# Progress in Meeting Degree Production in Data Science & Technology, Education, Healthcare, and Science & Engineering

February 2024

In the 2018 legislative session, the General Assembly appropriated $28.4 million to increase production of degree awards in the areas of data science and technology, education, healthcare, and science and engineering. The funding, targeted toward 14 public four-year institutions (University of Virginia's College at Wise was excluded), included budget language that identified an expected annual increase by institution and area/field, totaling 880 awards over the baseline year, which is 2017. The awards included degrees at the bachelor, master, doctoral and first professional levels, identified primarily via the field-of-study taxonomy of the federal Classification of Instructional Programs (CIP codes).

Between 2017 and 2023, across the 14 institutions and all degree levels, total degree awards in the identified areas/fields grew by 3,719 and exhibited a continuous annual increase. For one field – data science and technology – the trend was similar; degree awards in data science and technology also grew annually from the base year, increasing 58% from 2017 to 2023. However, the other three identified fields did not experience uninterrupted growth, showing both increases and decreases over the period. Notably, the annual number of degree awards in science and engineering did not change much between 2017 and 2023, and in fact declined by 0.5% over the period.

At the institution level, large variations occurred in annual awards in these degree areas/fields. In data science and technology, the awards at UVA and VT accounted for 69% of the field's total increase between 2017 and 2023; growth at GMU accounted for another 18.6%. In education, JMU and UVA had continuous annual increases and were the driving forces for the total annual growth in this area, while awards at the other 12 institutions grew and shrank annually. In healthcare, RU became the major contributor to award growth after its 2020 merger with the Jefferson College of Health Science. In science and engineering, GMU was the only institution that achieved continuous annual award growth. Compared to 2017, the

awards at NSU and VSU decreased annually in all four areas/fields. This decline coincided with a change in the federal Parental Loans for Undergraduate Students (PLUS) program, which disproportionately impacted families of students attending HBCU institutions, and which contributed greatly to HBCUs' enrollments declining from fall 2014 to fall 2018 (and completions through spring 2023).

The following narrative, tables and charts provide an overview and summaries of total annual awards by award area/field and institution and are accompanied by comparison data to the goals outlined in the budget language.

## Overall Awards

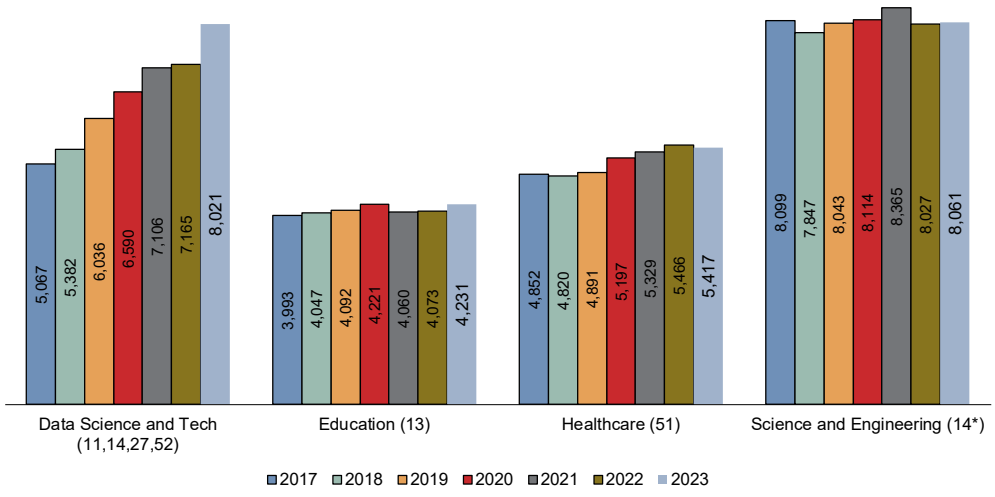
Total awards in the areas/fields/programs identified in the budget language grew by 3,719 between 2017 and 2023. Table 1 depicts the annual awards by area and year numerically and in total; Chart 1 depicts the annual by-area awards graphically.

