

# Private Pilot Ground School

## Week 1: Introduction to Flight

*“When once you have tasted flight, you will forever walk the Earth with your eyes turned skyward, for there you have been, and there you will always long to return.”*

- Leonardo da Vinci

*“It is possible to fly without motors, but not without knowledge and skill.”*

- Wilbur Wright

# Jeremy Axelrod

- 4<sup>th</sup>-Year Engineering Physics Major
- PPGS student, fall 2011 semester.
- Private Pilot since August 7, 2012; Instrument rated as of July 31<sup>st</sup>, 2014; tailwheel endorsement
- Trained in Montague, CA (KSIY) and Klamath Falls, OR (KLMT) flying a Cessna 172C, 172K, and Bellanca Citabria. Instrument rating out of Oakland, CA (KOAK) in a Piper Archer II.



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# Howard Brown

- 4<sup>th</sup> Year Mechanical Engineering, Business/Economics
- Home Airport: Whiteman (KWHP), Pacoima, CA
- Private Pilot (Summer 2010) in Cessna 172s

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# Crispin Herrick



- PPGS student, spring 2014
- 4<sup>th</sup>-year Molecular Cell Biology major
- Private pilot in summer 2014 out of Chino, CA

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# Austen Iverson

- 2<sup>nd</sup> Year intended Pre-Haas Business Administration
- KMHE is home for me in the bustling city of Mitchell, South Dakota
- Private Pilot (April 2012) in Piper PA-28.

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ImageQuest Photography - Patrick Ziegler 2012

# Trevor Nesbitt

tnesbitt@berkeley.edu

- Private Pilot & 3<sup>rd</sup> Year at Cal
- Trained @ Palomar Airport (San Diego) in a Piper Archer
- Complex and high-performance endorsements from training in a “highly” modified Navion



Call!



# Aaron Wienkers

- 4<sup>th</sup> Year Mechanical Engineering, Astronomy
- Started flying in Green Bay, WI in a 1979 Cessna 172N.
- Got PPL Summer 2009 in a Cirrus SR20.

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# Faculty Advisor: Jasenka Rakas

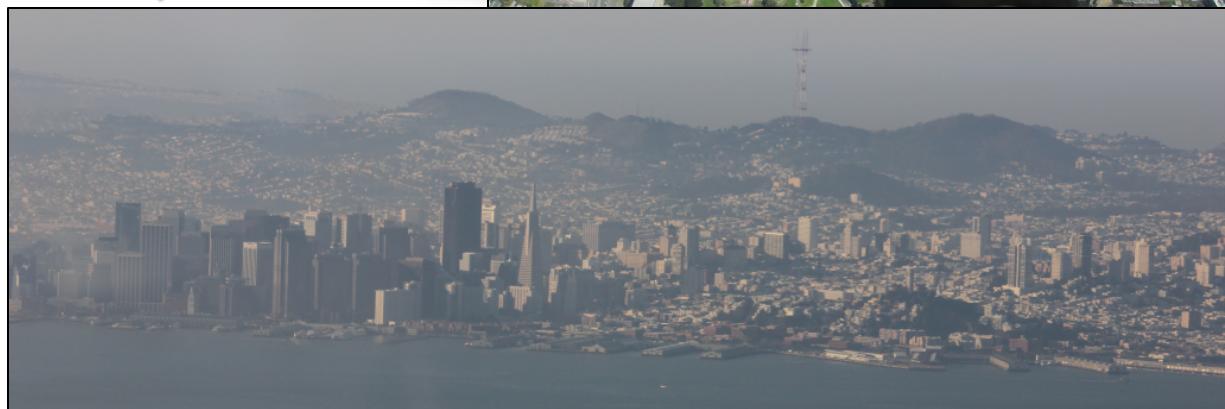
- Deputy Director of the UC Berkeley National Center of Excellence for Aviation Operations Research (NEXTOR) and its lead aviation researcher
- Director of the Airport Systems Planning and Design Short Course
- Faculty lecturer in the Civil and Environmental Engineering Department
- A founding chair of the UC Berkeley Advanced Aviation Educational Program, the Airport Design Studio and the National Airspace System Infrastructure Conference
- Vice-chair of the Transportation Research Board Committee for Airfield and Airspace Capacity and Delay (AV060) of the National Research Council



