


**16.687**  
**Private Pilot Ground School**  
**Massachusetts Institute of Technology**  
**IAP 2019**

**Instructors:**  
Philip Greenspun (CFI/ATP)  
Tina Srivastava (PPL)

**Introduction**

**Sponsoring Faculty:**  
Professor R. John Hansman (CFI/CFII)



**Introductions**

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- MIT/Wellesley/Harvard/Other?
- Aero Background?
- Flight Experience?
- Purpose for taking this class?
  - Fly an airplane?
  - Fly a helicopter?
  - Remote Pilot certificate?

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## Course Objectives

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- Prepare for FAA Private Pilot Knowledge Test (“Written” as opposed to “Practical” test or “checkride”)
- Available in Airplane, Helicopter, Balloon, Glider, etc. variants
- We will concentrate on Airplane
- Prepare for FAA Remote Pilots UAS Test
- Help you get the most out of flight training
- Learn about the engineering

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3



## What’s Great about Aviation

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- Realize the ancient human dream of flight
- Understand geology and human settlement by looking at the Earth from above
- Appreciate engineering achievements
- Use all of your capabilities: mental, physical coordination, emotional control
- Get to Martha’s Vineyard in 30 minutes! (and most places a little slower than if you’d taken a Honda Accord)

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4



## What you can do

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- Nearby Airports: Norwood, Bedford, Lawrence, Beverly, Nashua, Marshfield, etc.
- All have flight schools for lessons and rentals of airplanes or helicopters
- Learn to fly in 10 hours: take off, cruise, land.
- Next 35-55 hours: learn to be safe as the only pilot in the aircraft, the FAA standard for cert.

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5



## Our local area

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6

Hanscom Field (KBED)



## Local Trip: KBHB Bar Harbor, ME

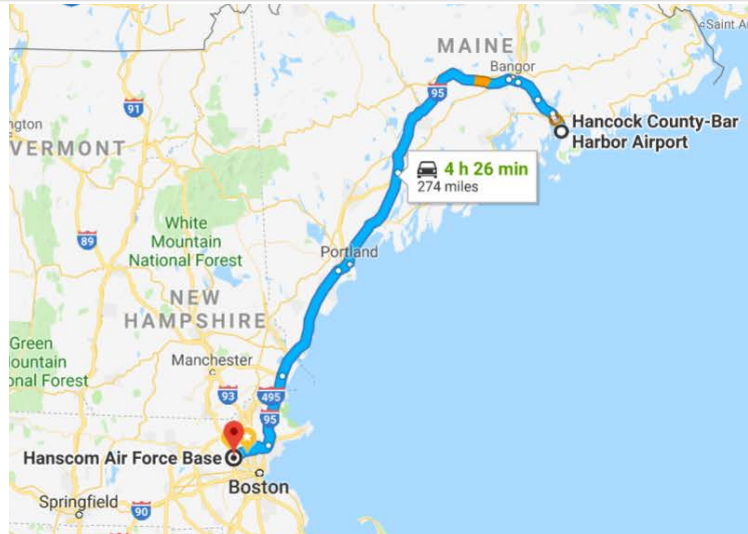
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# Flying is faster than driving

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# KBHB – Hiking in Acadia

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## 48 states; 18 days; 50 hours

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About \$5,000 in operating cost in a Cirrus SR20; see [Philip's weblog](#)



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## Why you will love it

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- A lot of people who have enough time and money to do anything they want choose to fly.
- You'll meet a lot of interesting people.
- Passion that pulls together people of all ages, education levels, nationalities, etc.



12



## Is it safe?

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- Statistically, traveling by light aircraft is less safe than being on JetBlue
- Only a tiny percentage of light aircraft accidents are related to mechanical failure
- Therefore, you can fly almost as safely as the airlines if you fly like the airlines:
  - Recurrent training
  - Develop and practice instrument flying skills
  - Two-pilot crew
  - Checklists
- All else fails? Pull the ballistic parachute!

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## Instructors: Philip Greenspun

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- MIT Class of 1982(!)
- Pilot since 2002
- Airplane instructor at East Coast Aero Club (2005)
- Helicopter instructor at ECAC (2006)
- First Officer flying CRJ-200 for Delta Airlines
- type-rated for two jets (CRJ and Cessna Mustang)
- Usually flies the Cirrus SR20, Robinson R44, Pilatus PC-12 (sea turtles!)

