Astronautical Engineering (ASTE)

DEN @ Viterbi Orientation

Luis Saballos, Student Advisor & Assistant Director of ASTE Student Affairs
AGENDA

- Welcome
- Department Overview
- Degree Requirements
- Department Policies, Procedures, Tips
- ASTE DEN
- Academic Advising
- Questions?
Welcome to ASTE @USC & DEN@Viterbi!

Luis Saballos, ASTE Student Advisor

Contact Information
Email    Lsaballo@usc.edu
Phone    (213) 821-4234
Office:  OHE 500Q

- Advise undergraduate, certificate, master, and doctoral students
- Advise for the Astronautical Engineering (ASTE) and the Systems Architecting and Engineering (SAE) degree programs
Department of Astronautical Engineering

- Unique pure-space-engineering department (established in 2004)
- Offers the full set of degrees in Astronautical Engineering (ASTE)
  - Bachelor of Science
  - Bachelor of Science Minor
  - Master of Science
  - Engineer
  - PhD
  - Graduate Certificate
- Among largest national programs in space engineering on Master’s level
- Mission:
  to provide forefront research and education in astronautical (space) engineering
Department of Astronautical Engineering
Faculty, Adjunct Faculty, and Lecturers

Faculty
- Prof. Mike Gruntman (Chairman; Director, Master of Science Program)
- Prof. Daniel Erwin (Director, Bachelor of Science Program)
- Prof. Joseph A. Kunc
- Prof. Azad Madni
- Prof. E. Phillip Muntz
- Prof. Stan Settles (joint appt.; ISE/SAE)
- Prof. Joseph Wang (Director, PhD Program)

Research Faculty
- Prof. Elliot Axelband
- Prof. David Barnhart
- Prof. Sergei Gimelshein
- Prof. Herb Schorr (joint appt.; ISI)
- Prof. Peter Will (joint appt.; ISI)

Adjunct Faculty and Lecturers (grad courses)
- Dr. Mohamed Abid (JPL)
- Dr. Oscar Alvarez-Salazar (JPL)
- Dr. Rodney Anderson (JPL)
- Dr. Kirstie Bellman (Aerospace Corp.)
- Dr. Douglas Buettner (Aerospace Corp.)
- Prof. Bruce Cordell (21st Century Waves)
- Prof. Don Edberg (Cal Poly Pomona)
- Dr. Anthony Freeman (JPL)
- Dr. Michael Gabor (TASC)
- Dr. Keith Goodfellow (Aerojet Rocketdyne)
- Dr. Troy Goodson (JPL)
- Prof. Gerald Hintz (ret., JPL, Aerospace Corp.)
- Prof. Michael Kezirian (IAASS, ISSF)
- Dr. Johnny Kwok (JPL)
- Mr. Steve Matousek (JPL)
- Dr. Leila Meshkat (JPL)
- Prof. Ryan Park (JPL)
- Dr. Robert Parker (ret.; Northrop-Grumman)
- Dr. G.P. Purohit (Aerospace Corp.)
- Prof. Anita Sengupta
- Mr. Madhu Thangavelu (AAA Visioneering)
- Prof. Kent Tobiska (Space Environment Techn.)
- Prof. James Wertz (Microcosm)
- Dr. Bret Williams (Raytheon)
- Dr. Sydney Yuan (Aerospace Corp.)
Department of Astronautical Engineering
Research Areas

- Astronautics
- Space environment and spacecraft interactions
- Space science
- Space instrumentation and sensors
- Spacecraft propulsion
- Space mission and spacecraft design
- Non-equilibrium processes in gases and plasmas
- Computational physics and high performance computing

- Faculty are Principal Investigators (PI’s) and Co-Investigators (Co-I’s) on programs supported by NASA, Air Force, Navy, NSF, industry
- Served on science teams (members, investigators, development, analysis): Pioneer 10/11, SOHO, Deep Space 1, IMAGE, Dawn
- Current NASA missions Co-I: TWINS and IBEX

- Student (undergraduate and Master’s) projects
  - Rocket propulsion lab
  - Liquid-propulsion lab
  - Lunar lander
  - Student microsatellites and cubesats
Department of Astronautical Engineering
Interdisciplinary Collaborations

• Interdisciplinary collaborations with other USC programs/departments/schools
  □ Systems Architecting and Engineering
  □ Electrical Engineering
  □ Mechanical Engineering
  □ Information Sciences Institute (ISI), VSOE
  □ Physics and Astronomy

