



BOARD *of* GOVERNORS

State University System of Florida

Graduate-Level Engineering Education in Florida: A Report with Special Attention to Florida Agricultural and Mechanical University and Florida State University [Working Paper]

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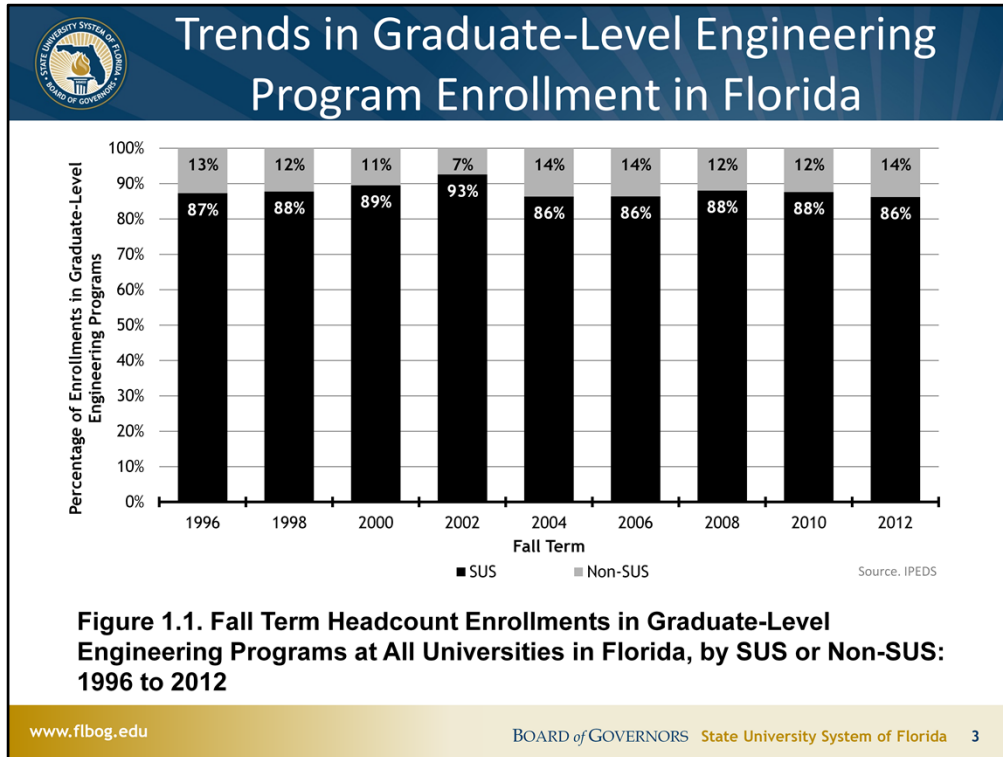
June 12, 2014

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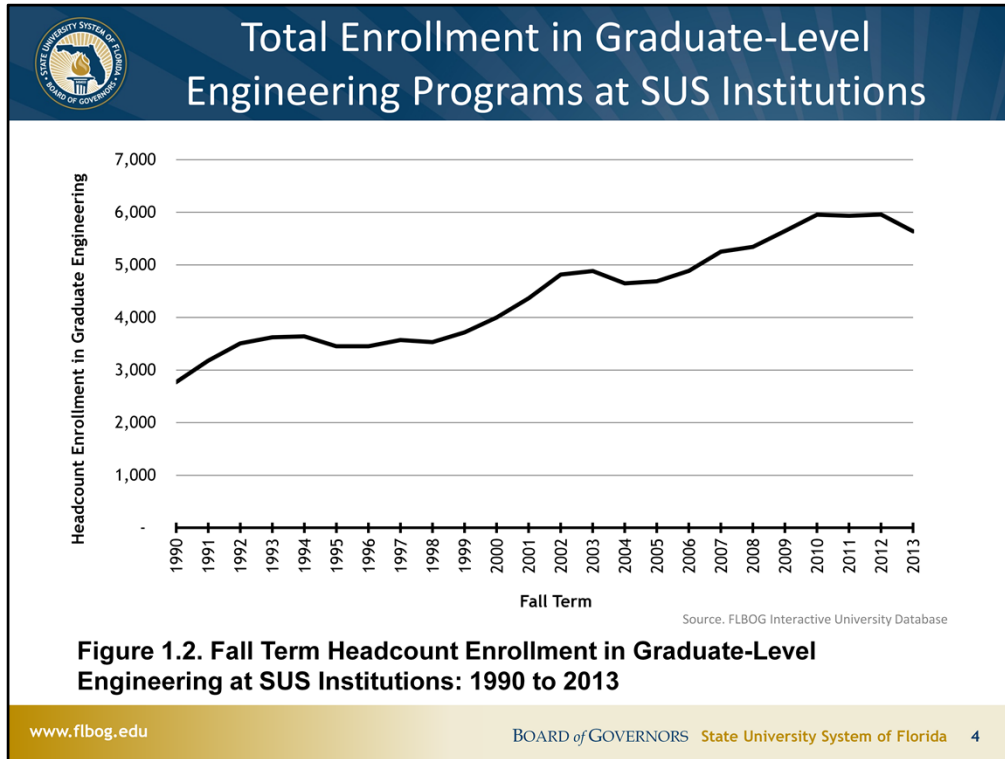
Section 1.

GRADUATE-LEVEL ENGINEERING ENROLLMENT

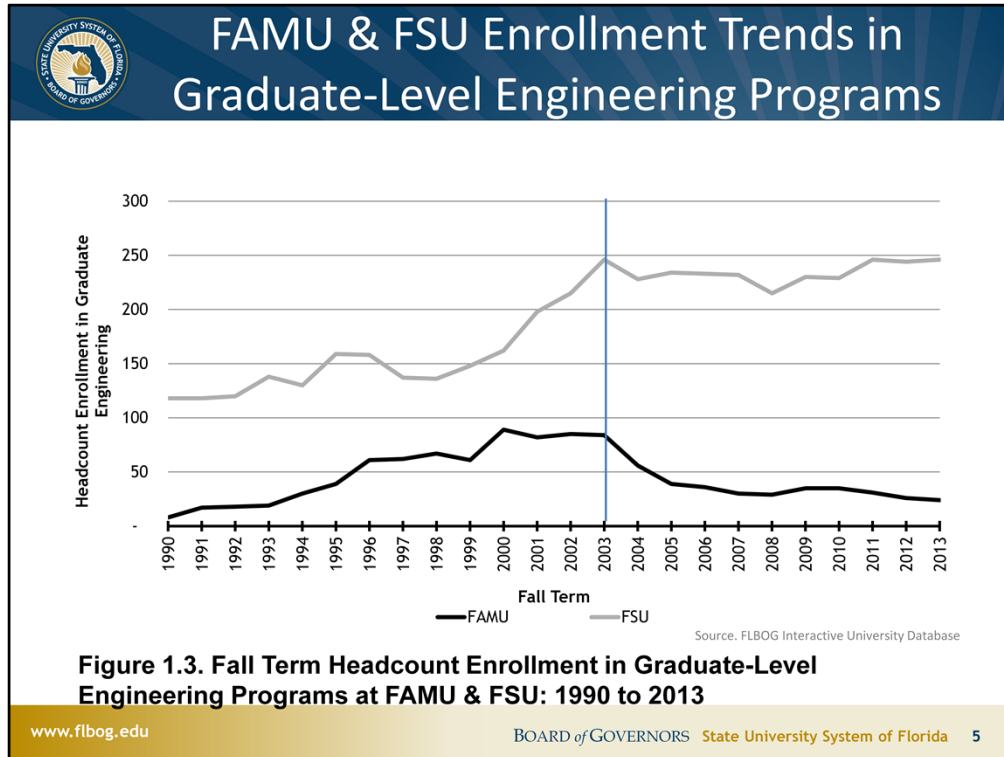


In the fall of 1996 enrollment in graduate-level engineering programs at all universities in Florida, including private and for-profit universities, was 4,007. In the fall of 2012, enrollment increased to 6,966, reflecting a 74% increase. Over this period of time, State University System of Florida (SUS) institutions accounted for at least 8.6 out of every 10 graduate students pursuing a graduate-level engineering degree (Figure 1.1).

(Note: The remainder of this section focuses on enrollment in graduate-level engineering programs at SUS institutions. Data are not provided for Non-SUS institutions because program enrollment counts are not available in the national database. The Florida Board of Governors, however, maintains a database of its institutions that allows for an analysis of enrollments by program area.)



Fall headcount enrollments in graduate-level engineering programs within the State University System of Florida increased from 2,771 to 5,638 between the fall of 1990 and the fall of 2013, reflecting a 104% increase in students (Figure 1.2).



As Figure 1.3 illustrates, enrollment in graduate-level engineering programs at both Florida Agricultural and Mechanical University and Florida State University were on an upward trend between the fall of 1990 and the fall of 2003.

- Graduate-level enrollment in engineering programs at Florida Agricultural and Mechanical University increased between the fall of 1990 and the fall of 2003, from less than 10 to 84 students. (To protect student privacy, data are not reported for observations of less than 10 students in this report).
- Graduate-level enrollment in engineering programs at Florida State University increased between the fall of 1990 and the fall of 2003, from 118 students to 246.

After 2003 the trajectory for enrollment in graduate-level engineering programs during the fall term at both institutions changed.

- Graduate-level enrollment in engineering programs at Florida Agricultural and Mechanical University decreased over a two year period – from 84 students in 2003 to 39 students in 2005 – and then continued with a gradual downward trend ending with 24 students in 2013.
- Graduate-level enrollment in engineering programs at Florida State University initially decreased after the fall of 2003 before returning to a level equal to 2003 in 2013 (246 students).



