

March 25, 2026

To: **Astronautics Students**  
**Students Enrolled in Astronautics Classes**  
**Astronautics Program Instructors**  
**Astronautics Program Supporters and Friends**

## **USC Astronautics Master's Program Update**

As always, this time of the year, we provide an update on the recent developments in the program ***Master of Science in Astronautical Engineering***, or **MS ASTE**.

**This is the last Newsletter in the current format.**

As many of you know, I have made a decision to step down – after 30+ years – from directing the program, effective June 30, 2026.

Unless the arrangements change, my *USC Astronautics* colleague Prof. Joe Wang will take over the MS ASTE leadership role. Together with the department chairman, Prof. Dan Erwin, he will manage the program.

More details are in my recent letter to instructors at

[http://astronauticsnow.com/pdf/2026\\_mg\\_astronautics.pdf](http://astronauticsnow.com/pdf/2026_mg_astronautics.pdf) .

**1)** The Master of Science program in astronautical engineering (MS ASTE) is in excellent shape (see statistics pp. 3, 4, 5). From humble beginnings and in a record short time since its founding in the summer of 2004, it has grown into a major, among the largest, internationally-recognized space-engineering program. We reach students all over the United States and Canada, as well as at military installations at home and abroad.

The Department awarded **more than 1100 Master of Science degrees in Astronautical Engineering** from 2004-2026. During the last 5 years, it was on average more than **80 Master's degrees annually**.

**2) Important.** The Viterbi School of Engineering has reorganized student services, with VASE/VSOE now responsible for Master's programs. Prisila Cisneros is the VASE/VSOE's Student Service staff member, supporting MS ASTE.

**3)** The newsletter provides program news, a long-term course schedule, and other information about coursework of interest to our current, past, and future students. Please always check with the ASTE Student Services about the near-term course schedule.

University of Southern California  
3650 McClintock Ave., OHE-530G, Los Angeles, CA 90089-1451 · Tel: 213 740 5536 · [mikeg@usc.edu](mailto:mikeg@usc.edu)



**4) Meet ASTE staff (photos on the right).**

Please do not hesitate to contact them as needed.

(a) Ms. **Dell Cuason** (OHE-500R; tel. 213-821-5817; [cuason@usc.edu](mailto:cuason@usc.edu)); **Astronautics Business Manager**; any questions about the program or department;

(b) Ms. **Marlyn Lat** (OHE-500V; tel. 213-740-4009; [marlynlat@usc.edu](mailto:marlynlat@usc.edu)); **Budget and Business Analyst**, supporting business and budget administration;

(c) Mr. **Luis Saballos** (OHE-500Q; tel. 213-821-4234; [lsaballos@usc.edu](mailto:lsaballos@usc.edu)); **ASTE's Student Services**, supporting BS ASTE and PhD ASTE;

(d) Ms. **Prisila Cisneros** (OHE-500U; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)); **VASE/VSOE's Student Services**, supporting MS ASTE.

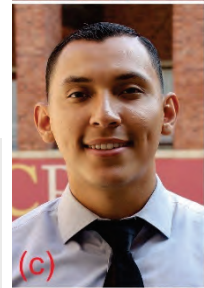
Prisila is the first contact for students with questions regarding class registration, schedule, and admission to the Master's program in astronautics. Before your inquiries, check MS ASTE's frequently asked questions at <http://astronauticsnow.com/msaste/faq.html>.

**5) Please find below**

- (a) ASTE program statistics (pp. 3-5)
- (b) founding of ASTE (pp. 6-7)
- (c) recent books by Astronautics instructors (pp. 8-11)
- (d) student resources – *The Space Show* (p. 12)
- (e) Astronautics MS ASTE classes in Summer and Fall of 2026 and Spring and Summer of 2027 (pp. 13-20)
- (f) long-term class schedule (pp. 21, 22)
- (g) MS ASTE catalog description (pp. 23-25)
- (h) admission requirements, transfer to graduate degree programs in Astronautical Engineering, GPA, leave of absence, and graduation (pp. 26-29).

**ASTE Staff**

- (a) Dell Cuason
- (b) Marlyn Lat
- (c) Luis Saballos
- (d) Prisila Cisneros (VASE/VSOE)



**Ad Astra,**

Mike Gruntman  
Professor of Astronautics  
Director, *MS in Astronautical Engineering*

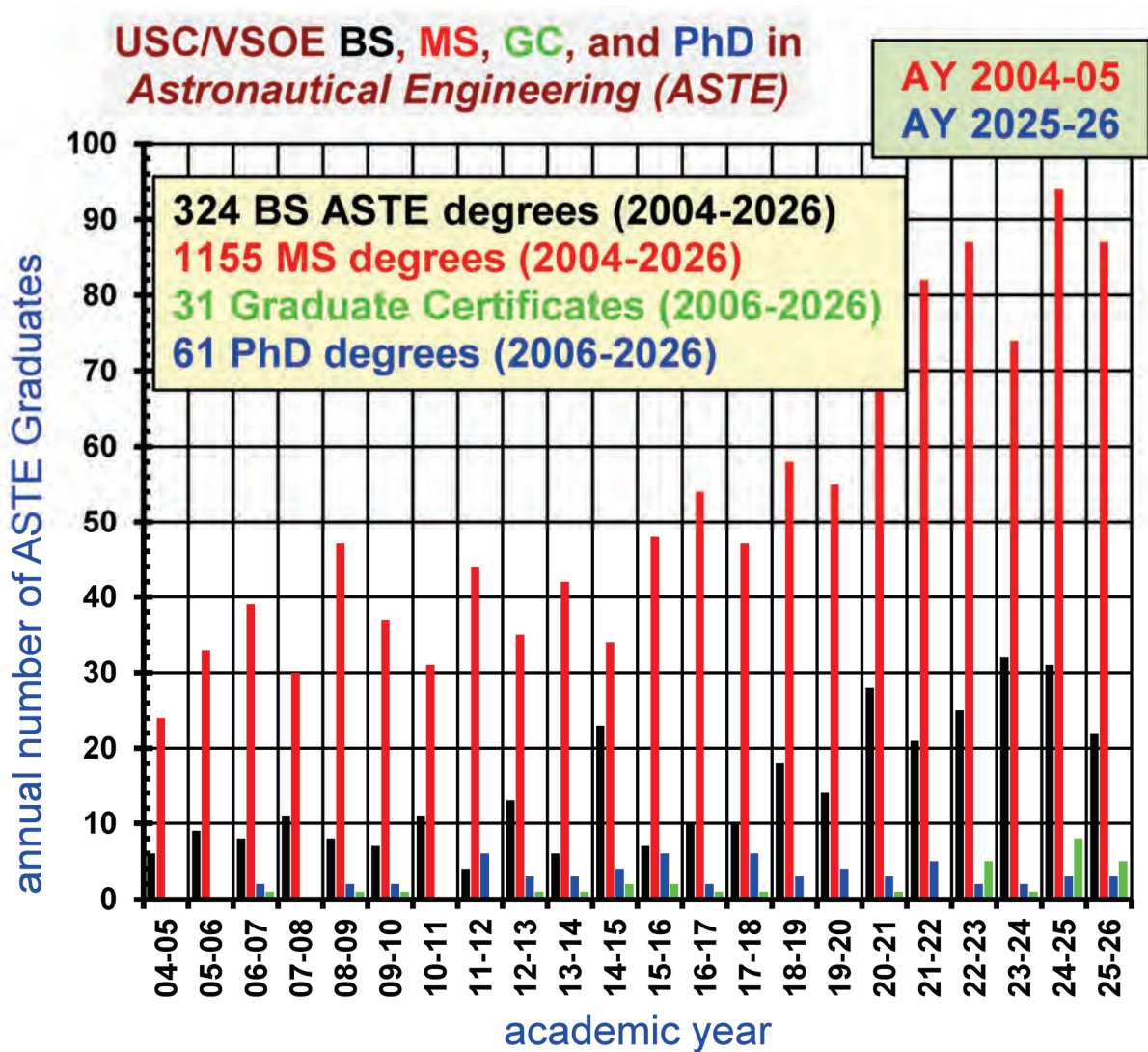
P.S. We amend our motto on reaching the stars as government and university regulations are becoming more and more bureaucratic, burdensome, and restrictive rather than inspirational and helpful.

