,
- P-O4. Clearly Consider the ethical implications and societal impacts of engineering solutions,
- P-O5. Continuously improve through lifelong learning.

Program Outcomes:

- POC1. Ability to identify and formulate problems in multidisciplinary environment with an understanding of engineering issues and constraints
- POC2. Ability to design and conduct experiments as well as analyze and interpret data
- POC3. Ability to apply knowledge of mathematics, science, and engineering for problem solving in mechanical engineering and related sectors or for further education in a research career
- POC4. Ability to develop specification and to design system, component, or process to meet needs
- POC5. Ability to understand the design, operation, and maintenance of aircraft components and systems
- POC6. Ability to use modern engineering tools, techniques, and skills in engineering practice
- POC7. Ability to communicate effectively
- POC8. Ability to function in multi-disciplinary teams and provide leadership
- POC9. Broadly educated with an understanding of the impact of engineering solutions on issues such as economics, business, politics, environment, health and safety, sustainability, and societal context
- POC10. Clear understanding of professional and ethical responsibilities
- POC11. Recognition of the need for life-long learning and continuing education
- POC12. International outlook with knowledge of contemporary issues