Summary Observations

- Fall term enrollment in graduate-level engineering programs at all universities in Florida, public and private, has been positive between 1990 and 2013.
- SUS institutions enroll the majority of graduate students in engineering programs.
- Prior to 2003 both FAMU and FSU exhibited growth in their graduate-level engineering programs.
- From 2003 to the present both FAMU and FSU have not increased graduate-level engineering enrollment, with
 - FAMU enrollments decreasing from 84 in 2003 to 24 in 2013, and
 - FSU exhibiting a flat trend with the same number of enrollments (246) in 2013 as they had in 2003

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Thus far, the following observations with respect to enrollment in graduate-level engineering programs may be made:

- Fall term enrollment in graduate-level engineering programs at all universities in Florida, public and private, has been positive between 1990 and 2013.
- SUS institutions enroll the majority of graduate students in engineering programs.
- Prior to 2003 both FAMU and FSU exhibited growth in their graduate-level engineering programs.
- From 2003 to present both FAMU and FSU have not increased graduate-level engineering enrollment, with
 - FAMU enrollments decreasing from 84 in 2003 to 24 in 2013, and
 - FSU exhibiting a flat trend with the same number of enrollments (246) in 2013 as they had in 2003

The next section attempts to understand the differences experienced by FAMU and FSU by looking more closely both at the race and ethnicity of the student body of engineering programs.



Section 2.

THE STUDENT BODY IN GRADUATE- LEVEL ENGINEERING PROGRAMS

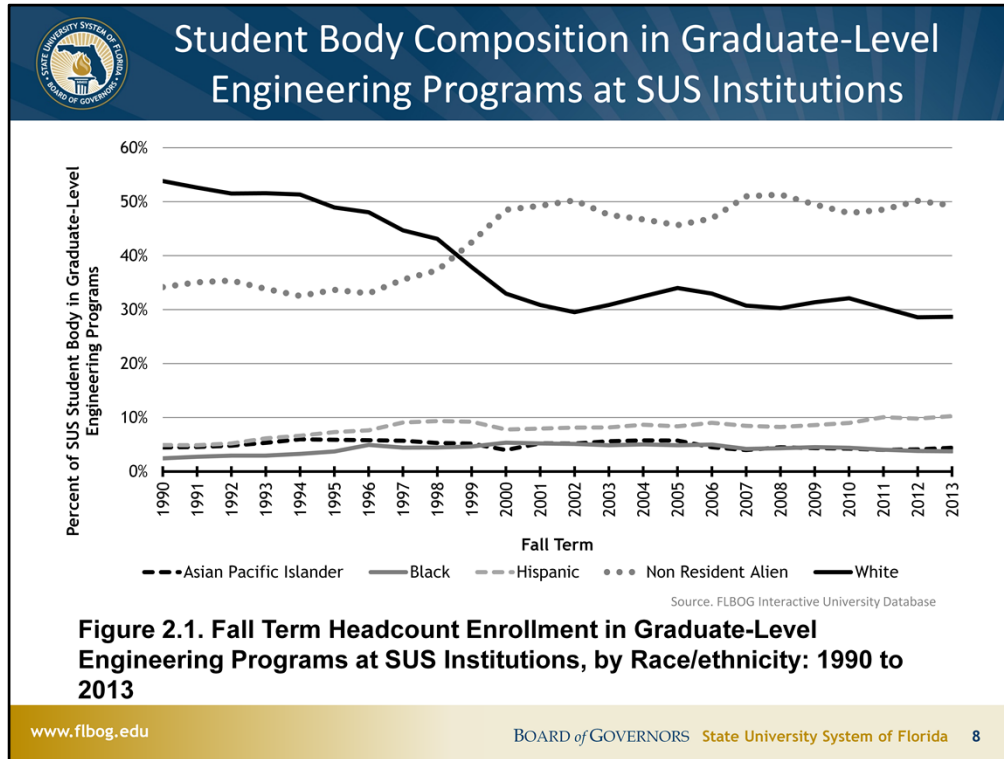
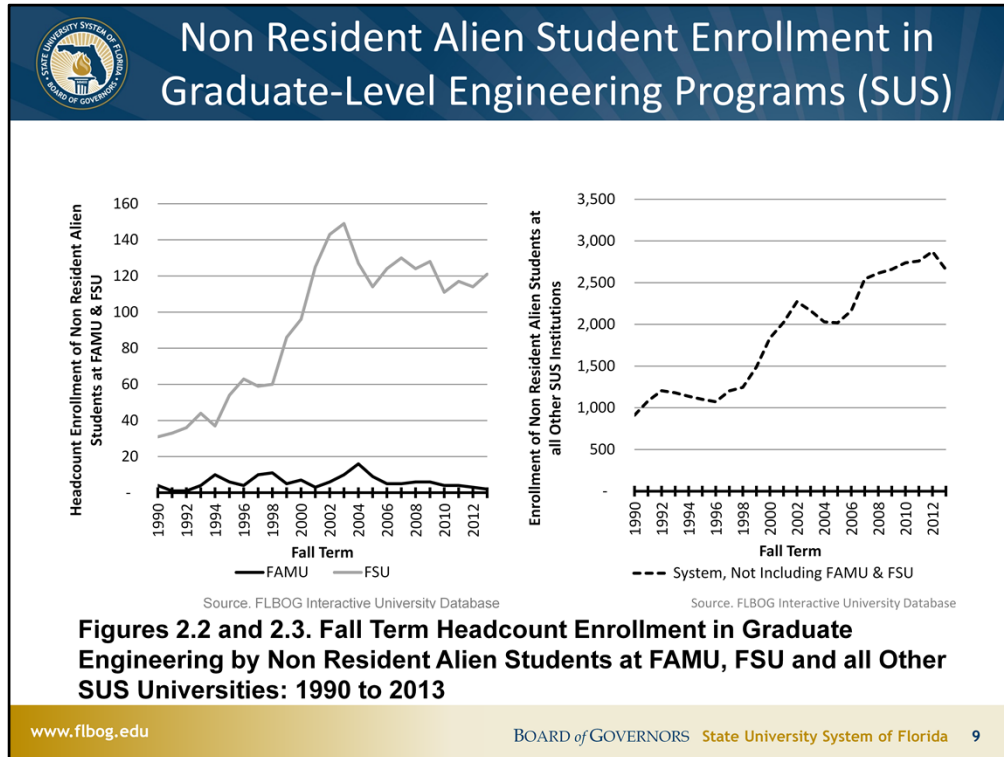


Figure 2.1 illustrates trends in the race/ethnicities enrolled in SUS graduate-level engineering programs. As it relates to each category shown in the figure,

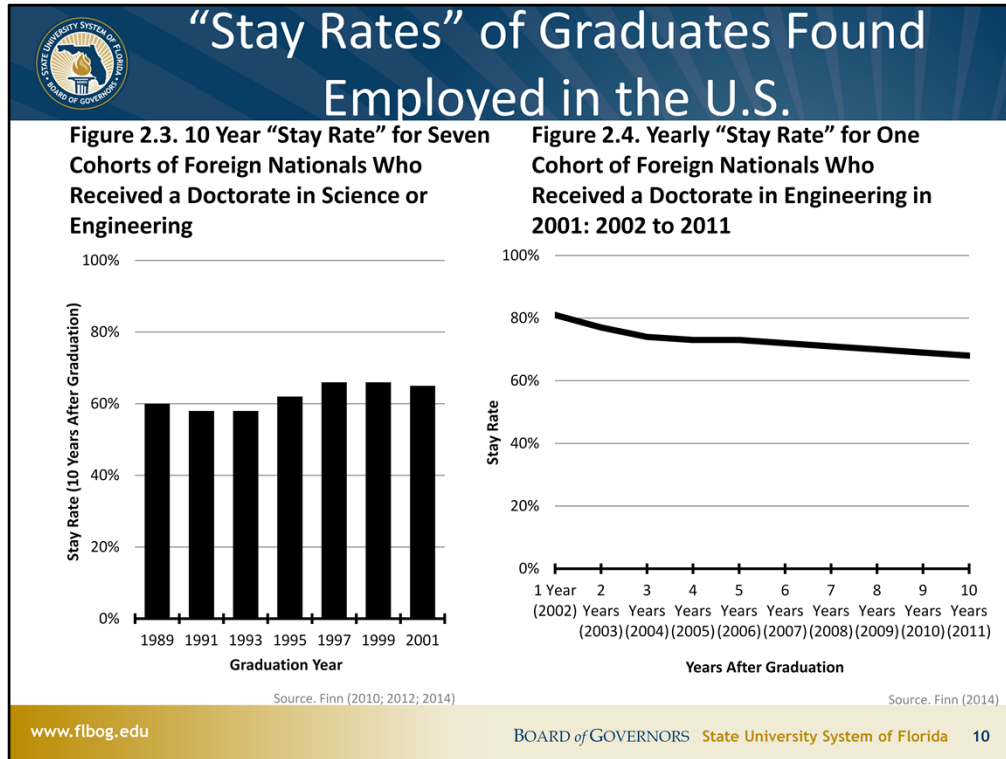
- Asian Pacific Islander enrollment in graduate-level engineering programs increased from 124 to 249 students. Their representation as part of the student body was 4% in 1990 and remained 4% in 2013.
- Black enrollment in graduate-level engineering programs increased from 68 to 212 students. Their representation as part of the graduate engineering student body increased from 2% in 1990 to 4% in 2013.
- Hispanic enrollment in graduate-level engineering programs increased from 136 to 579 students. Their representation as part of the graduate engineering student body increased from 5% in 1990 to 10% in 2013.
- Non Resident Alien enrollment in graduate-level engineering programs increased from 947 to 2,780 students. Their representation as part of the graduate engineering student body increased from 34% in 1990 to 49% in 2013.
- White enrollment in graduate-level engineering programs increased from 1,492 to 1,617 students. Their representation as part of the graduate engineering student body decreased from 54% in 1990 to 29% in 2013.