**Per aspera (et statuta) ad astra!**

**Through difficulties (and [unfortunately burdensome] regulations) to the stars!**

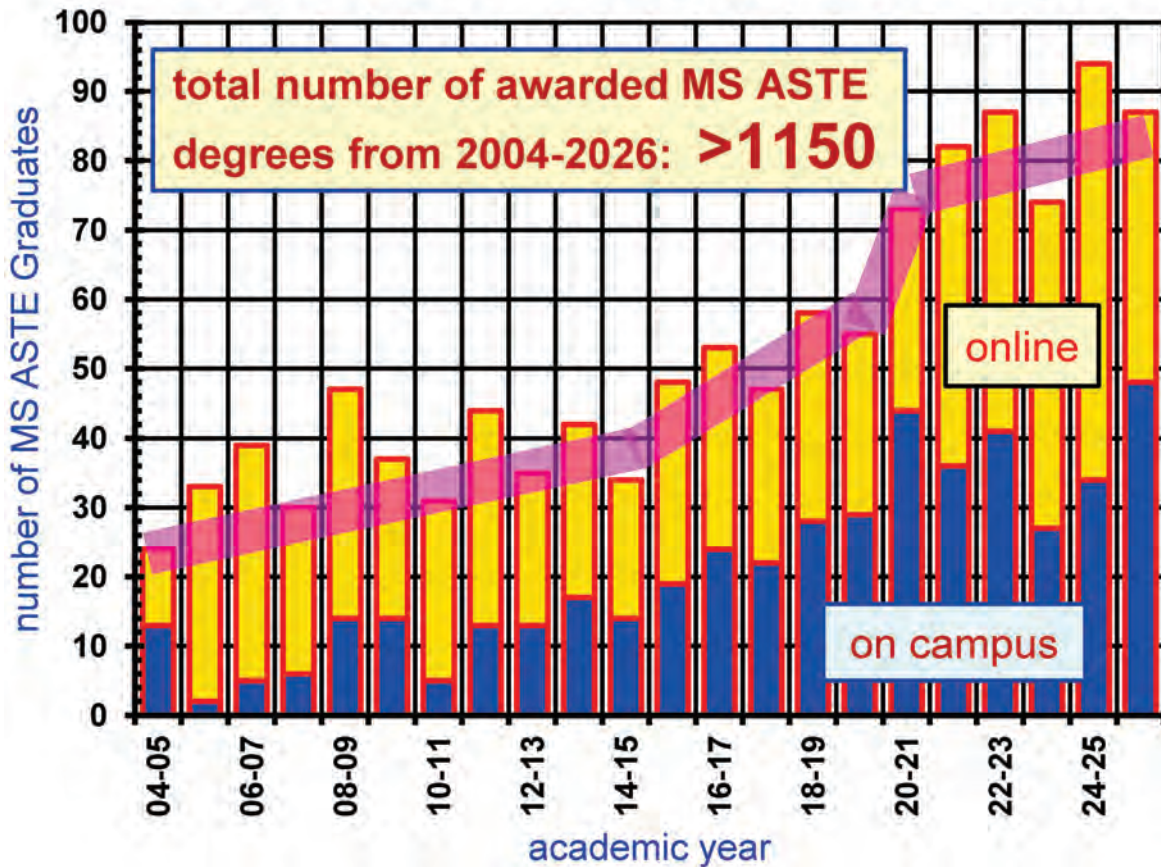
## Degrees in Astronautical Engineering – Statistics

Since its founding in 2004, the Astronautical Engineering Department has offered the full set of degrees in *Astronautical Engineering* (ASTE) – see figure below.



From Academic Year (AY) 2004-2005 to AY 2024-2025, the Department has awarded more than **320** Bachelor of Science degrees, more than **1150** Master of Science degrees, **60** PhD degrees, and **30** Graduate Certificates.

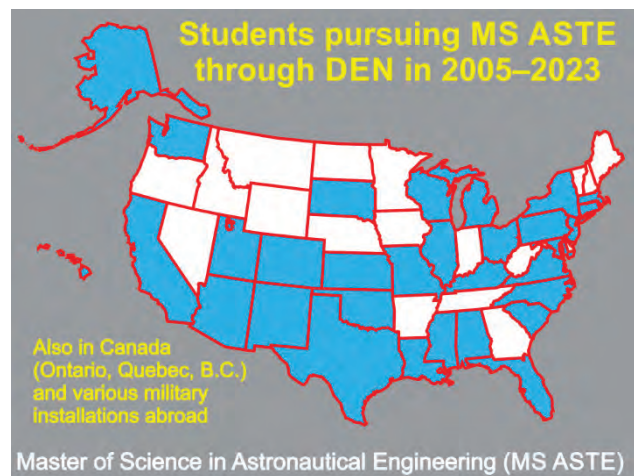
## USC/VSOE degrees awarded: Master of Science in Astronautical Engineering



The Master of Science in Astronautical Engineering (MS ASTE) program awarded **more than 1150** degrees from 2004-2025.

Full-time on-campus students earn about one-half of the degrees today. Online students account for the other half of the students.

The program reaches students all over the United States and Canada, as well as at military installations at home and abroad through Viterbi's Distance Education Network (DEN).



### **MS ASTE flagship class, *Spacecraft Systems Design (ASTE 520)***

More than **2600** graduate students have enrolled in ASTE-520 since 1994.

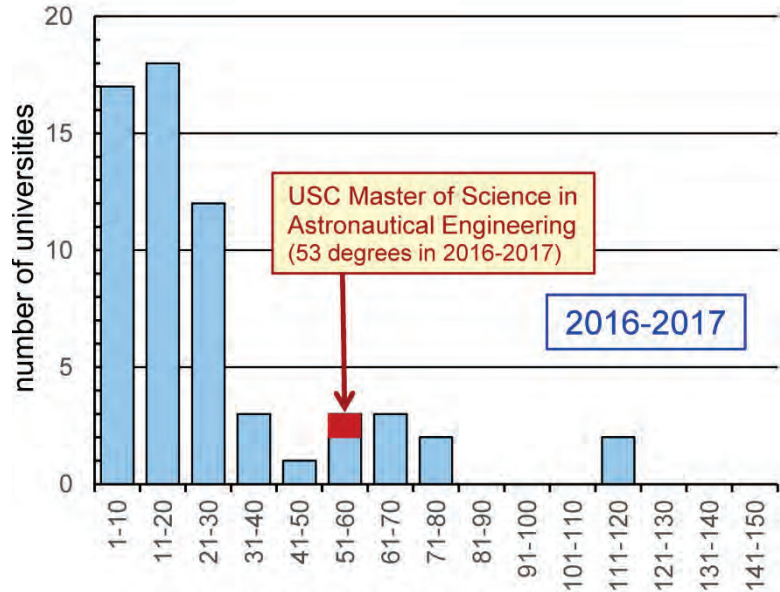
# USC Master of Science in Astronautics MS ASTE

