



The Takeaway

Policy Briefs from the Mosbacher Institute for
Trade, Economics, and Public Policy

The Accessibility of Space

Making the Space Industry Accessible to Texas High School Students

KEILLY O'REILLY
THE BUSH SCHOOL OF GOVERNMENT & PUBLIC SERVICE

Texas hosts one of the largest space industries in the nation. Space companies continue to expand into rural areas. Yet little research has been conducted on whether students are qualified for the jobs located within their own communities. This report examines whether students in Texas are acquiring the skills necessary to qualify them for employment opportunities in Texas' space industry.

Texas is at the frontier of the national space industry. As of 2022, almost 138,000 Texans were employed in the aerospace, aviation, and defense industries with sectors including product and parts manufacturing and satellite communications.¹ In addition to organizations that have been in Texas for a long time (like the National Aeronautics and Space Administration [NASA]), the state is also attracting emerging space companies, like SpaceX and Blue Origin, with facilities often in or near rural areas.² More Texans being hired in the space industry requires more space-related education, beginning with high school students.



THE TEXAS LYCEUM



WHAT'S THE TAKEAWAY?

Over half of job openings in leading Texas space companies require or prefer a bachelor's degree in an engineering specialty.

Texas high school students admitted to the Texas A&M College of Engineering between 2019 and 2023 were disproportionately urban.

Rural counties are less likely to have access to STEM courses that are required for university admissions.

Students attending rural high schools would benefit from chemistry, physics, pre-calculus, and calculus classes offered to them, particularly if they desire a career in the space industry.

Given the importance of the space industry in Texas, it is critical to understand whether high school students have access to the proper coursework that they need to qualify for admission into degree programs that support Texas' space industry.

Space Job Qualifications

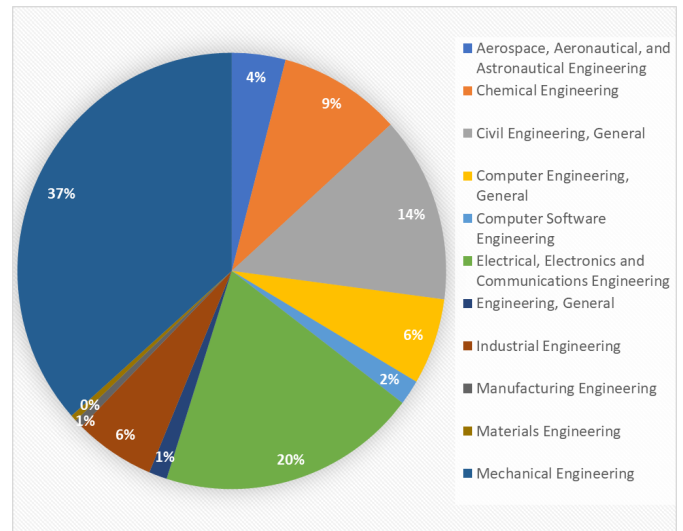
Although other positions exist (e.g., scientists, technicians, media/communications, etc.), primary space companies, overwhelmingly, offer jobs requiring or preferencing engineering degrees. The Texas Economic Development and Tourism Office has identified the NASA Johnson Space Center, SpaceX, Boeing, Blue Origin, and Firefly Aerospace as some of the leading organizations in Texas' space industry.³ Throughout these companies, 53% of recent job openings required or preferred an engineering degree (as of February 4, 2023). Required or preferred engineering degrees mentioned by these job listings include Aerospace, Chemical, Civil, Computer, Electrical, General, Industrial, Manufacturing, Materials, Mechanical, and Structural Engineering.⁴ This shows that, at least in five of the leading space companies in Texas, attaining an engineering degree is the most likely way to achieve a job in the space industry.

Between 2018 and 2022, 41,170 students graduated in Texas with a bachelor's degree in one of the aforementioned engineering specialties, representing around 11% of graduates in engineering nationally.^{5,6} Figure 1 shows the percentage breakdown by each degree of Texas graduates in fields desired in space companies.

Attaining the Credentials

Texas A&M University (A&M) produced 20% of Texas' graduates with bachelor's degrees in specialties desired by space companies,

Figure 1: Space-Related Undergraduate Engineering Degrees Granted in Texas, 2018 – 2022



Source: IES National Center for Education Statistics

while the University of Texas at Austin, Texas Tech University, and the University of Houston produced 13%, 8%, and 6% respectively.⁷ Additionally, A&M, as a triple-designated land-, sea-, and space-grant university, is the university this report evaluates for attaining an engineering degree.

The A&M College of Engineering is the college that grants engineering degrees, and their requirements for admission are not highly prescriptive. To be qualified for the College of Engineering's Entry to a Major (ETAM) program, which precedes the student declaring an Engineering specialty, A&M recommends high school coursework including four years of English, four years of Mathematics (with three courses being Algebra I, Algebra II, and Geometry), four years of science (with two courses being Biology I, Chemistry I, or Physics I), and two years of the same foreign language.⁸ To be successful in the ETAM program, a student needs to be familiar with chemistry, physics, pre-calculus, and, ideally, calculus.