Since the greatest growth in enrollment numbers in graduate-level engineering programs was for the Non Resident Alien population, it is informative to see this trend at the two universities of particular interest – Florida Agricultural and Mechanical University and Florida State University – as well as the rest of the SUS.

Figure 2.2 illustrates the trends in graduate-level engineering enrollment for Non Resident Alien students at Florida Agricultural and Mechanical University and Florida State University. Figure 2.3, on the right, illustrates the trends in graduate-level engineering enrollment at all other SUS Universities combined. (Two graphs were used due to the difference in the magnitude of enrollments).

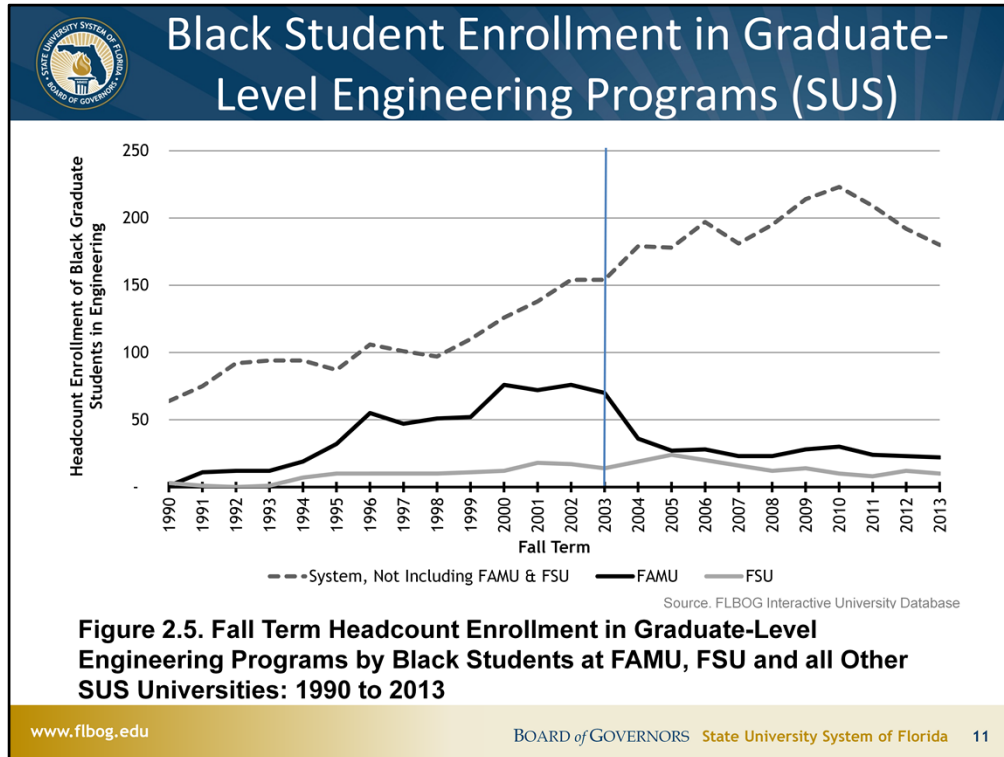
- Graduate-level enrollment in engineering programs for Non Resident Alien students at Florida Agricultural and Mechanical University increased between the fall of 1990 and the fall of 2003 from less than 10 students to 10, but fell back down again to less than 10 students over the next decade.
- Graduate-level enrollment in engineering programs for Non Resident Alien students at Florida State University increased in the 13 years between fall of 1990 and fall of 2003, from 31 to 149 students, but then decreased over the next 10 years, from 149 down to 121 between fall 2003 and fall 2013.
- In sum, enrollments are not increasing at either institution.



Given the large number of Non Resident Aliens enrolled in graduate-level engineering programs in Florida, a question of interest to many would be the stay rate (defined as those found to be employed in the United States) of this sub-population of graduates.

Data for seven cohorts of foreign nationals who earned a doctorate in science or engineering from U.S. universities indicate that approximately 60% remain in the United States ten years after graduation (Figure 2.3).

Figure 2.4 shows the stay rates over a 10-year period for a cohort of 3,088 foreign nationals who earned a doctorate in engineering from universities in the United States in 2001, which is the most recent long-term cohort tracking data available. The chart shows that, over time, the rate of graduates found employed in the U.S. decreased. 81% were found in the U.S. the year right after graduation. Ten years later, 68% were found. Data from another similar study of engineering doctoral graduates, conducted a few years earlier, showed similar results. (Please note that we do not have similar information on stay rates for engineering master’s degree graduates.)



Because the enrollment of black students in graduate-level engineering programs is related to the mission of Florida Agricultural and Mechanical University as one of the Historically Black Colleges and Universities, this trend is of particular interest.

Figure 2.5 illustrates the trends in graduate-level engineering enrollment for Black students. The following observations are made:

- Graduate-level enrollment in engineering programs for Black students at Florida Agricultural and Mechanical University increased between the fall of 1990 and the fall of 2003, from a value less than 10 to 70 students, but then declined to 22 in 2013.
- Graduate-level enrollment in engineering programs for Black students at Florida State University increased between the fall of 1990 and the fall of 2003, from a value less than 10 to 14 students, but then declined back down to 10 in 2013.

Figure 2.5 indicates that the enrollment for Black students in graduate-level engineering programs at State University System of Florida institutions other than FAMU and FSU increased from 154 to 223 students from Fall 2003 to Fall 2010, but then declined from 223 down to 180 between Fall 2010 and Fall 2013.



Summary Observations

- Growth in Non Resident Aliens increased during the 1990s and now account for approximately half of graduate engineering enrollment.
 - Nationally, approximately 68% of foreign nationals who earned a doctorate in engineering are still in the U.S. 10 years later.
- Since 2003, FAMU enrollments of the Non Resident Alien students held flat as FSU lost enrollments of this population.
- Since 2003, FAMU and FSU enrollments of Black students in graduate engineering programs decreased.

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Given the data presented in this section, the following summary observations with respect to student body enrolled in graduate-level engineering programs may be made:

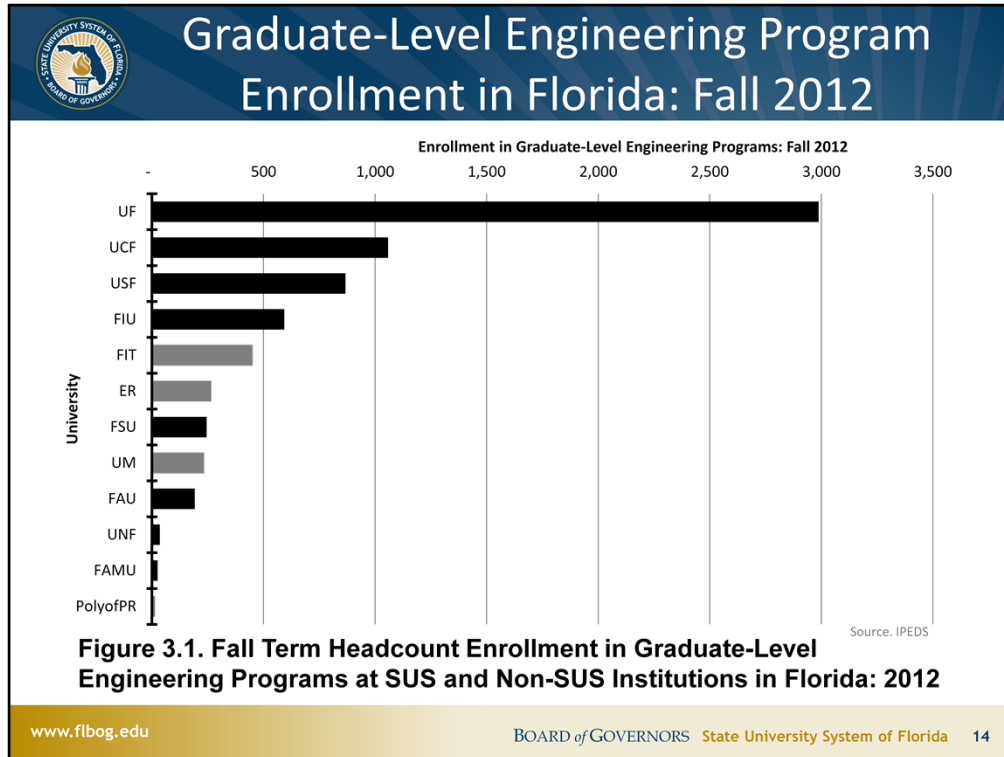
- Growth in Non Resident Aliens increased during the 1990s and now account for approximately half of graduate engineering enrollment. And these graduates tend to stay in the U.S.; Approximately 68% of foreign nationals who earned a doctorate in engineering are still in the U.S. 10 years later.
- Since 2003, FAMU enrollments of the Non Resident Alien students held flat as FSU lost enrollments of this population.
- Since 2003, FAMU and FSU enrollments of Black students in graduate engineering programs decreased.

The next section attempts to further understand graduate-level engineering enrollment at FAMU and FSU by looking more closely at graduate-level enrollment in specific engineering programs.



Section 3.