<http://www.ce.berkeley.edu/~rakas/index.html>

# Why Fly?

- Fun! Sightseeing, aerobatics, freedom to travel, adventure, *flying*.
- Compensation/Career (with a Commercial Pilot's License and above)
- Personal Transportation
  - Fast and direct; typical single-engine aircraft cruise speed is ~90-150kt = 104-173mph



# Why Fly?

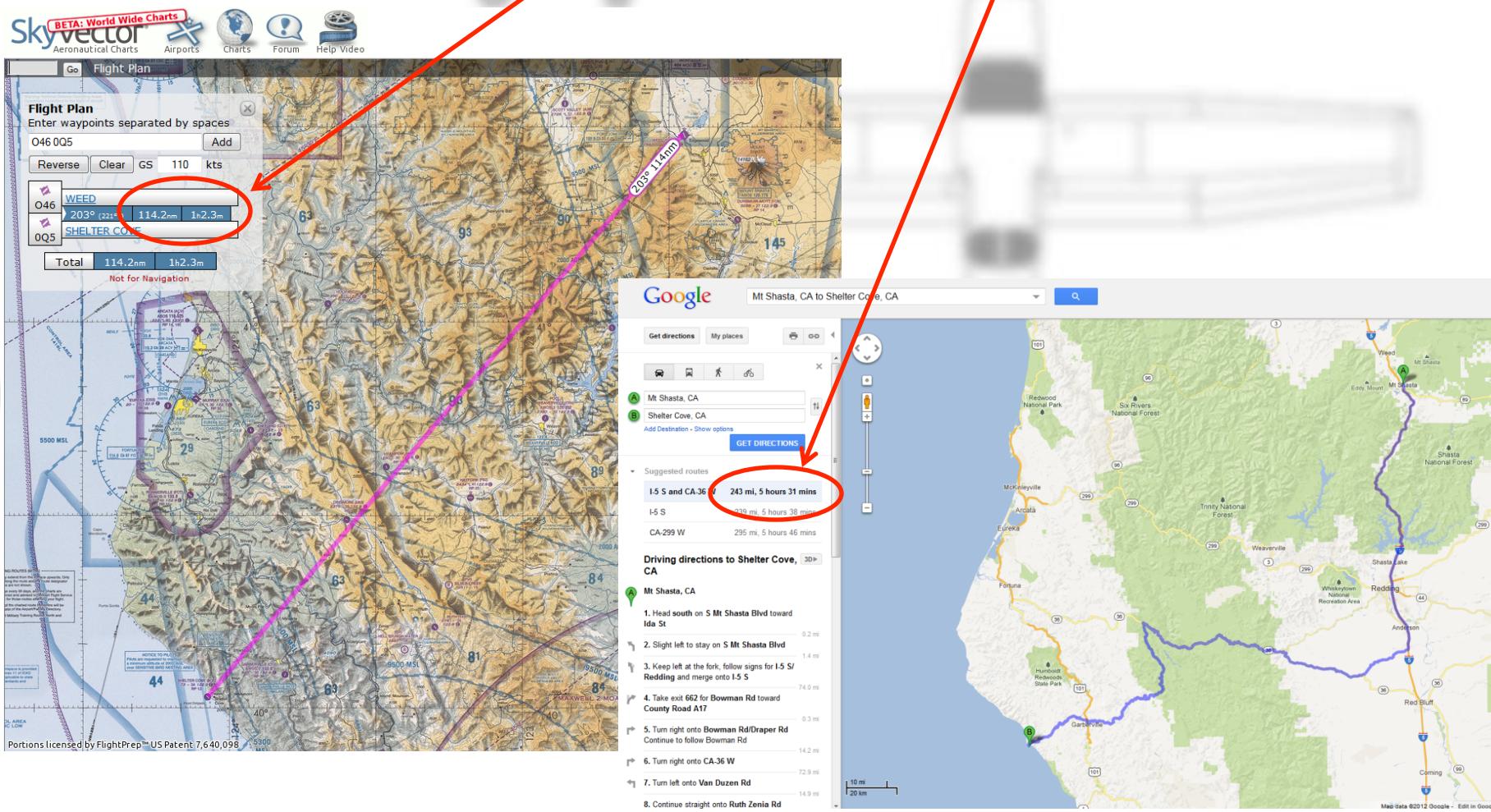
- Extreme example in practicality: My house to Shelter Cove, CA