**Table 1. Total Degrees Awarded between 2017 and 2023**

| Area (2 Digit CIP Code) | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Data Science and Tech (11,14,27,52) | 5,067 | 5,382 | 6,036 | 6,590 | 7,106 | 7,165 | 8,021 |
| Education (13) | 3,993 | 4,047 | 4,092 | 4,221 | 4,060 | 4,073 | 4,231 |
| Healthcare (51) | 4,852 | 4,820 | 4,891 | 5,197 | 5,329 | 5,466 | 5,417 |
| Science and Engineering (14*) | 8,099 | 7,847 | 8,043 | 8,114 | 8,365 | 8,027 | 8,061 |
| **Grand Total** | **22,011** | **22,096** | **23,062** | **24,122** | **24,860** | **24,731** | **25,730** |

*Excludes CIP 14.0901, 14.0903, and 14.1001 as they are reported as data science and technology degrees.

**Chart 1: Annual degrees awarded by area**




*Excludes CIP 14.0901, 14.0903, and 14.1001 as they are reported as data science and technology degrees.

Table 2 provides the expected increase and the actual annual growth and percent change over the 2017 baseline year. In 2023, the primary growth was in the data science and technology area, which grew by 58% over the 2017 awards. The next largest growth was in healthcare (12%) and education (6%). Science and engineering declined by 0.5% compared to the 2017 level.

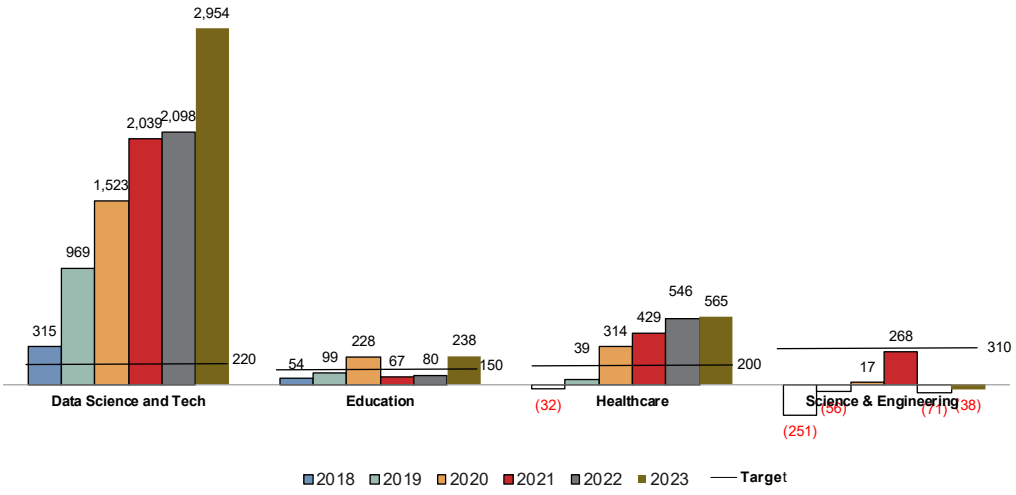
**Table 2: Annual award change over base year (2017) compared to expected annual growth**

| | | 2018 Annual Change over 2017 | | 2019 Annual Change over 2017 | | 2020 Annual Change over 2017 | | 2021 Annual Change over 2017 | | 2022 Annual Change over 2017 | | 2023 Annual Change over 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area (2 Digit CIP Code)** | Expected Annual Increase | #Awards | %Chng | #Awards | %Chng | #Awards | %Chng | #Awards | %Chng | #Awards | %Chng | #Awards | %Chng |
| Data Science & Tech (11,14,27,52) | 220 | 315 | 6.2% | 969 | 19.1% | 1,523 | 30.1% | 2,039 | 40.2% | 2,098 | 41.4% | 2,954 | 58.3% |
| Education (13) | 150 | 54 | 1.4% | 99 | 2.5% | 228 | 5.7% | 67 | 1.7% | 80 | 2.0% | 238 | 6.0% |
| Healthcare (51) | 200 | (32) | -0.7% | 39 | 0.8% | 345 | 7.1% | 477 | 9.8% | 614 | 12.7% | 565 | 11.6% |
| Science & Engineering (14*) | 310 | (252) | -3.1% | (56) | -0.7% | 15 | 0.2% | 266 | 3.3% | (72) | -0.9% | (38) | -0.5% |
| **Grand Total** | **880** | **85** | **0.4%** | **1,051** | **4.8%** | **2,111** | **9.6%** | **2,849** | **12.9%** | **2,720** | **12.4%** | **3,719** | **16.9%** |

*Excludes CIP 14.0901, 14.0903, and 14.1001 as they are reported as data science and technology degrees.

Chart 2 illustrates comparisons of the four areas' annual changes against their targets. For science and engineering, the overall target was not met in all years. Education awards met the target in 2020 and 2023. Healthcare met the growth goal between 2020 and 2023. The growth of data science and technology awards far surpassed its annual goal in each year since 2017.