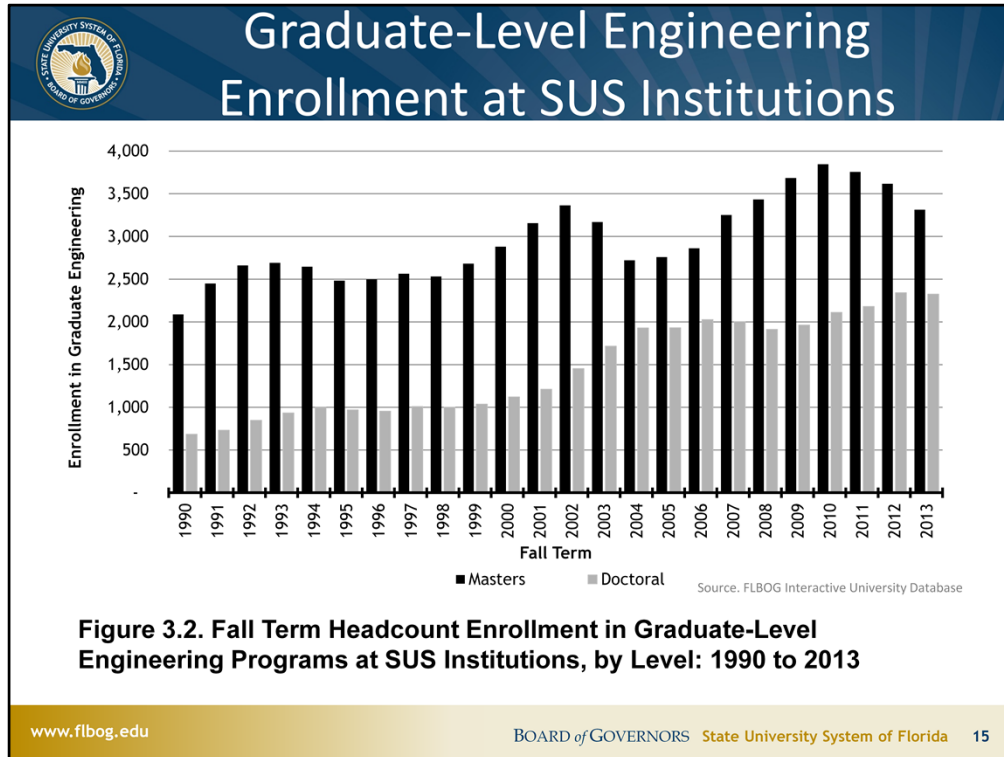
LEVEL OF EDUCATION IN GRADUATE ENGINEERING PROGRAMS



In the fall term of 2012, eight SUS institutions and four non-SUS institutions enrolled graduate students in engineering programs.

The magnitude of enrollment in graduate-level engineering programs is illustrated in Figure 3.1. The university with the largest enrollment was the University of Florida with 2,988 students. The institution with the smallest number of students in the fall of 2012 was Polytechnic University of Puerto Rico, with 14 students on a campus in Miami.

(Note. SUS universities are represented with black bars in Figure 3.1, whereas Non-SUS institutions are represented by grey bars.)



Within the State University System of Florida, doctoral education has become a larger part of graduate enrollment within engineering programs.

Enrollment in doctoral-level engineering programs increased from 684 in the fall of 1990 to 2,324 in the fall of 2013, a 240% increase. Over the same time period, enrollment in master's-level engineering programs increased from 2,087 to 3,314, a 59% increase.

Over 23 years, the ratio of master's to doctoral enrollment in engineering programs changed from 3.1-to-1 in the fall of 1990 to 1.4-to-1 in the fall of 2013.

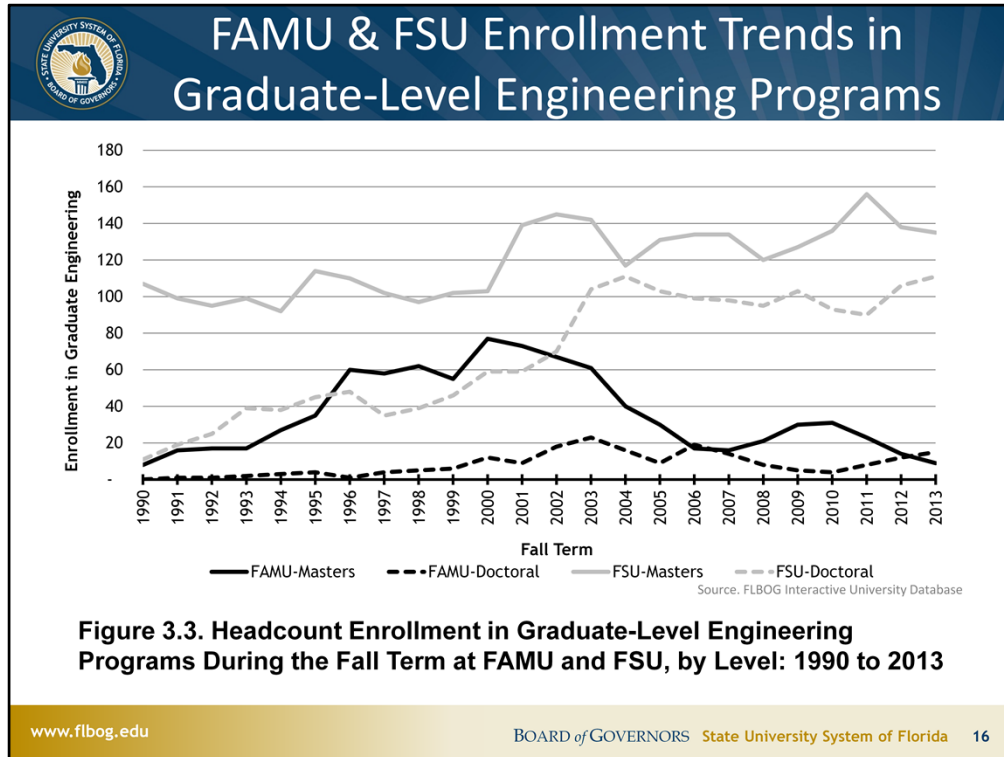


Figure 3.3 illustrates enrollment trends in graduate-level engineering programs for Florida Agricultural and Mechanical University and Florida State University by level (i.e. master's and doctoral). The following observations are made for master's-level enrollments:

- Enrollment in engineering programs for master's-level students at Florida Agricultural and Mechanical University increased between the fall of 1990 and the fall of 2003, from 11 to 61 students. Master's-Level enrollment in engineering then decreased from 61 students in the fall of 2003 to less than 10 in 2013.
- Enrollment in engineering programs for master's-level students at Florida State University increased between the fall of 1990 and the fall of 2003, from 107 to 142 students. Master's-level enrollment in engineering then decreased from 142 students to 135 in 2013.

The following observations are made for doctoral-level enrollments:

- Enrollment in engineering programs for doctoral-level students at Florida Agricultural and Mechanical University increased from less than 10 to 23 between fall 1990 and fall 2003, then decreased to 15 in 2013.
- Enrollment in engineering programs for doctoral-level students at Florida State University increased between the fall of 1990 and the fall of 2003, from 11 to 104 and then increased to 111 in 2013.



Graduate-Level Engineering Enrollment, by Academic Major

Table 3.1. Graduate Engineering Enrollments During the Fall Term in Academic Majors Offered by FAMU and FSU, with SUS Totals: Fall 2013

Academic Major (CIP)	State University System*			FAMU			FSU		
	Total	Master's	Doctoral	Total	Master's	Doctoral	Total	Master's	Doctoral
Biomedical Engineering (14.0501)	230	108	122	0	0	0	**	**	**
Chemical Engineering (14.0701)	271	164	107	**	**	0	18	**	**
Civil Engineering (14.0801)	758	487	271	**	**	**	50	40	10
Electrical Engineering (14.1001)	1,175	612	563	**	**	**	74	43	31
Mechanical Engineering (14.1901)	754	403	351	**	**	**	67	29	38
Industrial/Manufacturing Engineering (14.3501)	288	161	127	**	**	**	31	17	14

Source. FLBOG Interactive University Database

*Includes FAMU and FSU enrollments. ** Data less than 10 are not reported, due to privacy concerns.

In the Fall of 2013, Florida Agricultural and Mechanical University and Florida State University enrolled graduate students in 6 program areas: Biomedical Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Industrial/Manufacturing Engineering (Table 3.1).

Data are not available for all programs at Florida Agricultural and Mechanical University. For informational purposes, enrollments in the master's and doctoral programs at Florida Agricultural and Mechanical University ranged between 1 and 6 students and total enrollments for all programs did not exceed 8.

Data for programs with less than 10 students are not provided (as depicted by a double asterisk [**]).



Summary Observations

- 12 universities offer graduate engineering education in Florida (8 SUS, 4 Non-SUS)
- Doctoral education has become a larger part of the engineering school graduate enrollment system-wide.
- Enrollment trends over 23 years varied by level
 - Master's-level enrollment at FAMU decreased over the time period examined, while it increased at FSU.
 - Doctoral-level enrollment increased at both FAMU and FSU over the time period examined.
- In Fall 2013, FAMU and FSU enrolled graduate students in 6 program areas, with FSU enrolling a greater number of students.

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Given the data presented in this section, the following observations with respect to graduate-level engineering programs may be made:

- 12 universities offer graduate engineering education in Florida (8 SUS, 4 Non-SUS)
- Doctoral education has become a larger part of the engineering school graduate enrollment system-wide.
- Enrollment trends varied by level
 - Master's-level enrollment at FAMU decreased over the time period examined, while it increased at FSU.
 - Doctoral-level enrollment increased at both FAMU and FSU over the time period examined.
- In Fall 2013, FAMU and FSU enrolled graduate students in 6 program areas, with FSU enrolling a greater number of students.