131.4mi, 1:02 @ 110kt – Flying

# Why Fly?

- Extreme example in practicality: My house to Shelter Cove, CA



# Why Fly?

HOWEVER,

- Associated costs are fairly high:
  - Fuel ~\$6/gal, typical single-engine plane burns anywhere from 5-20 gal/hr. Typical trainer aircraft rental cost is ~\$100+/hr of flight time.
- Extra skill and care needed compared to other modes of transportation.



# Safety of Flight

- According to the 2011 Nall Report, there were 214 fatal accidents in non-commercial, fixed-wing aircraft in 2010, resulting in 360 fatalities. That year, non-commercial, fixed-wing aircraft in the United States were flown for approximately 18.42 million total flight hours. Thus there were 1.95 fatalities per 100,000 flight hours.
- According to the National Highway Traffic Safety Administration (NHTSA), there were 32,367 fatalities in traffic accidents in 2011, with 1.1 fatalities per 100 million miles travelled.
- Assuming an average speed of 120mph for aircraft, there were then 16.25 fatalities in non-commercial, fixed-wing aircraft per 100 million miles travelled.
  - This puts the safety of flying somewhere between driving and riding a motorcycle
- However, 69.2% of fatal accidents were “pilot-related” (i.e. pilot error). Fortunately, this is a more easily correctable cause than something like mechanical failures, which accounted for 10.3% of fatal accidents.
- A common misconception is that an engine failure in a single-engine aircraft is, to use a euphemism, “the end”. In fact, only ~10% of engine failures in single-engine aircraft result in fatalities.

# Learning to Fly: Types of Licenses

License – Governs privileges allowed as pilot-in-command. Issued by FAA.

Ratings – Determines what types of aircraft can be flown, and in what weather conditions. Issued by FAA.

Endorsements – Determines what types of aircraft can be flown within a rating, and how they can be flown. Issued by a Certificated Flight Instructor (CFI).

\*Sport Pilot – Small aircraft only, max. 1 passenger, no night flying, etc.

\*Recreational Pilot – max. 1 passenger, no night flying, etc.

\*Private Pilot – cannot fly for compensation/hire

\*Requires no prior license

Commercial Pilot – CAN fly for compensation/hire

Airline Transport Pilot – can fly large airliners with passengers

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“Type” – generally, aircraft with a MTOW $\geq$ 12,500lbs, or jets

“Multi-Engine” – aircraft with 2 or more engines

“Seaplane” – aircraft capable of operating from water

“Instrument” – fly in clouds, low visibility, or above 18,000’

“Private Pilot” – cannot fly for compensation

at flying, etc.

\*Requires no prior license

Commercial “Complex” – aircraft with retractable landing gear, flaps, and a variable-pitch propeller

Airlines “High-Performance” – aircraft with more than 200hp per engine

“Pressurized” – aircraft with pressurization capable of flying at high altitudes

“Tailwheel” – aircraft with a tailwheel or tailskid rather than a nosegear

# Learning to Fly: Path to License

Ground school (book knowledge)

Begin flight training (flying with a CFI)

Pass CFI-administered pre-solo written exam

First Solo flights, complete flight training requirements\*

Take oral test; Take practical flight test (usually both happen in the same day) from a Designated Pilot Examiner (DPE)

Obtain 3<sup>rd</sup>-Class Medical Certificate/Student Pilot's license combination from an Aviation Medical Examiner (AME)

Student Solo

Take FAA written exam

Qualify to take Practical Test

Private Pilot License

This class covers all of the material covered in a typical for-profit ground school, but for a small materials fee instead of \$400+

\*Requirements for practical flight training are detailed in the Federal Aviation Regulations (FAR) §61.109 and §61 Subpart C.