## National Standing

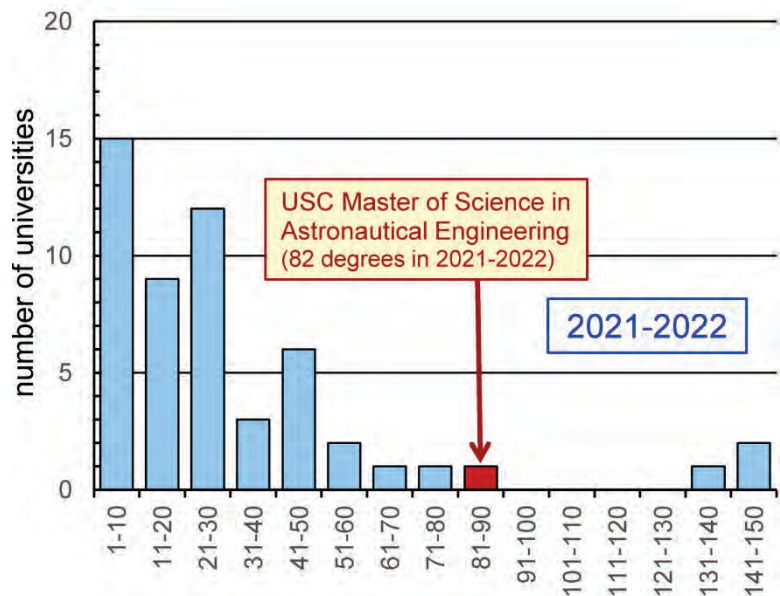
Latest available statistics

The statistics by the American Society for Engineering Education (ASEE) do not capture the separate numbers of awarded degrees in space-focused engineering. Therefore, one can only compare USC's MS ASTE program with other Master's programs in the broad aerospace-related field dominated by non-space areas.

One can only speculate how our program would have ranked in size if only space-engineering specializations were counted—clearly, it is among the largest.



awarded aerospace Master's degrees, 2016-2017



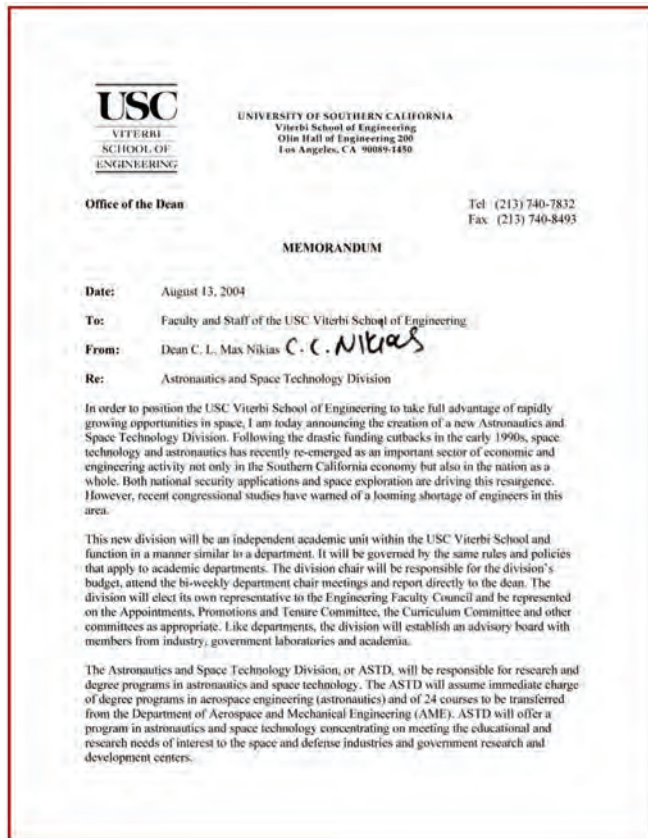
awarded aerospace Master's degrees, 2021-2022

Figure. Distribution of the numbers of Master of Science degrees awarded by U.S. universities (that is, sizes of Master's aerospace programs) in the broad aerospace area in the United States in academic years (top) 2016-2017 and (bottom) 2021-2022. The USC's M.S. ASTE program advanced from sharing the eighth and ninth places in size in 2016-2017 to the fourth place in 2021-2022.

Figure and text: <http://astronauticsnow.com/2025aste.pdf>

## Founding of ASTE at USC

The University of Southern California established the new Department first as the Astronautics and Space Technology Division on August 13, 2004. From day one, the new academic unit operated as an independent department and introduced the full set of degree programs in Astronautical Engineering. The University formally renamed it the Department of Astronautical Engineering in 2010.



In his memo (left) in 2004, then Dean of Engineering, and now USC President, Prof. Max Nikias wrote:

In order to position the USC Viterbi School of Engineering to take full advantage of rapidly growing opportunities in space, I am today announcing the creation of a new Astronautics and Space Technology Division. Following the drastic funding cutbacks in the early 1990s, space technology and astronautics have recently re-emerged as an important sector of economic and engineering activity not only in the Southern California economy but also in the nation as a whole. Both national security applications and space exploration are driving this resurgence ...

I am pleased to appoint Professor Mike Gruntman as chair of the Astronautics and Space Technology Division effective August 13, 2004, for a three-year term. Professor Joseph Kunc and Professor Daniel Erwin will join him as faculty in the division. Professor Stan Settles of the ISE Department and Professor Peter Will and Dr. Joseph Sullivan, from the Information Sciences Institute (ISI), will have secondary faculty appointments in the ASTD. Several other research faculty and staff will also be a part of the division.

For more than a year, the USC Viterbi School of Engineering with strong support from ISI has been engaged in a strategically focused effort to initiate a major program in astronautics and space technology. I expect the creation of the new division will help bring these efforts to fruition and expect the continuing close collaboration with ISI.

cc. Lloyd Armstrong, Jr.  
Michael Diamond  
Joseph Hellige  
Martin Levine  
Neal Sullivan

More about the history, rationale, and focus of ASTE in an article in *Acta*

*Astronautica*, 103, 92-105, 2014, at <http://dx.doi.org/10.1016/j.actaastro.2014.06.016> or <http://astronauticsnow.com/2014aste.pdf> .