• External collaborations
  □ U.S. Universities (Harvard, UC Berkeley, U of Az., BU, U Mass., ...)
  □ NASA centers (JPL, Goddard)
  □ DoE National Labs (Los Alamos, Princeton Plasma Physics Lab)
  □ R&D centers and institutes (Applied Physics Laboratory; Southwest Research Institute, ...)
  □ Industry (Northrop-Grumman, Lockheed-Martin, Boeing, ...)
  □ Foreign R&D centers and universities (Germany, Japan, ...)
Master of Science Program in Astronautical Engineering

- Students -

- Students pursuing MS in Astronautical Engineering
  - Full-time on-campus students – 25-30%
  - Working full-time and studying part-time students (through Distance Education Network of the Viterbi School – DEN@Viterbi) – 70-75%
  - Active duty military (Air Force, Army, Navy, Marine Corp)
  - Student background (BS and MS degrees)
    - Astronautical engineering
    - Mechanical Engineering
    - Electrical engineering
    - Aerospace engineering
    - Other areas (chemical, computer, systems, etc) of engineering
    - Physics and Astronomy
    - Other areas of science (including medical doctors)
    - Planning apply for astronaut training
  - Pathway to positions in system engineering of space systems (especially important for engineers with BS and MS in EE, ME, etc.)
Master of Science Program in Astronautical Engineering – Common Questions –

• Typical time to complete the program
  - Full-time students: 1.5 years (3 semesters)
  - Part-time student: 3 – 4 years (1 – 2 courses per semester)

• Course sequence (e.g., required courses before electives?)
  - Course sequence is entirely up to students. Advisors help as needed. Few exceptions:
    space navigation requires orbital mechanics; advanced propulsion requires propulsion, ...

• Waiver of required courses – yes
  - Required courses waived if a student had similar level courses elsewhere.

• Technical electives from other departments – yes
  - Almost any graduate science and engineering course approved
ASTE Degree Requirements
Master of Science in Astronautical Engineering (MS ASTE)

- 27 units of course work (9 classes)
- 3.0 minimum GPA required to fulfill degree requirements
- 5-year limit to satisfy degree requirements
- Thesis not required but is possible (for on-campus students)

ASTE Department Chair, Director of the Master’s Program
Dr. Mike Gruntman, mikeg@usc.edu

Helpful websites:

Degree Requirements for the
ASTE Master’s Program

Core Required Courses (4 courses, 3 units each)
Core Electives (3 courses, 3 units each)
Technical Electives (2 courses, 6 units total)

▪ Four Core Requirements, 3 units each:
  ASTE 470 Spacecraft Propulsion
  ASTE 520 Spacecraft System Design
  ASTE 535 Space Environments and Spacecraft Interactions
  ASTE 580 Orbital Mechanics I

▪ Three Core Electives, 3 units each:
  ASTE 501a Physical Gas Dynamics Units: 3
  ASTE 501b Physical Gas Dynamics Units: 3
  ASTE 505a Plasma Dynamics Units: 3
  ASTE 505b Plasma Dynamics Units: 3
  ASTE 523 Design of Low Cost Space Missions Units: 3
  ASTE 524 Human Spaceflight Units: 3
  ASTE 527 Space Studio Architecting Units: 3
  ASTE 528 Reliability of Space Systems Units: 3
  ASTE 529 Safety of Space Systems and Space Missions Units: 3
  ASTE 552 Spacecraft Thermal Control Units: 3
Degree Requirements for the ASTE Master’s Program cont’d

Core Electives Continued
ASTE 553 Systems for Remote Sensing from Space Units: 3
ASTE 554 Spacecraft Sensors Units: 3
ASTE 555 Space Cryogenic Systems and Applications Units: 3
ASTE 556 Spacecraft Structural Dynamics Units: 3
ASTE 557 Spacecraft Structural Strength and Materials Units: 3
ASTE 561 Human Factors of Spacecraft Operations Units: 3
ASTE 562 Spacecraft Life Support Systems Units: 3
ASTE 566 Ground Communications for Satellite Operations Units: 3
ASTE 570 Liquid Rocket Propulsion Units: 3
ASTE 571 Solid Rocket Propulsion Units: 3
ASTE 572 Advanced Spacecraft Propulsion Units: 3 *
ASTE 574 Space Launch Vehicle Design Units: 3
ASTE 577 Entry and Landing Systems for Planetary Surface Exploration Units: 3
ASTE 581 Orbital Mechanics II Units: 3
ASTE 583 Space Navigation: Principles and Practice Units: 3
ASTE 584 Spacecraft Power Systems Units: 3
ASTE 585 Spacecraft Attitude Control Units: 3 * (Summer only)
ASTE 586 Spacecraft Attitude Dynamics Units: 3
ASTE 589 Solar System Navigation Units: 3
Degree Requirements for the ASTE Master’s Program continued

Two Technical Electives, 500-level, 6 units total.