# Learning to Fly: Flight Schools

- Two main options: “Part 61” or “Part 141”
- Part 61:
  - Contact a CFI directly and begin practical training, no structured “flight school” need be involved. It’s just you training with your instructor.
- Part 141:
  - Official flight school. Often has an established infrastructure and teaching curriculum. CFI’s usually work for flight schools on a commissioned basis.

## PART 61 Advantages:

- Can sometimes be cheaper
- More flexible to your pace of learning (with a good instructor)
- More personal experience than with a flight school

## PART 141 Advantages:

- More structured
- School has a reputation to uphold
- More “professional”-feeling environment

# Learning to Fly: Flight Schools

- Bay Area Flight Schools (list may be incomplete and does not include North Bay airports—Petaluma, Novato, Napa, etc. Some schools may operate under Part 61 and merely serve as a focal point for CFI's, students, and rental planes):
  - Buchanan Field, Concord (KCCR)
    - Pacific States Aviation (<http://www.commercial-pilot-training.com/>)
  - Livermore Airport, Livermore (KLVK)
    - Red Sky Aviation (<http://www.redskyaviation.com/>)
    - Ahart Aviation Services (<http://www.ahart.com/>)
    - Attitude Aviation (<http://www.attitudeaviation.com/>)
  - Oakland Intl. Airport (North Field), Oakland (KOAK)
    - Alameda Aero Club (<http://www.alameda-aero.com/instruction/>)
    - Oakland Flyers (<http://www.oaklandflyers.com/>)
  - Hayward Airport, Hayward (KHWD)
    - Flying Vikings (<http://www.flyingvikings.com/>)
    - Hayward Flight (<http://www.haywardflight.com/pilotprograms.html>)
    - California Airways (<http://www.california-airways.com/>)
  - San Carlos Airport, San Carlos (KSQL)
    - San Carlos Flight Center (<http://sancarlosflightcenter.com/>)
    - Bel-Air International (<http://www.belairintl.com/>)
    - West Valley Flying Club, San Carlos Location (<http://www.wvfc.org/home>)
  - Palo Alto Airport, Palo Alto (KPAO)
    - Stanford Flying Club (<http://flystanford.com/>)
    - Advantage Aviation (<http://www.advantage-aviation.com/>)
    - Sundance Flying Club (<http://www.fllysundance.org/>)
    - Advanced Flyers (<http://www.advancedflyers.com/>)
    - West Valley Flying Club, Palo Alto Location (<http://www.wvfc.org/home>)

# Learning to Fly: Costs

- The FAA requires a minimum of 40hr or 35hr (Part 61 vs. Part 141, respectively) of total flight time as a student pilot in order to qualify to take the private pilot practical test; however, most people require more time than this to adequately prepare to take (and pass) the practical test. The national average is around 70hr.
- Expect to pay *at the very least* \$100/hr for the aircraft.
- Expect to pay *at the very least* \$40/hr for a CFI.
- Therefore, assuming that you are able to pass the practical test after logging 70hr of total time as a student pilot (say, 50hr of which was with a CFI and 20hr was solo), you can expect to pay about **\$9000 total**. Be aware that depending on your training schedule, the license can take anywhere from several weeks to several years to train for.
- **For some people, this cost will be substantially lower; for some it will be substantially higher (depending on your aptitude).**

# Learning to Fly: Costs

- The instructors of this class averaged about
  - 58 Flight hours to license
  - 17 months to license (minimum of 3 months)
  - \$6600
- **The take-home point: None of us has ever known anyone who had the passion for aviation but couldn't find a way to pay for it.**