# USC Astronautics program history, focus, rationale, and organization

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## *Acta Astronautica*

Advanced degrees in astronautical engineering for the space industry, v. 103, 92–105, 2014

<https://doi.org/10.1016/j.actaastro.2014.06.016>

Article download

<http://astronauticsnow.com/2014aste.pdf>



## *Journal of Space Safety Engineering*

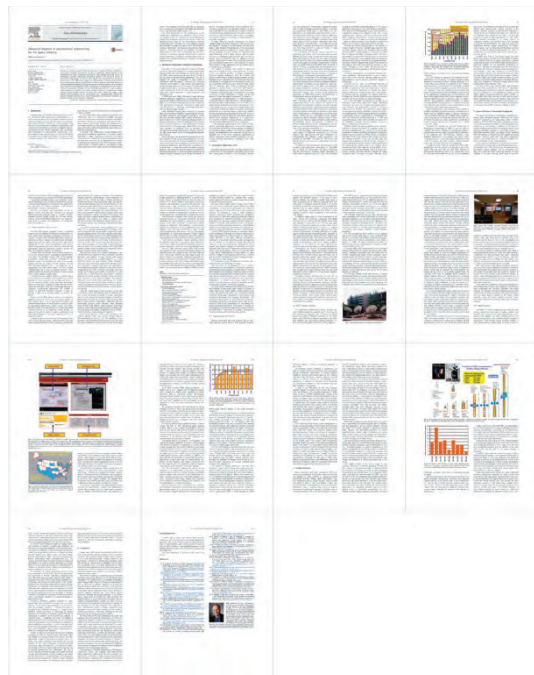
Master of Science in Astronautical Engineering degree at the University of Southern California for the space industry,

v. 12, issue 1, 1-11, 2025

<https://doi.org/10.1016/j.jsse.2024.07.007>  
(open access)

Article download

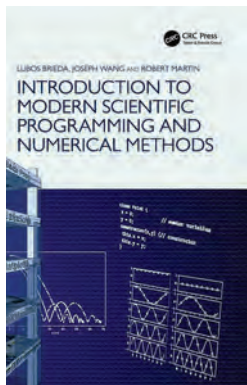
<http://astronauticsnow.com/2025aste.pdf>



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Other publications about the program – <http://astronauticsnow.com/aste.pdf>

## Recent Books by Astronautics Instructors



Lubos Brieda, Joseph Wang, Robert Martin

*Introduction to Modern Scientific Programming and Numerical Methods Example*

CRC Press, 2024

ISBN 978-0367671914 (hardcover)

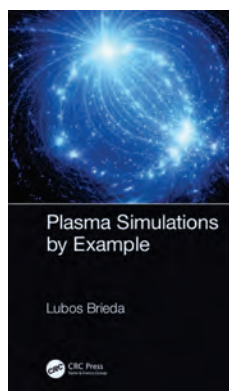


Editors: T. Sgobba, G. E. Musgrave, G. Johnson, and Michael Kezirian (ASTE)

*Safety Design for Space Systems (2nd edition)*

Butterworth-Heinemann, 2023 (1188 pages)

ISBN 978-0323956543



Lubos Brieda

*Plasma Simulations by Example*

CRC Press, 2021

ISBN 978-1032176147 (paperback)



Don Edberg and Willie Costa

*Design of Rockets and Space Launch Vehicles*

AIAA, 2020

ISBN 978-1624105937

## Recent Books by Astronautics Instructors

# Neil Armstrong at USC and on the Moon: Apollo 11 Lunar Landing

Mike Gruntman

Interstellar Trail Press, Los Angeles, 2025

available on [Amazon.com](https://www.amazon.com)  
also [Amazon.de](https://www.amazon.de), [fr](https://www.amazon.fr), [.es](https://www.amazon.es), [.it](https://www.amazon.it), [.ca](https://www.amazon.ca), [.co.uk](https://www.amazon.co.uk), [.com.au](https://www.amazon.com.au)

ISBN [979-8985668780](https://www.amazon.com/dp/979-8985668780) (paperback)

ISBN [979-8985668773](https://www.amazon.com/dp/979-8985668773) (hardcover)

ISBN [979-8985668797](https://www.amazon.com/dp/979-8985668797) (Kindle Print Replica)

186 pages with 80+ figures (see next page) and 140+ references Index: 450+ entries

**About the book.** On January 22, 1970, a “distinguished ‘member of the student body’” of the School of Engineering of the University of Southern California (USC) gave a one-hour seminar on techniques and procedures of lunar landing. He thus completed the requirements for the Master’s degree in aerospace engineering, which was conferred on him after the lecture. The name of the student was Neil A. Armstrong. Six months earlier, he commanded the Apollo 11 lunar mission and became the first man to set foot on the moon.

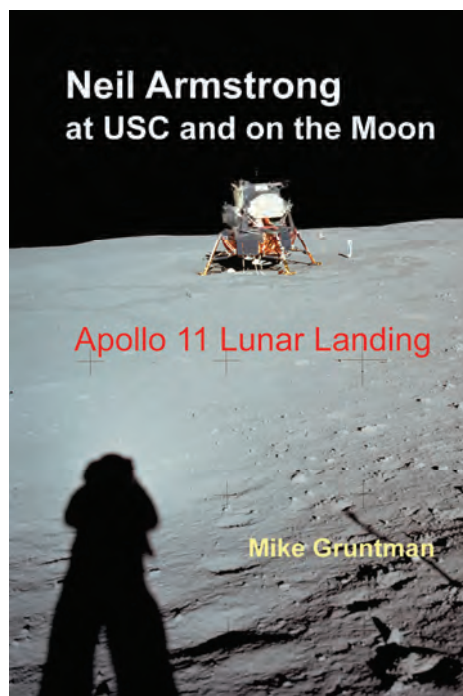
The story begins with Armstrong’s graduate studies at USC in the 1950s. Then, it describes his return to the university campus on that January day in 1970 for the festive dedication of a new science center in the morning.

Next, the book turns its attention to Apollo, a visionary program to land men on the moon that required the concentration of enormous

economic, scientific, and technological resources of the country.

Numerous technical details show the challenges of designing, building, and operating the Apollo spacecraft, particularly its Lunar Modules, which landed the astronauts on the lunar surface, as well as training the crews for this task. The recounted complexity of Apollo 11’s historic landing in the Sea of Tranquility on the moon puts into perspective this engineering accomplishment. Many quotes give readers a flavor of how participants viewed the events.

Finally, the story returns to Neil Armstrong’s visit to USC and his afternoon lecture on the guidance and control of the Lunar Module Eagle during the powered descent and landing on the moon, one of the most challenging elements of the Apollo missions.





## Recent Books by Astronautics Instructors

### Fundamentals of Space Missions:

### Problems with Solutions

Mike Gruntman

Interstellar Trail Press, 2022

ISBN 979-8985668742 478 pages with 175+ figures

160+ typical homework and exam problems that *were given, could have been given, or should have been given* (had the time allowed) in **ASTE-520**.



Complete list of problems at <http://astronauticsnow.com/fsm2022/>

## Books by Astronautics faculty and instructors



## The Space Show – Resource for Students



**The Space Show** has been on the air for more than 20 years, and it is heard in more than 50 countries around the world.

<http://thespaceshow.com>

The host and USC Astronautics supporter, **Dr. David Livingston** (right), broadcasts a few times each week. In contrast to many radio talk shows, the discussions with guests last 1.5 hours or longer, which allows for in-depth coverage of various topics.



This is one of the best informative and educational programs on the radio that brings problems and challenges of our vast space enterprise to a diverse audience of listeners across the globe. Stellar guest specialists discuss policies and politics; science, technologies, and education; entrepreneurial endeavors and innovations; and "new" and "legacy" space.

The Space Show focuses on timely and important issues influencing the development of outer-space commerce, space tourism, space exploration, and space development. The Space Show is committed to facilitating our becoming a space-faring nation and society with a growing and self-sustaining space-faring economy.