**Chart 2: Expected Annual Change over Base Year 2017 by Area Compared to Expected Annual Growth**



## Awards by Institution

Most institutions increased the total degrees produced in these areas/fields between 2017 and 2023. Three institutions – ODU, NSU and VSU – saw a continuous decline in enrollment from fall 2014 to fall 2018. Given the traditional four-year path to a bachelor's degree, this smaller cohort likely contributed to the decreased degree production at these institutions through spring 2023.

A 2015 report on the impact of changes in the federal Parental Loans for Undergraduate Students (PLUS) program indicated that HBCUs were disproportionately impacted and experienced larger enrollment declines compared to other institutions. Given that ODU also has a high percentage of low-income students, the changes to the PLUS program also may have impacted ODU and contributed to its lower awards in these areas.

Conversely, some institutions saw continuous enrollment growth that may have led to the increased degree production. For example, GMU's undergraduate enrollment increased by about 4,000 between fall 2014 and fall 2018.

**Table 3: Total awards of data science and technology, education, healthcare, and science and engineering by institution, 2017 to 2023**

| Inst. | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| CNU | 396 | 379 | 405 | 385 | 427 | 369 | 414 |
| GMU | 3,698 | 3,913 | 4,148 | 4,369 | 4,628 | 4,254 | 4,481 |
| JMU | 1,973 | 2,018 | 2,019 | 2,170 | 2,247 | 2,125 | 2,160 |
| LU | 322 | 342 | 326 | 323 | 334 | 413 | 346 |
| NSU | 388 | 348 | 260 | 278 | 257 | 300 | 301 |
| ODU | 3,060 | 2,983 | 2,900 | 2,879 | 2,892 | 2,847 | 2,843 |
| RU | 700 | 678 | 745 | 1,059 | 1,035 | 1,016 | 1,059 |
| UMW | 357 | 327 | 356 | 424 | 390 | 410 | 349 |
| UVA | 2,589 | 2,690 | 3,042 | 3,212 | 3,438 | 3,647 | 3,817 |
| VCU | 3,110 | 3,043 | 3,215 | 3,190 | 3,220 | 3,179 | 3,014 |
| VMI | 183 | 226 | 183 | 180 | 203 | 191 | 141 |
| VSU | 308 | 287 | 266 | 264 | 246 | 230 | 261 |
| VT | 4,158 | 4,064 | 4,443 | 4,585 | 4,757 | 4,737 | 5,585 |
| WM | 769 | 798 | 754 | 804 | 786 | 1,013 | 959 |
| **Total** | **22,011** | **22,096** | **23,062** | **24,122** | **24,860** | **24,731** | **25,730** |

Table 4 depicts the annual increase in STEM-H degree awards over the 2017 base year for each of the 14 targeted public institutions. Since 2019, the annual total STEM-H

degree awards exceeded the expected annual total goal. For the three institutions cited above as experiencing multi-year enrollment declines, those declines impacted their degree production. For Radford, its primary growth was in healthcare, due largely to its merger with the Jefferson College of Health Sciences in FY 2020.

**Table 4: Annual Award Change Over Base Year 2017 Compared to Expected Annual Growth by Institution**

| | Expected Total Annual Increase | 2017 Base Year | 2018 Annual Change over 2017 | 2019 Annual Change over 2017 | 2020 Annual Change over 2017 | 2021 Annual Change over 2017 | 2022 Annual Change over 2017 |
|---|---|---|---|---|---|---|---|
| CNU | 20 | 396 | (17) | 9 | (11) | 31 | (27) |
| GMU | 160 | 3,698 | 215 | 450 | 671 | 930 | 556 |
| JMU | 85 | 1,973 | 45 | 46 | 197 | 274 | 152 |
| LU | 15 | 322 | 20 | 4 | 1 | 12 | 91 |
| NSU | 20 | 388 | (40) | (128) | (110) | (131) | (88) |
| ODU | 125 | 3,060 | (77) | (160) | (181) | (168) | (213) |
| RU | 30 | 700 | (22) | 45 | 359 | 335 | 316 |
| UMW | 10 | 357 | (30) | (1) | 67 | 33 | 53 |
| UVA | 80 | 2,589 | 101 | 453 | 623 | 849 | 1,058 |
| VCU | 110 | 3,110 | (67) | 105 | 80 | 110 | 69 |
| VMI | 10 | 183 | 43 | 0 | (3) | 20 | 8 |
| VSU | 15 | 308 | (21) | (42) | (44) | (62) | (78) |
| VT | 160 | 4,158 | (94) | 285 | 427 | 599 | 579 |
| WM | 40 | 769 | 29 | (15) | 35 | 17 | 244 |
| **Total** | **880** | **22,011** | **85** | **1,051** | **2,111** | **2,849** | **2,720** |

