BERGEN COMMUNITY COLLEGE
DIVISION OF MATHEMATICS, SCIENCE AND TECHNOLOGY
DEPARTMENT OF INDUSTRIAL & DESIGN TECHNOLOGIES

COURSE SYLLABUS
AVT – 210 INTRODUCTION TO AIRCRAFT AVIONICS I

INSTRUCTOR: _____ **OFFICE: _____**

EMAIL: _____ **PHONE: _____**

COURSE TITLE: **AVT – 210 Introduction to Aircraft Avionics I**

COURSE DESCRIPTION: Introduction to Aircraft Avionics I is the first in a two course sequence. It is a study of the electronics and computer technologies that have revolutionized the aircraft industry. Topics considered include: avionics bus systems used for fly-by-wire intra-aircraft communications, types of digital communications signals used, basic digital logic, various valid input and output levels, and digital states. Avionics system architectures, concept applications, and practical aircraft usage will be stressed.

CREDITS/HOURS: 4 credits, includes lab: 6 hours (3 lecture, 3 lab)

PREREQUISITE: ELC-203

COREQUISITE (or PREREQUISITE): ELC-204 or by permission of the Academic Department Chair

GEN ED COURSE: No

STUDENT LEARNING OBJECTIVES:

As a result of meeting the requirements for this course the student will:

1. Demonstrate the fundamental concepts of avionics circuits and systems and how they are utilized in present real-world applications.
2. Demonstrate basic knowledge of fundamental principles and characteristics of electrical/electronic systems involved with avionics systems.
3. Be able to solve avionics problems using circuit measurements and related techniques, computer-based techniques, and be able to define and describe basic BITE/BIT Built-In-Self-Test automatic processes.
4. Demonstrate basic concepts of navigation tools and their ability to help plan and manage flight.
5. Demonstrate knowledge of how to use tools to measure and obtain information leading to the diagnosis for circuit and related system malfunctions.
6. Demonstrate understanding of some basic principles of electronic systems features and how they are applied in avionics technology.

ASSESSMENT MEASURES: Student learning objectives will be assessed by:

1. Written assignments and/or quizzes
2. Written Tests
3. Laboratory exercises or other assessments as determined by the instructor.

COURSE CONTENT:

	TOPIC	CHAPTER *
1	Basic Solid State Devices, Basic Logic Circuitry Overview, Introduction to Digital v/s Analog, Driver Circuit Review	1
2	Servo, Synchro, and Tachometer Rate Generators, Basic Vectors	3,4
3	Basic logic levels, Introduction to Basic Gates	-
4	Direction, Inertial and Magnetic Compass Systems	5,6,7
5	Logic Circuit Edge Rates, Logic Gate Propagation Delays	-
6	Basics of Radio Waves: Waves, Amplifiers, Detection/Directionality: SSB, AM, FM	8, -
7	GPS basics	9
8	Aircraft Power ac/dc	-
9	VOR (Very High Frequency Omni-Range)	10
10	Introduction to ILS, Distance Measuring Systems, ATC (Air Traffic Control) electronic system	11, 12, 13
11	Marker Beacons, Radio Altimeter Systems Principles, Ground Proximity Systems	14, 18
12	Digital Latches, Registers, Serial v/s Parallel, Digital Codes, Binary, Binary Arithmetic Basics, Active Lo/Hi Logic	-
13	Fundamental Basic Microprocessor Architecture, Busses, Memory structure, BIT basics	-
14	Area Navigation Systems Introduction	24

* Material comes from the indicated chapter(s) and is supplemented with additional information for certain topics

TEXTBOOK:

Avionics Fundamentals, Mike Restivo, Jeppesen (publishing company, " A Boeing Company") Englewood, CO, USA, © United Airlines Published 2006 www.jeppesen.com ISBN-13: 978-0-88487-432-4

REFERENCE BOOKS:

Aircraft Electricity and Electronics Thomas K. Eismin, Glencoe Mc-Graw-Hill, New York, NY, USA © 1989 (2011 imprint) ISBN-13: 978-0-02-801859-1

Avionics Systems Operations and Maintenance James W. Wasson, Jeppesen (publishing company, Sanderson Training Products, Jeppesen Sanderson Inc.) Englewood, CO, USA © 1994 James W. Wasson, ISBN: 0-89100-436-X

Aircraft Wiring and Bonding AC 21-99, Aircraft Technical Book Company, www.ACTechbooks.com ISBN: 978089 386580 3

COURSE GRADE: Students should refer to the instructor's grading policy which will be distributed at the first meeting of class. Attendance and tardiness policies will be determined by the instructor for each section of the course. These will be established in writing on the individualized course outlines. Attendance will be kept by the instructor for administrative and counseling purposes.

EXAMINATION REQUIREMENTS There will be 3 to 5 (4 ± 1) tests, each of equal weight. For further details, students should refer to the instructor's grading policy which will be distributed at the first meeting of class.