While the Space Show primarily focuses on the "new" space ventures, it also covers traditional areas of the space enterprise. Many leading specialists, including former NASA administrators, top scientists and technologists, space entrepreneurs, authors, and leaders of space advocacy groups, were among its guests. **The list also includes at least six USC Astronautics (ASTE) instructors.**

All shows – **more than 4000** – are archived and conveniently accessible through the Show's flashy website <http://thespaceshow.com>. One can search for various topics and guests, download mp3 files (usually 30-50MB), and listen on computers or other devices. Many listen to programs live on the Internet and call in with questions.

**The Space Show is a great resource for Astronautics students.**

# Schedule of Astronautics Courses

When you plan your coursework, please always check in advance with the ASTE Student Adviser about the availability of the chosen courses.

While we carefully plan our course offerings, it is the Dean's Office that makes the final scheduling decision. Then, there is a challenge of the availability of DEN studios. You may call it, using the language of physics and mathematics, the "boundary conditions" or "constraints." Also, sometimes our instructors from industry and government centers cannot offer scheduled courses due to work-related or personal emergencies.

We try to minimize such occurrences, but they are outside our direct control. Please always check in advance with the ASTE Student Adviser about the availability of the chosen courses.

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Special arrangements for some courses in the summer (2026), fall (2026), spring (2027), and summer (2027) semesters (all subject to change).

## Summer 2026

### **ASTE 570 Liquid Rocket Propulsion**

Instructor: Prof. G.P. Purohit (Aerospace Corp.)

Offered in the summer semester (usually in the spring).

### **ASTE 580 Orbital Mechanics I**

Instructor: Prof. R. Park (JPL)

Offered in the summer semester.

### **ASTE 585 Spacecraft Attitude Control**

Instructor: Prof. H. Flashner (USC)

Offered in the summer semester.

## Spring 2027

### **ASTE 570 Liquid Rocket Propulsion**

Instructor: Prof. G.P. Purohit

Resumed annual offering in spring semesters.

## University of Southern California

### Department of Astronautical Engineering (ASTE)

#### Astronautics Classes offered in the summer semester, 2026

##### Core technical elective course



**Prof. G.P. Purohit**  
(Aerospace Corp.)

**ASTE 570**  
*Liquid Rocket Propulsion*

##### **ASTE 570 (3)**

Liquid Rocket Propulsion  
campus-and-DEN

Instructor: **Prof. G.P. Purohit**  
(Aerospace Corp.)

##### Required course



**Prof. Ryan Park**  
(Jet Propulsion Laboratory)

**ASTE 580**  
*Orbital Mechanics I*

##### **ASTE 580 (3)**

Orbital Mechanics I  
campus-and-DEN

Instructor: **Prof. Ryan Park**  
(JPL)

##### Core technical elective course



**Prof. Henryk Flashner**  
(Univ. of Southern California)

**ASTE 585**  
*Spacecraft Attitude Control*

##### **ASTE 585 (3)**

Spacecraft Attitude Control  
campus-and-DEN

Instructor: **Prof. Henryk Flashner**  
(USC)

The schedule for Summer 2026 is preliminary – always check with the student adviser. For more information on the *Master of Science in Astronautical Engineering* (MS ASTE) program, please check

<https://viterbigradadmission.usc.edu/programs/masters/msprograms/astronautical-engineering/> and contact ASTE Senior Administrator Ms. Dell Cuason (OHE-500U; tel. 213-821-5817; [cuason@usc.edu](mailto:cuason@usc.edu)) or VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)).

MS ASTE Frequently Asked Questions are at <http://astronauticsnow.com/msaste/faq.html>.

# Instructors of *Astronautics* courses in Fall 2026 (alphabetically)

## University of Southern California



**Dr. Oscar Alvarez-Salazar**  
(JPL)  
**ASTE 556**  
*Spacecraft Structural Dynamics*



**Dr. David Reese**  
(The Aerospace Corp.)  
**ASTE 571**  
*Solid Rocket Propulsion*



**Dr. Justin Bailey**  
(Space Environment Techn.)  
**ASTE 535**  
*Space Environments and Spacecraft Interactions*



**Prof. Garrett Reisman**  
(Univ. of Southern California)  
**ASTE 524**  
*Human Spaceflight*



**Dr. Seung-Bum (Sab) Kim**  
(JPL)  
**ASTE 553**  
*Systems for Remote Sensing from Space*



**Prof. Anita Sengupta**  
(Hyperloop)  
**ASTE 577**  
*Entry and Landing Systems for Planetary Exploration*



**To be announced**  
**ASTE 520**  
*Spacecraft Systems Design*



**Madhu Thangavelu**  
(AAA Visioneering)  
**ASTE 527**  
*Space Studio Architecting*



**Prof. Ryan Park**  
(Jet Propulsion Laboratory)  
**ASTE 580**  
*Orbital Mechanics I*

## University of Southern California

### Department of Astronautical Engineering (ASTE)

#### Astronautics Classes offered in the fall semester, 2026

#### Core Requirements

<b>ASTE 520 (3)</b> Instructor:	– Spacecraft System Design <b>to be announced</b>	campus-and-DEN
<b>ASTE 535 (3)</b> Instructor:	– Space Environment and SC Interactions <b>Dr. Justin Bailey</b> (Space Environment Techn.)	campus-and-DEN
<b>ASTE 580 (3)</b> Instructor:	– Orbital Mechanics I <b>Prof. Ryan Park</b> (JPL)	campus-and-DEN

#### Core Elective and Elective Requirements

<b>ASTE 524 (3)</b> Instructor:	– Human Spaceflight <b>Prof. Garrett Reisman</b> (USC)	campus-and-DEN
<b>ASTE 527 (3)</b> Instructor:	– Space Exploration Architect Concept Studio <b>Madhu Thangavelu</b> (AAA Vis) limited enrollment (9 on-camp + 9 online)	campus-and-DEN
<b>ASTE 553 (3)</b> Instructor:	– Systems for Remote Sensing from Space <b>Dr. Seung-Bum (Sab) Kim</b> (JPL)	DEN-webcast
<b>ASTE 556 (3)</b> Instructor:	– Spacecraft Structural Dynamics <b>Dr. Oscar Alvarez-Salazar</b> (JPL)	DEN-webcast
<b>ASTE 571 (3)</b> Instructor:	– Solid Rocket Propulsion <b>Dr. David Reese</b> (Aerospace Corp.)	DEN-webcast
<b>ASTE 577 (3)</b> Instructor:	– Entry and Landing Systems for Planetary Exploration <b>Prof. Anita Sengupta</b> (Hyperloop)	campus-and-DEN

The schedule is preliminary – always check with the student adviser. For more information on the *Master of Science* degree program in *Astronautical Engineering* (MS ASTE), please check <http://gapp.usc.edu/graduate-programs/masters/astronautical-engineering> and contact VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)).

MS ASTE Frequently Asked Questions are at <http://astronauticsnow.com/msaste/faq.html>.