Barriers to the Credentials

Rural Texas counties are defined in the Education Code as counties with less than or equal to 50,000 people.⁹ In an evaluation of A&M freshman undergraduate admissions to the College of Engineering for the College Station, Galveston, and Qatar campuses over the past five years, only 5.3% of Texans admitted were from rural counties (whereas 94.7% came from urban counties). Rural students represented 9.1% of 12th graders in Texas, but only 7.6% of the Texas students admitted to the A&M College of Engineering under Texas' Top 10 Percent Rule and only 3.4% of the Texas students admitted otherwise. In other words, the admissions data show that Texas students admitted outside of the Top 10 Percent were disproportionately urban.¹⁰

Moreover, high school courses that are either required or highly advantageous for admission to Texas A&M's College of Engineering (namely chemistry, physics, pre-calculus, and calculus) are not offered in every school district throughout Texas.¹¹ There are 72 counties where none of the school districts offer all four of these courses.¹² The concentrations of course offerings for chemistry, physics, pre-calculus, and AP Calculus (either AB or BC)

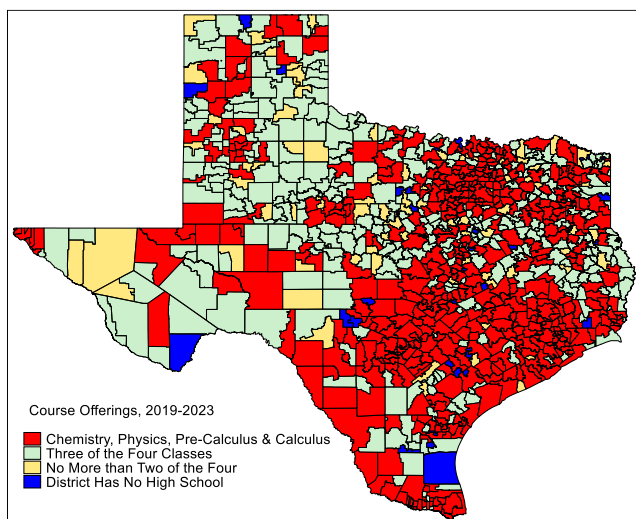
among all school districts between 2019 – 2023 can be seen in Figure 2.

The most commonly unavailable “engineering prep” course in Texas school districts is AP Calculus BC, with only around 16% of districts offering it throughout the state.¹³ As shown in Figure 3, districts offering AP Calculus BC are located in or around urban counties. Though this course is not a required prerequisite for admission into the Texas A&M College of Engineering, it can give students an advantage in successfully completing the required coursework in both the ETAM program and their engineering specialty based on the required college coursework of engineering degrees.¹⁴

What is Next?

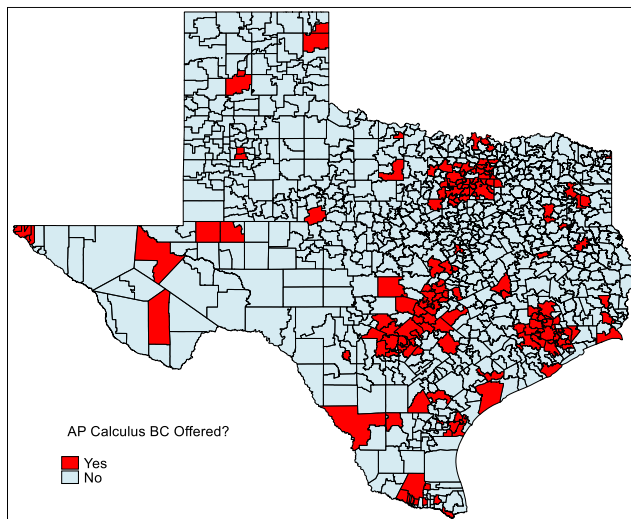
Key lessons from our research indicate that there is an obvious need for more math and science courses, particularly chemistry, physics, pre-calculus, and calculus, offered to students in rural areas in order to prepare them for degrees relevant to the skyrocketing Texas space industry. There are many steps that Texas' leaders could implement to make these courses more accessible to interested students. The Texas Rural Schools Task Force, in a

Figure 2: High School Chemistry, Physics, Pre-Calculus, and AP Calculus Course Offerings in Texas, 2019-2023



Source: Texas Education Agency and author's calculations

Figure 3: High School AP Calculus BC course offerings in Texas, 2019 - 2023



Source: Texas Education Agency and author's calculations

2017 report, recommended measures that are pertinent to making space more accessible, like exploring more flexible teacher certification options, making it easier for certified teachers to teach outside of their fields, and making it easier for retired teachers to return to full-time teaching.¹⁵ Additionally, leaders could explore opportunities that would allow students to take these courses from resources outside of their home district, including expanding and incentivizing summer school opportunities that can fill in the course gaps students miss through the school year, incentivizing partnerships between districts and colleges, and expanding rural access to online forms of education in critical subjects.^{16,17} In the future, other work could focus on broadening this study to include the many other employment opportunities in the Texas space industry or the other degrees and certificates for which organizations are looking.

