

# HYPERSONIC AEROTHERMODYNAMICS (2017-2018 Spring)

Term: **2017-2018 Spring**  
 Subject: **ME**  
 Catalog & Section: **356 1**  
 Course Title: **HYPERSONIC AEROTHERMODYNAMICS**

Instructor: **Urzay Lobo, Javier**  
 Enrollment: **18**  
 Responses Incl Declines: **17**  
 Declines: **0**

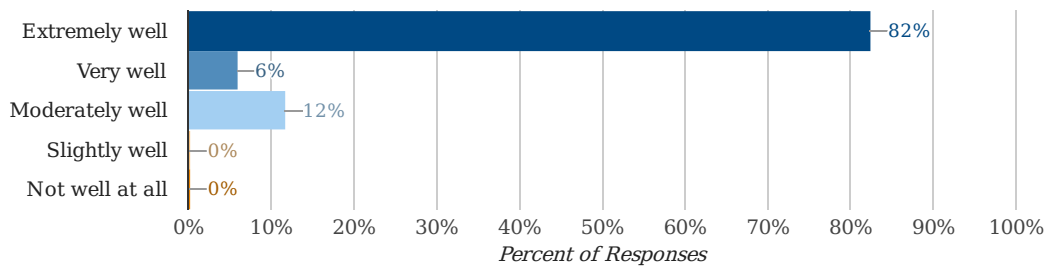
## Learning Goals

Students are most likely to say their learning goals have been met when

- The goals are clearly articulated in the syllabus and/or directly to students
- There's a clear connection between the goals and the exams, quizzes, and/or assignments in the class
- Students have adequate practice doing work that is relevant to the goals

For information on writing effective learning goals, please see Writing Learning Goals (<https://vptl.stanford.edu/teaching-learning/teaching-practices/evaluation/stanfords-new-course-evaluations/writing-learning>).

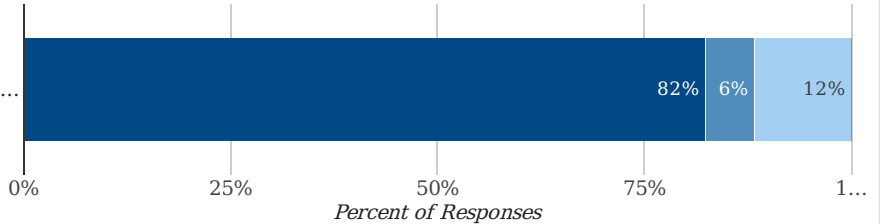
**How well did you achieve the learning goals of this course?**



*Percent of Responses*

■ Extremely well   
 ■ Very well   
 ■ Moderately well   
 ■ Slightly well   
 ■ Not well at all

How well did you achieve the learning goals of this...



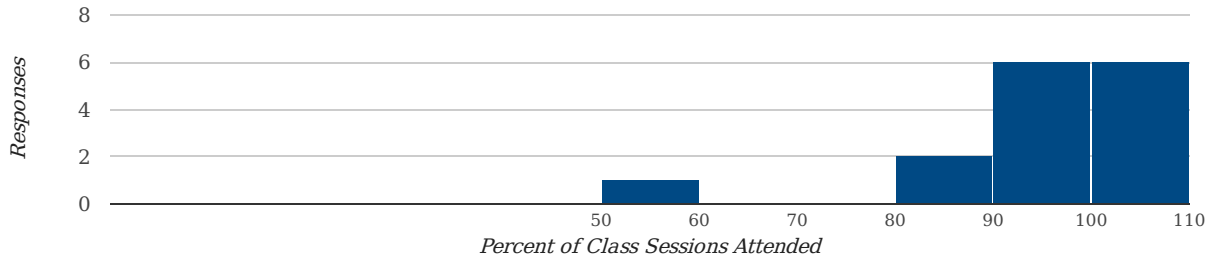
*Percent of Responses*

Question	Number of Responses	Response Rate	Course Mean	Course Median	STDEV	5	4	3	2	1
How well did you achieve the learning goals of this course?	17	94%	4.7	5	0.7	82%	6%	12%	0%	0%

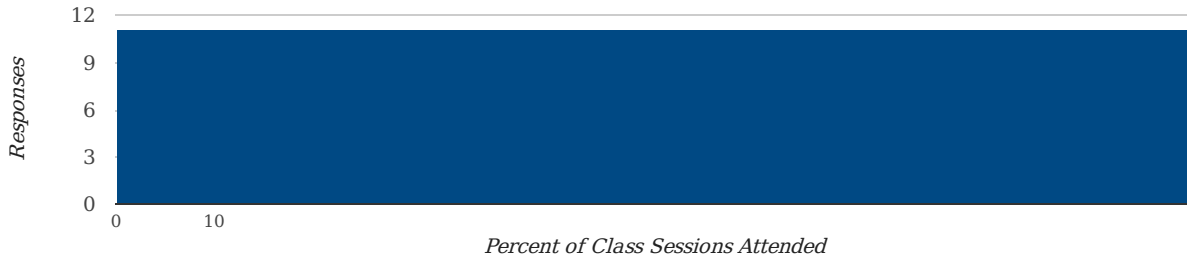
Note: 5:Extremely well; 4:Very well; 3:Moderately well; 2:Slightly well; 1:Not well at all;

