A PUBLICATION OF

NCTECH Association

TECH 2023 INNOVATION INDEX

National Metro Comparison

TECH WORKER SUPPLY + TECH WORKER DEMAND + INNOVATION

NC TECH METRO INDEX

METHODOLOGY

This year's tech metro index follows the same methodology created for the first two iterations in 2021 and 2022. Economic Leadership LLC reviewed the data available at the metropolitan statistical area (MSA) level relevant to the tech sector to create a list of metrics to evaluate. This list of potential metrics was presented to NC Tech's board of advisors who provided feedback to finalize the list. The list of metrics was grouped into three subindexes of tech talent supply, tech talent demand, and innovation. Based on feedback from the tech business leaders on the board, the supply of tech workers was given the highest weighting, as they felt it was one of the biggest factors in a tech business' location decision. Demand was the next priority, as colocation has been a significant factor in tech agglomeration. Innovation was given the lower weighting, as the metrics available at the metro level were more focused on general research & development (R&D) and entrepreneurship, rather than specifically tech focused data.

INTRODUCTION

NC Tech has been quantifying the state's progress in the tech industry for years. In early 2024, the organization will release the tenth version of the State of the Tech Industry report (STIR), which analyzes the size and growth of the state's tech workers, firms, and wages. A key component of the STIR report is comparing North Carolina with the other states to gauge performance and assess competitiveness. The STIR report is produced annually by Economic Leadership LLC, a research and consulting firm also based in North Carolina.

Starting in 2021, NC Tech wanted to evaluate the metro areas of the state (STIR focuses on the state level) and asked Economic Leadership LLC to help develop an index to compare the state's metros' tech performance against other top metros in the country. A methodology for measuring metro tech performance was developed with the goal of releasing new findings annually. This report details the results from the second year of the analysis for release in the fall of 2023.

The metro index focuses on emerging challenges for tech hubs, including a heavy focus on 2023's top competitive issue, the availability of workforce. The struggle to find enough qualified workers has been exacerbated since the onset of the COVID-19 pandemic. The index also places an equal emphasis on tech skills and traditional, educational training. As skills-based hiring is rising as a trend to find talent, this index includes data on job postings and online profiles based on whether they contain tech skills, regardless of educational attainment. The methodology assesses postsecondary education talent but also quantifies those who may have the necessary skills without institutional training. Self-employed tech workers were also included in this analysis to capture all available tech talent in an area.

ECONOMIC LEADERSHIP

THE NC TECH METRO INDEX WEIGHTING

Each subindex consisted of seven unique metrics that were weighted equally (14.3 percent) based on their ranking. Most of the data evaluated is from the year 2021 or 2022. Some of the most recent data from public governmental sources is a few years older.

Only one metric did not have new data for this year's report (patents per worker) and the same data from the previous metro index was used. A more detailed description of each metric is provided in the appendix.

TECH SUPPLY: 45%	SOURCE	DATA YEAR
Resident Tech Workers per 1,000 Adults	Lightcast	2022
Computer, Math, and Statistics Degrees per 1,000 Adults	Census	2021
STEM Educational Completions per 1,000 Adults	Lightcast	2021
Number of Online Profiles in MSA with Tech Skills per 1,000 Adults	Lightcast	2019-2023
Bachelor's Degree or Higher per 1,000 Adults	Lightcast	2023
H-1B Visa Approvals per 1,000 Adults	USCIS	2019-2022
Diversity of Tech Occupations Relative to Total Population	Lightcast	2022
TECH DEMAND: 35%		
Tech Occupation Location Quotient (LQ)	Lightcast	2022
Unique Job Postings with Tech Skills per 1,000 Adults	Lightcast	2019-2023
Median Job Posting Duration	Lightcast	2019-2023
Cost of Living Adjusted Tech Wages	Lightcast	2022
Annual Tech Job Openings per 1,000 Adults	Lightcast	2019-2023
Competitive Effect of Tech Job Growth	Lightcast	2019-2023
Turnover Rate of Employees	Lightcast	2022
INNOVATION: 20%		
Patents per 1,000 Workers	US PATENT OFFICE	2019
Higher Education R&D as % of GDP	NSF	2021
Business Funded Higher Education R&D % of GDP	NSF	2021
SBIR/STTR Funding per $ of GDP	SBIR	2021
Business Dynamism Rate (Opening vs Closing Rate)	Census	2020
Business Applications per 1,000 Adults	Census	2022
Business R&D as a % of GDP	NSF	2020

An index value was created for each subindex and then based on its weighting a final overall index was created. This index included the top 105 populated MSAs in America as well as the top ten populated metros in NC. Some of the NC metros were included in the 105 most populated MSAs. The addition of five North Carolina metros that were smaller than those in the 105 most populous created a total of 110 metros to be ranked. Data was also standardized by the adult population (those over age 25 in each MSA), or the gross domestic product (GDP) of the metro's economy.

OVERALL RESULTS

With the tech supply, tech demand, and innovation indexes combined, the final results included Charlotte, Raleigh, and Durham in the top 30 best-ranked tech metros once again this year. Durham-Chapel Hill and Raleigh-Cary are both in the top ten at 6th and 7th respectively. Wilmington ranked just outside the top 50 and moved up 3 rankings from last year's report. Winston-Salem, Fayetteville, and Hickory also had improved performance this year.

Interestingly, several of the smaller metros in the state that fall outside of the top 105 metros in terms of population performed well. Considering that Greenville's adult population ranked the metro 290th out of all MSAs in the nation, it is quite impressive that the metro ranked as the 74th best metro for tech. Many of the typical tech metro rankings across the country only look at the top 50 or 100 metros so many of these smaller metros in NC had not been typically compared to other metros across the country prior to this research.

NORTH CAROLINA STANDINGS

DURHAM-CHAPEL HILL, NC — 90 — 6
ranking change from last year: 0

RALEIGH-CARY, NC — 41 — 7
ranking change from last year: +1

CHARLOTTE-CONCORD-GASTONIA, NC-SC — 23 — 27
ranking change from last year: +1

WILMINGTON, NC — 169 — 51
ranking change from last year: +3

GREENVILLE, NC — 290 — 74
ranking change from last year: -1

WINSTON SALEM, NC — 86 — 80
ranking change from last year: +2

GREENSBORO-HIGHT POINT, NC — 77 — 85
ranking change from last year: -1

ASHEVILLE, NC — 111 — 91
ranking change from last year: 0

FAYETTEVILLE, NC — 116 — 94
ranking change from last year: +4

HICKORY-LENOIR-MORGANTON, NC — 145 — 100
ranking change from last year: +5

Adult Population Ranking

Tech Index Ranking

FINAL OVERALL TECH METRO INDEX RANKINGS

In this year's report, there was no shakeup in the top six spots after several big moves in last year's report. Austin remains in the top spot followed by the two metros in the Bay Area. Boston and Seattle round out the top five. San Diego dropped from 7th to 8th and Raleigh moved up in its place. Provo, UT and Madison, WI are two university-dominated metros that moved up into the top ten in this year's report. The Charlotte metro ranked just ahead of the St. Louis, Nashville, Boise, and the Chicago area. Miami, FL was reported as experiencing an influx of tech workers relocating during the pandemic. This is borne out in the data as the metro increased by 10 spots in the rankings.

