

# A&AE 421 Flight Dynamics and Control

Fall 2008  
Professor Dominick Andrisani

## Course Objectives

- To study the significance of the Boeing B-17 to American history,
- To study the aerodynamic structural and dynamic properties of a B-17,
- To develop a dynamic simulation of a B-17,
- To develop an autopilot that allows for autonomous flight of a B-17.

### B-17 bomber to visit Purdue next month

The Experimental Aircraft Association's restored B-17 bomber, "Aluminum Overcast," will visit the Purdue University Airport from Sept. 4 through Sept. 8.

Five daily flight tours begin Sept. 5 at 9:30 a.m. each day. Ground tours begin daily at 2 p.m.

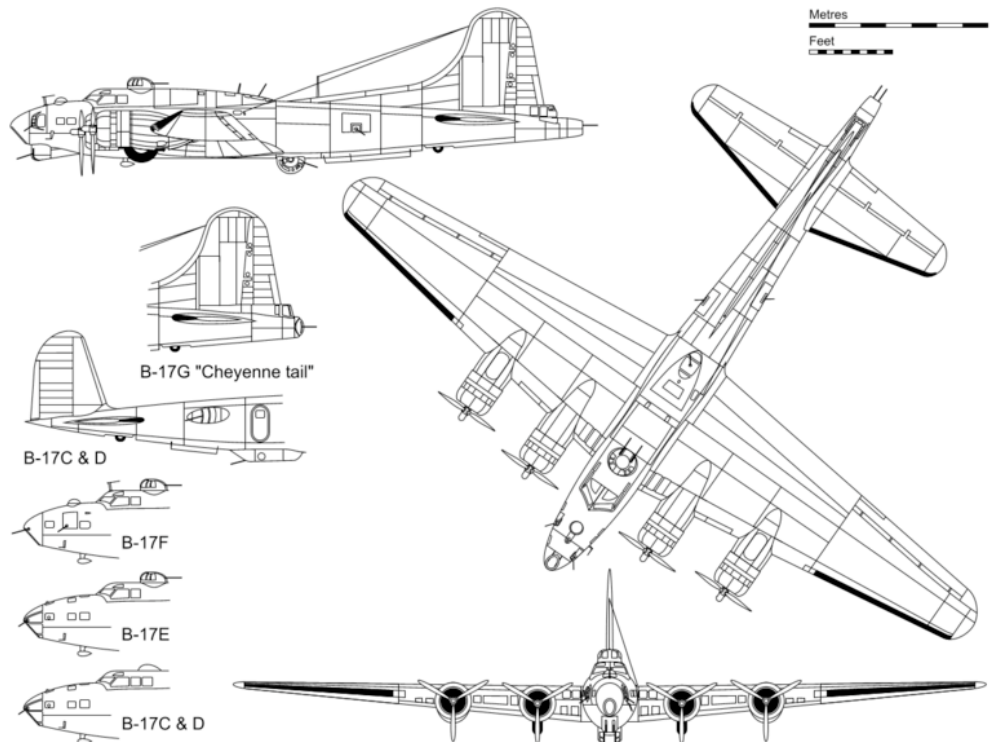
At each stop, flight "missions" are available, which allow people to take flights in the aircraft.

For information, including ground tour and flight rates, visit [www.b17.org](http://www.b17.org) or call the EAA's B-17 tour office at (800) 359-6217. Special pre-book rates on flights are available for members and nonmembers. Group rates are available for ground tours by schools or other large groups.

The airplane's crew is available at each stop to answer questions.

Local EAA Chapter 256 is the host for the B-17.

The B-17 also was called the "Flying Fortress."



## A&AE 421 Flight Dynamics and Control

1. Instructor: Professor Dominick Andrisani  
Office: Armstrong Hall Room 3203  
Office phone: 494-5135  
login: andrisan@purdue.edu
2. Textbook: Airplane Flight Dynamics and Automatic Control  
(Part I: Chapters 1-6 and Appendices A-D), **latest edition (>=4)**,  
by Jan Roskam. This book is published in as a paperback and as  
a **3-ring binder**.
3. Seating: Starting next class keep the same seat throughout the semester.
4. Grading: 50% of grade is based on homework  
20% of grade is based on 2 in-class exams  
30% of grade is based on the comprehensive final exam.
5. I reserve the right to raise or lower your grade by as much as one letter grade  
based on my judgment of your knowledge of the material in this course.
6. Course prerequisite: A&AE 364 Control Systems Analysis.
7. Course prerequisite or corequisite: A&AE 340 Dynamics and Vibrations.
8. Class attendance is strongly recommended. You are responsible for obtaining  
notes and homework assignments which take place on days you miss.
9. We will cover all six chapters of the text.
10. Grader: Yu-Ming Yang, yang110@purdue.edu, ARMS 3132
11. Web site: (will be up shortly)  
[http://cobweb.ecn.purdue.edu/~andrisan/Courses/AAE421\\_Fall\\_2008/AAE421\\_Fall\\_2008.html](http://cobweb.ecn.purdue.edu/~andrisan/Courses/AAE421_Fall_2008/AAE421_Fall_2008.html)

### **A&AE 421 Bibliography**

Abbott, Ira H. and VonDoenhoff, Albert E, *Theory of Wing Sections Including a Summary of Airfoil Data*, Dover Publications, Inc., 1949, 1959.