# Instructors of *Astronautics* courses in Spring 2027 (alphabetically)

## University of Southern California



**Prof. Keenan Albee**  
(Univ. of Southern California)  
**ASTE 599**  
*Spacecraft Structural Dynamics*



**Steve Lapen**  
(Northrop Grumman)  
**Co-Instructor**  
**ASTE 584**  
*Spacecraft Power Systems*



**Prof. David Barnhart** (ASTE  
and ISI; University of  
Southern California)  
**ASTE 566**  
*Ground Communications  
for Satellite Operations*



**Dr. David E. Lee**  
(Northrop Grumman)  
**Co-Instructor**  
**ASTE 584**  
*Spacecraft Power Systems*



**Prof. Keith Goodfellow**  
(Aerojet Rocketdyne)  
**ASTE 572**  
*Advanced Spacecraft  
Propulsion*



**Prof. Ryan Park** (JPL)  
**ASTE 581**  
*Orbital Mechanics II*



**Dr. Troy Goodson**  
(Jet Propulsion Laboratory)  
**ASTE 586**  
*Spacecraft Attitude Dynamics*



**Prof. G.P. Purohit**  
(Aerospace Corp.)  
**ASTE 570**  
*Liquid Rocket Propulsion*



**Prof. Michael Kezirian**  
(IAASS)  
**ASTE 599**  
*Safety of Space Operation*



**Prof. Garrett Reisman**  
(Univ. of Southern California)  
**ASTE 562**  
*Spacecraft Life Support  
Systems*

## Instructors of *Astronautics* courses in Spring 2027 (alphabetically; cont.)



**Prof. Joseph Wang**  
(Univ. of Southern California)

**ASTE 535**  
*Space Environments and  
Spacecraft Interactions*



**Prof. James Wertz**  
(Microcosm)

**ASTE 523**  
*Design of Low Cost Space  
Missions*



**Prof. Joseph Wang**  
(Univ. of Southern California)

**ASTE 575**  
*Rocket and Spacecraft  
Propulsion*

## University of Southern California

### Department of Astronautical Engineering (ASTE)

#### Astronautics Classes offered in the spring semester, 2027

##### Core Requirements

- |                                    |   |                |
|------------------------------------|---|----------------|
| <b>ASTE 535 (3)</b><br>Instructor: | – Space Environment and SC Interactions<br><b>Prof. Joseph Wang</b> (USC) | campus-and-DEN |
| <b>ASTE 575 (3)</b><br>Instructor: | – Rocket and Spacecraft Propulsion<br><b>Prof. Joseph Wang</b> (USC)      | campus-and-DEN |

##### Core Elective and Elective Requirements

- |   |  |                                      |
|---|--|--------------------------------------|
| <b>ASTE 523 (3)</b><br>Instructor:      | – Design of Low Cost Space Missions<br><b>Prof. James Wertz</b> (Microcosm)            | DEN-webcast                          |
| <b>ASTE 562 (3)</b><br>Instructor:      | – Spacecraft Life Support Systems<br><b>Prof. Garrett Reisman</b> (USC)                | DEN-webcast                          |
| <b>ASTE 566 (3)</b><br>Instructor:      | – Ground Communications for Satellite Operations<br><b>Prof. David Barnhart</b> (USC)  | campus-and-DEN<br>limited enrollment |
| <b>ASTE 570 (3)</b><br>Instructor:      | – Liquid Rocket Propulsion<br><b>Dr. G. P. Purohit</b> (Aerospace Corp.)               | campus-and-DEN                       |
| <b>ASTE 572 (3)</b><br>Instructor:      | – Advanced Spacecraft Propulsion<br><b>Prof. Keith Goodfellow</b> (Aerojet Rocketdyne) | campus-and-DEN                       |
| <b>ASTE 581 (3)</b><br>Instructor:      | – Orbital Mechanics II<br><b>Prof. Ryan Park</b> (JPL)                                 | campus-and-DEN                       |
| <b>ASTE 584 (3)</b><br>Instructors:     | – Spacecraft Power Systems<br><b>Steve Lapen and Dr. David E. Lee</b> (NGC)            | campus-and-DEN                       |
| <b>ASTE 586 (3)</b><br>Instructor:      | – Spacecraft Attitude Dynamics<br><b>Dr. Troy Goodson</b> (JPL)                        | DEN-webcast                          |
| <b>ASTE 599 (4)</b><br>Instructor:      | – Extreme Environment Robotic Autonomy<br><b>Prof. Keenan Albee</b> (USC)              | on campus only                       |
| <b>ASTE 599 (3)</b><br>Lead Instructor: | – Safety of Space Operations<br><b>Prof. Michael Kezirian</b> (IAASS)                  | DEN-webcast                          |

The schedule is preliminary – always check with the student adviser. For more information on the *Master of Science* degree program in *Astronautical Engineering* (MS ASTE), please check <http://gapp.usc.edu/graduate-programs/masters/astronautical-engineering> and contact VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)). MS ASTE Frequently Asked Questions are at <http://astronauticsnow.com/msaste/faq.html>.

## University of Southern California

### Department of Astronautical Engineering (ASTE)

#### Astronautics Classes offered in the summer semester, 2027

##### Required course



**Prof. Ryan Park**  
(Jet Propulsion Laboratory)

**ASTE 580**  
*Orbital Mechanics I*

##### **ASTE 580 (3)**

Orbital Mechanics I

campus-and-DEN

Instructor: **Prof. Ryan Park**  
(JPL)

##### Core technical elective course



**Prof. Henryk Flashner**  
(Univ. of Southern California)

**ASTE 585**  
*Spacecraft Attitude Control*

##### **ASTE 585 (3)**

Spacecraft Attitude Control

campus-and-DEN

Instructor: **Prof. Henryk Flashner**  
(USC)

The schedule for Summer 2027 is preliminary – always check with the student adviser. For more information on the *Master of Science in Astronautical Engineering* (MS ASTE) program, please check

<https://viterbigradadmission.usc.edu/programs/masters/msprograms/astronautical-engineering/> and contact ASTE Senior Administrator Ms. Dell Cuason (OHE-500U; tel. 213-821-5817; [cuason@usc.edu](mailto:cuason@usc.edu)) or VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)).

MS ASTE Frequently Asked Questions are at <http://astronauticsnow.com/msaste/faq.html>.

# Preliminary Astronautics Class Schedule (as of Mar 2026)

(subject to change – always check with *ASTE Student Adviser*)