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14



## Instructors: Tina Srivastava

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15



## Instructors: Tina Srivastava

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- MIT Course 16, S.B., S.M., Ph.D
- Zero-G flight, satellite deployment testing
- Chief Engineer, Raytheon, \$40M radar and electronic warfare program
- Pilot since 2012
- MIT Flying Club
- Working on IFR (completed stages 3 of 4)
- Usually flies the Cessna 172

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## What you've read already

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... or what you're going to read tonight!

- FAA Pilot's Handbook of Aeronautical Knowledge, Chapters 1, 3-8, 12, 14-16
- FAA Airplane Flying Handbook, Chapters 1-3, 7-8, 10
- FAA Helicopter Flying Handbook, Chapters 1-4, 9

Don't worry if you didn't get everything.

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17



## Optional Supplies

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Typical Private student has the following in hardcopy:

- A non-FAA textbook (not necessary)
- FAR/AIM (regulations plus official FAA info)
- Test Prep Book (ASA or Gleim);
- Airman Certification Standards (ACS)

Don't forget a noise-canceling headset, e.g., Bose or Lightspeed.  
Everything is available at the front desk of a flight school.

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18

MIT  
AEROASTRO

## Getting the Private Pilots License

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- Flight Training
- Apply for Student Pilot Certificate
- Exam for 3<sup>rd</sup> class Medical Certificate
- FAA Private Pilot Knowledge Exam
  - “The Written”
  - Variants for Airplane, Helicopter, Glider, etc.
- Checkride (Practical Exam)
  - Oral section
  - Flight section

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19

MIT  
AEROASTRO

## Meenakshi Asokan

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- First experience: passenger on fly-out with MIT Flying Club (Feb 2016) – Inspired me to become a pilot



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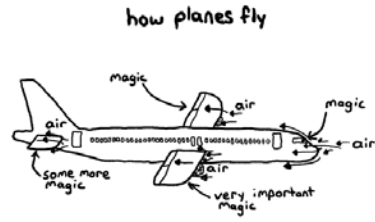
20



## Spring 2017: 16.687

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- PhD student in Neuroscience, Harvard, cross-registered for 16.687
- Knowledge before the course:



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- Enabled me to become a pilot, laid the foundation for the aviation experiences in the rest of my life

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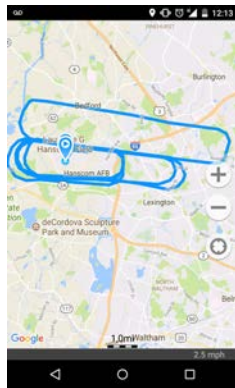
21



## May-Sept 2017: Student Pilot

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- Two years of savings -> lessons at East Coast Aero Club



LOG#	DATE	AIRCRAFT TYPE	AIRCRAFT IDENT	ROUTE OF FLIGHT		NR INSTR APP	REMARKS AND ENDORSEMENTS	NR TO	NR LOGS	AIRCRAFT SINGLE ENGINE LOGS
				FROM	TO					
				BED	BED		TAKE OFF AND LANDING	8	8	1 4
0744	11-24-11	N15520J	BED	BED	BED		TAKE OFF AND LANDING	7	7	1 3
0745	11-24-11	N11640J	BED	BED	BED		TALK OFF AND LANDING	8	8	1 5
0746	11-24-11	N15520J	BED	BED	BED		TALK OFF AND LANDING	8	8	1 5
0747	11-24-11	N15520J	BED	BED	BED		TALK OFF AND LANDING	7	7	1 4
0748	11-24-11	N11640J	BED	BED	BED		TALK OFF AND LANDING	6	6	1 2
0749	11-24-11	N15520J	BED	BED	BED		TALK OFF AND LANDING	6	6	1 1
0750	11-24-11	N11640J	BED	BED	BED		2nd SOLO!!! Take off Landing	7	7	1 1
0751	11-24-11	N11640J	BED	BED	BED		2nd SOLO!!! Take off Landing	5	5	1 7
0752	11-24-11	N11640J	BED	BED	BED		TAKE OFF AND LANDING	7	7	1 3
0753	11-24-11	N11640J	BED	BED	BED		TAKE OFF AND LANDING	3	3	1 4
0754	11-24-11	N15520J	BED	BED	BED		TAKE OFF AND LANDING	2	2	1 9
0755	11-24-11	N15520J	BED	BED	BED		TAKE OFF AND LANDING	2	2	1 9
0756	11-24-11	N15520J	BED	BED	BED		SOLD Take off & Landings	6	6	0 8

