



The Digest of Biotech Job Trends
in Massachusetts

2017

3-Month Job Trend Report

January – March 2017

About the 3-Month Report

MassBioEd produces a *3-Month Report* on biopharmaceutical job trends each quarter of the year. The report compares job listings for the most current three-month period with job listings for the same three-month period of the previous year to determine underlying trends in job listings.

About the MassBioEd Foundation

MassBioEd engages teachers, inspires students, and guides the life sciences workforce. Our BioTeach program supports Massachusetts teachers as they work to engage students through lab-centered, inquiry-based learning. Our Job Trends initiative identifies workforce needs and illuminates the pathway from the classroom to careers in the life sciences.

About The Digest of Biotech Jobs Trends in Massachusetts

The *3-Month Report* is a part of MassBioEd's ongoing Digest of Biotech Jobs Trends in Massachusetts, which also includes *Briefs*, a *Medical Device Snapshot*, and an annual *Job Trends Forecast*. The *Briefs* present basic data and analysis on particular aspects of biopharma industry job trends. The initial 2015 *Briefs* are focused upon entry level position job trends in the biopharmaceutical industry.

The objectives in publishing the *Briefs* is to provide basic information about job listings trends, skills required of candidates, prevalence of degree requirements for high trending occupations. The *Annual Job Trends Forecast* is intended to provide greater insight based on additional study in these areas.

Acknowledgements

The analysis found in the *3-Month Report* was conducted by Mark Bruso, Manager of Labor Market Research, under the direction of MassBioEd Foundation Executive Director, Peter Abair. Erica Dickinson, Product Support Manager at Burning Glass provided able assistance to the MassBioEd research team in effectively using data from Burning Glass Technologies. MassBio, the industry council serving the biopharmaceutical community of the Massachusetts region, provided support for this series and MassBioEd's ongoing job trends initiative.

For more MassBioEd job trends analysis, visit MassBioEd.org.

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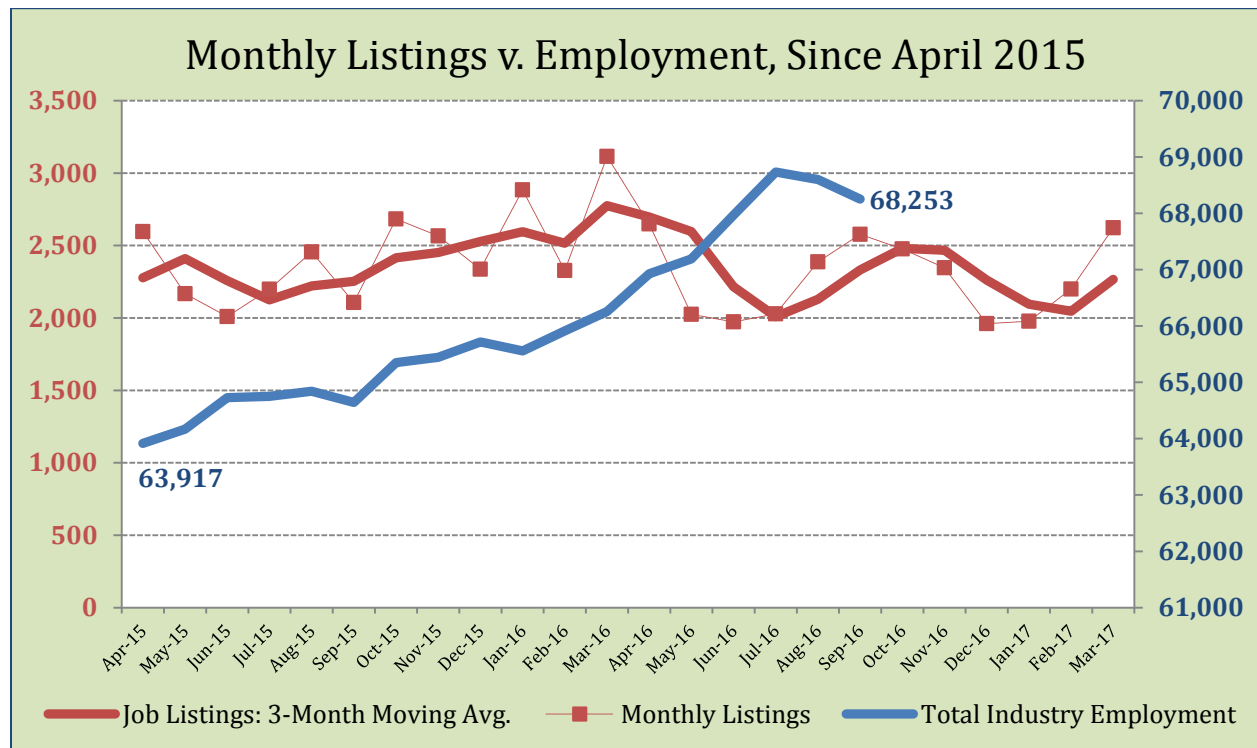
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Quarterly Highlights