ATTENDANCE POLICY The instructor will review the attendance policy on the first day of class.
All students are expected to attend punctually and completely every scheduled meeting of each course in which they are registered. Attendance policies and sanctions are to be determined by the instructor of each section of each course. These will be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

FACULTY ABSENCE PROCEDURE A daily list of class cancellations is posted on the college's web page at www.bergen.edu If students find the class has been cancelled without being posted; they should report it to the Divisional Dean's Office (A325) or to the Evening Office (C-107).

STUDENT SUPPORT SERVICES

Learning Assistance Center	Room: L-125	201-447-7908
Sidney Silverman Library	Room: L-226	201-447-7436
Office of Specialized Services	Room: L-115	201-612-5270
Academic Counseling Center	Room: A-118	201-447-7211

COURSE OUTLINE AND CALENDAR

Lecture etc. WEEK	**TOPIC/ACTIVITY**	**STUDENT LEARNING OBJECTIVES**
1	Basic Solid State Devices Overview, Basic Logic Circuitry Overview, Introduction to Digital v/s Analog, Driver Circuit Review; Course Orientation and Introduction	1, 2, 6
2, 3, 4**	Servo, Synchro, and Tachometer Rate Generators, Basic Logic Levels, Introduction to Basic Gates, Logic Gate Symbols, Logic "1" 's and "0" 's, EOS	1, 2, 3, 5

5	Direction, Inertial and Magnetic Compass Systems	2, 4, 6
6	Logic circuit Edge Rates, Logic Gate Propagation Delays	1, 2, 3, 5, 6
6, 7	Basics of Radio Waves: Waves, Amplifiers, Detection/Directionality: SSB, AM, FM	1, 2
7, 8	GPS basics	4, 6
9	VOR	2, 4, 6
10	Aircraft Power ac/dc 3ø Power, WYE (Y) – DELTA (△) Power, Neutral, The dc bus,	2, 3, 5, 6
11	Basics of Radio Waves: Waves, Amplifiers, Detection/Directionality; SSB, AM, FM	2, 4, 6
12	ILS, Distance Measuring Systems, ATC (Air Traffic Control) electronic systems	1, 2, 6
13	Market Beacons, Radio Altimeter Systems Principles, Ground Proximity Systems	1, 6
14	Introduction to Fundamental Basic Microprocessor Architecture, Busses, Basic Logic Levels, Memory Structures, NAND/NOR equivalencies and why, BIT basics, Area Navigation Systems	1, 2, 4, 6
15	The last class meeting is reserved for the last lab experiment and/ or the last test (If the last class for the semester falls on the last lab day, then the last lab day is used for this purpose.)	ALL

**Laboratory experiment 1 can be done after lecture 1 or lecture 2. (This was set up to allow this, since room scheduling sometimes puts the first class of the term in a lab room and sometimes in a lecture room (each about half the time). For the first case, lecture one can be given in a properly equipped lab room. This produces the first two lectures consecutively, then followed by the first lab experiment).

*Tests will ordinarily be scheduled during class. Tests will be announced at least the week before. There will be 3 to 5 tests of equal weight. Quizzes may occur at anytime with or without notice.
**Some lab time may be transferred or split with lecture/discussion time to cover background and other related material, if needed.

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(This is done since room scheduling sometimes puts the first class of the term in a lab room and sometimes in a lecture room (each about half the time). For the first case, lecture one can be given in a properly equipped lab room. This makes the first two lectures consecutive, that is then followed by the first lab experiment. For the second case the first lab experiment benefits from the material covered in the first lecture.)

Laboratory Experiences and Experiments

WEEK	EXPERIMENT	STUDENT LEARNING OBJECTIVES
1 **	Introduction to basic logic – Relay Logic AND, OR, NOT, Shutdown Latch	2
2 – 3	Basic Logic Gate – Solid State (IC) input and output, V_{IH}, V_{IL}, V_{OH} and V_{OL}.	1, 2, 3, 5
4 – 5	Adding Magnetic Fields in a Synchro	1, 2
6 – 7 ***	Digital Signals: Edge Rates, Wavefroms, Maximum Clocking Rate Considerations Gate Propagation Delay, Revisiting Threshold	2, 5
8 ***	Bipolar (differential/transverse) Digital Signals (NRZ/RZ)	1, 2, 3, 5, 6
9	NAND/NOR/INVERT equivalencies, Parallel Adder (XOR)	1, 2, 6
10 – 11	Flip-Flop Basics Latches, Registers	2, 5
12	Three Phase Rectifier – Basic Operation and Ripple	1, 2, 5, 6
13 – 14	A Sequencer (State Change Basics)	2, 5
15	Parallel to Serial and Serial to Parallel Conversion	2

** Laboratory experiment 1 can be done after lecture 1 or after lecture 2. (See earlier note for details)

***Some lab time may be transferred or split to lecture/discussion time to cover background material, if needed.

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