Abzug, Malcolm, J. and Larrabee, E. Eugene, *Airolane Stability and Control: A History of the Technologies that made Aviation Possible*, Cambridge Aerospace Series, Cambridge University Prwess,1997.

Blakelock, John H., *Automatic Control of Aircraft and Missiles*, Second Edition, John Wiley and Sons, Inc., 1991.

Biezad, Daniel J., *Integrated Navigation and Guidance Systems*, AIAA Education Series, 1999.

Cook, M.V., *Flight Dynamics Principles*, John Wiley and Sons, Inc. NY, 1997.

Etkin, Bernard, *Dynamics of Atmospheric Flight*, John Wiley and Sons, Inc., 1972.

Etkin, Bernard, *Dynamics of Flight, Stability and Control*, John Wiley and Sons, Inc., 1959, also revised edition in 1981 or 1982.

Hoak, D. E., *USAF Stability and Control DATCOM*, Air Force Flight Dynamics Laboratory, published in nine volumes or sections, Volume 4 is the most useful.

Hodgkinson, John, *Aircraft Handling Qualities*, AIAA Education Series. 1999.

McCormick, Barnes W. *Aerodynamics, Aeronautics and Flight Mechanics*, Second Edition, John Wiley and Sons, Inc., NY, 1995.

McRuer, Dwane, Ashkenas, Irving, and Graham, Dunstan, *Aircraft Dynamics and Automatic Control*, Princeton University Press, 1973.

Miele, Angelo, *Flight Mechanics Volume 1 Theory of Flight Paths*, Addison-Wesley Publishing Company, Inc., 1962.

Nelson, Robert C., *Flight Stability and Automatic Control, Second Edition*, McGraw Hill, 1998.

Pamadi, Bandu N., *Performance, Stability, Dynamics, and Control of Airplanes*, AIAA Education Series, 1998.

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Roskam, Jan, *Airplane Flight Dynamics and Automatic Flight Controls, Part I*, Roskam Aviation and Engineering Corporation, 1979.

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Stevens, B. L. and Lewis, Frank L., *Aircraft Control and Simulation*, John Wiley and Sons, Inc., 1992.

### **Homework Policy**

1. Homework is collected, graded, and returned.
2. NO LATE HOMEWORK IS ACCEPTED (unless your excuse makes me laugh or cry).
3. Cooperation on homework can be helpful in learning. Copying someone's homework will not be tolerated.
4. In reading assignments you are responsible for all material whether it is covered in class or not.
5. Homework will be graded by the TA.
6. Homework Format:
  - a. Staple multiple pages together.
  - b. Every answer must contain physical units. (e.g. feet, seconds, slugs, etc.)
  - c. All answers and physical units must be enclosed in a box.
  - d. Answers should generally contain three significant digits (i.e. 2.15,  $3.24 \times 10^{-4}$ ).
  - e. Do not hand in a paper pulled from a spiral binder.
  - f. Sketches defining coordinate directions, axis system, etc. are almost always required.

## NOTES ON NOTE TAKING

1. Date all notes. This indicates the start and end of a lecture for comparison with other notes.
2. Copy everything written on board.
3. Learn to take notes verbally without waiting for the notes to be written by the professor.
4. Take notes on material not written on the board as well. At least jot down key ideas. Fill in the explanation at home.
5. Review, correct and *copy over* all notes shortly after class. Use the text to help. Any questions which result should be resolved. After this process the copied over notes should contain no errors and you should understand them thoroughly. Notes should be as thorough as a book.

**Remark:** Step 5 is important if the class is being taught without a textbook.

### My Responsibilities in this Course

1. Facilitate your learning the material of this course.
2. Help you develop into mature, confident, competent, ethical engineers and citizens. This involves material not found in the book or course description.
3. Evaluate your level of skill (assign a grade to your work).

### Your responsibilities

1. Learn the material in this course.
2. Conduct yourself in an ethical manner regarding homework and tests and your relationships with colleagues and Purdue University.
3. Achieve the level of skill you are capable of.
4. Learn to speak and write effectively.
5. Survive till tomorrow.

### Necessary Student Skills

1. Note taking from lectures.
2. Note taking from book.
3. Time management skills including regular reading, regular homework, and regular review of notes.
4. Learn to perform well in time-restricted situations, e.g., quizzes and tests.

Concept Map A&AE 421