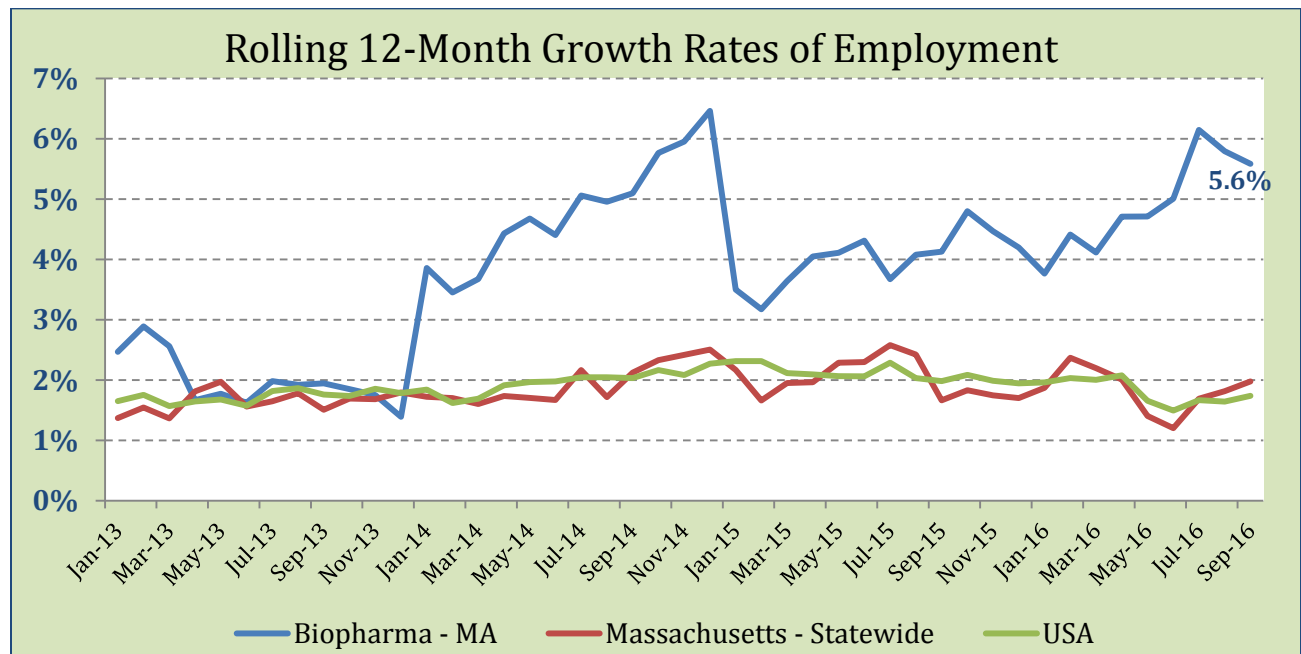
- Industry employment reached an all-time high of 68,733 in July 2016, the latest month for which data is available, before dropping by over 500 combined in the two succeeding months.
- Quarterly job listings decreased by 15.8% from the same quarter last year.
- Year-over-year job listings decreased by over 20% in the *Core* region of Cambridge-Boston, for the second straight quarter, falling by 24% in Q1 2017.
- Year-over-year job listings have increased in the North region for three consecutive quarters, the only region in the state to do so.
- March 2017 had the most job listings in any month since April 2016.