The next section attempts to understand the engineering workforce.



Section 4.

ENGINEERING WORKFORCE



Engineer Employment

Table 4.1. Engineers Working in Florida and the Nation, by Occupation Area: May 2013

Engineering Occupation Area	Florida	National
Aerospace	3,320	71,500
Agricultural	160	2,590
Biomedical	800	19,890
Chemical	430	33,300
Civil	12,920	262,170
Computer Hardware	1,870	77,670
Electrical	6,700	168,100
Electronics	4,830	135,350
Other	4,630	155,720
Environmental	2,660	53,020
Health and Safety	1,120	23,850
Industrial	10,020	230,580
Marine	650	6,640
Materials	500	24,190
Mechanical	5,610	258,630
Mining	130	7,990
Nuclear	280	16,400
Total	56,630	1,512,680

Source: OES, BLS

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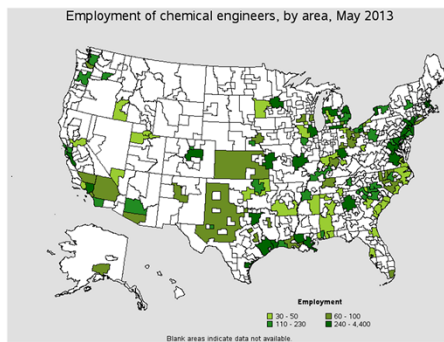
Employment data for engineering are not detailed by level of educational attainment associated with the job. This makes it impossible to attempt to connect available jobs in engineering at the master's or doctoral-level with the available supply of graduates.

Absent employment data by educational level, we can still use general information that is available about engineers in the workforce to provide context. The number of engineers working in Florida, and the nation in May of 2013 are provided in Table 4.1. The largest engineering sub-specialty in Florida is Civil Engineering; the smallest is Mining Engineering. In the nation as a whole, we also find that Civil Engineering is the largest engineering sub-specialty, but Agricultural Engineering is the smallest.



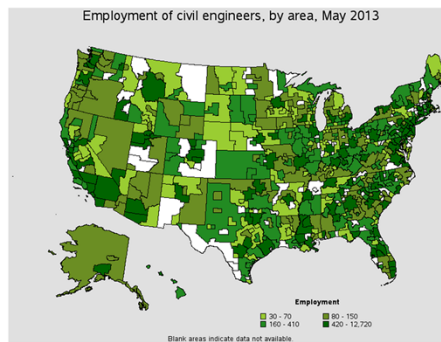
Engineer Employment

Figure 4.1. Chemical Engineering Employment: May 2013



Source: OES, BLS

Figure 4.2. Civil Engineering Employment: May 2013



Source: OES, BLS

Table 4.1 suggests there are differences in the magnitude of jobs available by engineering occupations. Figures 4.1 and 4.2 illustrate the different levels of employment in specific engineering occupations by U.S. Metropolitan Statistical Areas in which at least 30 workers were reported.

(Maps for all engineering occupations are available in the appendix).

Figure 4.1 (left) illustrates that the job opportunities for workers with chemical engineering degrees are limited to specific geographic locations. Workers with a degree in civil engineering, however, were employed across a larger array of geographic locations (Figure 4.2; right). As it relates to Florida, there are fewer geographic areas to work as a chemical engineer than there are to work as a civil engineer.



Self-employed Engineers

Table 4.2. Nonemployer Engineering Firms & Self-employed Engineers, Florida and the U.S.: 2012

Industry Description	Nonemployer Firms & Workers	Gross Receipts
Florida		
All Establishments	5,907	\$308,042,000
Corporations	1,133	\$100,645,000
Individual Proprietorships	4,591	\$180,778,000
Partnerships	183	\$26,619,000
Nation		
All Establishments	88,661	\$5,259,754,000
Corporations	8,217	\$809,423,000
Individual Proprietorships	77,149	\$3,711,359,000
Partnerships	3,295	\$738,972,000

Source: U.S. Census

In addition to engineers who work for a company, engineers may work for themselves. Table 4.2 presents data for engineering firms in Florida and the nation and includes those who are self-employed. Among other criteria self-employed is defined at the federal level as those who do not have paid employees and can include partnerships.



Engineering Wages (Median)

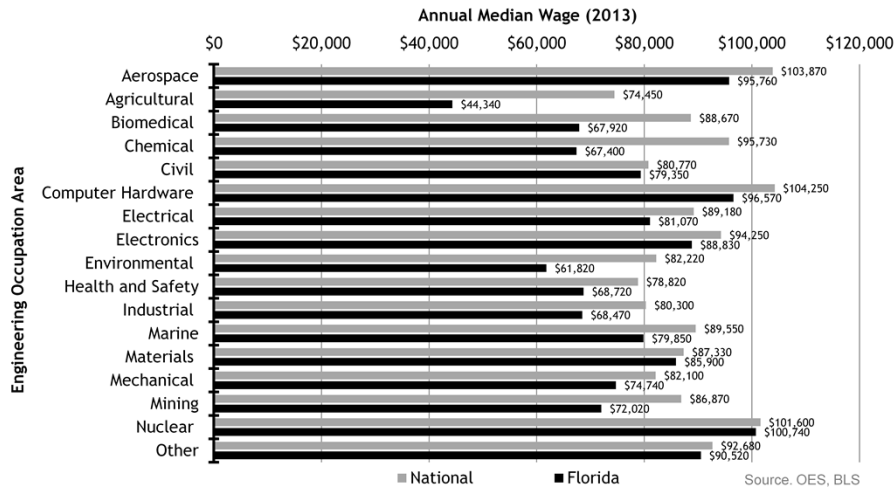


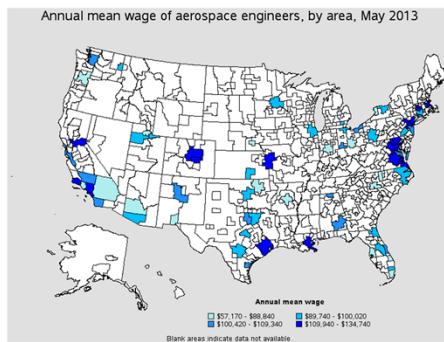
Figure 4.3. Annual Median Wages in Florida and the Nation for Engineers, by Occupation Area: 2013

In May of 2013, annual median wages varied across engineering occupations. As illustrated in Figure 4.3 annual median wages for all engineering occupations are lower in Florida than they are nationally. In some cases, Agricultural Engineers for example, earnings were noticeably lower.



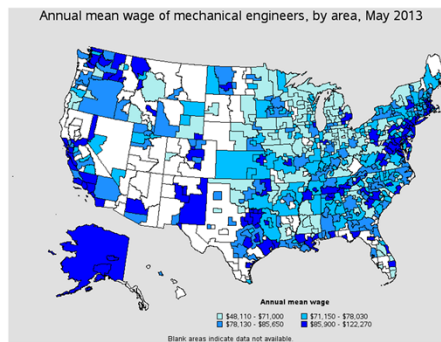
Wages for Engineers

Figure 4.4. Aerospace Engineer Wages: May 2013



Source: OES, BLS

Figure 4.5. Mechanical Engineer Wages: May 2013



Source: OES, BLS

Wage data vary by occupational area and geographical location, just like employment demand for the various engineering sub-specialties. Figure 4.4 illustrates both the locations where Aerospace Engineers work as well as how annual mean wages compare to other geographical areas in the country. The same data are presented for Mechanical Engineers in Figure 4.5.



Summary Observations

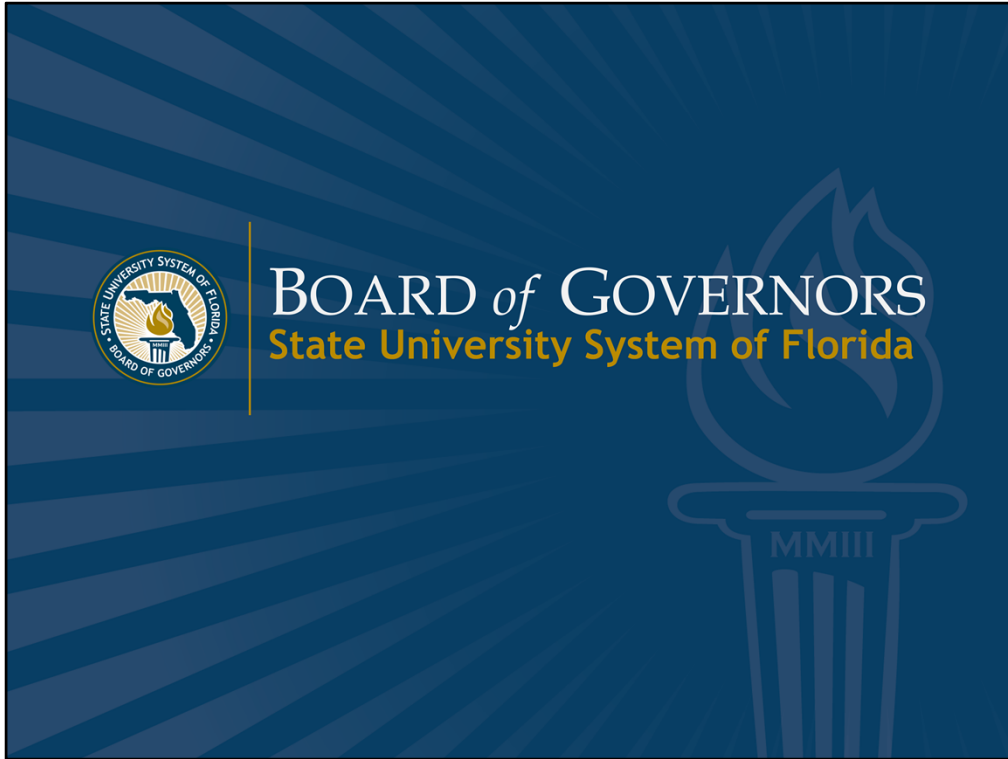
- 56,630 engineers worked in Florida in May 2013.
 - 1.5 million engineers worked in the United States in May 2013.
- Median annual wages for all engineering occupations in Florida were lower than the national average for all engineering occupations.
- Employment and earnings vary by engineering occupation and geographic location.