## Attendance and Engagement

**About what percent of the class meetings (including discussions) did you attend in person?**



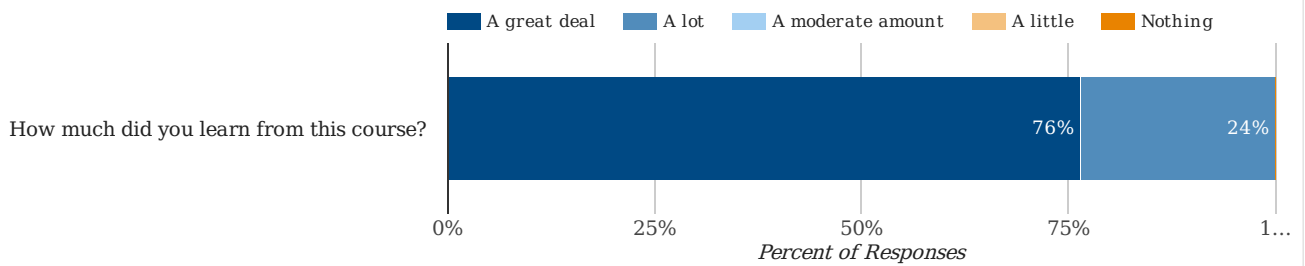
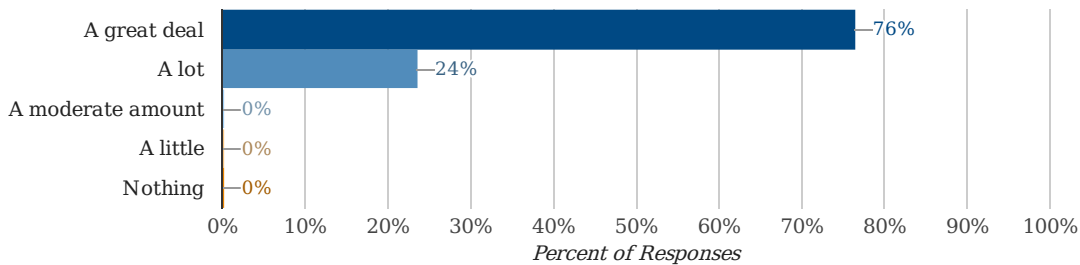
**About what percent of the class meetings did you attend online?**



**Student Learning**

For information on factors that contribute to students' learning, please see Interpreting Your Course Evaluation Report (<https://vptl.stanford.edu/teaching-learning/teaching-practices/evaluation-feedback/stanfords-new-course-evaluations>).

**How much did you learn from this course?**



Question	Number of Responses	Response Rate	Course Mean	Course Median	STDEV	5	4	3	2	1
How much did you learn from this course?	17	94%	4.8	5	0.4	76%	24%	0%	0%	0%

Note: 5:A great deal; 4:A lot; 3:A moderate amount; 2:A little; 1:Nothing;

(10 comments)

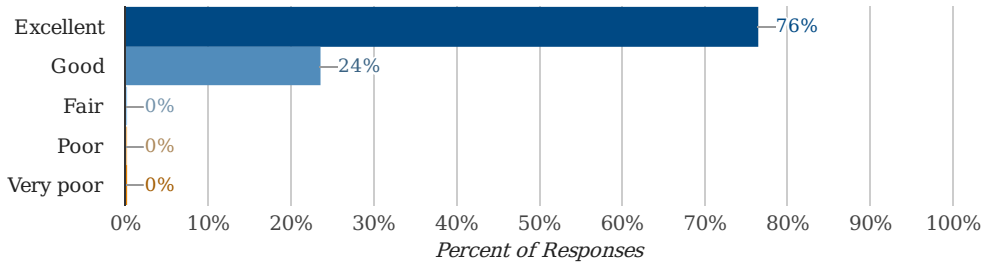
**Q: What skills or knowledge did you learn or improve?**

- 1 General Hypersonic Knowledge
- 2 Fundamental understanding of hypersonic theory and viscous/thermochemical phenomena that can occur in various regions
- 3 I know a lot more about hypersonic flows, and the philosophy behind the design of hypersonic vehicles
- 4 Compressible flow in hypersonic limit, aerodynamic calculations of hypersonic bodies
- 5 I received a relatively brief overview of the essential questions in hypersonic flight, and I began to develop an intuition for this regime.
- 6 Hypersonic aerothermodynamics
- 7 A better understanding of the physical concepts involved in hypersonic flows
- 8 My knowledge and appreciation of the many complexities that must be taken into account in the hypersonic flow regime was greatly enhanced.
- 9 Hypersonic theory
- 10 Inviscid and viscous hypersonic flows, thermo-chemical effects and re-entry aeromechanics

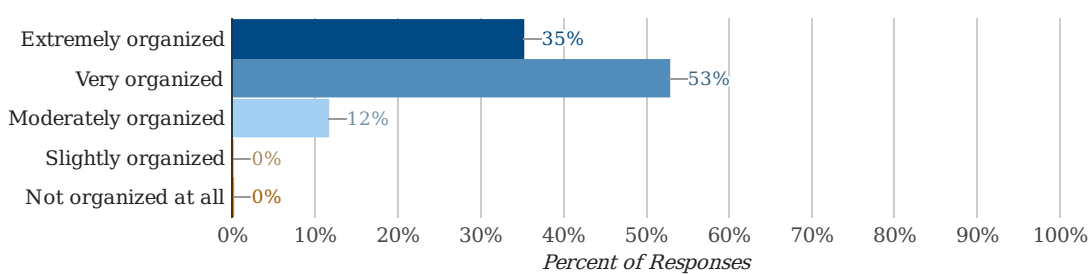
**Instruction and Organization**

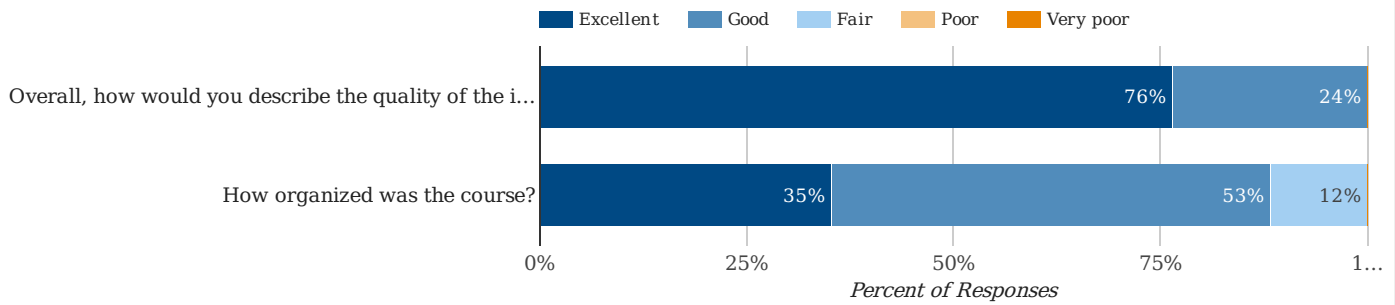
For information about effective teaching in a variety of contexts, please see Teaching Strategies (<https://teachingcommons.stanford.edu/resources/teaching-resources/teaching-strategies>).