Courses that apply as technical electives:
- Any course from the list of ASTE Core Electives
- ASTE 599 Special Topics courses. They are not offered every semester, so check the Schedule of Classes for availability [http://classes.usc.edu/](http://classes.usc.edu/)
- A course from another engineering department must be approved by Dr. Mike Gruntman (copy lsaballo@usc.edu to the email) prior to registration. More information can be found here: [http://astronauticsnow.com/msaste/faq.html](http://astronauticsnow.com/msaste/faq.html)

Full curriculum requirements found here: [https://catalogue.usc.edu/preview_program.php?catoid=14&poid=17112&returnto=5360](https://catalogue.usc.edu/preview_program.php?catoid=14&poid=17112&returnto=5360)
Seven Areas of Concentration in ASTE

- Spacecraft Propulsion
- Spacecraft Dynamics
- Space Systems Design
- Spacecraft Systems
- Space Applications
- Safety of Space Systems
- Human Space Flight

Students are *not* required to identify an area of specialization. These concentrations act as a guide for students in order to meet their educational or professional objectives.
Seven Areas of Concentration in ASTE cont’d

**Spacecraft Propulsion**
- ASTE 501a Physical Gas Dynamics Units: 3
- ASTE 501b Physical Gas Dynamics Units: 3
- ASTE 505a Plasma Dynamics Units: 3
- ASTE 570 Liquid Rocket Propulsion Units: 3
- ASTE 571 Solid Rocket Propulsion Units: 3
- ASTE 572 Advanced Spacecraft Propulsion Units: 3
- ASTE 574 Space Launch Vehicle Design Units: 3
- ASTE 584 Spacecraft Power Systems Units: 3

**Spacecraft Dynamics**
- ASTE 556 Spacecraft Structural Dynamics
- ASTE 557 Spacecraft Structural Strength and Materials
- ASTE 581 Orbital Mechanics II
- ASTE 583 Space Navigation: Principles and Practice
- ASTE 585 Spacecraft Attitude Control (*summer only*)
- ASTE 586 Spacecraft Attitude Dynamics
- ASTE 589 Solar System Navigation
Seven Areas of Concentration in ASTE cont’d

Space Systems Design
ASTE 523 Design of Low Cost Space Missions Units: 3
ASTE 524 Human Spaceflight Units: 3
ASTE 527 Space Studio Architecting Units: 3
ASTE 528 Reliability of Space Systems Units: 3
ASTE 529 Safety of Space Systems and Space Missions Units: 3
ASTE 557 Spacecraft Structural Strength and Materials Units: 3
ASTE 562 Spacecraft Life Support Systems Units: 3
ASTE 574 Space Launch Vehicle Design Units: 3
ASTE 577 Entry and Landing Systems for Planetary Surface Exploration Units: 3

Spacecraft Systems
ASTE 524 Human Spaceflight Units: 3
ASTE 529 Safety of Space Systems and Space Missions Units: 3
ASTE 552 Spacecraft Thermal Control Units: 3
ASTE 553 Systems for Remote Sensing from Space Units: 3
ASTE 554 Spacecraft Sensors Units: 3
ASTE 555 Space Cryogenic Systems and Applications Units: 3
ASTE 561 Human Factors of Spacecraft Operations Units: 3
ASTE 562 Spacecraft Life Support Systems Units: 3
ASTE 566 Ground Communications for Satellite Operations Units: 3
ASTE 584 Spacecraft Power Systems Units: 3
Seven Areas of Concentration in ASTE cont’d

**Space Applications**
ASTE 524 Human Spaceflight Units: 3  
ASTE 527 Space Studio Architecting Units: 3  
ASTE 553 Systems for Remote Sensing from Space Units: 3  
ASTE 554 Spacecraft Sensors Units: 3  
ASTE 555 Space Cryogenic Systems and Applications Units: 3

**Safety of Space Systems**
ASTE 528 Reliability of Space Systems Units: 3  
ASTE 529 Safety of Space Systems and Space Missions Units: 3  
ASTE 561 Human Factors of Spacecraft Operations Units: 3