The following tables provide awards by area and annual changes in awards from 2017 to 2023. Tables 5.1 through 5.4 show the annual degree awards by area and institution. Tables 6.1 to 6.4 show the expected annual degree increases and the actual annual degree changes over the 2017 base year. For the degree production in science and technology, Table 6.4 indicates that only GMU produced more than its expected annual award increase consistently between 2018 and 2023. VT met its annual growth goal in 2020, 2021 and 2023. UVA met its annual growth goals in 2021 and 2022. JMU and VCU met their annual growth goals in 2021. The remainder of the institutions did not produce their expected annual award increases over the 2017 base year from 2018 to 2023.

**Table 5.1: Annual Awards in Data Science and Technology**

| Inst. | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|---|---|---|---|---|---|---|---|
| CNU | 107 | 109 | 129 | 130 | 147 | 126 | 163 |
| GMU | 1,313 | 1,434 | 1,527 | 1,683 | 1,876 | 1,723 | 1,863 |
| JMU | 297 | 312 | 317 | 365 | 359 | 318 | 333 |
| LU | 26 | 29 | 29 | 30 | 19 | 21 | 24 |
| NSU | 85 | 82 | 59 | 77 | 65 | 95 | 81 |
| ODU | 382 | 420 | 442 | 477 | 514 | 521 | 641 |
| RU | 93 | 92 | 108 | 69 | 82 | 75 | 65 |
| UMW | 74 | 69 | 90 | 92 | 75 | 84 | 72 |
| UVA | 572 | 590 | 956 | 1,203 | 1,306 | 1,326 | 1,598 |
| VCU | 454 | 456 | 441 | 464 | 476 | 517 | 399 |
| VMI | 38 | 64 | 55 | 50 | 58 | 57 | 35 |
| VSU | 79 | 76 | 60 | 70 | 75 | 59 | 76 |
| VT | 1,320 | 1,400 | 1,592 | 1,608 | 1,774 | 1,854 | 2,321 |
| WM | 227 | 249 | 231 | 272 | 280 | 389 | 350 |
| **Total** | **5,067** | **5,382** | **6,036** | **6,590** | **7,106** | **7,165** | **8,021** |

**Table 5.2: Annual Awards in Education**

| Inst. | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|---|---|---|---|---|---|---|---|
| CNU | 70 | 77 | 60 | 52 | 49 | 47 | 56 |
| GMU | 907 | 954 | 1,026 | 1,115 | 1,053 | 834 | 869 |
| JMU | 325 | 362 | 334 | 386 | 372 | 396 | 488 |
| LU | 111 | 137 | 86 | 116 | 167 | 217 | 188 |
| NSU | 71 | 70 | 69 | 43 | 36 | 37 | 37 |
| ODU | 708 | 663 | 615 | 602 | 608 | 586 | 611 |
| RU | 286 | 264 | 285 | 294 | 276 | 239 | 296 |
| UMW | 120 | 106 | 106 | 133 | 113 | 119 | 108 |
| UVA | 314 | 358 | 404 | 388 | 349 | 482 | 483 |
| VCU | 559 | 552 | 655 | 652 | 659 | 627 | 585 |
| VMI | | | | | | | |
| VSU | 116 | 115 | 85 | 76 | 56 | 93 | 107 |
| VT | 261 | 214 | 206 | 190 | 182 | 171 | 160 |
| WM | 145 | 175 | 161 | 174 | 140 | 225 | 243 |
| **Total** | **3,993** | **4,047** | **4,092** | **4,221** | **4,060** | **4,073** | **4,231** |