1. Austin-Round Rock-Georgetown, TX
2. San Jose, CA
3. San Francisco, CA
4. Boston, MA
5. Seattle, WA
6. Durham-Chapel Hill, NC
7. Raleigh-Cary, NC
8. San Diego, CA
9. Provo, UT
10. Madison, WI
11. Salt Lake City, UT
12. Washington, DC
13. Portland, OR
14. Dallas,TX
15. Baltimore, MD
16. Minneapolis-St. Paul, MN
17. Denver, CO
18. Atlanta, GA
19. Columbus, OH
20. Philadelphia, PA
21. Phoenix, AZ
22. Colorado Springs, CO
23. New York, NY
24. Fayetteville, AR
25. Albany, NY
26. Richmond, VA
27. Charlotte, NC
28. St. Louis, MO
29. Pittsburgh, PA
30. Chicago, IL
31. Hartford, CT
32. Nashville, TN
33. Omaha, NE
34. Boise, ID
35. Palm Bay, FL
36. Worcester, MA
37. Detroit, MI
38. Des Moines, IA
39. Cincinnati, OH
40. Rochester, NY
41. Los Angeles, CA
42. Sacramento, CA
43. Dayton, OH
44. Kansas City, MO
45. Tampa, FL
46. Houston, TX
47. Bridgeport, CT
48. Charleston, SC
49. Albuquerque, NM
50. Milwaukee, WI
51. Wilmington, NC
52. Tucson, AZ
53. Indianapolis, IN
54. Virginia Beach, VA
55. Orlando, FL
56. Harrisburg, PA
57. Knoxville, TN
58. Lexington, KY
59. Oxnard, CA
60. Syracuse, NY
61. New Haven, CT
62. Portland, ME
63. Jacksonville, FL
64. Cleveland, OH
65. Providence, RI
66. Wichita, KS
67. Buffalo, NY
68. Ogden, UT
69. Akron, OH
70. Oklahoma City, OK
71. Miami, FL
72. San Antonio, TX
73. Greenville, SC
74. Greenville, NC
75. Springfield, MA
76. Birmingham, AL
77. Grand Rapids, MI
78. Little Rock, AR
79. Louisville, KY
80. Winston-Salem, NC
81. Poughkeepsie, NY
82. Spokane, WA
83. Urban Honolulu, HI
84. Memphis, TN
85. Greensboro, NC
86. Chattanooga, TN
87. Columbia, SC
88. Allentown, PA
89. Northpoint, FL
90. Augusta, GA
91. Asheville, NC
92. Tulsa, OK
93. Las Vegas, NV
94. Fayetteville, NC
95. Baton Rouge, LA
96. Deltona, FL
97. Toledo, OH
98. New Orleans, LA
99. Jackson, MS
100. Hickory, NC
101. Myrtle Beach, SC
102. El Paso, TX
103. Riverside, CA
104. Lakeland, FL
105. Stockton, CA
106. McAllen, TX
107. Fresno, CA
108. Scranton, PA
109. Bakersfield, CA
110. Youngstown, OH

NO.1

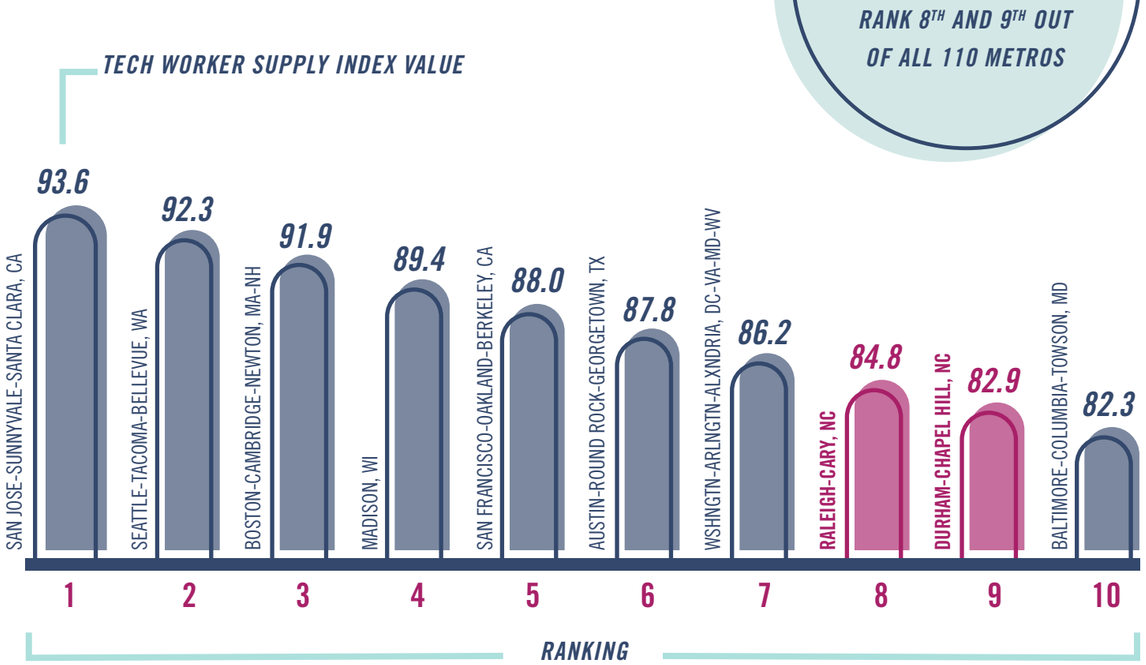
TECH WORKER SUPPLY INDEX

The Tech Worker Supply subindex was given the highest weighting (45 percent) out of the three. This was based on feedback provided by NC Tech's Board of Advisors, who stated that the availability of workforce was the greatest challenge for tech companies, and the biggest draw that a tech hub could provide. This index included the metrics of the number of tech workers who live in the metro, the number of computer and math degrees present, and tech skills present in the population. The ability of the metro to accept highly skilled workers from abroad, and the diversity of the tech sector, were also included in evaluating the supply of tech workers.

TOP 10 METROS FOR TECH WORKER SUPPLY

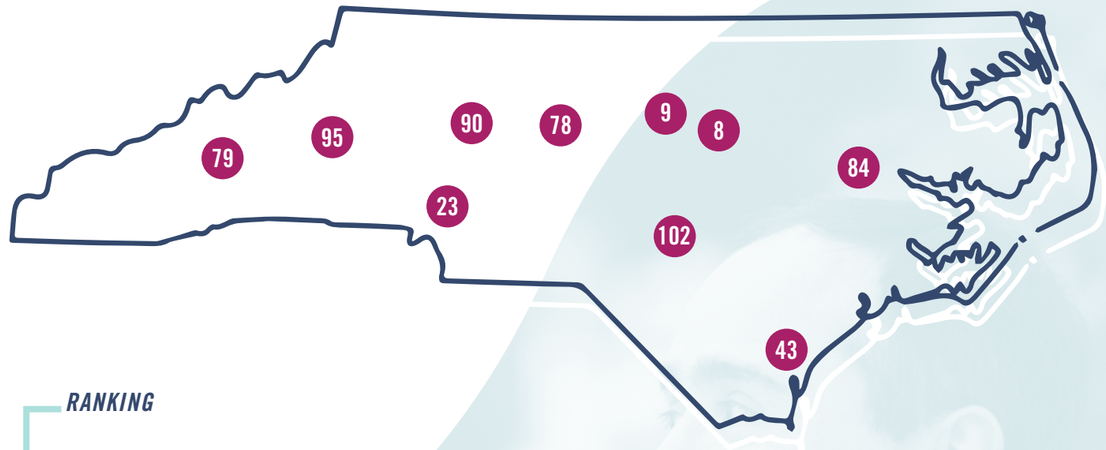
8 & 9

RALEIGH-CARY AND DURHAM-CHAPEL HILL RANK 8TH AND 9TH OUT OF ALL 110 METROS



TOP 10 NC METROS

Raleigh-Cary, NC ranked 8th out of the 110 metros for tech talent supply, down two spots from the previous year, just behind Austin and Washington, DC. Durham-Chapel Hill, NC remained in the 9th place spot this year. Raleigh-Cary scored in the top ten for every supply metric except H1-B visa approvals and tech worker diversity. Charlotte ranked in the top 25 for online profiles with tech skills, the number of resident workers, computer degrees, and H1-B visas. Greenville, NC had the highest value of STEM education completions per capita across all 110 metros. Asheville, NC had the most racial diverse tech workforce across all 110 metros. Hickory's tech workforce was also among the most diverse and ranked 8th across the metros studied.



