

FORM VERSION: 5/95

DATE REVISED: 9/9/99

**PALOMAR COLLEGE**  
**COURSE OUTLINE OF RECORD FOR**  
**DEGREE CREDIT COURSE**

  X   Transfer course                      X   A.A. degree applicable

**COURSE NUMBER AND TITLE:** AERONAUTICAL SCIENCE 140  
Aviation Mathematics and Modern Navigation  
Systems

**UNIT VALUE:** 3

**MINIMUM NUMBER OF SEMESTER HOURS:** 48

**BASIC SKILLS REQUIREMENTS:**

Appropriate language and computational skills.

**ENTRANCE REQUIREMENTS:**

**PREREQUISITE:** None

**COREQUISITE:** None

**RECOMMENDED PREPARATION:** None

**SCOPE OF COURSE:**

The nature and properties of numbers and arithmetic operations utilizing the flight computer for improvement in operational efficiency and applications involving all forms of air navigation. Basic principles of modern navigation systems such as Loran, INS/IRS, R-NAV, TCAS, GPWS, Flight Directors, and GPS will be examined.

**SPECIFIC COURSE OBJECTIVES:**

The successful student will be able to:

1. analyze and solve mathematical type problems relating to the flight planning and operation of an aircraft as listed under units 1 and 2 below.
2. compare, contrast and describe the basis of operation of the different types of navigation devices found in modern aircraft.

**CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:**

Unit 1. USE OF E6B COMPUTER AND POCKET CALCULATOR

A. Conversions

1. Feet to meters
2. Nautical miles to statute miles to kilometers
3. ° Celsius to ° Fahrenheit

- 4. Reciprocals
- 5. Minutes to seconds to hours
- 6. Liters to gallons
- B. Time-Distance Problems
- C. Time-Fuel Consumption Problems
- D. Time-Distance-Fuel Problems
- E. Density Altitude Problems
- F. True Airspeed Problems
- G. True Altitude Problems
- H. Mach Numbers
- I. Takeoff and Landing Cross-wind Components
- J. Wind Correction Angles and Ground Speed
- Unit 2. USE OF E6B COMPUTER POCKET CALCULATOR, LOS ANGELES SECTIONAL CHART, AND PLOTTER
  - A. Rate of Climb vs. Foot/Mile Climb
  - B. Climb-Cruise-Descent Profiles
  - C. Finding Ground speed and ETA
  - D. Off Course Corrections
  - E. Radius of Action
  - F. Interpolation of Performance Charts
- Unit 3. ADVANCED NAVIGATION SYSTEMS
  - A. Loran
  - B. Inertial Navigation Systems/Inertial Reference Systems (INS/IRS)
  - C. Area Navigation (R-NAV)
  - D. Traffic Collision Avoidance Systems (TCAS)
  - E. Ground Proximity Warning Systems (GPWS)
  - F. Flight Directors
  - G. Global Positioning System (GPS)

**REQUIRED READING:**

Houser, J. Worksheets and notes on Modern Navigation Systems.  
 San Marcos, CA: Palomar College, 1999.

**SUGGESTED READING:**

Various current magazine articles on modern navigation systems.

**REQUIRED WRITING:**

A 2 page paper summarizing one of the current, modern navigation systems.

**OUTSIDE ASSIGNMENTS:**

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short term classes.

Outside assignments include completing worksheets of computational type problems, studying modern navigation system notes, studying class notes, and writing a paper.

**INSTRUCTIONAL METHODOLOGY:**

Check all that apply:

- lecture
- laboratory
- lecture-laboratory combination
- Directed study

This course may be offered as a telecourse and meets Title 5 regulations 55370, 55372, 55374, 55376, and 55378. Yes\_\_\_ No X

If yes, check all that apply.

- telecourse
- mediated instruction
- computer assisted instruction

Lecture, student practice, discussion, appropriate films/video tapes.

**GRADING POLICY AND STANDARDS** (include methods for determining whether the stated objectives have been met by students):  
(Attach additional sheets if necessary)

There will be 5 tests and one paper. The 5 tests will be averaged and then "adjusted" for the paper. Minus 5 percentage points for no paper; no adjustment for a 2 page, acceptable paper; or up to plus 5 percentage points for a longer, more in-depth paper.

**IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?**

YES\_\_\_ NO X Number of times course may be taken for credit 1.

If yes, identify specific provision of Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable.

**CONTACT PERSON:**

Jerry Houser  
(760) 744-1150 Ext. 2518

SIGNATURES ON FILE
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