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Given the data presented in this section, the following observations with respect to the engineering workforce may be made:

- 56,630 engineers worked in Florida in 2013.
 - 1.5 million engineers worked in the United States in May 2013.
- Median annual wages for all engineering occupations in Florida were lower than the national average for all engineering occupations.
- Employment and earnings vary by engineering occupation and geographic location.



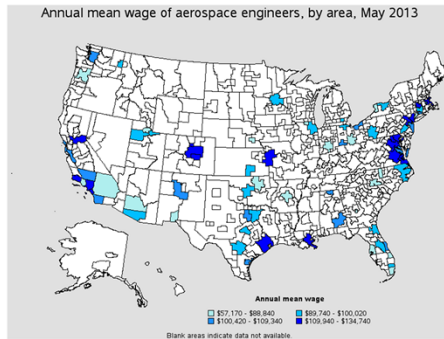


APPENDIX SLIDES



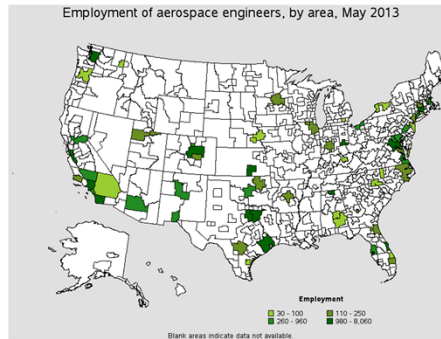
Aerospace Engineers

Aerospace Engineer Wages: May 2013



Source: OES, BLS

Aerospace Engineer Employment: May 2013

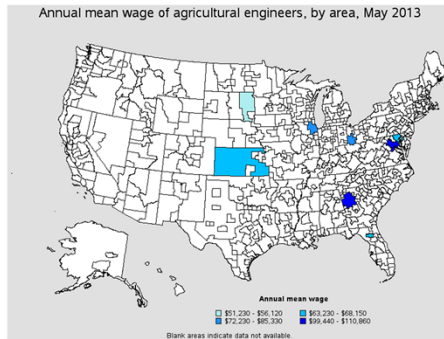


Source: OES, BLS



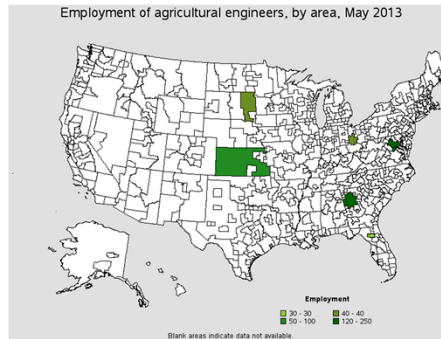
Agricultural Engineers

Agricultural Engineer Wages: May 2013



Source: OES, BLS

Agricultural Engineer Employment: May 2013

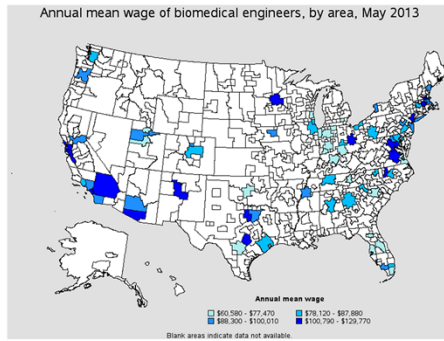


Source: OES, BLS



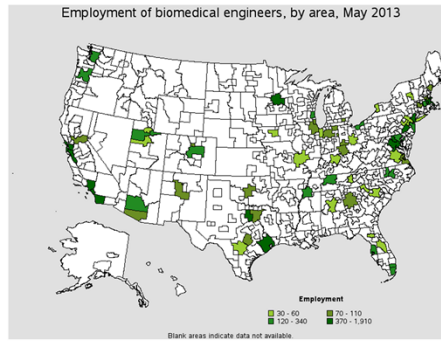
Biomedical Engineers

Biomedical Engineer Wages: May 2013



Source: OES, BLS

Biomedical Engineer Employment: May 2013

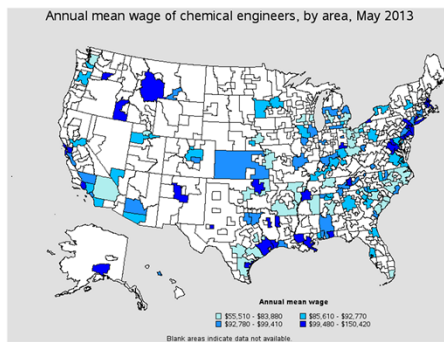


Source: OES, BLS



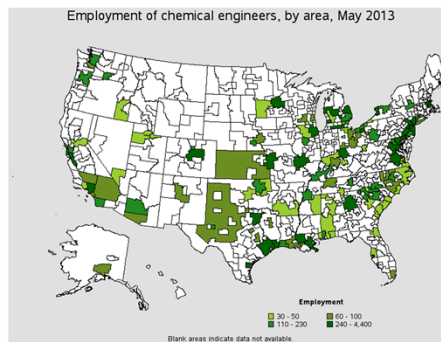
Chemical Engineers

Chemical Engineer Wages: May 2013



Source: OES, BLS

Chemical Engineer Employment: May 2013

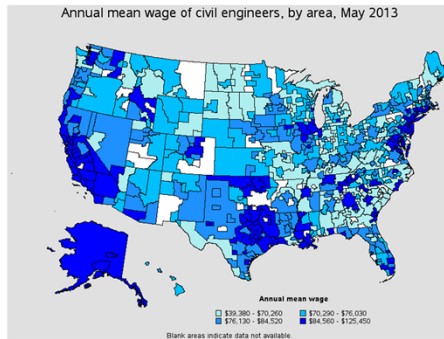


Source: OES, BLS



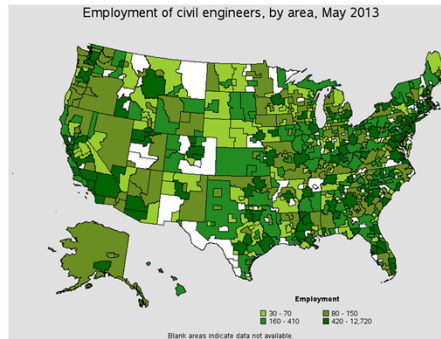
Civil Engineers

Civil Engineer Wages: May 2013



Source: OES, BLS

Civil Engineer Employment: May 2013



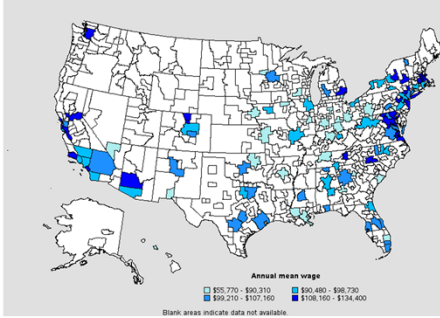
Source: OES, BLS



Computer Hardware Engineers

Computer Hardware Engineer Wages: May 2013

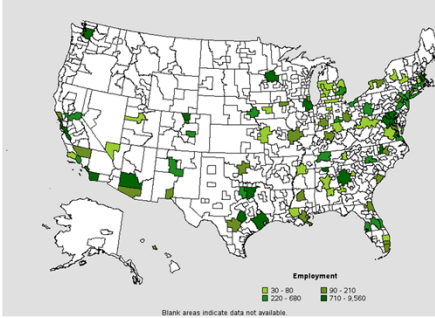
Annual mean wage of computer hardware engineers, by area, May 2013



Source: OES, BLS

Computer Hardware Engineer Employment: May 2013

Employment of computer hardware engineers, by area, May 2013

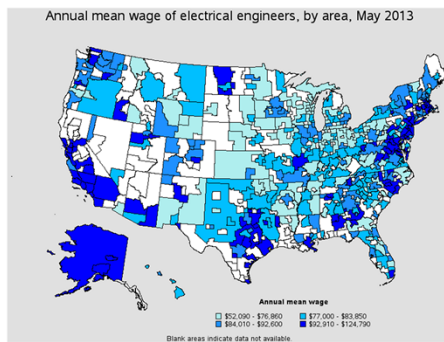


Source: OES, BLS



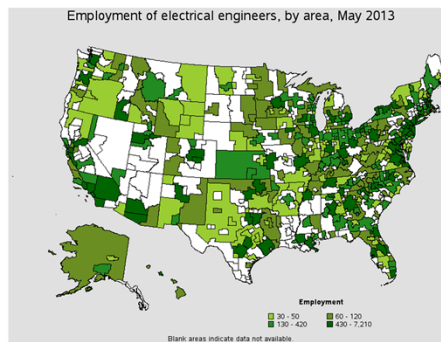
Electrical Engineers

Electrical Engineer Wages: May 2013



Source: OES, BLS

Electrical Engineer Employment: May 2013



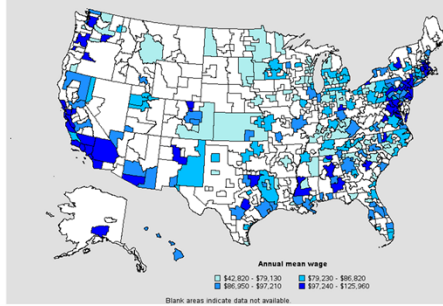
Source: OES, BLS



Electronics Engineers

Electrical Engineer Wages: May 2013

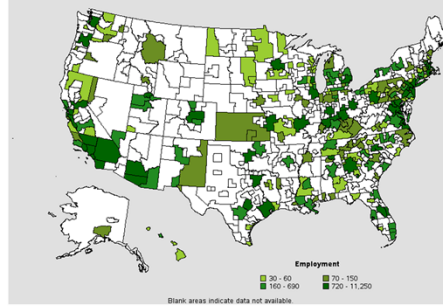
Annual mean wage of electronics engineers, except computer, by area, May 2013