RANKING

8	RALEIGH-CARY, NC	84.8
9	DURHAM-CHAPEL HILL, NC	82.9
23	CHARLOTTE-CONCORD-GASTONIA, NC-SC	71.2
43	WILMINGTON, NC	58.0
78	GREENSBORO-HIGH POINT, NC	36.3
79	ASHEVILLE, NC	35.9
84	GREENVILLE, NC	33.0
90	WINSTON-SALEM, NC	29.3
95	HICKORY-LENOIR-MORGANTON, NC	21.8
102	FAYETTEVILLE, NC	16.1

TECH WORKER SUPPLY INDEX VALUE

NC TECH WORKER SUPPLY INDEX CHARTS

RANKING ACROSS ALL METROS

NUMBER OF RESIDENT TECH WORKERS*

7	45.7	Raleigh, Cary
13	36.5	Durham, Chapel Hill
22	30.7	Charlotte, Concord, Gastonia
69	18.3	Wilmington
76	16.3	Greensboro, High Point
84	15.4	Fayetteville
85	15.3	Winston-Salem
88	15.2	Greenville
100	11.0	Hickory, Lenoir, Morganton
106	10.0	Asheville

*PER 1,000 ADULTS

COMPUTER, MATH & STATISTICS DEGREES*

5	36.2	Raleigh, Cary
12	26.3	Durham, Chapel Hill
24	21.2	Charlotte, Concord, Gastonia
52	15.9	Wilmington
75	13.5	Greensboro, High Point
78	13.2	Asheville
82	12.4	Winston-Salem
90	11.2	Fayetteville
95	10.3	Greenville
107	7.0	Hickory, Lenoir, Morganton

*PER 1,000 ADULTS

STEM EDUCATIONAL COMPLETIONS*

1	10.99	Greenville
4	7.71	Raleigh, Cary
6	6.82	Durham, Chapel Hill
39	2.94	Greensboro, High Point
49	2.52	Wilmington
58	2.21	Charlotte, Concord, Gastonia
69	1.88	Fayetteville
79	1.61	Hickory, Lenoir, Morganton
84	1.52	Winston-Salem
102	0.89	Asheville

*PER 1,000 ADULTS

NUMBER OF ONLINE PROFILES W/ TECH SKILL(S)*

5	52.4	Raleigh, Cary
20	31.5	Durham, Chapel Hill
23	30.4	Charlotte, Concord, Gastonia
50	21.2	Wilmington
64	17.0	Greensboro, High Point
74	15.1	Asheville
91	12.0	Winston-Salem
95	11.6	Greenville
97	10.1	Fayetteville
105	7.6	Hickory, Lenoir, Morganton

*PER 1,000 ADULTS

PEOPLE W/ BACHELOR'S DEGREES OR HIGHER*

6	493.8	Raleigh, Cary
8	488.3	Durham, Chapel Hill
18	418.4	Wilmington
31	392.7	Asheville
37	382.6	Charlotte, Concord, Gastonia
77	332.1	Greenville
88	310.3	Greensboro, High Point
96	277.3	Winston-Salem
102	253.3	Fayetteville
107	208.3	Hickory, Lenoir, Morganton

*PER 1,000 ADULTS

H-1B VISA APPROVALS*

3	34.9	Durham, Chapel Hill
23	7.0	Raleigh, Cary
25	6.8	Charlotte, Concord, Gastonia
46	3.6	Wilmington
57	2.8	Greenville
65	2.2	Greensboro, High Point
83	1.3	Winston-Salem
103	0.5	Hickory, Lenoir, Morganton
107	0.4	Fayetteville
109	0.3	Asheville

*PER 1,000 ADULTS

TECH WORKER DIVERSITY INDEX

1	169.5	Asheville
8	143.8	Hickory, Lenoir, Morganton
31	109.0	Winston-Salem
40	106.8	Charlotte, Concord, Gastonia
47	104.1	Wilmington
75	92.2	Raleigh, Cary
77	92.0	Durham, Chapel Hill
91	85.0	Greensboro, High Point
104	75.8	Fayetteville
110	68.7	Greenville

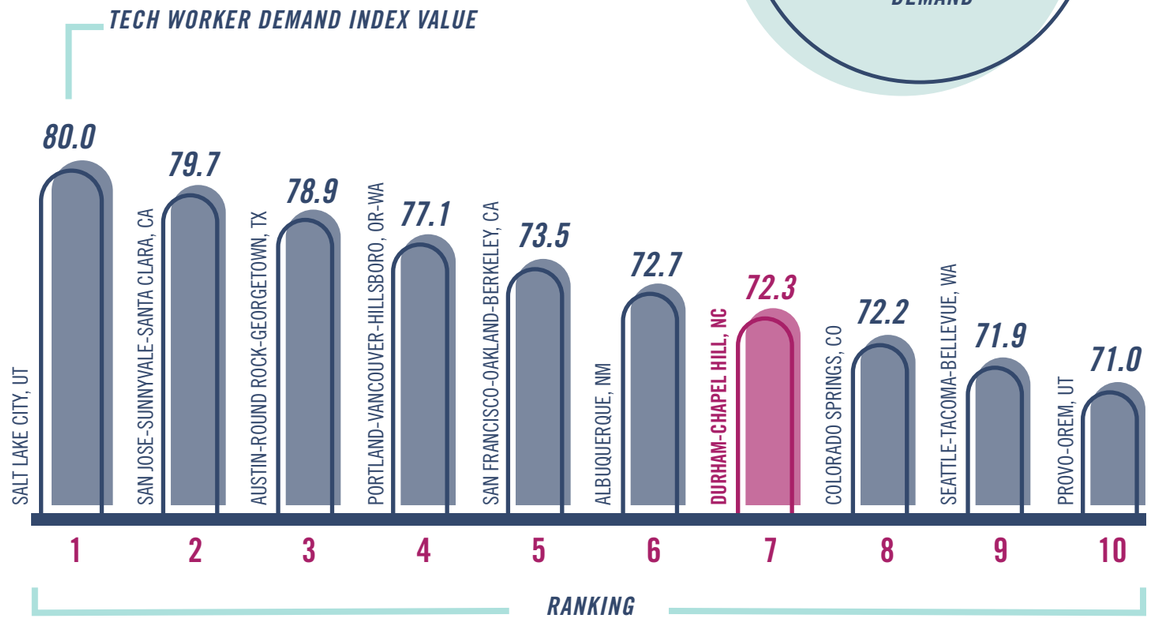
NO.2

TECH WORKER DEMAND INDEX

The Tech Worker Demand subindex was given the second highest weighting (35 percent) of the three. Demand is an important indicator for tech because tech companies and startups look for thriving tech presence when they decide where they want to locate. This index includes the metrics of tech worker concentration, tech wages, and turnover rate. Skills-based data was used for measuring demand in job postings.