Ultimately, rural high school students are at a disadvantage when it comes to attaining a high school education that lends itself to the highest-demand jobs in Texas' space industry. Rural high school students need to be much better equipped to realize the Texas space industry's full potential.

Keilly O'Reilly is pursuing a master's degree in International Affairs at the Bush School of Government and Public Service. Her work was supported by a research fellowship from [The Texas Lyceum](#) and supervised by **Dr. Lori Taylor**.

Acknowledgements:

I would like to thank Carlos Navarro, Dr. Holly Heard, Texas 2036, Dr. Lori Taylor, Dr. Raymond Robertson, Jennifer Moore, Jill Steco, Professor Michael Jackson, Dr. Alexandra Chinchilla, the Texas Lyceum, and the Mosbacher Institute.

Notes:

¹Texas Economic Development & Tourism, Office of Governor Greg Abbott. (2022) *Texas Aerospace, Aviation & Defense Industry*.

<https://businessintexas.com/wp-content/uploads/2022/09/TexasAerospaceAviationandDefense-2022.pdf>

²Texas Economic Development & Tourism, Office of Governor Greg Abbott. (2022) *Texas Aerospace, Aviation & Defense Industry*. <https://gov.texas.gov/uploads/files/business/TexasAerospaceReport.pdf>

³*Ibid.*

⁴Author's dataset compiled with data from: TAMU Office of Academic and Business Performance Analytics. *Student Demographics by Texas Counties*. <https://abpa.tamu.edu/accountability-metrics/student-metrics/student-demographics-by-texas-counties>

⁵IES National Center for Education Statistics. *Detail for CIP Code 14*.

<https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?v=55&cid=88196>

⁶Numbers for 2020 are unclear and not included in this dataset.

American Society for Engineering Education. (2023). *By the Numbers*. <https://ira.asee.org/by-the-numbers/>

⁷IES National Center for Education Statistics. *Detail for CIP Code 14*.

<https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?v=55&cid=88196>

⁸Texas A&M University Admissions. *College Readiness*. <https://admissions.tamu.edu/resources/future-students/college-readiness>

⁹Texas Legislative Council. (2018). *Definitions of "Rural" in Texas Statutes and the Texas Administrative Code as of April 2018*. https://tlc.texas.gov/docs/policy/Def_Rural_Statutes.pdf#page=17&zoom=100,0,0

¹⁰TAMU Office of Academic and Business Performance Analytics. *Student Demographics by Texas Counties*. <https://abpa.tamu.edu/accountability-metrics/student-metrics/student-demographics-by-texas-counties>

¹¹Texas Education Agency. (2022). *Teacher FTE Counts and Course Enrollment Reports*. <https://rptsvr1.tea.texas.gov/adhocrpt/adfte.html>

¹²*Ibid.*

¹³*Ibid.*

¹⁴Texas A&M University Engineering. *Degree Programs*. <https://engineering.tamu.edu/academics/degrees/index.html>

¹⁵Texas Rural Schools Task Force. (2017). *Elevating Support for Texas Rural and Small Schools*. <https://tea.texas.gov/system/files/17-0648%20Texas%20Rural%20Schools%20Taskforce%20Report%20v06%20FINAL%20-%20lm.pdf>

¹⁶Terry K. Peterson, PhD. *Opportunities for Texas State and Local Leaders to Leverage Afterschool and Summers to Expand Learning*. <https://tea.texas.gov/texas-schools/support-for-at-risk-schools-and-students/tab-5--terry-peterson-elo-council-may-2.pdf>

¹⁷Texas Education Agency. *TEA Student Success Initiative/Community Partnerships*. <https://tea.texas.gov/texas-schools/support-for-at-risk-schools-and-students/loicommunity-partnerships-program20.pdf>

Published by:
Mosbacher Institute for Trade, Economics, and Public Policy
The Bush School of Government and Public Service
4220 TAMU, Texas A&M University
College Station, Texas 77843-4220

Email: bushschoolmosbacher@tamu.edu
Website: <https://bush.tamu.edu/mosbacher>

The views expressed here are those of the author(s) and not necessarily those of the Mosbacher Institute, a center for independent, nonpartisan academic and policy research, nor of the Bush School of Government and Public Service.



To share your thoughts on *The Takeaway*, please visit <https://bit.ly/1ABajdH>