Source: OES, BLS

Electrical Engineer Employment: May 2013

Employment of electronics engineers, except computer, by area, May 2013

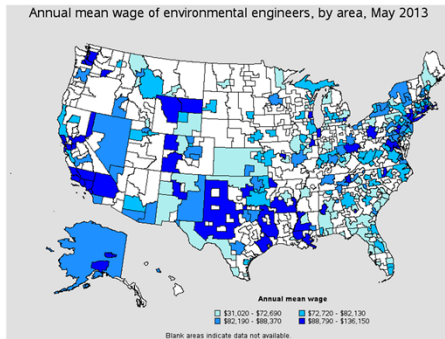


Source: OES, BLS



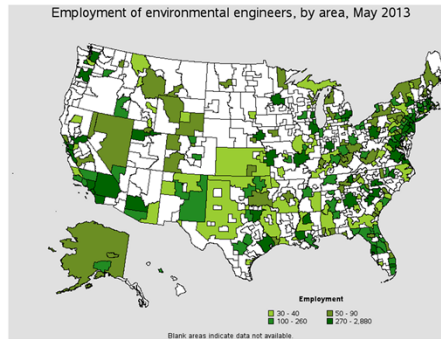
Environmental Engineers

Environmental Engineer Wages: May 2013



Source: OES, BLS

Environmental Engineer Employment: May 2013

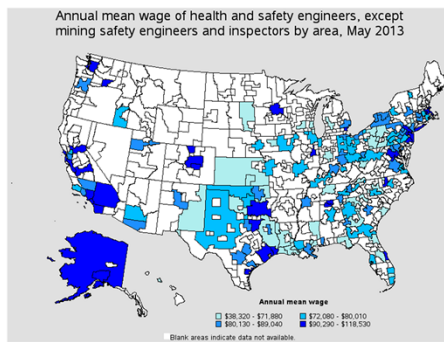


Source: OES, BLS



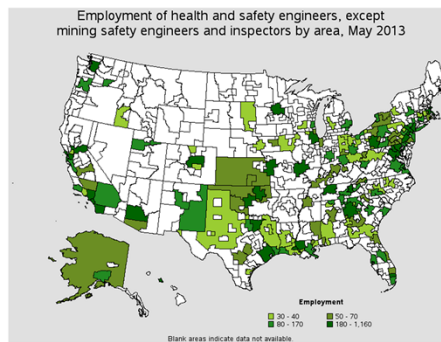
Health and Safety Engineers

Health and Safety Engineer Wages: May 2013



Source: OES, BLS

Health and Safety Engineer Employment: May 2013

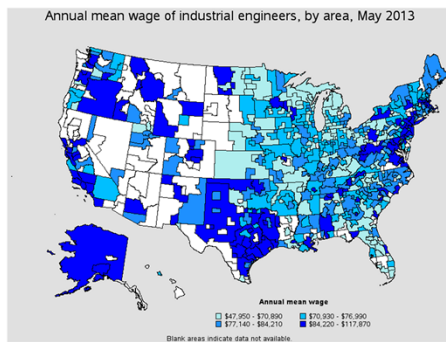


Source: OES, BLS



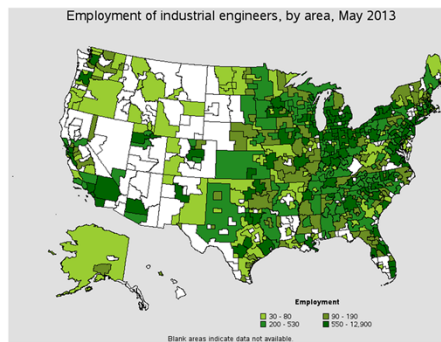
Industrial Engineers

Industrial Engineer Wages: May 2013



Source: OES, BLS

Industrial Engineer Employment: May 2013



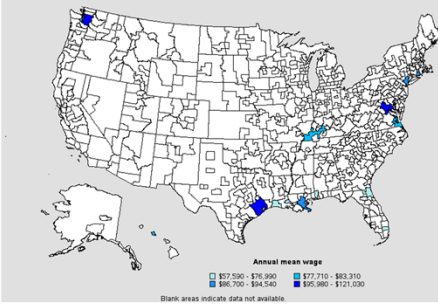
Source: OES, BLS



Marine Engineers

Marine Engineer Wages: May 2013

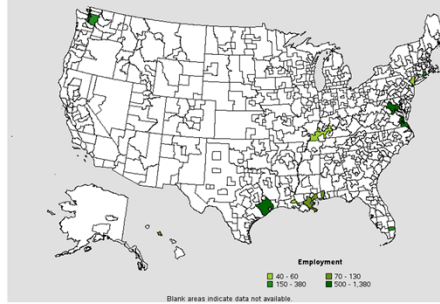
Annual mean wage of marine engineers and naval architects, by area, May 2013