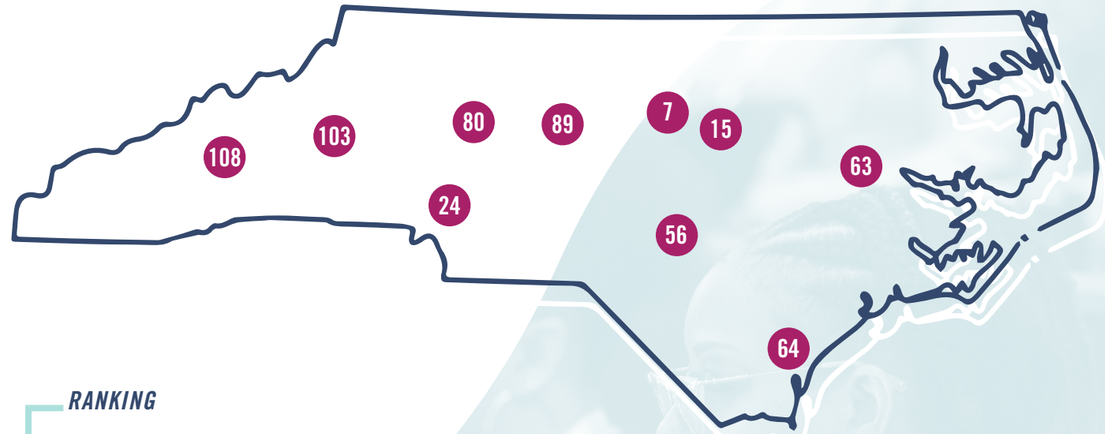
TOP 10 METROS FOR TECH WORKER DEMAND

7 *DURHAM-CHAPEL HILL, NC RANKED 7TH OF THE 110 METROS FOR TECH TALENT DEMAND*



TOP 10 NC METROS

Durham-Chapel Hill, NC ranked seventh of the 110 metros for tech demand, the same ranking as last year. Metros in the Intermountain West surged up in the demand index in this year's report including Salt Lake City, Albuquerque, Provo, and Colorado Springs. The Charlotte and Raleigh metros scored in the top 25. Notably, Fayetteville was the next top-performing metro for demand in NC. Eight of the ten NC metros scored in the top 55 on cost-of-living adjusted tech wages. NC metros also scored well on competitive effect tech job growth. The metros in NC tended to have more worker churn, or turnover, in the tech workforce compared to other places in the country, particularly the Charlotte metro area.



RANKING

7	DURHAM-CHAPEL HILL, NC	72.3
15	RALEIGH-CARY, NC	68.0
24	CHARLOTTE-CONCORD-GASTONIA, NC-SC	62.5
56	FAYETTEVILLE, NC	49.3
63	GREENVILLE, NC	47.3
64	WILMINGTON, NC	47.2
80	WINSTON SALEM, NC	39.4
89	GREENSBORO-HIGH POINT, NC	35.4
103	HICKORY-LENOIR-MORGANTON, NC	25.7
108	ASHEVILLE, NC	21.7

TECH WORKER DEMAND INDEX VALUE

NC TECH WORKER DEMAND INDEX CHARTS

RANKING ACROSS ALL METROS

TECH WORKER LOCATION QUOTIENT

6	1.96	Durham, Chapel Hill
7	1.68	Raleigh, Cary
19	1.25	Charlotte, Concord, Gastonia
72	0.72	Wilmington
80	0.64	Winston-Salem
81	0.63	Fayetteville
85	0.62	Greensboro, High Point
91	0.56	Greenville
101	0.46	Asheville
104	0.40	Hickory, Lenoir, Morganton

UNIQUE JOB POSTINGS W/ TECH SKILL(S)*

4	122.8	Durham, Chapel Hill
6	102.4	Raleigh, Cary
10	84.1	Charlotte, Concord, Gastonia
68	30.6	Greensboro, High Point
74	28.9	Fayetteville
89	21.1	Winston-Salem
92	19.5	Wilmington
99	13.2	Greenville
100	12.1	Hickory, Lenoir, Morganton
104	8.6	Asheville

*PER 1,000 ADULTS

MEDIAN JOB POSTING W/ TECH SKILL(S) DURATION, DAYS

9	28	Greenville
24	27	Wilmington
24	27	Winston-Salem
50	26	Fayetteville
50	26	Greensboro, High Point
67	25	Hickory, Lenoir, Morganton
86	24	Charlotte, Concord, Gastonia
99	23	Durham, Chapel Hill
99	23	Raleigh, Cary
107	22	Asheville

COST OF LIVING ADJUSTED MEDIAN HOURLY TECH WAGES

2	$55.70	Durham, Chapel Hill
3	$55.25	Raleigh, Cary
4	$54.81	Charlotte, Concord, Gastonia
18	$47.67	Winston-Salem
22	$46.40	Greensboro, High Point
25	$46.05	Fayetteville
51	$42.70	Wilmington
53	$42.58	Greenville
62	$41.88	Hickory, Lenoir, Morganton
86	$38.69	Asheville

ANNUAL TECH JOB OPENINGS*

2	7.54	Durham, Chapel Hill
9	4.97	Raleigh, Cary
18	3.71	Charlotte, Concord, Gastonia
56	2.21	Wilmington
62	2.16	Greenville
80	1.74	Fayetteville
84	1.66	Greensboro, High Point
85	1.65	Winston-Salem
97	1.30	Asheville
103	1.10	Hickory, Lenoir, Morganton

*PER 1,000 ADULTS

COMPETITIVE EFFECT OF TECH JOB GROWTH*

3	7.51	Durham, Chapel Hill
7	2.13	Greenville
14	1.02	Asheville
15	0.96	Wilmington
16	0.95	Fayetteville
23	0.75	Raleigh, Cary
30	0.53	Hickory, Lenoir, Morganton
37	0.34	Charlotte, Concord, Gastonia
45	-0.23	Winston-Salem
74	-1.57	Greensboro, High Point

*PER 1,000 ADULTS

TURNOVER RATES OF TECH WORKERS

56	37.2%	Fayetteville
78	39.6%	Greenville
79	39.6%	Wilmington
95	43.1%	Hickory, Lenoir, Morganton
98	43.7%	Durham, Chapel Hill
99	43.9%	Asheville
100	44.0%	Raleigh, Cary
106	48.3%	Greensboro, High Point
108	51.1%	Winston-Salem
110	52.3%	Charlotte, Concord, Gastonia