**Overall, how would you describe the quality of the instruction in this course?**



**How organized was the course?**





Question	Number of Responses	Response Rate	Course Mean	Course Median	STDEV	5	4	3	2	1
Overall, how would you describe the quality of the instruction in this course?	17	94%	4.8	5	0.4	76%	24%	0%	0%	0%
How organized was the course?	17	94%	4.2	4	0.6	35%	53%	12%	0%	0%

Note: 5:Excellent; 4:Good; 3:Fair; 2:Poor; 1:Very poor;

## Course Elements

No Data.

## Additional Student Comments

Answers to this question will be viewable by the Stanford student community four weeks after the release of reports to instructors. If you have a question about a comment, please review the guidelines under "Questions or concerns?" at <http://evals.stanford.edu/results/respond-feedback> (<http://evals.stanford.edu/results/respond-feedback>) and write to [VPTLevaluations@stanford.edu](mailto:VPTLevaluations@stanford.edu) (<mailto:vptlevaluations@stanford.edu>).

(12 comments)

### Q: What would you like to say about this course to a student who is considering taking it in the future?

- 1 Its an awesome course.
- 2 Great course for understanding the difficulties of hypersonic flight and different phenomena that occur beyond the thermal barrier
- 3 Its a very interesting course. Not very tough, but rewarding
- 4 Wide coverage of many interesting topics in compressed lectures. This kind of material is not covered in any other course.
- 5 Brush up on your calculus and ODE because they will be essential to follow the lectures. The tests tend to be more math heavy than the home works.
- 6 This course is the best course I have taken thus far, so I would highly recommend taking it.
- 7 Prepare for the course by taking classes on compressible flows and PGD, and a lot will be learnt from the material
- 8 If you are interested in aero and astrodynamics, and the implications of gas dynamics on them, this course is a must.
- 9 A very thorough and well taught course essential for future work in hypersonics.
- 10 Feels like a sequel to compressible flow class
- 11 An amazing introduction to hypersonics that is extremely well taught.

12 It is a very interesting and useful class.

(12 comments)

**Q: Would you like to provide any other comments about this course?**

- 1 I would like to see a part 2. Also, more homeworks/ more hypersonic question on exams....a lot of questions felt like they were asking math questions.
- 2 No
- 3 Full understanding would be achieved with standard HW load.
- 4 This as a fantastic course, and I deeply enjoyed it!
- 5 I only wish there would be a part 2 of this course offered in the near future.
- 6 maybe spend less time on review of compressible flow (leave it as reading) and tackle right from the beginning the specifics of hypersonics  
would love to have a more advanced version of that course in terms of thermochemical effects
- 7 A little too front-heavy
- 8 This was my favorite course I've taken at Stanford. I cannot commend enough Professor Urzay. The passion he brings to the subject and the thoroughness with which he explores topics are truly remarkable.
- 9 Would be nice to have a second hypersonics course that goes into more detail about the thermochemical effects
- 10 Thanks for the great course Javier! I really enjoyed it.
- 11 Newtonian theory working out well for hypersonics was very interesting.
- 12 This was the first time the course was taught, so organization/pacing could be better.

## Instructor Added Questions

### Close-Ended Questions

No Data.

Interpreting these results and deciding what changes you might want to make in your course can benefit greatly from a conversation with a colleague and/or a teaching consultant. To discuss your course evaluation feedback with a consultant in the Office of the Vice Provost for Teaching and Learning, please click here: [VPTL Consultation Request Form \(https://jfe.qualtrics.com/form/SV\\_78KTbL61cIEWsO9\)](https://jfe.qualtrics.com/form/SV_78KTbL61cIEWsO9)

# HYPERSONIC AEROTHERMODYNAMICS (2018-2019 Spring)

Term: **2018-2019 Spring**  
 Subject: **ME**  
 Catalog & Section: **356 1**  
 Course Title: **HYPERSONIC AEROTHERMODYNAMICS**

Instructor: **Urzay Lobo, Javier**  
 Enrollment: **26**  
 Responses Incl Declines: **25**  
 Declines: **1**

## Learning Goals

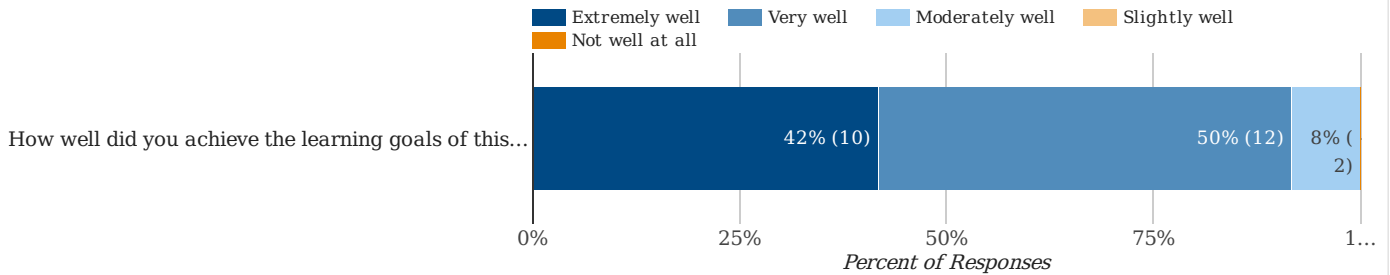
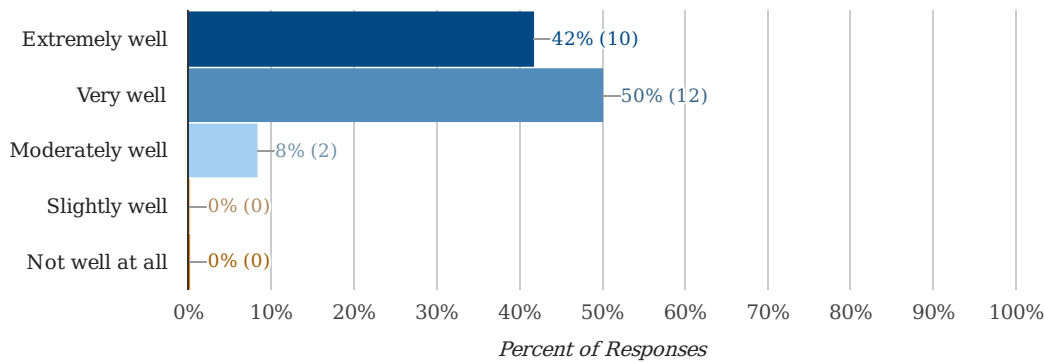
We want your feedback about your experience using the course evaluation system and reporting. To provide your feedback, please click [HERE \(https://stanforduniversity.qualtrics.com/jfe/form/SV\\_9WxxjNycVY9uOj3\)](https://stanforduniversity.qualtrics.com/jfe/form/SV_9WxxjNycVY9uOj3) to answer one question.