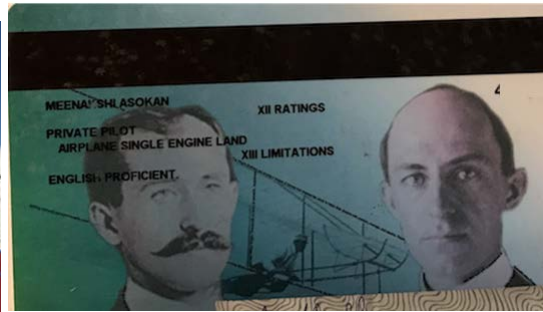
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# Sept 29, 2017: Private Pilot

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# After PPL

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- Spin training and aerobatics lessons in Decathlon



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# With the MIT flying club

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# 2000 ft, south-bound

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# Spoke to Kennedy Tower!!!

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27



# With friends

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28



## With friends

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## With family

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## Why do I love it?

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- **Fun:** beautiful views and experiences, and the surge of excitement every single time I have the controls.
- **Challenge:** Something new (and rewarding) to learn from every single experience.
- **People:** Amazing to meet and interact with the aviation community.

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## The FAA Written Exam

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- Computer-based multiple-choice 2.5-hour test
- 60 questions
  - Part of question bank is published
  - New questions introduced continuously so know the principles!
  - Answers are shuffled

Passing is 70. If you sit through this class and earn less than a 70, Philip will buy you lunch.

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## Getting the most out of this class

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- Read the FAA books three times before taking the test.
- Use a test prep book
- Take practice tests from [Sporty's Study Buddy](#)
- Free [6-month AOPA student membership](#)
- Physics question? Learn from a Ph.D. physicist and pilot in [See How it Flies](#) by John Denker

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## Testing and Grading

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### Final Exam

- 60-question final exam simulating the FAA Knowledge Test
- Take it at home with a web browser

### For-Credit (3 units) Students

- Show up for all three days
- Score at least 70 on the final

### CFI Endorsement for the real test

- Request sign-off PDF via email from Philip (FAA certificated flight instructor)
- Go to a flight school and take the real test
- Fail: Philip buys you lunch

Aero/Astro majors: The FAA material is designed for people as young as 16 and without any technical or scientific training.

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34



## Sample Question

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Why is frost considered hazardous to flight?

- A. Frost changes the basic aerodynamic shape of the airfoils, thereby increasing lift.
- B. Frost slows the airflow over the airfoils, thereby increasing control effectiveness.
- C. Frost spoils the smooth flow of air over the wings, thereby decreasing lifting capability

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35



## Sample Question

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Why is frost considered hazardous to flight?

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- C. Frost spoils the smooth flow of air over the wings, thereby decreasing lifting capability**

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36

# The Best-laid Plans

## Day 1 (Tuesday)

This Intro  
 Aerodynamics  
**\*\* Break \*\***  
 Learning to Fly  
 Airplane Systems  
**\*\* Oshkosh at Lunch! (pizza provided!) \*\***  
 Charts and Airspace  
 Navigation  
**\*\* Break \*\***  
 Flight Environment  
 Helicopters  
 F-22 with Randy "Laz" Gordon  
 MIT Flying Club

## Day 2 (Wednesday)

Meteorology  
**\*\* Break \*\***  
 Comms, Radar, ATC  
 Aircraft Ownership  
**\*\* Lunch Break \*\***  
 IFR  
 Performance  
 Weather data  
**\*\* Break \*\***  
 Human Factors  
 Aerobatics with Marc Nathanson

## Day 3

Flight Planning  
**\*\* Break \*\***  
 Seaplanes  
 sUAS (drones) with Michael Holzwarth  
 Night flying  
 Multi-engine and Jets  
**\*\* Brazilian Air Force Lunch \*\***  
 Weight and Balance  
 Weather Minimums and Parting words  
**\*\* Break \*\***  
 App Planning & Engineering with Tyson Weihs



# Welcome Again

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- Welcome again to our class and to the community of aviators.
- Better to be on the ground wishing you were in the air than in the air wishing you were on the ground.
- But remember that humans have been wishing to be in the air for tens of thousands of years. You're going to be some of the lucky few to be in the air and also control your destiny through the air.



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