**Human Space Flight**
ASTE 524 Human Spaceflight Units: 3  
ASTE 529 Safety of Space Systems and Space Missions Units: 3  
ASTE 561 Human Factors of Spacecraft Operations Units: 3  
ASTE 562 Spacecraft Life Support Systems Units: 3
ASTE Policies, Procedures, Tips
ASTE Policies, Procedures, Tips

- Maintain a 3.0 grade point average
- Review your STARS Report every semester.
  - The STARS Report includes the degree and major you are currently pursuing, GPA, Catalogue year, admission term, the number of units and course required to fulfill your degree requirements.
  - You can access it through the “OASIS” section of the myUSC portal (http://my.usc.edu).
  - Your STARS Report is manually activated after you enroll in your first course as an officially admitted student.
- Check your USC email regularly
- It is possible to transfer in previous graduate coursework (please contact me for the full policy)
- If you desire to change majors, you can do so after your first semester if you receive a 3.0 of higher (contact the other department for the transfer procedures)
- USC requires graduate students to maintain continuous enrollment every Fall and Spring semester (more detailed information provided on the next slide).
ASTE Policies, Procedures, Tips Cont.d

USC Schedule of Classes:
http://classes.usc.edu/

ASTE Future Courses List:
http://astronauticsnow.com/msaste/astd_ms_class_schedule.pdf

ASTE Curriculum Requirements:
https://catalogue.usc.edu/preview_program.php?catoid=14&poid=17112&hl=aste&returnto=search

• Since some electives may be offered in specific semesters, it is recommended to plan out those courses first (use the future courses list above for reference). Most of the core classes can then be filled in between.

• If you will be working full-time, we strongly recommend only taking 1 class in your first semester. If you will be a full-time student, it is recommended you enroll in no more than 3 classes per semester.
Continuous Enrollment/Leave of Absence/Withdrawal/Reinstatement

- Once admitted to a graduate degree program, students must enroll at USC each fall and spring semester each year until she or he has satisfactorily completed all degree requirements.

- If a student must skip a semester, the student must petition for a leave of absence. Leave of absence request forms are available by emailing lsaballo@usc.edu.

- An approved leave may not exceed one academic year (and a total of 4 semesters are granted). A student who fails to maintain continuous enrollment without obtaining an approved leave must, when ready to return to school, may have to apply for readmission to the program.
# DEN@Viterbi Contacts

**Viterbi Admission & Student Engagement Office**

- **Location**: Olin Hall of Engineering (OHE), Rm. 106
- **Hours**: Mon. - Fri. 8:30 am - 5 pm (Pacific Time)
- **Phone**: (213) 740-4488 | **Fax**: (213) 821-0851  
  [https://viterbigrad.usc.edu/](https://viterbigrad.usc.edu/)
- **DEN d-clearance inquiries**: den@vase.usc.edu

## DEN@Viterbi Support

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<thead>
<tr>
<th>Technical support, Desire2Learn training, Homework</th>
<th>Contact Information</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:dentsc@usc.edu">dentsc@usc.edu</a></td>
<td></td>
<td>Daniel Cueva</td>
</tr>
<tr>
<td>213-740-9356</td>
<td></td>
<td>Bianca Richter</td>
</tr>
</tbody>
</table>

- **DEN d-clearance inquiries**: den@vase.usc.edu

## Exams

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<tbody>
<tr>
<td>213-740-9356</td>
<td><a href="mailto:denexam@usc.edu">denexam@usc.edu</a></td>
<td>Shirley Schutt</td>
</tr>
</tbody>
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## VASE Advisor

- **General advisement**: 213-740-0116
- **Policies & Procedures**
Academic Advising Appointments

Luis Saballos, ASTE & SAE Student Advisor

Email: Lsaballo@usc.edu  Phone: (213) 821-4234

- I am available by email and phone if you have any questions. If you send an email, please include your 10-digit USC ID number.

- Please email me to set up a zoom advising appointment.
MyViterbi Advisement Appointment System

https://myviterbi.usc.edu/

myViterbi

Announcements

Student Resources

- Academic Integrity Introduction
- Advisement Appointment System
- Application to Graduate
THANK YOU!

HAVE A GREAT FALL 2021 SEMESTER!

A recording of this online orientation and presentation will be available for viewing and download on the VASE website at

https://viterbigrad.usc.edu/ms-denviterbi-new-student-information/

FIGHT ON!