Students are most likely to say their learning goals have been met when

- The goals are clearly articulated in the syllabus and/or directly to students
- There's a clear connection between the goals and the exams, quizzes, and/or assignments in the class
- Students have adequate practice doing work that is relevant to the goals

For information on writing effective learning goals, please see Writing Learning Goals (<https://evals.stanford.edu/end-term-feedback/how-write-learning-goals>).

### How well did you achieve the learning goals of this course?



Question	Number of Responses	Response Rate	Course Mean	Course Median	STDEV	5	4	3	2	1
How well did you achieve the learning goals of this course?	24	92%	4.3	4	0.6	42%	50%	8%	0%	0%

Note: 5:Extremely well; 4:Very well; 3:Moderately well; 2:Slightly well; 1:Not well at all;

## Attendance and Engagement

How much did you learn from this course? 24 92% 4.4 5 0.6 50% 42% 8% 0% 0%

Note: 5:A great deal; 4:A lot; 3:A moderate amount; 2:A little; 1:Nothing;

(18 comments)

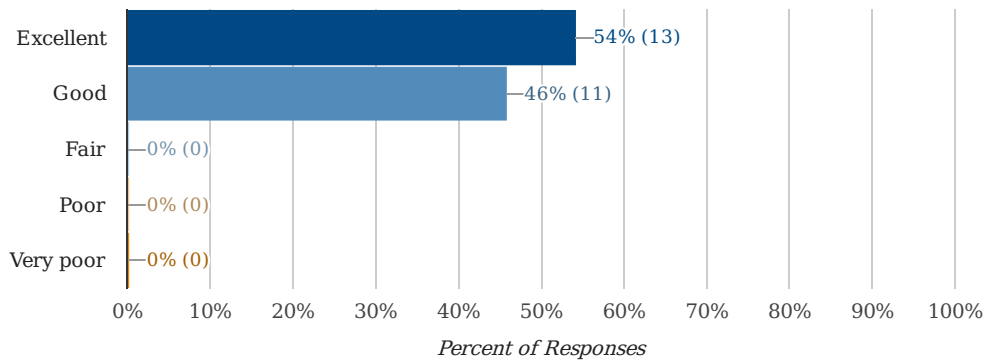
### Q: What skills or knowledge did you learn or improve?

- 1 Aerodynamics, theories of hypersonic flows, shocks
- 2 The differences between supersonic and hypersonic flows, exact and approximate solutions to hypersonic flows, compressible boundary layer theory, and aerodynamic heating were all covered in detail. We also discussed nonequilibrium thermodynamics and entry mechanics for orbital vehicles in the last week and a half of the class.
- 3 Knowledge of aerodynamics, gas dynamics, thermochemistry, aero-mechanics, mathematics, open-ended problem solving.
- 4 supersonic flow and hypersonic flow
- 5 General understanding of how hypersonic flows behavior, and some general assumptions that go into making the simplified models.
- 6 Improved compressible flow abilities and overall aerothermodynamic understandings. Also learned fundamental theories relevant for hypersonics and what research avenues are possible in the field.
- 7 I learned what considerations must be taken into account when analyzing a hypersonic flow vs a supersonic flow.
- 8 I came into this class not knowing anything about compressible flows. I was not only brought up to speed, but I learned a great deal about hypersonic flows from multiple perspectives. This included inviscid phenomena, viscous effects, the importance of thermodynamic nonequilibrium and physical gas dynamics in hypersonic flows, as well as an introduction to the analysis of re-entry aeromechanics accounting for hypersonic effects.
- 9 Effects at the hypersonic limits, design for hypersonic flight, chemical effects at high temperatures
- 10 knowledge of hypersonics in general
- 11 Developed a better foundation in hypersonics
- 12 Hypersonics fundamentals and applications
- 13 How flows behave at hypersonic flight speeds; current state of the theory regarding hypersonic flows; history of the development and application of hypersonic technology and leaders in the field
- 14 Thermochemical effects, the importance of normal Ma, heat transfer/viscous effects, Ma independence, the combined limit and Newton's theory
- 15 Analytical modeling of high speed flows
- 16 Introductory knowledge on compressible flows and aspects of hypersonic flows
- 17 Learned many engineering problems that we are facing in this area and also how to understand them
- 18 I learned more about the theory behind hypersonics and I especially realized just how complex and deep the field is, and how little I can actually learn from just one quarter.

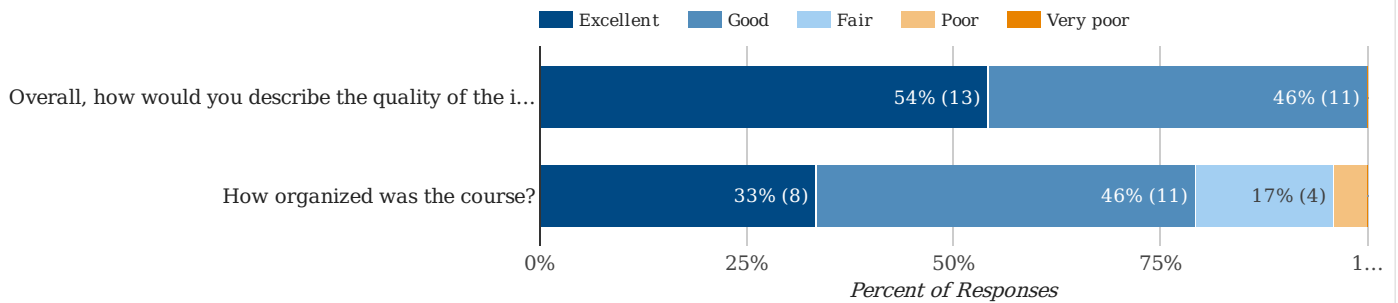
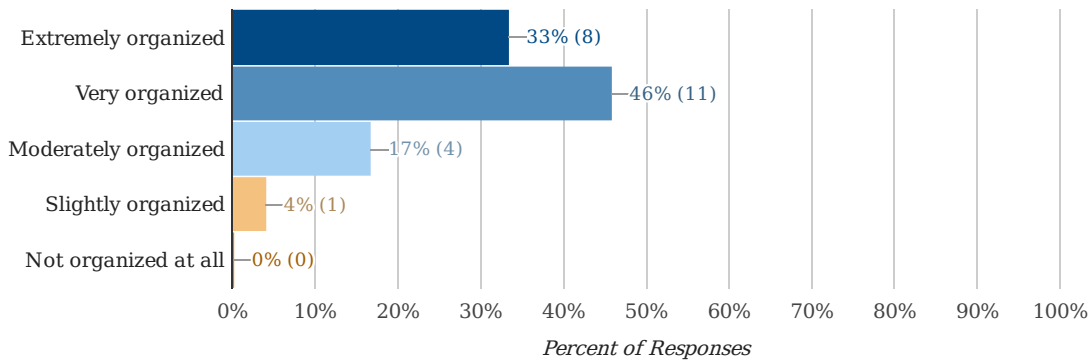
## Instruction and Organization