					2025	2026	2026	2027	2027	2028	2028	2029
					Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
<b>Required Courses</b>												
ASTE 520	Spacecraft Design	1	D	R	▼		▼		▼		▼	
ASTE 535	Space Environment and Spacecraft Interactions	2	D	R	▼	▼	▼	▼	▼	▼	▼	▼
ASTE 580	Orbital Mechanics I	2	D	R	▼		▼		▼		▼	
ASTE 580	Orbital Mechanics I - summer		D	R	offered in summers -- see next page							
ASTE 575	Rocket and SC Propulsion	1	D	R		▼		▼		▼		▼
<b>Elective Courses</b>												
ASTE 501a	Physical Gas Dynamics I	#	D	C	▼				▼			
ASTE 505ab	Plasma Dynamics I, II	1#	D	C					▼ <sup>a</sup>			
ASTE 523	Design Low Cost Sp Missions	#	D	C				▼				▼
ASTE 524	Human Spaceflight	1	D	C	▼		▼		▼		▼	
ASTE 527	Space Studio Architecting	1	D	C	▼		▼		▼		▼	
ASTE 528	Reliability of Space Systems	#	D	C	▼				▼			
ASTE 529	Safety Space Sys. & Missions	#	D	C		▼				▼		
ASTE 546	Comp. Plasma Dynamics	lr	N	E						cwi		
ASTE 552	Spacecraft Thermal Control	#	D	C	▼				▼			
ASTE 553	Sys Remote Sensing Space	#	D	C			▼				▼	
ASTE 554	Spacecraft Sensors	#	D	C					▼			
ASTE 555	Space Cryogenic Sys & Applic	lr	D	C	see next page							
ASTE 556	SC Structural Dynamics	#	D	C			▼				▼	
ASTE 557	SC Structural Materials	#	D	C	▼				▼			
ASTE 561	Human Factors Spacecraft Ops	1	D	C		▼				▼		
ASTE 562	Spacecraft Life Support Sys	1	D	C				▼				▼
ASTE 566	Ground Comm Satellite Ops	1	D	C		▼		▼		▼		▼
ASTE 570	Liquid Rocket Propulsion	1	D	C	smmr - see next page			▼		▼		▼
ASTE 571	Solid Rocket Propulsion	#	D	C			▼				▼	
ASTE 572	Advanced SC Propulsion	1	D	C		▼		▼		▼		▼
ASTE 574	Space Launch Vehicle Design	#	D	C		▼				▼		
ASTE 577	Entry & Landing Planet. Sys.	1	D	C			▼		▼		▼	
ASTE 581	Orbital Mechanics II	1	D	C		▼		▼		▼		▼
ASTE 583	Space Navigation	#	D	C	▼				▼			
ASTE 584	SC Power Systems	1	D	C		▼		▼		▼		▼
ASTE 585	SC Attitude Control	1	D	C	offered in summers -- see next page							
ASTE 586	SC Attitude Dynamics	#	D	C				▼				▼
ASTE 589	Solar System Navigation	lr#	D	C	see next page							
ASTE 599	Safety of Space Operations	#	D	E				▼				▼
ASTE 599	Extrm Envrt Robotic Autonomy	1	N	E				▼		▼		▼
ASTE 683	Adv. Spacecraft Navigation	lr	D	E	see next page							

See the next page →

## Required course in spacecraft propulsion

ASTE-575 has replaced ASTE-470 as a required course for MS ASTE. If you have taken ASTE-470, then there is no need for ASTE-575. (ASTE-470 duplicates the credit for ASTE-575).

**As an exception, ASTE 570 is offered in Summer 2026 (instead of Spring 2026).**

### Courses in summer

					2026 summer	2027 summer	2028 summer	2029 summer
<b>Required Courses</b>								
ASTE 580	Orbital Mechanics I	2	D	R	▼	▼	▼	▼
<b>Elective Courses</b>								
ASTE 585	Spacecraft Attitude Control	1	D	C	tbc	tbc	tbc	tbc
ASTE 570	Liquid Rocket Propulsion	1	D	C	▼	in spring	in spring	in spring

### Courses listed but not offered (due to the availability of instructors)

<b>Elective Courses</b>													
ASTE 555	Space Cryogenic Sys & Applic	#	D	C									
ASTE 589	Solar System Navigation	#	D	C									
ASTE 683	Advanced Spacecraft Navigation	Ir	D	E									

### Table notation

SC = spacecraft

2 = course offered in both fall and spring each year

1 = course offered each year

# = course offered every second year

Ir = course offered irregularly

▼ = planned (subject to School approval)

tbc = to be confirmed

R = required MS ASTE

C = core elective MS ASTE

E = technical elective

D = webcast through DEN

N = on campus; not available through DEN

? = uncertain, check with the ASTE Student Adviser

cwi = check with the instructor directly

The course schedule is subject to change. Please check with ASTE Student Adviser.

## Master of Science in Astronautical Engineering

This degree is in the highly dynamic and technologically advanced area of astronautics and space technology. The program is designed for those with B.S. degrees in science and engineering who work or wish to work in the space sector of the defense/aerospace industry, government research and development centers and laboratories and academia. The program is available through the USC Distance Education Network (DEN).

The general portion of the Graduate Record Examinations (GRE) and two letters of recommendation are required.

### Required courses: 27 units

<b>CORE REQUIREMENT (12 units)</b>		<b>Units</b>
ASET 575	Spacecraft Propulsion	3
ASTE 520	Spacecraft System Design	3
ASTE 535	Space Environment and Spacecraft Interactions	3
ASTE 580	Orbital Mechanics I	3
<b>CORE ELECTIVE REQUIREMENT (9 units - choose three courses)</b>		<b>Units</b>
ASTE 501ab	Physical Gas Dynamics	3-3
ASTE 505ab	Plasma Dynamics	3-3
ASTE 523	Design of Low Cost Space Missions	3
ASTE 524	Human Spaceflight	3
ASTE 527	Space Exploration Architectures Studio	3
ASTE 528	Reliability of Space Systems	3
ASTE 529	Safety of Space Systems and Space Missions	3
ASTE 552	Spacecraft Thermal Control	3
ASTE 553	Systems for Remote Sensing from Space	3
ASTE 554	Spacecraft Sensors	3
ASTE 555	Space Cryogenic Systems and Applications	3
ASTE 556	Spacecraft Structural Dynamics	3
ASTE 557	Spacecraft Structural Strength and Materials	3
ASTE 561	Human Factors of Spacecraft Operations	3
ASTE 562	Spacecraft Life Support Systems	3
ASTE 566	Ground Communications for Satellite Operations	3
ASTE 570	Liquid Rocket Propulsion	3
ASTE 571	Solid Rocket Propulsion	3
ASTE 572	Advanced Spacecraft Propulsion	3
ASTE 574	Space Launch Vehicle Design	3
ASTE 577	Entry and Landing Systems for Planetary Surface Exploration	3
ASTE 581	Orbital Mechanics II	3
ASTE 583	Space Navigation: Principles and Practice	3

ASTE 584	Spacecraft Power Systems	3
ASTE 585	Spacecraft Attitude Control	3
ASTE 586	Spacecraft Attitude Dynamics	3
ASTE 589	Solar System Navigation	3

**TECHNICAL ELECTIVE REQUIREMENT (6 Units)**

Two 3-unit courses. Students are advised to select these two elective courses from the list of core electives or from other courses in astronautical engineering or from other science and engineering graduate courses, as approved by the faculty adviser. No more than 3 units of directed research (ASTE 590) can be applied to the 27-unit requirement. New courses on emerging space technologies are often offered; consult the current semester's course offerings, particularly for ASTE 599 Special Topics.

At least 21 units must be at the 500 or 600 level.

**Areas of concentration:**

Students choose core elective and technical elective courses that best meet their educational objectives. Students can also concentrate their studies in the desired areas by selecting corresponding core elective courses. Presently, ASTE faculty suggest the following areas of concentration:

**Spacecraft propulsion** Choose two core electives from

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

**Spacecraft dynamics** Choose two core electives from

ASTE 556	Spacecraft Structural Dynamics	3
ASTE 557	Spacecraft Structural Strength and Materials	3
ASTE 581	Orbital Mechanics II	3
ASTE 583	Space Navigation: Principles and Practice	3
ASTE 585	Spacecraft Attitude Control	3
ASTE 586	Spacecraft Attitude Dynamics	3
ASTE 589	Solar System Navigation	3

**Space system design** Choose two core electives from

ASTE 523	Design of Low Cost Space Missions	3
ASTE 524	Human Spaceflight	3
ASTE 527	Space Exploration Architectures Studio	3
ASTE 528	Reliability of Space Systems	3
ASTE 529	Safety of Space Systems and Space Missions	3

ASTE 557	Spacecraft Structural Strength and Materials	3
ASTE 562	Spacecraft Life Support Systems	3
ASTE 574	Space Launch Vehicle Design	3
ASTE 577	Entry and Landing Systems for Planetary Surface Exploration	3

**Spacecraft systems and operations**

Choose two core electives from

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

**Space applications**

Choose two core electives from

ASTE 524	Human Spaceflight	3
ASTE 527	Space Exploration Architectures Studio	3
ASTE 553	Systems for Remote Sensing from Space	3
ASTE 554	Spacecraft Sensors	3
ASTE 555	Space Cryogenic Systems and Applications	3

**Safety of Space Systems**

Choose two core electives from

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

**Human Space Flight**

Choose two core electives from

ASTE 524	Human Spaceflight	3
ASTE 529	Safety of Space Systems and Space Missions	3
ASTE 561	Human Factors of Spacecraft Operations	3
ASTE 562	Spacecraft Life Support Systems	3

Note to students:

Please note that tracks, or areas of specialization (concentration), within the program do not appear in transcripts or have separate post-codes. Faculty uses tracks to advise students on different routes to the degrees meeting their educational objectives. The tracks are usually listed in the catalog to help describe the program to prospective students.