**Table 5.3: Annual Awards in Healthcare**

| Inst. | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|---|---|---|---|---|---|---|---|
| CNU | | | | | | | |
| GMU | 700 | 701 | 726 | 744 | 831 | 798 | 872 |
| JMU | 976 | 979 | 1,011 | 1,042 | 1,087 | 1,034 | 983 |
| LU | 112 | 115 | 143 | 112 | 106 | 135 | 99 |
| NSU | 103 | 92 | 71 | 73 | 59 | 76 | 87 |
| ODU | 1,004 | 964 | 890 | 853 | 855 | 904 | 795 |
| RU | 188 | 210 | 218 | 553 | 563 | 610 | 603 |
| UMW | 22 | 30 | 40 | 52 | 48 | 55 | 39 |
| UVA | 508 | 534 | 524 | 532 | 552 | 589 | 563 |
| VCU | 1,197 | 1,159 | 1,203 | 1,153 | 1,145 | 1,115 | 1,148 |
| VMI | | | | | | | |
| VSU | | | | | | 1 | 5 |
| VT | 42 | 36 | 65 | 83 | 83 | 149 | 223 |
| WM | | | | | | | |
| **Total** | **4,852** | **4,820** | **4,891** | **5,197** | **5,329** | **5,466** | **5,417** |

**Table 5.4: Annual Awards in Science and Engineering***

| Inst. | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|---|---|---|---|---|---|---|---|
| CNU | 219 | 193 | 216 | 203 | 231 | 196 | 195 |
| GMU | 778 | 824 | 869 | 827 | 868 | 899 | 877 |
| JMU | 375 | 365 | 357 | 377 | 429 | 377 | 356 |
| LU | 73 | 61 | 68 | 65 | 42 | 40 | 35 |
| NSU | 129 | 104 | 61 | 85 | 97 | 92 | 96 |
| ODU | 966 | 936 | 953 | 947 | 915 | 836 | 796 |
| RU | 133 | 112 | 134 | 143 | 114 | 92 | 95 |
| UMW | 141 | 122 | 120 | 147 | 154 | 152 | 130 |
| UVA | 1,195 | 1,208 | 1,158 | 1,089 | 1,231 | 1,250 | 1,173 |
| VCU | 900 | 876 | 916 | 921 | 940 | 920 | 882 |
| VMI | 145 | 162 | 128 | 130 | 145 | 134 | 106 |
| VSU | 113 | 96 | 121 | 118 | 115 | 77 | 73 |
| VT | 2,535 | 2,414 | 2,580 | 2,704 | 2,718 | 2,563 | 2,881 |
| WM | 397 | 374 | 362 | 358 | 366 | 399 | 366 |
| **Total** | **8,099** | **7,847** | **8,043** | **8,114** | **8,365** | **8,027** | **8,061** |

Note: *excludes CIP 14.0901, 14.0903, and 14.1001 as they are reported as Data Science and Technology degree awards.

**Table 6.1: Annual Award Change over 2017 Base Year in Data Science and Technology**

| Inst. | Expected Annual Increase | 2018 Annual Change over 2017 | 2019 Annual Change over 2017 | 2020 Annual Change over 2017 | 2021 Annual Change over 2017 | 2022 Annual Change over 2017 | 2023 Annual Change over 2017 |
|---|---|---|---|---|---|---|---|
| CNU | 5 | 2 | 22 | 23 | 40 | 19 | 56 |
| GMU | 50 | 121 | 214 | 370 | 563 | 410 | 550 |
| JMU | 10 | 15 | 20 | 68 | 62 | 21 | 36 |
| LU | | 3 | 3 | 4 | (7) | (5) | (2) |
| NSU | 5 | (3) | (26) | (8) | (20) | 10 | (4) |
| ODU | 15 | 38 | 60 | 95 | 132 | 139 | 259 |
| RU | 5 | (1) | 15 | (24) | (11) | (18) | (28) |
| UMW | | (5) | 16 | 18 | 1 | 10 | (2) |
| UVA | 20 | 18 | 384 | 631 | 734 | 754 | 1,026 |
| VCU | 20 | 2 | (13) | 10 | 22 | 63 | (55) |
| VMI | 5 | 26 | 17 | 12 | 20 | 19 | (3) |
| VSU | 5 | (3) | (19) | (9) | (4) | (20) | (3) |
| VT | 60 | 80 | 272 | 288 | 454 | 534 | 1,001 |
| WM | 20 | 22 | 4 | 45 | 53 | 162 | 123 |
| **Total** | **220** | **315** | **969** | **1,523** | **2,039** | **2,098** | **2,954** |