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**Overall, how would you describe the quality of the instruction in this course?**



**How organized was the course?**



Question	Number of Responses	Response Rate	Course Mean	Course Median	STDEV	5	4	3	2	1
Overall, how would you describe the quality of the instruction in this course?	24	92%	4.5	5	0.5	54%	46%	0%	0%	0%
How organized was the course?	24	92%	4.1	4	0.8	33%	46%	17%	4%	0%

Note: 5:Excellent; 4:Good; 3:Fair; 2:Poor; 1:Very poor;

**Course Elements**

No Data.



## Additional Student Comments

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(18 comments)

### Q: What would you like to say about this course to a student who is considering taking it in the future?

- 1 Professor Urzay is a good lecturer. The tests are brutal. If you take this class, think of it as a fun learning experience rather than trying to get perfect scores, he asked questions that pull heavily from material from outside this class.
- 2 I highly recommend this class. Professor Urzay is very passionate about the subject and it shows. It is recommended to have some familiarity with compressible flows, but I think you could pick up everything you need along the way if you haven't formally taken the class.
- 3 Professor Urzay is good and cares deeply about students. He likes open-ended problems and critical thinking. Would recommend this course to anyone who has had compressible flow.
- 4 take it!
- 5 Great course for fundamental understanding of hypersonics. Great introduction if wanting to dig in deeper after this class since it builds a fundamental overview of various ideas about hypersonic flows.
- 6 This class is a good introduction to the topic for someone who has previous compressible flow experience. You will not dive heavily into the nitty gritty but will rather cover all general considerations for hypersonics.
- 7 The curriculum is very well-structured and comes full-circle at the end, when using hypersonics theory to analyze entry of a spacecraft into Earth's atmosphere. I felt like I learned a lot about what considerations must be taken into account in a hypersonic flow that wouldn't need to be taken into account for a slower flow. However, the course did not go too deep into the mathematical analysis of more complicated flows such as non-calorically perfect flows (which made it an easier course), but I feel confident in my ability to go out and learn what I need when doing research on a related project. Class notes were hand-written by the instructor, which made the filesize very large and hard to read, but there is apparently a digital copy in the works for future years.
- 8 It is an excellent introduction to hypersonic flows and is presented in a very engaging and encompassing manner. The class is not too focused on the boring aspects of using tables but is instead presented with the aim of building fundamental understanding as well as intuition for hypersonic flows.
- 9 A difficult class but interesting to take. It would be very hard to learn this topic outside of academia, and Javier was extremely knowledgeable in the field. Provided a good foundation on what you should be aware of for hypersonic flight.
- 10 Good survey course in hypersonics.
- 11 Highly recommended. Instructor puts in effort to engage and motivate students.
- 12 This class is not overwhelming but you still learn a lot, which are two traits hard to come by together in many engineering courses here. The professor is more interested in students learning the subject than giving you a grade, which is fantastic.
- 13 Very fun and fascinating class
- 14 This is a great class! Discusses a broad range of topics, but manages to go deeper than surface level. Best if you have seen the normal shock relations before possibly in an undergrad class otherwise you will have to work a little harder in the first couple weeks to catch up.
- 15 Excellent class. Highly recommended for anyone in the fluids track
- 16 Javier is a very good (knowledgeable and animated) instructor, it was one of the few classes that I found myself unexpectedly looking forward to breaking myself from away my office desk in positive anticipation of going to hypersonics lecture. I didn't have much theoretical background of compressible flows and I still found myself not struggling to keep up.
- 17 If you are interested in hypersonic, you should take this class!
- 18 I recommend it to students who wish to enter a lifelong study of hypersonics, or those who want an intro to see how deep and interesting it really is (like me).

(14 comments)

**Q: Would you like to provide any other comments about this course?**

- 1 Nope.
- 2 Well done.
- 3 Please provide a printed copy of the course notes next time.  
The hand-written notes are very hard to read and some of the words got cut off during the scan. Also, there were errors in the reference numbers of some figures.
- 4 The course was great for the first few weeks then really slowed down. I would have liked to see more hard, deeply technical principles and assignments instead of the 'fluff' that seemed to constitute the middle third of the course. Also if we could spend more time on orbits and applications of hypersonic aircraft and reentry (like if you were working on a hypersonic aircraft, these are the key things you'll be thinking about daily) as opposed to the underlying motivating physics from the 1950s that we learned about for ~80% of the course.  
ALSO HE WAS A PHENOMENAL LECTURER AND PERSON!
- 5 I think the class was very well presented, but the homework was usually assigned within a short time frame. Otherwise, it is an excellent class. Thank you, Javier!
- 6 Really would have appreciated a TA for this class. Having one session of office hours a week made it difficult to ask questions and frankly, a bit intimidating. Also would have appreciated a few more problem sets. Class notes were great, but it was hard to determine the important bits or apply it to real life without a problem to work through.
- 7 The material was good, but often wasn't framed well. There was a lack of emphasis on why we are learning what we are learning and how it fits into the bigger picture.  
  
A lot of class time is wasted on very rapid derivations that were almost impossible to follow on-the-fly. This material is important, and honestly not particularly difficult, but rapid and under-explained white-board derivations are a poor way to convey the material.  
  