# Admission Requirements for Graduate Degrees in *Astronautical Engineering* – Code **ASTE**

The **Department of Astronautical Engineering (ASTE)** of the **USC Viterbi School of Engineering** offers degrees in **astronautical engineering**, code **ASTE**. The admission to the Master of Science degree program (MS ASTE) is based on the totality of the applicant's record, which includes GPA, **GRE (temporarily suspended)**, and two letters of recommendation.

## Required items:

	<u>Send To</u>
<b>Application</b>	Office of Grad. and Int'l Admission
<b>Official Transcript(s)</b>	Office of Grad. and Int'l Admission
<b>General Record Exam</b>	Office of Grad. and Int'l Admission
<b>TOEFL (international students only)</b>	Office of Grad. and Int'l Admission
<b>Financial Statement</b>	Office of Grad. and Int'l Admission
<b>Recommendation Letters</b>	Office of Grad. and Int'l Admission

## Application

All applications should be submitted online at <http://www.usc.edu/admission/graduate/apply/>

## Official Transcript(s)

The University requires official transcripts from the accredited colleges or universities the applicant has attended. The MS Degree Program in Astronautical Engineering (Code ASTE) requires a minimum GPA of 3.0.

USC now accepts official electronic transcripts, provided they meet the following guidelines:

1. The transcript originates from a secure site formally linked to the sending institution.
2. The school is located in the United States. We do not accept electronic transcripts from any institution overseas.

## General Record Exam (temporarily suspended)

The Department of Astronautical Engineering requires the general GRE. The GRE must be taken within five years of the application date. USC's ETS school code is 4852. Applicants taking the GRE should use this code to ensure the official submission of test scores.

## English Language Proficiency for International Applicants

In addition to the general admission criteria listed above, international students whose first language is not English are required to take the TOEFL or IELTS examination to be considered a candidate for admission. There is no minimum TOEFL or IELTS score required for admission to the Viterbi School. For possible exemption from additional language requirements, you must achieve an Internet Based TOEFL (iBT) score of 90, with no less than 20 on each section, or an IELTS score of 6.5, with no less than 6 on each band score.

For more details on English Proficiency Criteria for the University of Southern California, please visit <https://www.usc.edu/admission/graduate/international/englishproficiency.html>.

## Recommendation Letters

Please provide two professional letters of reference (former instructors, supervisors, professional colleagues, advisers, etc.) to be filed through the online application process.

## Mailing addresses, if needed

Office of Graduate and International Admission  
University of Southern California  
3601 S. Flower St, Room 112  
Los Angeles, CA 90089-0915

Department of Astronautical Engineering  
ASTE Graduate Program, 3650 McClintock Ave, OHE-500  
University of Southern California  
Los Angeles, CA 90089-1451

## Department Application deadline

**15 January for fall; 1 October for spring; 1 February for summer.**

Please note that verification and processing of materials by the Office of Graduate and International Admission may take four to six weeks.

## Limited Status Enrollment

Limited enrollment is to provide strong candidates for admission the opportunity to get started, without having to wait for the next admissions cycle. Strong candidacy is indicated by a B.S. in engineering or science from a regionally accredited institution with a GPA of 3.0 or above. Students who do not meet these standards must apply for admission where their GPA, transcripts, GRE scores, and letters of recommendation will be evaluated by admissions officers and faculty.

Limited-status students can take up to three (3) courses. These courses will be credited, after formal admission to the program, toward the Master's degree in Astronautical Engineering (MS ASTE).

Students who are interested in pursuing a graduate degree should not delay their application. We have many limited-status students in the program.

## Admission

Admission decisions are based on the totality of the applicants' records, including academic performance, test scores, letters of recommendation, and other supporting materials. Applicants will be notified once an admission decision has been reached. Admitted applicants will receive further information about advisement, housing, orientations, and campus tours.

## Conditional Admission

Applicants who do not meet admission qualifications may be granted conditional admission. Conditionally admitted students will be notified in writing of their admission status and of the conditions that must be satisfied to gain regular student status. Students must satisfy the admission conditions typically during the first semester of study.

## Other Questions:

Please contact ASTE Senior Administrator Ms. Dell Cuason (OHE-500U; tel. 213-821-5817; [cuason@usc.edu](mailto:cuason@usc.edu)) and VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)). and visit <http://astronautics.usc.edu>.

# Student Transfer to Degrees in Astronautical Engineering – Code ASTE

## Transfer Process – Viterbi Engineering Students

Please refer to the VSOE change of major form and contact VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)) for further details of the process.

## Transfer Process – Non-Engineering Students

Transfer to a program in Astronautical Engineering, Code ASTE, requires a non-engineering student to file the USC application for graduate admission to the program in Astronautical Engineering. Processing of the application does not require the re-submission of supporting documents (e.g., transcripts) that have been previously submitted to USC. Check with VASE Student Services Ms. Prisila Cisneros (OHE-106L; tel. 213-764-7919; [prisilac@usc.edu](mailto:prisilac@usc.edu)).

## Restrictions

Transfer to a program in Astronautical Engineering, Code ASTE, cannot be requested during the first semester of student studies at USC.

## Questions?

Please contact ASTE Senior Administrator Ms. Dell Cuason (OHE-500U; tel. 213-821-5817; [cuason@usc.edu](mailto:cuason@usc.edu)).

# GPA, Leave of Absence, and Graduation

## Grade Point Average

Students must maintain an overall 3.0 GPA on 400-level and above work attempted at USC beyond the bachelor's degree to graduate. A minimum grade of C (2.0) is required in a course to receive graduate credit. Transfer units count as credit (CR) and are not calculated in the GPA.

## Leave of Absence

There are times when students suspend their studies for a semester due to heavy workload or personal matters. Students must file for leave of absence within the department, and withdraw from classes before the last day to drop classes without a mark of W (see the Schedule of Classes). Students who miss the deadline for LOA may still withdraw from classes with a mark of W but must apply for readmission to the program.

## Graduation

At the beginning of the last semester, students should file an Application for a Master's Degree and contact the Student Affairs staff. This will initiate the degree check process, verifying that all academic and administrative requirements are met.

## Questions?

Please contact ASTE Senior Administrator Ms. Dell Cuason (OHE-500U; tel. 213-821-5817; [cuason@usc.edu](mailto:cuason@usc.edu)) and visit <http://astronautics.usc.edu>.