# PPGS DeCal Course Outline

- This course is designed to prepare students to pass the FAA written exam required to take the PPL practical test. It will be more rigorous than the average DeCal. We understand that some of you may not have immediate plans to get a PPL, but we do not wish to shortchange (in any way) students who do.
- General Syllabus:
  1. Fundamentals of Flight (physics of flight, aircraft systems)
  2. Flight Operations (airports, charts, airspace, radar & ATC, radio procedures)
  3. Aviation Meteorology (basic weather theory, hazards, obtaining weather information, “go/no-go” decisions)
  4. Performance and Navigation (aircraft performance, pilot performance, flight planning)
  5. Federal Aviation Regulations (FAR) applicable to PPL
- Textbooks will be passed out next week. The primary text for this class is Jeppesen’s “Guided Flight Discovery: Private Pilot”. *We require an \$80 cash or check deposit for the textbook which will be returned to you in exchange for us getting the textbook back at the end of the course.* Alternately, you may purchase the textbook online if you so wish.
- The primary course website will be via bSpace. Additional information, photos of flying around the Bay Area, etc. are on our additional website at  
<http://aiaa.berkeley.edu/skycal/>

# PPGS DeCal Course Outline

- Professor Rakas will be the faculty sponsor for this course. While the student facilitators have the primary responsibility of running the course, Professor Rakas has the final authority for inputting course grades. Also, if there are any complaints about the nature of the decal or how the course is run, she is the person to contact. See the Decal website for more on her responsibilities as a faculty sponsor.
- Professor Rakas maintains a webpage at  
<http://www.ce.berkeley.edu/~rakas/index.html>

# PPGS DeCal Course Outline

- Class structure:
  - Lectures Tuesdays 6-8pm in 30 Wheeler Hall, and irregular Thursdays 6-8pm in the same location. Most Thursdays will usually be for special guest lecturers from the aviation profession and industry, and for topics that are too long to cover in one class period on Tuesday.
  - We may bring in a PC-based flight simulator for the students to use and learn from on Thursdays which otherwise would have no class scheduled.
- Homework is assigned weekly (except for Week 1) and due at the beginning of the first scheduled lecture the next week (almost always Tuesday), unless otherwise specified, via electronic submission on the course website on bCourses. Late homework is not accepted.
- Homework is graded on correctness and completeness.
- There will be an optional final exam for the course—a practice FAA written test. The exam will take place in class on the last week of the DeCal.

# PPGS DeCal Course Outline

- Grading:
  - 20% Attendance
  - 20% the maximum percentage of either the optional final exam or attendance
  - 60% the maximum percentage of either the optional final exam or homework
- The course is P/F, “Pass”  $\geq 70\%$
- The highest scorer above 80% on the optional final exam will receive a free flight lesson at a local flight school.

# PPGS DeCal Course Outline

- The last free flight recipient wanted to have some extra fun:

# PPGS DeCal Course Outline

- Required course materials (~\$30):
  - San Francisco VFR Sectional Chart
  - Course Plotter
  - E6B Flight Computer
  - 2015 Federal Aviation Regulation/Aeronautical Information Manual (FAR/AIM)  
*(available online for free, or in print for ~\$10)*

Links to online retailers where these supplies can be purchased will be posted on bCourses.

- Suggested Materials (for those very committed to earning a PPL):
  - Practice PPL written test questions by Gleim
  - PC- or Macintosh-based flight simulation program (e.g. Microsoft Flight Simulator, X-plane, etc.)

# PPGS DeCal Course Outline

**Lecture Thursday:** The History of Aviation with Professor Rakas

Next week's class will be on:

**Airplane Systems**, including Powerplants and Flight Instruments

BRING YOUR \$80 CASH OR CHECK BOOK DEPOSIT NEXT TUESDAY (9/16) TO COLLECT YOUR TEXTBOOK!

Questions?

Note: The field of aviation suffers from EUA (Extended Use of Abbreviations), so it is important to be familiar with those that you come across. Some abbreviations from today were: FAA, FAR, PPL, CFI, DPE, and AME. There will be many more.