NO.3

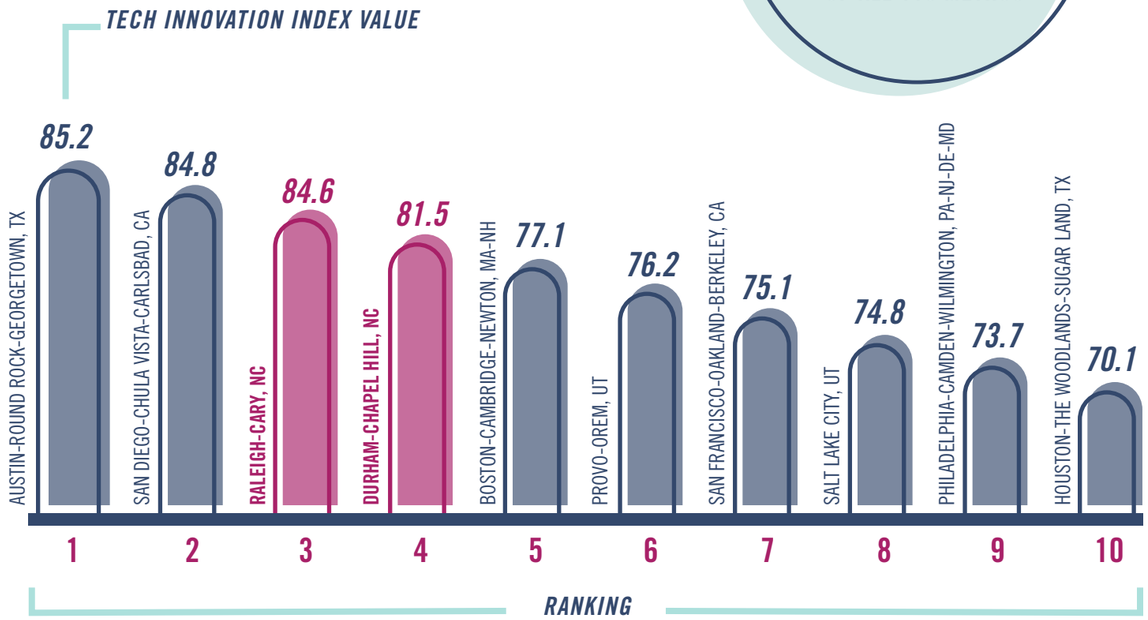
TECH INNOVATION INDEX

The Tech Innovation subindex evaluates the culture of Research & Development and entrepreneurship in each metro. Our industry partners reminded the researchers that the next great tech advancements will come in non-tech industries such as automobiles, healthcare, etc. Therefore research & development is important to developing new and innovative technology. Some of the biggest unicorns of the past decade have been tech startups. If a metro can support new businesses and help them thrive, then perhaps the next great tech startup will come out of their area.

TOP 10 METROS FOR INNOVATION

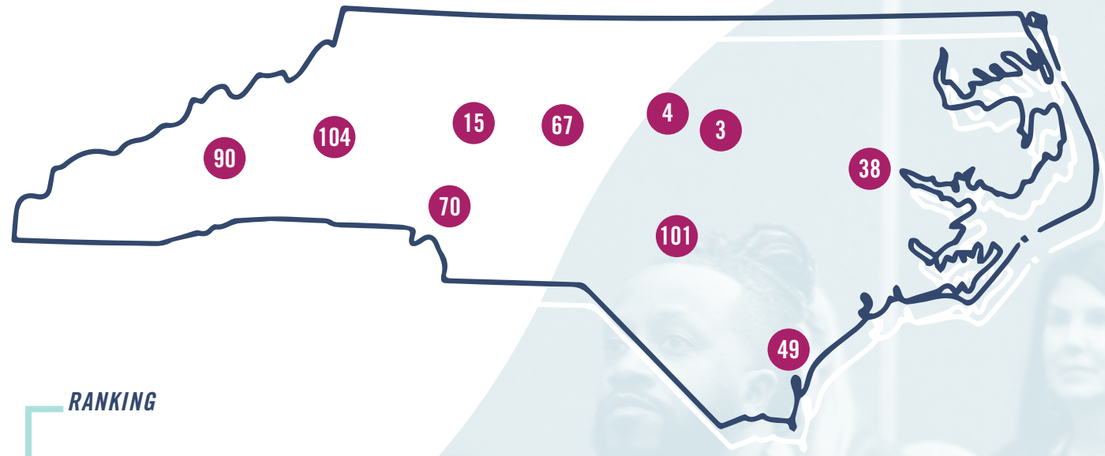
3&4

RALEIGH-CARY AND DURHAM-CHAPEL HILL RANK 3RD AND 4TH OUT OF ALL 110 METROS



TOP 10 NC METROS

Raleigh-Cary and Durham-Chapel Hill ranked 3rd and 4th out of all 110 metros studied, each moving back one spot in the rankings as San Diego moved into the 2nd spot. Metros that do not appear in the tech demand or supply top ten but have strong innovation are Philadelphia and Houston. Durham is notably the top metro out of the 110 metros for rates of higher education R&D and SBIR funding. Charlotte does not rank as high in innovation as it does for tech supply and demand. Charlotte did rank 13th overall in business dynamism and 20th in business applications, indicating the entrepreneurial pipeline is strong. Winston-Salem moved from 49th in last year's innovation rankings to 15th this year due to higher levels of education-based R&D and SBIR funding rates. Greensboro, NC also moved up in the innovation rankings from 93rd to 67th.



RANKING

3	RALEIGH-CARY, NC	84.6
4	DURHAM-CHAPEL HILL, NC	81.5
15	WINSTON SALEM, NC	67.0
38	GREENVILLE, NC	58.1
49	WILMINGTON, NC	52.5
67	GREENSBORO-HIGH POINT, NC	45.9
70	CHARLOTTE-CONCORD-GASTONIA, NC-SC	44.6
90	ASHEVILLE, NC	35.4
101	FAYETTEVILLE, NC	28.3
104	HICKORY-LENOIR-MORGANTON, NC	26.3

TECH INNOVATION INDEX VALUE

NC TECH INNOVATION INDEX CHARTS

RANKING ACROSS ALL METROS

PATENTS PER 1,000 WORKERS

14	2.00	Raleigh, Cary
16	1.83	Durham, Chapel Hill
47	0.78	Winston-Salem
59	0.61	Hickory, Lenoir, Morganton
65	0.56	Charlotte, Concord, Gastonia
70	0.49	Wilmington
75	0.44	Asheville
77	0.43	Greensboro, High Point
103	0.16	Greenville
109	0.09	Fayetteville

HIGHER ED R&D AS A % OF GDP

1	4.05%	Raleigh, Cary
14	0.71%	Durham, Chapel Hill
29	0.51%	Winston-Salem
33	0.48%	Hickory, Lenoir, Morganton
72	0.17%	Charlotte, Concord, Gastonia
81	0.09%	Wilmington
92	0.03%	Asheville
94	0.02%	Greensboro, High Point
96	0.02%	Greenville
107	0.00%	Fayetteville

BUSINESS FUNDED HIGHER EDUCATION R&D AS A % OF GDP

1	0.390%	Durham, Chapel Hill
16	0.046%	Raleigh, Cary
18	0.040%	Greenville
21	0.040%	Winston-Salem
71	0.005%	Wilmington
2	0.001%	Charlotte, Concord, Gastonia
88	0.001%	Greensboro, High Point
89	0.001%	Fayetteville
99	0.000%	Asheville
104	0.000%	Hickory, Lenoir, Morganton

SBIR/STTR* FUNDING PER $1M OF GDP

1	$1,278	Durham, Chapel Hill
13	$307	Raleigh, Cary
40	$150	Winston-Salem
61	$72	Greensboro, High Point
65	$63	Wilmington
89	$30	Charlotte, Concord, Gastonia
92	$24	Asheville
93	$24	Greenville
103	$0	Hickory, Lenoir, Morganton
103	$0	Fayetteville

*Small Business Innovation Research/Small Business Technology Transfer

BUSINESS DYNAMISM RATE

13	1.2%	Charlotte, Concord, Gastonia
17	1.1%	Raleigh-Cary
27	0.7%	Greenville
36	0.6%	Winston-Salem
39	0.5%	Asheville
42	0.5%	Wilmington
46	0.2%	Hickory, Lenoir, Morganton
47	0.1%	Greensboro, High Point
74	-0.4%	Durham, Chapel Hill
97	-1.1%	Fayetteville

