A long time ago in a country far, far away a few of us had a vision... to provide Astronautics for Anyone!

That vision became...

UNDERSTANDING SPACE
An Introduction to Astronautics

this is the story of the past, present and future of that bold endeavor
It all started in 1991...

Gen. Bob Giffen, Head of the Dept of Astronautics at USAF Academy suggested an introductory book to SMAD was needed

Dr. Wiley Larson stepped up as editor, along with Doug Kirkpatrick

I raised my had to volunteer

The rest is history...
The Vision...

Astronautics for Anyone

Introductory text at the undergraduate level

Cover A to Z of space missions with roughly equal breadth and depth
The Approach...

- The Space Mission Architecture
- The Mission - need, goals, ConOps
- Trajectories and Orbits
- Spacecraft
- Launch Vehicles
- Mission Operations Systems
- Mission Management & Operations
The first draft...1992

- Rough, black and white edition
- Used by cadets in core astro classes at USAFA
- Great feedback
The first edition...1993

- 3-color (red, blue, black)
- Widely published by McGraw-Hill
- Used by thousands of students around the US
The second edition...2000

- Full color
- Expanded space systems sections
- Used by thousands more students around the US and world
The third edition...2004

- Full color
- Complete update and corrections
- Expanded propulsion and systems engineering discussion
Take Understanding Space anywhere!

Full searchable text available as e-book from McGraw-Hill Create

Can run on up to 3 devices, Mac, PC, iPad, iPhone, etc.
In the Classroom...Around the World

Undergraduate
Graduate
Foundation for a complete curriculum...

Example: Undergraduate Astronautical Engineering major at USAF Academy

Oldest @ 50 ys, (and only?) astronautics only major in the US (world?)

THE ASTRONAUTICAL ENGINEERING MAJOR

Department of Astronautics
United States Air Force Academy

USAF Department of Astronautics
Curriculum Handbook 2012
Program Curricular Outcomes are listed below. Upon successful completion of the Academy program in Astronautical Engineering, cadets will have the ability to:

- Use fundamental knowledge of orbital mechanics, space environment, attitude dynamics and control, telecommunications, space structures, and rocket propulsion to solve astronautical engineering problems, including engineering design,
- Plan and execute experimental studies and formulate sound conclusions, analyzing empirical data,
- Apply modern technology tools to solve astronautical engineering problems,
- Communicate effectively using oral, written, graphical and electronic format,
- Recognize the ethical and professional responsibilities of Air Force Officership and the engineering profession,
- Work effectively as a member of a multi-disciplinary design team,
- Recognize the benefits of and possess skills needed to engage in life-long learning, and
- Informatively discuss the impact of engineering on present-day societal and global contemporary issues to include Air Force aerospace capabilities and requirements.
COURSE REQUIREMENTS: 148 Semester Hours

A. 97 Semester hours of Dean's academic core courses to include:

- Aero Engr 241 - Aero-Thermodynamics
- Astro Engr 210 - Introduction to Astronautics (Understanding Space!)
- Math 356 - Probability and Statistics for Engineers and Scientists
- ECE 231 - Electrical Circuits and Systems I
- Astro Engr 437 - Small Spacecraft Engineering II

B. 3 Semester hours of Academy Option, e.g. Astro Engr 423 Space Mission Design

C. 43 Semester hours of major's courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>Math 243</td>
<td>Differential Equations</td>
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<tr>
<td>Math 245</td>
<td>Engineering Math</td>
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<tr>
<td>Math 346</td>
<td>Dynamics</td>
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<tr>
<td>Engr Mech 320</td>
<td>Mechanics of Deformable Bodies</td>
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<tr>
<td>Engr Mech 330</td>
<td>Linear Systems Analysis and Design</td>
</tr>
<tr>
<td>Engr 341</td>
<td>Intermediate Astrodynamics</td>
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<tr>
<td>Engr 342</td>
<td>Space Systems Engineering</td>
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<tr>
<td>Astro Engr 201</td>
<td>Rocket Propulsion</td>
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<tr>
<td>Astro Engr 321</td>
<td>Applied Communications</td>
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<tr>
<td>Astro Engr 331</td>
<td>Spacecraft Attitude Dynamics and Control</td>
</tr>
<tr>
<td>Astro Engr 351</td>
<td>Upper Atmospheric and Geo-Space Physics</td>
</tr>
<tr>
<td>ECE 446</td>
<td>Small Spacecraft Engineering I</td>
</tr>
<tr>
<td>Astro Engr 445</td>
<td>436 (F)</td>
</tr>
</tbody>
</table>
High School, Middle Schools....

- Versions developed tailored especially for middle school (12-14 year olds) and high school (14-18 year olds)

- Includes:
  - Teacher notes
  - Student workbook
Short Courses...

Starting in 1996, Teaching Science & Technology Inc. (TSTI) began offering Understanding Space as a short course around the industry.

Now the basis for:

- NASA - Introduction to Aerospace @ NASA
- Lockheed-Martin - New hire program
- Numerous other organizations
Impact...

- University Students
  >30,000
- Short Courses
  >15,000 students and counting!
- But that’s not enough!
Now...Online...

Launched in 2012
Official online training for USAF Space & Missile Center
Available to Anyone today

Learn
Explore
Do
Show You Know
Welcome to...

UNDERSTANDING SPACE
An Introduction to Astronautics and Space Systems

Since the dawn of the Space Age just five decades ago, we have come to rely more and more on space for a variety of earthly needs. Daily weather forecasts, instantaneous worldwide communication and navigation, as well as the ability to keep an eye on not-so-friendly neighbors, are all examples of space capabilities that we’ve come to take for granted.

This course is designed to make you “space smart,” by building your understanding and appreciation for the complex requirements of space missions. This course will help you....

- Gain core Space Knowledge
- Comprehend space mission capabilities, trade-offs and limitations
- Apply space concepts to real-world problems
- Analyze typical space problems
- Synthesize concepts to design a space mission
- Evaluate basic technical and programmatic space issues

Getting Started
Your space adventure starts here...

Step 1:
Read through the Course Handbook and watch the introductory videos
Course Handbook

Step 2:
Complete the Initial Personal Study Plan Questionnaire
Initial Personal Study Plan

Step 3:
Take the Pre-course quiz (no need to study) just take to see where you’re starting from!
Pre-Quiz

Step 4:
Create your student profile (click on “profile” under the Administration block on the left).

Step 5:
Access your Understanding Space e-Book using the access code provided by your course mentor. Read and follow the e-Book access instructions by clicking the link below.
e-book Access Instructions

Finishing Up

Online Course Survey
Post-Quiz
Final Personal Study Plan
The future?...in your hands?

- Branded Understanding Space-based online courses
- JAXA? UN? CNES? UK Space Agency?
- Understanding Space-lite free online course?
- Understanding Space App?
- Understanding Space iBook?
Questions...?

about past, present or future episodes