Because of this, almost everything I learned was from reading the notes outside of lecture.
- 8 Great course!
- 9 I know this class is relatively new and is still in the experimental phase. The professor's clear dedication to creating a comprehensive set of notes on a largely unexplored subject and his enthusiasm for teaching the class made hypersonics one of the most enjoyable courses I have taken at Stanford.
- 10 Exams were not sufficiently representative of the type of material covered in lectures or homework, and felt more like trick questions than a review/test
- 11 I really enjoyed the lectures! Javier has great energy and was really engaging
- 12 It would be good if chapter 3 was cut a little short, and more time spent on 4/5
- 13 Highly recommend; in fact, highly recommend taking any course by Javier (please consider offering compressible turbulence)
- 14 Overall good and engaging, but timing of things could be more clearly laid out, and office hours/scheduling could be clearer.

**Instructor Added Questions**

**Close-Ended Questions**

No Data.

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 Catalog & Section: **356 1**  
 Course Title: **HYPERSONIC AEROTHERMODYNAMICS**

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 Responses Incl Declines: **12**  
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## Learning Goals

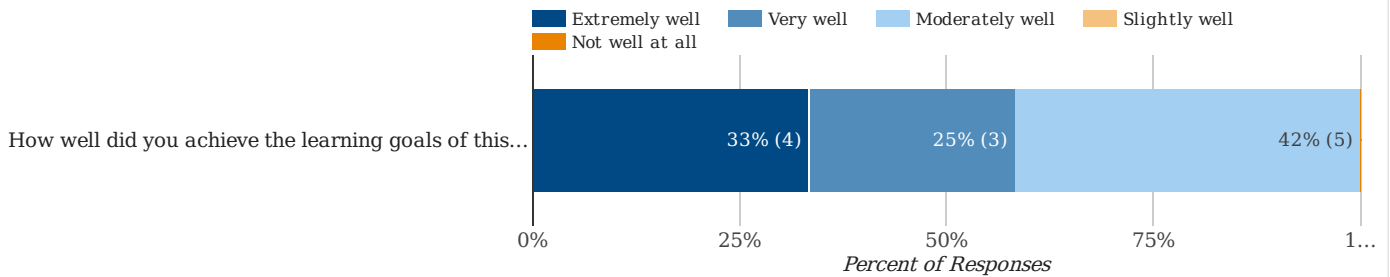
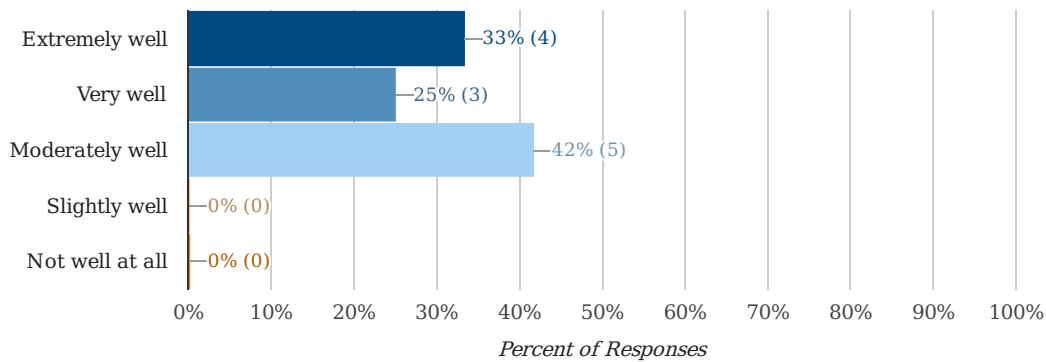
We want your feedback about your experience using the course evaluation system and reporting. To provide your feedback, please click [HERE](https://stanforduniversity.qualtrics.com/jfe/form/SV_cOSKtrVV0G7PTNj) (https://stanforduniversity.qualtrics.com/jfe/form/SV\_cOSKtrVV0G7PTNj) to answer one question.

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**How well did you achieve the learning goals of this course?**

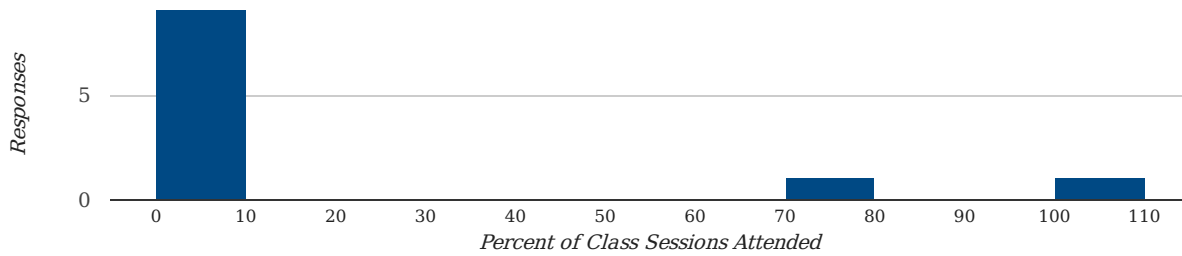


Question	Number of Responses	Response Rate	Course Mean	Course Median	STDEV	5	4	3	2	1
How well did you achieve the learning goals of this course?	12	70%	3.9	4	0.9	33%	25%	42%	0%	0%

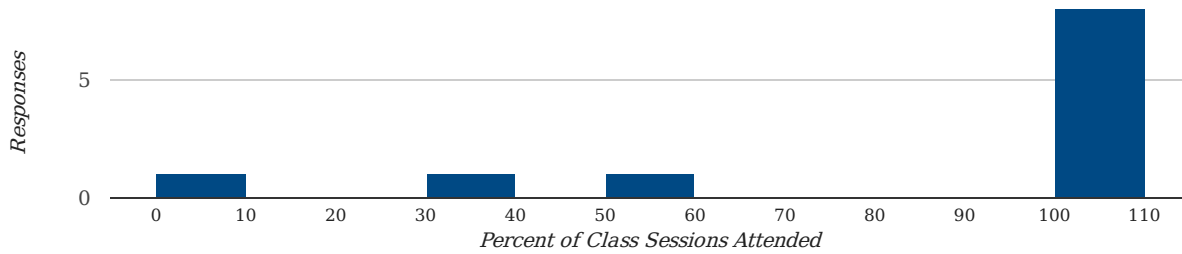
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## Attendance and Engagement

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**About what percent of the class meetings did you attend online?**



## Student Learning

For information on factors that contribute to students' learning, please see *Interpreting Your Course Evaluation Report* (<https://evals.stanford.edu/results/respond-feedback>).