BUSINESS APPLICATIONS PER 1,000 ADULTS

20	28.4	Charlotte, Concord, Gastonia
22	27.3	Greenville
23	26.6	Raleigh, Cary
24	26.6	Fayetteville
31	25.0	Wilmington
50	21.5	Greensboro, High Point
53	20.8	Durham, Chapel Hill
70	17.6	Winston-Salem
72	17.4	Asheville
106	11.7	Hickory, Lenoir, Morganton

BUSINESS FUNDED TOTAL R&D AS A % OF GDP

4	8.3%	Durham, Chapel Hill
13	4.0%	Wilmington
14	3.9%	Raleigh, Cary
29	2.3%	Greensboro, High Point
30	2.2%	Greenville
30	2.2%	Hickory, Lenoir, Morganton
30	2.2%	Asheville
30	2.2%	Fayetteville
30	2.2%	Winston-Salem
73	1.1%	Charlotte, Concord, Gastonia

INSIGHTS

The tech metro index shows which metros have the talent, the demand, and the innovation to maintain, create, and recruit tech businesses. North Carolina's top metros (Durham, Raleigh, and Charlotte) score well across metrics, and rank in the top 30 overall. Some of the smaller metros in the state have continued to improve their performance in the rankings each year, particularly Wilmington and Greenville.

TECH INNOVATION INDEX
National Metro Comparison

The index highlights opportunities for NC metros to improve their tech rankings. Outside of the Triangle, the innovation metrics lagged. Fostering more business R&D and entrepreneurship would improve innovation in these other metros. Several NC metros also had high turnover rates for tech occupations, with Charlotte having the highest out of all 110 metros in 2022. This could indicate high rates of cannibalism between firms or insufficient hiring and/or training programs for employees. This shows an opportunity for local educational institutions to help ensure that their students are ready to hit the ground running when they start at a local firm. NC metros outside of Durham also scored low in approvals of H1-B visas. This means metros could be missing injecting talent into their area.

Compared to last year's results, NC metros scored mostly similar to the previous year with the big 3 (Durham, Raleigh, and Charlotte) maintaining their spots in the top 30 overall. Most NC metros maintained or improved on their status from the previous analysis. Fayetteville and Hickory had the biggest improvements in this year's report, by moving up by four and five spots, respectively. Only two NC metros dropped rankings and that was only by one spot for each metro.

This analysis also highlights where NC metros rank well on several metrics that contribute to their competitiveness. Most of the NC metros had positive business dynamism rates, which means more businesses are being created than exiting. Several NC metros scored high in the competitive effect of tech occupation growth. This means job growth is driven by more than just national and tech industry trends. When cost of living is considered, 8 of the top 10 NC metros scored in the top 55 for tech wages.

APPENDIX

SUPPLY	DESCRIPTION
Resident tech workers per 1,000 adults	The number of tech workers who live within the metro area standardized by the adult population of the metro (over the age of 25).
Computer, math, and statistics degrees per 1,000 adults	The number of adults who had their first major in a computer, math, or statistics degree in the metro standardized by the adult population of the metro.
STEM educational completions per 1,000 adults	Number of completions (certification, degree, or award from a postsecondary institution) in STEM fields standardized by the adult population of the metro.
Number of online profiles in MSA with tech skills per 1,000 adults	Number of online professional profiles that contained any tech skill in the metro area standardized by the adult population of the metro.
Bachelor's degree or higher per 1,000 adults	Number of adults with a bachelor's degree standardized by the adult population of the metro.
H-1B visa approvals per 1000 adults	The number of new and renewed high-skilled immigration work visas standardized by the adult population of the metro.
Diversity of tech occupations relative to total population	The percentage of tech workers who are people of color divided by the percentage of people of color in the general adult population. A value of 100 means the tech workforce is as diverse as the general population of the metro. If lower, less diverse. If higher, more diverse.
DEMAND	**DESCRIPTION**
Tech occupation location quotient (LQ)	Tech workers as a percentage of the total metro workforce compared to the national average. If higher than 1, more concentrated in tech than the national average.
Unique job postings with tech skills per 1,000 adults	Online job postings (with duplicates removed) that required at least one tech skill standardized by the adult population of the metro.
Median job posting duration	The median amount of time it takes for an online job posting with at least one tech skill to be filled.
Cost of living adjusted tech wages	The median hourly wage for tech workers in the metro adjusted for the cost of living in the metro.
Annual tech job openings per 1,000 adults	Openings are the number of jobs that need to be filled to meet growth demand, turnover, and retirement of workers in a year.
Competitive effect of tech job growth	The competitive effect is the actual change in tech workers minus the expected change in tech workers for the metro. The expected change accounts for the national growth and the industry mix. If positive, it means the job growth was higher than expected due to the region's competitive effect.
Turnover rate of employees	The total number of separations in tech jobs divided by the total number of tech jobs. A separation is when a worker's SSN is removed from a company's payroll. This demonstrates the amount of movement occurring in tech jobs.
INNOVATION	**DESCRIPTION**
Patents per 1,000 workers	The number of registered patents created in a metro area standardized by the number of workers in the metro.
Higher education R&D as % of GDP	The $ amount of research & development spending occurring at universities in the metro standardized by the GDP of the metro.
Business funded higher education R&D as a % of GDP	The $ amount of research & development spending occurring at universities that are funded by the private sector in the metro standardized by the GDP of the metro.
SBIR/STTR funding per $ of GDP	The total funding awarded to SBIR/STTR projects in the metro standardized by the GDP of the metro.
Business Dynamism Rate (Opening vs Closing Rate)	The percentage of businesses opening compared to the percentage of the businesses closing in the area. If positive, it means that there is good business churn in the area that contributes to innovation.
Business applications per 1,000 adults	The number of applications people submitted to start businesses in the metro standardized by the adult population of the metro.
Business R&D as a % of GDP	The $ amount of research & development that is funded by the private sector in the metro standardized by the private sector GDP of the metro. For some values there was no data available, in this case the state level was used.

