



Introduction to Aerospace Engineering

AS2101: Laboratory Portion

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July 2021 • Department of Aerospace Engineering



- **Objectives:** To develop basic computer skills and reporting skills essential for an engineer. To introduce different aircraft and components; history of flight and Indian aerospace activities.
- **Prerequisites:** None
- **Instructors:** Bharath Govindarajan (bharath@ae.iitm.ac.in)
M Ramakrishna (krishna@ae.iitm.ac.in)
- **Lectures:** July 3rd – July 31st
 - Classroom: meet.iitm.ac.in
 - Hours: 1400-1630 Saturdays
- **Course URL:** Moodle

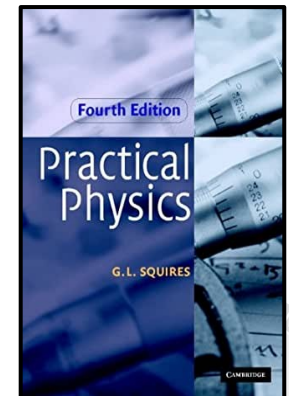
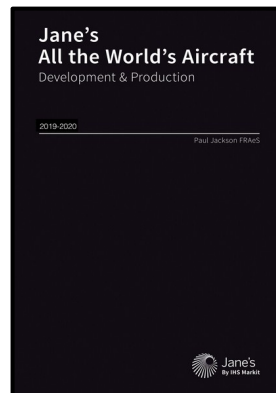
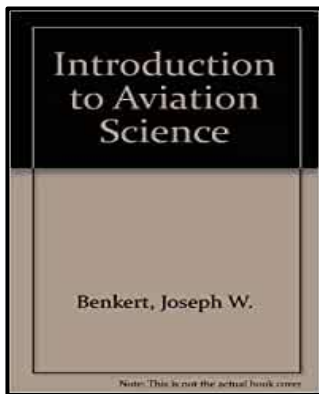


- **Assessment Method**
 - **Theory: 50 %**
 - We have already had 7 quizzes
 - **Laboratory: 50%**
 - Four graded assignments (equal weightage)
- **Attendance Policy**
 - **None**
- **Examination Policy**
 - **Assignments to be turned in on the due-date**
 - **Late submissions will not be graded**



Reference Material

- *Introduction to Aviation Science*, J. W. Benkert
- *Above and Beyond: Encyclopedia of Aviation and Space Sciences*, W. B. Black and J. F. Blashfield
- *Jane's All the World's Aircraft*, Jane Information Group
- ***The Not So Short Introduction to LaTeX***, Tobias Oetiker
- *Practical Physics*, G. L. Squires
- ***The World-Wide-Web ...***



- **Theory**

- History of aviation and space flight
- Classification of aircraft and space vehicles
- Functions of major components of airplane and space vehicles
- Subdivisions of aerospace engineering: elements of aerodynamics, propulsion, structures, systems, flight mechanics and controls
- Indian aerospace activities

- **Laboratory**

- LaTeX: Scientific document preparation, report writing and standardization;
- Programming Tools: Python and Octave
- Graphing Techniques
- Basic scientific computing
- Statistical treatment of data and curve fitting.



Required Tools

- **Python3 (min version 3.8)**



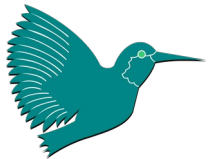
- High-level programming language available on Windows and UNIX platforms
- Source: <https://www.python.org/downloads/>
- Many integrated development environments (IDEs) are available

- **Octave (min version 5.2)**



- Open-source scientific programming platform similar to MatLab
- Source: <https://www.gnu.org/software/octave/>
- Available on Windows and UNIX platforms

- **LaTeX**



- Scientific document preparation and report writing
- Source: <https://www.latex-project.org/>
- Available on Windows and UNIX platforms



Learning Outcomes

- Thorough understanding of the fundamentals governing the underlying principles of aerospace engineering
- **Ability to write precise and concise scientific documents in LaTeX**
- **Basic programming ability using Python and Octave to analyze and solve scientific problems**
- **Basic understanding of curve fitting and associated errors**
- **Inculcate “good practices” for plots, writing and reporting**
- Develop an appreciation for the simplicity and complexity of the tenets of aerospace engineering
- This course is part of the core foundation for understanding flying vehicles (structures, flight control, propulsion)



Google Meet Sessions

Google Meet Links	
Lecture	meet.google.com/hsx-njaj-nvr
Room 1 (Vizan)	meet.google.com/rvm-yztz-ivu
Room 2 (Rushikesh)	meet.google.com/nyk-ufon-bcg
Room 3 (Suraj)	meet.google.com/cyo-shrm-smw
Room 4 (Kamal)	meet.google.com/nxj-mbzm-fob
Room 5 (Ananth)	meet.google.com/xdk-mebr-sag

- **Room 1: AE18B<all>, AE19B001 – 008**
- **Room 2: AE19B009 – 022**
- **Room 3: AE19B023 – 038**
- **Room 4: AE19B039 – 053, AE19B101**
- **Room 5: AE19B102 – 109, ED19B<all>**



Task 1

- **Ensure all tools work!**
- **Write a script in Python to generate an plot and save the image**
- **Write a script in Octave to create a plot and save the same**
- **Include both figures in a Latex document, write the equations used to create them and write a small paragraph that explains the figure.**
- **Create a folder with `<roll_number>`. Submit the PDF, *.py, *.m, and *.tex in the appropriate folder:**

https://drive.google.com/drive/folders/15A4ZJFH0ie9M_k9OGuVVnoS6k9DT7c9z?usp=sharing