If you are viewing a report from the 2019-2020 Winter term, quantitative responses to the *How much did you learn from this course?* question in this section have been removed in response to changes in instruction at the end of the term due to the COVID-19 pandemic.

The COVID-19 Academic Continuity Group and school deans have authorized the release of the removed results from Winter 2019-2020 evaluations to individual instructors for their own course(s) upon request. If you would like these results for your course(s), please submit this request form ([https://stanforduniversity.qualtrics.com/jfe/form/SV\\_cwmTY20SiRWXuAd](https://stanforduniversity.qualtrics.com/jfe/form/SV_cwmTY20SiRWXuAd)).

No Data.

(8 comments)

### Q: What skills or knowledge did you learn or improve?

- 1 Inviscid/Viscous Hypersonics  
Deviations from calorically perfect gas  
History & Insight on hypersonics
- 2 basics of hypersonics
- 3 As my first class in hypersonics, it was really my first introduction to the material. As such, I learned a lot of the basics of the field including tradeoffs between aerodynamics and heating, shockwave/boundary layer interactions, and vehicle design considerations.
- 4 Analyzing flows at or near the hypersonic limit, and really trying to think through physical phenomenon and assumptions from first principles
- 5 Approximations for high Mach number regime flows
- 6 Basics of hypersonic flow conditions, inviscid hypersonic flows, hypersonic boundary layers
- 7 fundamentals of fluid dynamics, hypersonic examples and behaviors, hypersonic boundary layer, aerodynamic heating, shocks

8 Basic understanding of the challenges involved in analysis of hypersonic flows.

## Instruction and Organization

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No Data.

## Course Elements

No Data.

## Additional Student Comments

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(9 comments)

### **Q: What would you like to say about this course to a student who is considering taking it in the future?**

- 1 Pretty interesting material. Things can get a little muddy in derivations in the second half of the class.
- 2 I liked it a lot
- 3 very good class, highly recommend it
- 4 I really learned a lot from this class. The material isn't really covered anywhere else, and so most of it was new and interesting to me.

Professor Urzay is clearly very knowledgeable on the subject, and it's a pleasure to listen to him talk about both the physics and mathematics of the field, but also to hear him explain the history and effects the physics have had on the different designs of the past. Honestly, you feel pretty cool at the end of the class when you can give a rough estimate for the Apollo capsules re-entry heating, or the Space Shuttle's optimal angle of entry.

I will say though that the derivations in class are pretty complex and can be hard to follow. With that said, (and maybe this is just because the class was online this time around), that level of rigor was fortunately not needed in the homeworks, which managed to be stimulating and difficult, but not too over the top.

Overall, I would definitely recommend the class to anyone interested in the subject. As Professor Urzay said, "this [was] a class [he] dreamed of taking as an engineering student," and with that in mind I think he succeeded in creating an interesting and challenging class on an interesting and challenging subject matter.

- 5 Very interesting and engaging overview of hypersonic flows and applications, and also good discussion of why they are important and the history of the field. Covers many broad topics so no one is entered in very great depth but a lot of room for individually motivated learning.
- 6 A very interesting class, we got lots of physical applications and examples which was enjoyable. The content was helpful as a complement to my research topics.
- 7 A good overview of the topic of hypersonics. Previous exposure to compressible flow is recommended. Key concepts can often be lost as the instructor focuses greatly on the math. The non-required textbooks are helpful to reinforce these concepts.
- 8 the exams are brutal but Professor Urzay is really passionate about the material
- 9 Prior knowledge of compressible flows, e.g. AA 210A, is helpful. A very interesting course.

(4 comments)

**Q: Would you like to provide any other comments about this course?**

- 1 More people should take this course
- 2 While this is not technically feedback on the course per se, good luck in whatever you are doing next! I saw that this would probably be your last time teaching the class, and I want to say that I really enjoyed it and found the material fascinating. As someone who is considering working in this field specifically for at least some part of his career, this was just what I needed to break into the field and get a foundation of the subject. Because of that, I think the trade off between the video quality and lecture interactivity was definitely a worthwhile one, as the lectures will likely be something I reference back to in the future.
- 3 The organization of the course was very helpful, and especially the nicely edited lecture recordings. Felt like watching NCFMF.
- 4 i consistently scored 5-10 points lower on assignments I would work on with my friends (and have the same answer). I don't know why.

## Instructor Added Questions

### Close-Ended Questions

No Data.

Interpreting these results and deciding what changes you might want to make in your course can benefit greatly from a conversation with a colleague and/or a teaching consultant. To discuss your course evaluation feedback with a consultant in the Office of the Vice Provost for Teaching and Learning, please click here: [Course Evaluation Consultation Request Form](https://stanforduniversity.qualtrics.com/jfe/form/SV_eEcR99HdhguiH0d) ([https://stanforduniversity.qualtrics.com/jfe/form/SV\\_eEcR99HdhguiH0d](https://stanforduniversity.qualtrics.com/jfe/form/SV_eEcR99HdhguiH0d))

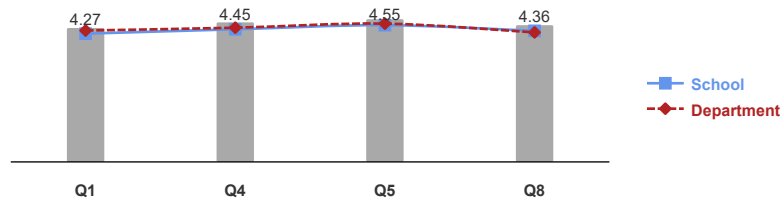
# Stanford University

## Spring 2021 Course Feedback

**Course:** Sp21-ME-356-01: HYPERSONIC AEROTHERMODYNAMICS  
**Instructor:** Javier Urzay Lobo \*  
**Response Rate:** 11/12 (91.67%)

### At A Glance : Summary Chart

Extremely well
Very well
Moderately well
Slightly well
Not well at all



Q1 - How well did you achieve the learning goals of this course?  
 Q4 - How much did you learn from this course?  
 Q5 - Overall, how would you describe the quality of the instruction in this course?  
 Q8 - How organized was the course?