TECH SKILLS LIST

2D Computer-Aided Drafting And Design
3D Touch
3M (Software)
3M Encoder
Accubid (Estimating Software)
ACORD Forms
ADDIE Instructional Design Model
Aderant (Software)
Adobe Business Catalyst
Adobe Spark
Adobe Substance
ADP PayForce
Ad Serving
Advent Geneva
Agile Product Development
Agile Project Management
Alexa Skills Kit
Allen-Bradley Equipment
Amag Symmetry
Amazon Comprehend
Amazon Data Pipeline
Amazon ElastiCache
Amazon Elastic Container Registry
Amazon Elastic Container Service
Amazon Elastic File System
Amazon Forecast
Amazon Lumberyard
Amazon Macie
Amazon Quantum Ledger Database
Amazon Textract
Amazon Translate
Amazon WorkSpaces
AMX Programming
Anaconda (Software)
Android Emulators
Android Middleware
Android Testing
Apache Administration
Apache Avro
Apache Felix
Apache Flume
Apache MADlib
Apache Samza
Apache Thrift
Apple Device Enrollment Program
Application Delivery Controller
Application Remediation
Application Security Testing
AppSense
Apptus
Apttus
Archivists' Toolkit
ARISg
ASC 606 (Revenue Recognition)
ASP.NET MVC 5
ATG Dynamo
ATLAS.ti (Qualitative Data Analysis Software)
Atlassian OpsGenie
Atmospheric Modeling
Attribution Modeling
Audio-Visual Technology
Augmented Reality (AR) Headsets
Automated Machine Learning
Automation Controls
Autonomous Underwater Vehicle
Autoregressive Integrated Moving Average (ARIMA)
Avaya (Telecommunications)
Avid Media Composer (Software)
AWS App Mesh
AWS Auto Scaling
AWS Certified Solutions Architect
AWS CloudHSM
AWS CodeCommit
AWS CodeDeploy
AWS Inferentia
AWS Internet Of Things (IoT)
AWS Key Management Service
AWS Kinesis
AWS SageMaker
Azure Active Directory
Azure Command-Line Interface
Azure Data Lake
Azure Logic Apps
Azure Security
Azure Service Fabric
Bentley LumenRT
Big Data Analytics
BirchStreet Software
Blaze Advisor
Bluecoat Proxies
Breeze.js (Javascript Library)
Build Management
Build vs Buy Analysis
Business Activity Monitoring
Business Intelligence Architecture
Business Rules Engines
BuzzSumo (Software)
C3.js (Javascript Library)
CA-7
Call Center Technology
Canva (Software)
Capital IQ (Software)
Cellular Phone Exploitation
Cerner EHR
Certified Information System Auditor (CISA)
Choice Modeling
Circuit Assembly
Cisco Certified Internetwork Expert (CCIE) Routing And Switching
Cisco Certified Internetwork Expert (CCIE) Wireless
Cisco Certified Network Associate (CCNA) Routing And Switching
Cisco Certified Network Professional (CCNP) Wireless
CISCO Certified Network Professional - Security
Cisco Meraki
Citrix Workspace
Clarabridge (Software)
Clarizen
Clinical Informatics
Clip Studio Paint
Cloud-Native Architecture
Cloud-Native Computing
Cloud-Native Computing Foundation (CNCF) Standards
Cloud Hosting
Cloud Management
Cloud Management Platforms
Cloud Security Applications
Cloud Security Infrastructure
Cloud Services
CNSSI 1253
Command And Data Handling
Commercial Off-the-Shelf
CommVault
CompTIA Cybersecurity Analyst
CompTIA IT Fundamentals (ITF+)
CompTIA Security+ CE
Computational Design
Computational Tools
Computer-To-Plate
Computer Upgrades
Conceptual Data Modeling
Construction Management Software
Content Filtering
Content Manager OnDemand
Control-M (Batch Scheduling Software)
ControlLogix
Conversational User Interface
Cordova Plugins
Corel AfterShot
Correlation Analysis
Corridor Analysis
Crazy Egg (Website Optimization Tool)
Credit Risk Modeling
Crestron (A/V Systems)
Crestron Certified Programmer
Crimeware
Cross-Industry Standard Process for Data Mining (CRISP-DM)
Custom Scripting
Cyber-Physical Systems
CyberArk
Cyber Defense
Cyber Governance
Cyber Hygiene
Cyber Incident Response
Cyber Operations
Cyber Safety
Cyber Security Management
Cyber Security Strategy
CyberX
Cypher Query Language
Data-Driven Testing
Database Activity Monitoring
Database Architecture
Database Conversion
Database Management
Database Modeling
Database Query Tools
Database Software

TECH SKILLS LIST CONTINUED

Database Upgrades
Data Encryption
Data Exploitation
Data Highway Plus
Data Interfaces
Data Lakes
Data Literacy
Data Management Platforms
DataStax Enterprise Graph
DCID 6/3
DeBabelizer
Deep Learning Methods
Defect Life Cycle
Defense In Depth
Dell Boomi (Integration Platform)
Dell EMC UniSphere
Design Portfolio
Design Software
Desktop Management
Desktop Underwriter
DevSecOps
Dialogflow (Google Service)
Dialog Programming
Digital Communications
Digital Content Management
Digital Design
Digital Experience Strategy
Digital File Management
Digital Rights Management
DISA Gold Disk
Docker Compose
DoD Information Technology Portfolio Repository (DITPR)
Dynamic Object-Oriented Requirements System (DOORS)
E-Kanban
E-Waste
EarlGrey (Software)
Economic Modeling
Eggplant Functional
Electronic Component Design
Elixir (Programming Language)
Email Service Providers
Embarcadero Software
Ember Data
EMC Avamar
EnCase Certified Examiner
Encoder Pro
Endianness
Endpoint Devices
Energy Policy Analysis
Enterprise Storage System
Epicor Prophet 21 (Distribution Software)
Equivio (eDiscovery Software)
ES6 Module Loader
Espresso (Android Testing Framework)
eTapestry (Fundraising Software)
Excel Services
Expense Forecasting
Facebook Advertising
FastAPI
Fastboot
Fastpath (Software)
Feature Learning
Figma (Design Software)
FileAid (Software)
File Naming
Finance Automation
Financial Aid Software
Firebase Analytics
Firebase Cloud Messaging (FCM)
Firebase Security
Firmware Development
Flask (Web Framework)
FlexSlider
Foglight (Database Software)
Forgerock
Free-To-Play Games
FullCalendar Premium
Full Stack Development
FundEZ
Gatsby.js (Javascript Library)
GE iFix
General Fund Enterprise Business Systems (GFEBS)
Geophysical Instruments
Geospatial Information Technology
Geospatial Mapping
getView
GIAC Web Application Defender
GigE Vision
GIS Certification
Gmail API
Go-to-Market Strategy
GoCAD
Google Ads Certification
Google Cloud Dataproc
Google Colaboratory
Google Display & Video 360
Google Fonts
Google Identity Toolkit
Google Keyword Planner
Google Pay
GoSystems (Tax Software)
GPS Data
GPU Optimization
Graphics APIs
Green Hills Integrity
GridView
Growth Hacking
Gulp.js (Javascript Library)
Gulp Sass (Software)
HackerOne
Hardware Asset Management
Hardware Troubleshooting
Haskell (Programming Language)
HCL AppScan
Healthcare Analytics
Health Management Information Systems
Heartbleed Bug
Heuristic Evaluation
High Availability Design
Honeywell Operating System
Hootsuite (Social Media Management Software)
Host Based Security System (HBSS)
Houdini (3D Animation Software)
HP 3Par
Hybrid Cloud Computing
Hyland OnBase
HyperLynx
HyperWorks (CAE Software)
IAM Level III Certification
IBM Guardium
IBM Informix
IBM Initiate
IBM Integration Designer
IBM Mobile
IBM Operational Decision Manager
IBM Servers
IBM Sterling B2B Integrator
IBM Worklight
IdentityServer4
Image Segmentation
iMessage Extension
Indegy
Industrial Control Software
Industry 4.0
Industry Analysis
Informatica
Informatica Data Validation Option
Information Systems Architecture
InMoment
Interactive 3D
Interactive Web Content
Interactive Web Pages
Internetwork Packet Exchange/ Sequenced Packet Exchange
Ionic 4 (Mobile App Framework)
IPSoft Amelia
IronPort
iSqFt (Bidding Software)
ITIL Foundation Certification
IT Security Documentation
Ivalua (Spend Management Software)
IxChariot (Traffic Generator)
Ixia BreakingPoint
IxLoad (Network Testing Tool)
IxVeriWave (Network Test Tool)
Jamf Certification
JD Edwards World
Jobvite
Julia (Programming Language)
Kendo UI Mobile
Kenshoo (Marketing Software)
Kochava
LabWare LIMS (Software)
LAN Administration
Laptop Troubleshooting
LibGuides
Life 70 (Software)
LINQ To Entities
Loss Functions
LS-DYNA (FEA Software)