Source: OES, BLS

Marine Engineer Employment: May 2013

Employment of marine engineers and naval architects, by area, May 2013

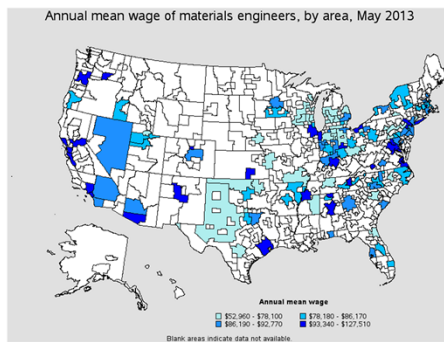


Source: OES, BLS



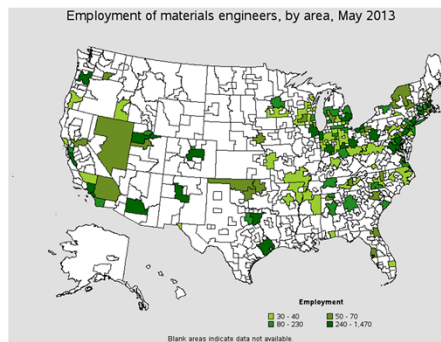
Materials Engineers

Materials Engineer Wages: May 2013



Source: OES, BLS

Materials Engineer Employment: May 2013

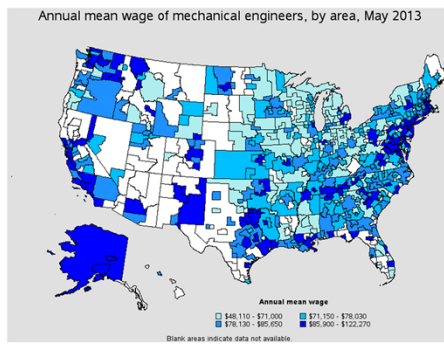


Source: OES, BLS



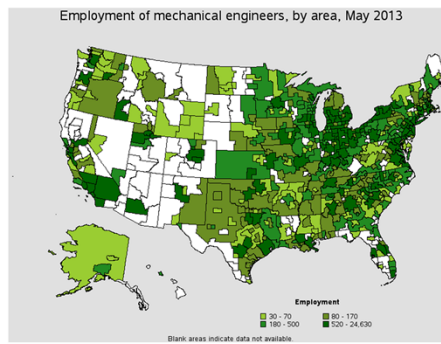
Mechanical Engineers

Mechanical Engineer Wages: May 2013



Source: OES, BLS

Mechanical Engineer Employment: May 2013

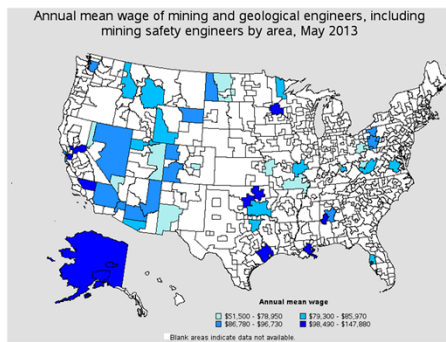


Source: OES, BLS



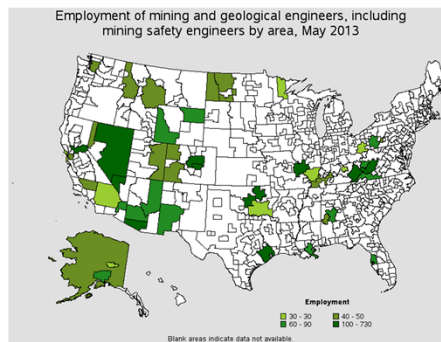
Mining Engineers

Mining Engineer Wages: May 2013



Source: OES, BLS

Mining Engineer Employment: May 2013

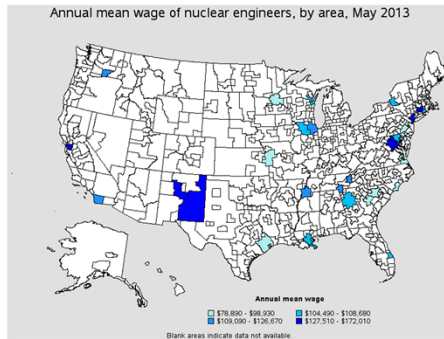


Source: OES, BLS



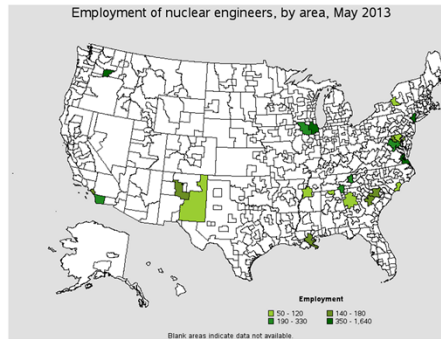
Nuclear Engineers

Nuclear Engineer Wages: May 2013



Source: OES, BLS

Nuclear Engineer Employment: May 2013

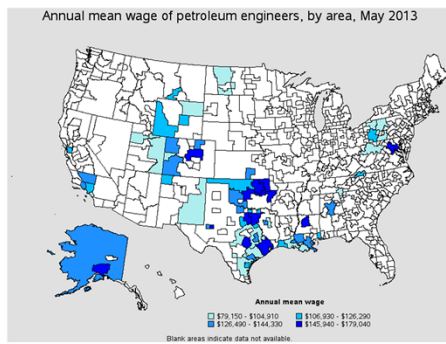


Source: OES, BLS



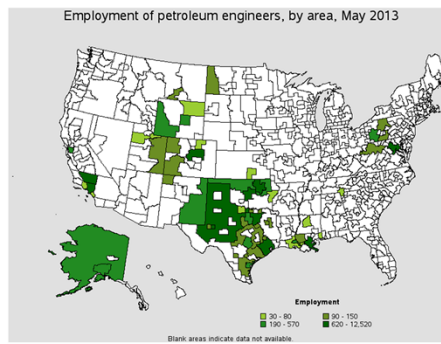
Petroleum Engineers

Petroleum Engineer Wages: May 2013



Source: OES, BLS

Petroleum Engineer Employment: May 2013

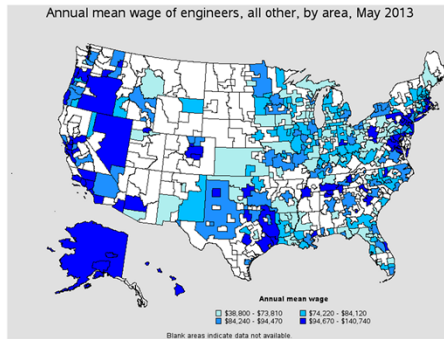


Source: OES, BLS



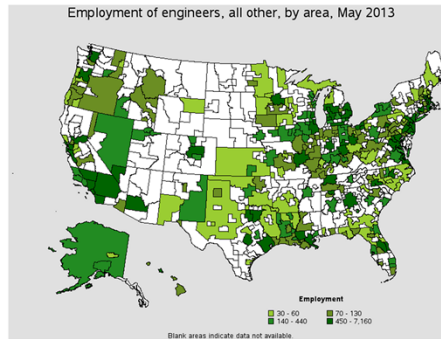
All Other Engineers

All Other Engineer Wages: May 2013



Source: OES, BLS

All Other Engineer Employment: May 2013



Source: OES, BLS



REFERENCES AND NOTES



References & Notes

	Title	Source(s)	Notes
Figure 1.1	Fall Term Headcount Enrollments in Graduate-Level Engineering Programs at Universities in Florida, by SUS or Non-SUS: 1996 to 2012	Integrated Postsecondary Education Data System, National Center for Education Statistics	Qualifying characteristics to be included as an institution in this analysis of IPEDS data included, Title IV eligible, U.S. only, State = Florida, Sector = Public, Private not-for-profit, and Private For-profit 4-year or above, degree-granting, and highest degree offered = master's degree or higher. In total, 89 institutions met the criteria, with only those universities with a value greater than zero in any year being presented in the figure. Data were only available for even numbered years.
Figure 1.2	Fall Term Headcount Enrollment in Graduate-Level Engineering Programs at a SUS Institutions: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool.
Figure 1.3	Fall Term Headcount Enrollment in Graduate-Level Engineering Programs at FAMU & FSU: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool.



References & Notes

	Title	Source(s)	Notes
Figure 2.1	Fall Term Headcount Enrollment in Graduate-Level Engineering Programs at an SUS University, by Race/ethnicity: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool.
Figure 2.2	Fall Term Headcount Enrollment in Graduate Engineering by Non Resident Aliens at, FAMU, FSU and all Other SUS Universities: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool.
Figure 2.3	10 Year "Stay Rate" for Seven Cohorts of Foreign Nationals Who Received a Doctorate in Science or Engineering	Finn, M. G. (2014, January). Stay rates of foreign doctorate recipients from U.S. universities, 2011. Oak Ridge, TN: Oak Ridge Institute for Science and Education.	Data were also retrieved from the 2010 and 2012 reports of the same title and by the same author.
Figure 2.4	Yearly "Stay Rate" for One Cohort of Foreign Nationals Who Received a Doctorate in Engineering in 2001: 2002 to 2011	Finn, M. G. (2014, January). Stay rates of foreign doctorate recipients from U.S. universities, 2011. Oak Ridge, TN: Oak Ridge Institute for Science and Education.	Adapted from Table 3.
Figure 2.5	Fall Term Headcount Enrollment in Graduate-Level Engineering Programs by Black Students at FAMU, FSU and all Other SUS Universities: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool.



References & Notes

	Title	Source(s)	Notes
Figure 3.1	Fall Term Headcount Enrollment in Graduate-Level Engineering Programs at SUS and Non-SUS Institutions in Florida: Fall 2012	Integrated Postsecondary Education Data System, National Center for Education Statistics	See notes for Figure 1.1
Figure 3.2	Fall Term Headcount Enrollment in Graduate Engineering at SUS Institutions, by Level: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool. For master's level students, the student level applied in the analysis was "beginning graduate." For doctoral-level students, the student level applied in the analysis was "advanced graduate."
Figure 3.3	Fall Term Headcount Enrollment in Graduate-Level Engineering Programs at FAMU and FSU, by Level: 1990 to 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool. For master's level students, the student level applied in the analysis was "beginning graduate." For doctoral-level students, the student level applied in the analysis was "advanced graduate."
Table 3.1	Table 3.1. Graduate Engineering Enrollments During the Fall Term in Academic Majors Offered by FAMU and FSU, with SUS Totals: Fall 2013	Board of Governors, State University Database System, available from the Interactive University Database (http://www.flbog.edu/resources/iud/)	This source links to an interactive data cutting tool. For master's level students, the student level applied in the analysis was "beginning graduate." For doctoral-level students, the student level applied in the analysis was "advanced graduate."



References & Notes

	Title	Source(s)	Notes
Table 4.1	Engineers Working in Florida and the Nation, by Occupation Area: May 2013	May 2013 National Occupational Employment and Wage Estimates, Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor (http://www.bls.gov/oes/current/oes_nat.htm)	For the National data, the "Other" category includes petroleum engineers. Petroleum engineers were not sufficient in number enough in Florida to warrant a separate category.
Figure 4.1	Chemical Engineering Employment: May 2013	Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor (http://www.bls.gov/oes/current/map_changer.htm)	This source links to an interactive map making tool.
Figure 4.2	Civil Engineering Employment: May 2013	Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor (http://www.bls.gov/oes/current/map_changer.htm)	This source links to an interactive map making tool.
Table 4.2	Nonemployer Engineering Firms & Self-Employed Engineers, Florida and the U.S.: 2012	<p>Nonemployer Statistics, U.S. Census Bureau (http://www.census.gov/econ/nonemployer/index.html)</p> <p>Notes cont'd: Firms are used as a proxy for the self-employed as the criteria for classification include submitting a business income tax return, having no paid employees, having an annual business receipts of \$1,000 or more (\$1 or more in the Construction industry), and being subject to federal income taxes. Given that some of these firms, especially partnerships, may consist of more than one person the data provide in Table 4.2 may be considered conservative estimates</p>	<p>The U.S. Census provides the following definitions:</p> <p>Corporation: An incorporated business that is granted a charter recognizing it as a separate legal entity having its own privileges and liabilities distinct from those of its members.</p> <p>Partnership: An unincorporated business where two or more persons join to carry on a trade or business with each having a shared financial interest in the business. Sole proprietorship: Also referred to as a "individual proprietorship," an unincorporated business with a sole owner. Also included in this category are self-employed persons. Generally, an establishment is a single physical location at which business is conducted, services are rendered, or industrial operations are performed. However, Nonemployer Statistics counts each distinct business income tax return as a firm. For Nonemployer Statistics, the Census Bureau uses the terms firm and establishment interchangeably. (http://www.census.gov/econ/nonemployer/definitions.htm)</p>



References & Notes

	Title	Source(s)	Notes
Figure 4.3	Annual Median Wages in Florida and the Nation for Engineers, by Occupation Area: 2013	May 2013 National Occupational Employment and Wage Estimates, Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor (http://www.bls.gov/oes/current/oes_nat.htm)	
Figure 4.4	Wages for Aerospace Engineers: May 2013	Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor (http://www.bls.gov/oes/current/map_changer.htm)	This source links to an interactive map making tool.
Figure 4.5	Wages for Mechanical Engineers: May 2013	Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor (http://www.bls.gov/oes/current/map_changer.htm)	This source links to an interactive map making tool.