

***Engineering and Technology Education Department***  
***Semester Course Syllabus***

**AV 1130 – Flight Principles**  
**Fall 2008 – 2 credits**

Class Location: ENGR 302  
Class Time: T – TR 10:30 – 11:45am  
Instructor: Nolan Clifford  
Office: Technology Building – Room 115  
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**I. Catalog Description**

Basic flight theory and physics of flight and aircraft control systems related to flight. Ground handling and servicing of aircraft. Special lab fee.

**II. Course Objectives**

This course will provide an understanding of basic theory and physics of flight, and aircraft control systems related to flight. A separate Lab curriculum for Maintenance Management students will include ground handling, taxiing, and servicing of aircraft and use of physical principles to solve basic problems.

Students will demonstrate knowledge and understanding of principles, theories, and concepts, and be able to find and interpret information and perform basic operations.

**A. Basic Aerodynamics and Flight Theory**

1. The Atmosphere
2. Laws of Physics Pertaining to Aerodynamics
3. Aerodynamic Lift
4. Drag
5. Thrust

**B. Stability and Control**

1. Airplane Axes
2. Longitudinal Stability
3. Dynamic Stability
4. Center of Gravity Effects
5. Controls
6. Directional Stability
7. Lateral Stability
8. Directional-Lateral Coupling
9. Turning Performance

**C. High-speed Aerodynamics**

1. The Speed of Sound
2. Mach Number
3. Shock Waves

4. Critical Mach Number
5. Airfoils in Transonic Flight
6. Wave Drag
7. Swept Wings
8. High Speed Airfoils
9. Control Problems
10. Area rule
11. Hypersonic Flight

**D. Fundamentals of Rotary-wing Aircraft**

1. History of Rotary-Wing Aircraft
2. Configurations of Rotary-Wing Aircraft

**E. Aircraft Performance (time permitting)**

1. Introduction to performance issues

**III. Text**

*The Illustrated Guide to Aerodynamics*, 2nd Edition, Smith (Required)  
*Aviation Technician General Section Textbook*, Jeppesen (Suggested)

**IV. Course Fee**

There will be a \$5.00 course fee for airport-based training equipment (aircraft run-ups).

**V. Grades**

Will be determined by the total points of examinations, quizzes, and lab assignments.

At least two major exams will be given.

90% -100%	A
80% -89%	B
70% -79%	C
60% -69%	D
Below 55%	F

**VI. Examination Schedule**

	<b>Professional Pilot</b>	<b>Maint. Mgmt.</b>
Midterm Examination	200 points	200 points
Final Examination	200 points	200 points
Quizzes, Problems	150 points	150 points
Participation	<u>50 points</u>	50 points
	600 Total	Lab <u>200 points</u>
		800 Total

The classroom portion of the course will run for 10 weeks at which time there will be a final examination for all students. The lab section for the Maintenance Management students will then run for the remaining 5 weeks. All Professional Pilot students who think they may want to obtain an A&P certification are encouraged to complete the lab section to document the instructional hours required by the FARs.

## **VII. Laboratory**

Projects will be assigned to coincide with the material taught in the lecture. Each student will complete all lab projects to the satisfaction of the Instructor and to the level of instruction specified by FAR 147 Appendix A and B.

## **VIII. Attendance**

Attendance is required for all A&P students, and a daily roll will be kept as required by FAR 147. If a student does not meet the attendance requirements, he/she will not be permitted to take the FAA Airframe or Powerplant exams. All absences must be made up. A minimum of 46 clock hours are required in this course.

## **IX. Accommodation for Persons With Disabilities**

If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats --large print, audio, diskette, or Braille.

### **AV 1130 Fall 2008 Flight Principles Lab Laboratory Lecture**

- A. Ground Operation and Servicing**
  - 1. Aircraft Ground Safety and Run-up Precautions
  - 2. Start, Move, and Ground Operate Aircraft
  - 3. Servicing and Securing of Aircraft
  
- B. Identification, Selection, and Handling of Aviation Fuels**
  - 1. Aircraft Fuel Identification
  - 2. Turbine Fuel Identification
  - 3. Handling and Storage of Aircraft Fuels
  
- C. Aircraft and Shop Safety**
  - 1. Ground Handling and Servicing, and Safety
  - 2. OSHA Requirements and Shop Safety

## Laboratory Projects

**A. Start, ground operate, move, service, and secure aircraft.  
Identify typical ground operations hazards.**

Hours Level

- |     |     |   |
|-----|-----|---|
| 1.0 | (2) | 1. Start, perform run-up checks of an aircraft                  |
| .5  | (2) | 2. Taxi an aircraft   |
| .5  | (2) | 3. Tie and secure an aircraft                                   |
| .5  | (2) | 4. Assist in movement of an aircraft by hand                    |
| .5  | (2) | 5. Select proper oil for an aircraft engine                     |
| .5  | (2) | 6. Select proper fuel for an aircraft                           |
| 1.0 | (2) | 7. Fuel and defuel an aircraft                                  |
| .5  | (2) | 8. Clean, degrease and polish aircraft and aircraft<br>Windows. |

**B. Use the principles of simple machines, sounds, fluid, heat,  
dynamics, basic aerodynamics, aircraft structures, and  
theory of flight.**

Hours Level

- |      |     |   |
|------|-----|---|
| 3.0  | (2) | 1. Apply the principles of physics related to flight<br>and determine solutions to basic problems.<br>a. Simple Machines<br>b. Energy<br>c. Work & Power<br>d. Levers<br>e. Inclined Planes<br>f. Pulleys and Gears<br>g. Stress and Strain<br>h. Motion<br>i. Specific Heat<br>j. Temperature<br>k. Pressure<br>l. Gas Laws<br>m. Fluid Dynamics<br>n. Sound |
| 2.0  | (2) | 2. Define basic aerodynamic terms and solve basic<br>problems   |
| 2.0  | (2) | 3. Identify basic structural elements   |
| 3.0  | (2) | 4. Solve problems dealing with theory of flight   |
| 15.0 |     | Total Hours   |