TECH SKILLS LIST CONTINUED

Lumion (3D Rendering Software)
Mac/Apple Support
Machine Learning Methods
macOS Sierra
Mainframe Testing
Mapping Software
MarinOne (Software)
Marmoset Toolbag
MassLynx
Material-UI
McAfee Enterprise Security Manager
Mechanical Electrical Plumbing (MEP) Design Software
MeteorJS
Micrografx
Microprocessor Architecture
Microservices Development
Microsites
Microsoft 365
Microsoft Azure Certification
Microsoft Certified: Azure Fundamentals
Microsoft Delve
Microsoft Dynamics 365
Microsoft Enterprise Library
Microsoft Planner
Microsoft Simplygon
Microsoft Sysprep
Microsoft Test Manager
Mitel
MITRE ATT&CK Framework
mlpack (C++ Library)
Mobile Native Application Testing
MobX
MockK
Model-Based Design
Mod Rewrite
mod_perl
Muhimbi
Natural Language Generation
Navisworks (BIM Software)
NedGraphics (Textile Design Software)
NetIQ
Netskope
NetSuite Financials
Network Infrastructure
Network Migration
Network Science
NgRx (Framework)
NgRx Effects
NgRx Store
Nielsen NetRatings
Nielsen NetView
Nintex Workflow
Nokogiri (Software)
Non-Relational Data Stores
Novell Network
Nuxt.js (Javascript Library)
Nvidia Jetson
OCLC Connexion
Odoo 10
Office 365 Admin Center
Office 365 Administration
OmniGraffle
On-Screen Takeoff (Estimating Software)
Online Marketing
Onsen UI
OpenHire (Recruiting Software)
OPNET
Optitex (Fashion Design Software)
Oracle Accounts Payable
Oracle Audit Vault
Oracle Billing and Revenue Management (BRM)
Oracle Bronto
Oracle Configure-Price-Quote
Oracle Database Vault
Oracle Demantra
Oracle Development
Oracle Exalytics
Oracle Field Service
Oracle HRMS
Oracle Human Capital Management
Oracle Identity Analytics
Oracle Identity Manager
Oracle Javascript Extension Toolkit
Oracle Procurement
Oracle Retail
Oracle Service Contracts
Oracle SOA Suite
Oracle Waveset
OrmLite Servicestack
OSI Monarch
Outlook Add-Ins
Paint Tool SAI
Part-of-Speech Tagging
Pega Certified Lead System Architect
Pega Certified Senior System Architect
Pega Robotics Software
Pelco (Security System)
Peoplesoft Administration
Peoplesoft nVision
Performance Profiling
PHP Frameworks
PinkSoft FStorm
PMI Professional in Business Analysis
Pointclickcare
Poka-Yoke
Poll Everywhere (Polling Software)
Poppulo
Power Distribution Units
Power Electronics Design
Presagis Creator
Product Roadmap Management
Project Management Body Of Knowledge (PMBOK) Methodology
PVT Analysis
QAD Cloud ERP
Qualitative Data Analysis
QualysGuard
Quantitative Data Analysis
Quantum Mechanics
Radare2 (Reverse Engineering Software)
Redux-Saga
Reltio (Master Data Management Software)
Resilient Distributed Datasets (RDD) Programming
Ridge/LASSO Regressions
Robotic Process Automation
Robotic Systems
Rockwell FactoryTalk
RSA SecurID
Sales Automation Software
Salesforce Chatter
Samsung Gear VR
SAP Basis
SAP Business Workflow
SAP Information Steward
SAP IoT
SAS Business Intelligence (BI)
SAS Enterprise Miner
SciDB
Scratch Programming
SCSS Mixins
Searchable Encryption
Secure Application Development
SeeTest
Semantic Parsing
Semiconductors
Server Automation
Server Configuration
Serverless Security
Shell Commands
Shiny (R Package)
Shopify App
Siemens Invision
SIS AdvantX
Sizmek (Software)
SkyKick
Small-Unmanned Aerial Systems
Smart Buildings
Smart Meter Systems
Snap Lens Studio
SOA (Service-Oriented Architecture) Testing
Social Media APIs
Social Media Strategy
Social Media Trends
Soft Sensors
Software-Defined Data Center
Software Development Engineer in Test
Software Installation
Software Strategy
Solution Design
Sound Design
Spark Core
Spark View Engine
Spectre Circuit Simulator
Sponsored Posts
Sports Analytics
Spring Cloud
Spring Cloud Config
Spring Cloud Netflix
Spring MVC
Spring WebFlux
Sprint Backlogs
SpriteKit
Sprout Social
SQL Backup And Restore
StarVR
Storage Architecture
StreamSets
Stripe Connect
Supply Base Management
Supply Chain Cyber Security
Sybase (Software)
Symantec Altiris
Synopsys VCS
Synthesio
System Level Troubleshooting
System Recovery
System Security Analysis
Technology Sales
Technology Strategy Development
Test Datasets
TestStand
Thea Render
Thermal Desktop (Thermal Modeling Software)
ThreatConnect
TIBCO Adapters
TKProf
TrackWise
TransCAD
Travel Demand Modeling
Tricentis Tosca
Tridion Content Delivery
TriZetto Facets
TriZetto QNXT
Troux (Enterprise Architecture Software)
Udeploy
UI/UX Research
UICollectionView
UIScrollView
UITableView
UIViewController
Unified Endpoint Management
UNIGINE Engine
Universal Image Loader
Unreal Blueprint
User Acceptance Testing (UAT)
User Journey Mapping
UserZoom GO
UXPin
Vbrick (Software)
ViewModel
Virtualization Security
Virtual Reality
Vizor.Io
Vocus (Public Relations Software)
Voice User Interface
watchOS
WatiN
Watson Conversation
Watson IoT
Watson LIMS
WCF Security
Web Access Control
Web Audio API
WebCIS
WebMethods
Web Site Analysis
Web UI Design
WebVR
Web Writing
Wget
Windows Performance Analyzer
Windows Software
Wise Package Studio
Word Embedding
WordPress Admin
Workday Adaptive Planning
Worksoft Certify
WP Query
XLSTAT
Xsens
XtremIO (Network-Attached Storage System)
ZenHub
Zuken (Software)

TECH OCCUPATIONS LIST

CODE	DESCRIPTION
11-3021	Computer and Information Systems Managers
15-1211	Computer Systems Analysts
15-1212	Information Security Analysts
15-1221	Computer and Information Research Scientists
15-1231	Computer Network Support Specialists
15-1232	Computer User Support Specialists
15-1241	Computer Network Architects
15-1242	Database Administrators
15-1243	Database Architects
15-1244	Network and Computer Systems Administrators
15-1251	Computer Programmers
15-1252	Software Developers
15-1253	Software Quality Assurance Analysts and Testers
15-1254	Web Developers
15-1255	Web and Digital Interface Designers
15-1299	Computer Occupations, All Other
17-2061	Computer Hardware Engineers

2023 RESEARCH UNDERWRITERS

LEAD UNDERWRITERS

Charter COMMUNICATIONS

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RECRUITING *with* PURPOSE

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FirstCitizensBank

RAILINC

CONTRIBUTING UNDERWRITERS

DELL Technologies

Deutsche Bank

TECH INNOVATION INDEX
National Metro Comparison

NCTECH Association
NCTECH.ORG