**Table 6.2: Annual Award Change over 2017 Base Year in Education**

| Inst. | Expected Annual Increase | 2018 Annual Change over 2017 | 2019 Annual Change over 2017 | 2020 Annual Change over 2017 | 2021 Annual Change over 2017 | 2022 Annual Change over 2017 | 2023 Annual Change over 2017 |
|---|---|---|---|---|---|---|---|
| CNU | | 7 | (10) | (18) | (21) | (23) | (14) |
| GMU | 40 | 47 | 119 | 208 | 146 | (73) | (38) |
| JMU | 15 | 37 | 9 | 61 | 47 | 71 | 163 |
| LU | 5 | 26 | (25) | 5 | 56 | 106 | 77 |
| NSU | 5 | (1) | (2) | (28) | (35) | (34) | (34) |
| ODU | 30 | (45) | (93) | (106) | (100) | (122) | (97) |
| RU | 10 | (22) | (1) | 8 | (10) | (47) | 10 |
| UMW | 5 | (14) | (14) | 13 | (7) | (1) | (12) |
| UVA | 10 | 44 | 90 | 74 | 35 | 168 | 169 |
| VCU | 20 | (7) | 96 | 93 | 100 | 68 | 26 |
| VMI | | | | | | | |
| VSU | 5 | (1) | (31) | (40) | (60) | (23) | (9) |
| VT | | (47) | (55) | (71) | (79) | (90) | (101) |
| WM | 5 | 30 | 16 | 29 | (5) | 80 | 98 |
| **Total** | **150** | **54** | **99** | **228** | **67** | **80** | **238** |

**Table 6.3: Annual Award Change over 2017 Base Year in Healthcare**

| Inst. | Expected Annual Increase | 2018 Annual Change over 2017 | 2019 Annual Change over 2017 | 2020 Annual Change over 2017 | 2021 Annual Change over 2017 | 2022 Annual Change over 2017 | 2023 Annual Change over 2017 |
|---|---|---|---|---|---|---|---|
| CNU | | | | | | | |
| GMU | 35 | 1 | 26 | 44 | 131 | 98 | 172 |
| JMU | 45 | 3 | 35 | 66 | 111 | 58 | 7 |
| LU | 5 | 3 | 31 | 0 | (6) | 23 | (13) |
| NSU | 5 | (11) | (32) | (30) | (44) | (27) | (16) |
| ODU | 40 | (40) | (114) | (151) | (149) | (100) | (209) |
| RU | 10 | 22 | 30 | 365 | 375 | 422 | 415 |
| UMW | | 8 | 18 | 30 | 26 | 33 | 17 |
| UVA | 20 | 26 | 16 | 24 | 44 | 81 | 55 |
| VCU | 40 | (38) | 6 | (44) | (52) | (82) | (49) |
| VMI | | | | | | | |
| VSU | | | | | | 1 | 5 |
| VT | | (6) | 23 | 41 | 41 | 107 | 181 |
| WM | | | | | | | |
| **Total** | **200** | **(32)** | **39** | **345** | **477** | **614** | **565** |

**Table 6.4: Annual Award Change over 2017 Base Year in Science and Engineering***

| | Expected Annual Increase | 2018 Annual Change over 2017 | 2019 Annual Change over 2017 | 2020 Annual Change over 2017 | 2021 Annual Change over 2017 | 2022 Annual Change over 2017 | 2023 Annual Change over 2017 |
|---|---|---|---|---|---|---|---|
| CNU | 15 | (26) | (3) | (16) | 12 | (23) | (24) |
| GMU | 35 | 46 | 91 | 49 | 90 | 121 | 99 |
| JMU | 15 | (10) | (18) | 2 | 54 | 2 | (19) |
| LU | 5 | (12) | (5) | (8) | (31) | (33) | (38) |
| NSU | 5 | (25) | (68) | (44) | (32) | (37) | (33) |
| ODU | 40 | (30) | (13) | (19) | (51) | (130) | (170) |
| RU | 5 | (21) | 1 | 10 | (19) | (41) | (38) |
| UMW | 5 | (19) | (21) | 6 | 13 | 11 | (11) |
| UVA | 30 | 13 | (37) | (106) | 36 | 55 | (22) |
| VCU | 30 | (24) | 16 | 21 | 40 | 20 | (18) |
| VMI | 5 | 17 | (17) | (15) | 0 | (11) | (39) |
| VSU | 5 | (17) | 8 | 5 | 2 | (36) | (40) |
| VT | 100 | (121) | 45 | 169 | 183 | 28 | 346 |
| WM | 15 | (23) | (35) | (39) | (31) | 2 | (31) |
| **Total** | **310** | (252) | (56) | 15 | 266 | (72) | (38) |

Note: *excludes CIP 14.0901, 14.0903, and 14.1001 as they are reported as Data Science and Technology Degree Awards.