### 1 - How well did you achieve the learning goals of this course?

Response Option	Weight	Frequency	Percent	Percent Responses	Means								
Extremely well	(5)	4	36.36%		4.27	4.09	4.19						
Very well	(4)	6	54.55%										
Moderately well	(3)	1	9.09%										
Slightly well	(2)	0	0.00%										
Not well at all	(1)	0	0.00%										
					0	25	50	100	Question	School	Department		
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median		
11/12 (91.67%)	4.27	0.65	4.00	8348	4.09	0.88	4.00	768	4.19	0.82	4.00		

### 2 - About what percent of the class meetings (including discussions) did you attend in person?

Response Option	Weight	Frequency	Percent	Percent Responses	Means								
0	(0)	5	100.00%		12.58	15.98							
					0	25	50	100	Question	School	Department		
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median		
5/12 (41.67%)	0.00	0.00	0.00	5482	12.58	30.02	0.00	516	15.98	34.15	0.00		

### 3 - About what percent of the class meetings did you attend online?

Response Option	Weight	Frequency	Percent	Percent Responses	Means								
100	(100)	10	100.00%		100.00	88.07	92.37						
					0	25	50	100	Question	School	Department		
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median		
10/12 (83.33%)	100.00	0.00	100.00	7789	88.07	25.73	100.00	746	92.37	19.96	100.00		

### 4 - How much did you learn from this course?

Response Option	Weight	Frequency	Percent	Percent Responses	Means								
A great deal	(5)	5	45.45%		4.45	4.23	4.28						
A lot	(4)	6	54.55%										
A moderate amount	(3)	0	0.00%										
A little	(2)	0	0.00%										
Nothing	(1)	0	0.00%										
					0	25	50	100	Question	School	Department		
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median		
11/12 (91.67%)	4.45	0.52	4.00	8110	4.23	0.86	4.00	758	4.28	0.85	4.00		

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### 5 - Overall, how would you describe the quality of the instruction in this course?

Response Option	Weight	Frequency	Percent	Percent Responses	Means						
Excellent	(5)	6	54.55%			4.55	4.36	4.41	Question	School	Department
Good	(4)	5	45.45%								
Fair	(3)	0	0.00%								
Poor	(2)	0	0.00%								
Very Poor	(1)	0	0.00%								
					0	25	50	100			
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median
11/12 (91.67%)	4.55	0.52	5.00	8109	4.36	0.83	5.00	759	4.41	0.80	5.00

### 6 - What skills or knowledge did you learn or improve?

Response Rate	8/12 (66.67%)
<ul style="list-style-type: none"> <li>Compressible boundary layers and aerothermodynamics</li> <li>Simple hypersonic analysis</li> <li>Learned about physical phenomena that we typically ignore but that become important at hypersonic speeds. Built a better fundamental understanding of compressible and hypersonic flows.</li> <li>Honestly the lectures were extremely interesting and I learnt a lot. If you have done compressible flow before the first half will be a good revision and the second half was lots of new material</li> <li>Inviscid and viscous hypersonic flow equations, real-gas effects for hypersonics, hypersonic boundary layers.</li> <li>Understanding of the theories underlying hypersonic flight and the engineering challenges associated with hypersonic vehicles.</li> <li>Learned the basics of hypersonics. Really had little understanding of the topic beforehand. Feel a little more competent now and feel like I can have a conversation with someone on the subject.</li> <li>I learned more about hypersonics, the history of hypersonics, and how hypersonics relate to other fields in fluid dynamics/aero-astro engineering.</li> </ul>	

### 7 - How many hours per week on average did you spend on this course (including class meetings)?

Response Option	Weight	Frequency	Percent	Percent Responses	Means						
4	(4)	2	22.22%			7.56	11.94	11.44	Question	School	Department
5	(5)	2	22.22%								
7	(7)	1	11.11%								
8	(8)	1	11.11%								
10	(10)	2	22.22%								
15	(15)	1	11.11%								
					0	25	50	100			
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median
9/12 (75.00%)	7.56	3.64	7.00	7352	11.94	8.45	10.00	713	11.44	7.64	10.00

### 8 - How organized was the course?

Response Option	Weight	Frequency	Percent	Percent Responses	Means						
Extremely organized	(5)	5	45.45%			4.36	4.18	4.13	Question	School	Department
Very organized	(4)	5	45.45%								
Moderately organized	(3)	1	9.09%								
Slightly organized	(2)	0	0.00%								
Not organized at all	(1)	0	0.00%								
					0	25	50	100			
Response Rate	Mean	STD	Median	School	Mean	STD	Median	Department	Mean	STD	Median
11/12 (91.67%)	4.36	0.67	4.00	8003	4.18	0.87	4.00	751	4.13	0.89	4.00



# Stanford University

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**9 - What would you like to say about this course to a student who is considering taking it in the future? All comments are subject to Stanford's Terms of Use for Sites. Answers to this question will be viewable by other students, as well as instructors.**

<b>Response Rate</b>	8/12 (66.67%)
<ul style="list-style-type: none"> <li>• Took this course online. The content is nice but no feedback and class discussion kind of ruined the fun.</li> <li>• Great course and instructor, go for it!</li> <li>• This was a fun course. It was laid out a little differently this year due to the pandemic. Javier does a great job of walking through the mathematical derivations and key results in class. The lectures and assignments tend to be on the math intensive side. I would highly recommend this course.</li> <li>• I think the pandemic changed the teaching style significantly and made the material much easier. I don't think the class would be this easy otherwise.</li> <li>• Excellent course: I learned a lot, the workload is very manageable, and the independent research aspect was very interesting. I highly recommend this class.</li> <li>• An excellent course. Interesting material presented in a very interesting way.</li> <li>• Really good entry level course on hypersonics. Picking up a random textbook and trying to learn the material on one's own can be a daunting task. Javier really simplifies the material so its easy to comprehend.</li> <li>• Interesting material, would highly recommend to anyone who wants to work with projects reaching hypersonic speeds. Also, Prof. Urzay is a really good teacher.</li> </ul>	

**10 - Would you like to provide any other comments about this course?**

<b>Response Rate</b>	1/12 (8.33%)
<ul style="list-style-type: none"> <li>• While I appreciated the flexibility due to COVID, I think that a return to a more formal course structure next year would be a good idea.</li> </ul>	

Mean of Means Calculations	Mean	School	Department	
Mean of Means	4.41	4.22	4.25	