Overview

December 2016 through March 2017 witnessed an increased level of growth in job listings. However, job listings still lag behind their totals from the year prior, and seasonality may be at play – since 2012, Q1 has been the quarter with the highest rate of job listings compared to the baseline. The downtrend in job listings that began last spring may finally be rearing its head in employment totals. After reaching an apex in July 2016, the biopharma industry in Massachusetts shed over 500 employees from their payrolls in August and September combined.

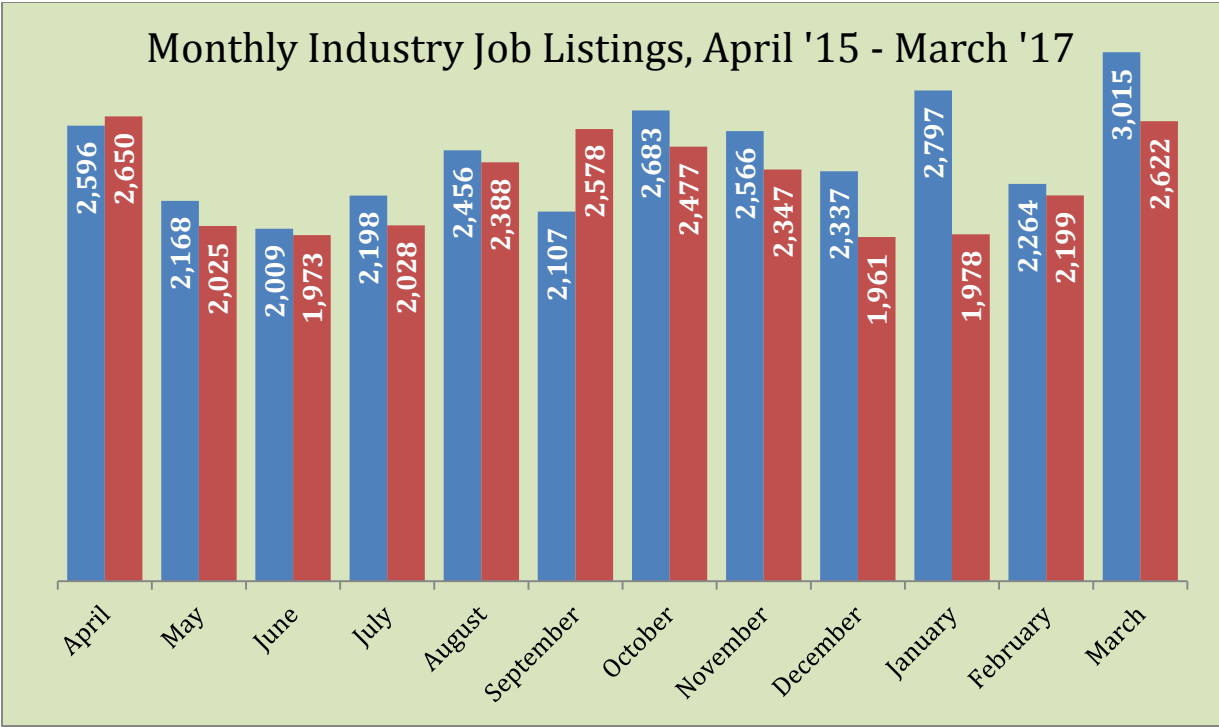


The red line on the preceding graph is a rolling three-month average of job listings, so as to smooth out any wild fluctuations in the month-to-month totals. A threshold of 2,500 for the rolling 3-month average of job listings has not been crossed since May 2016. Between December 2015 and June 2016, every month was well above that mark. A sustained recovery in job listings after a marked decline over the summer months remains elusive.



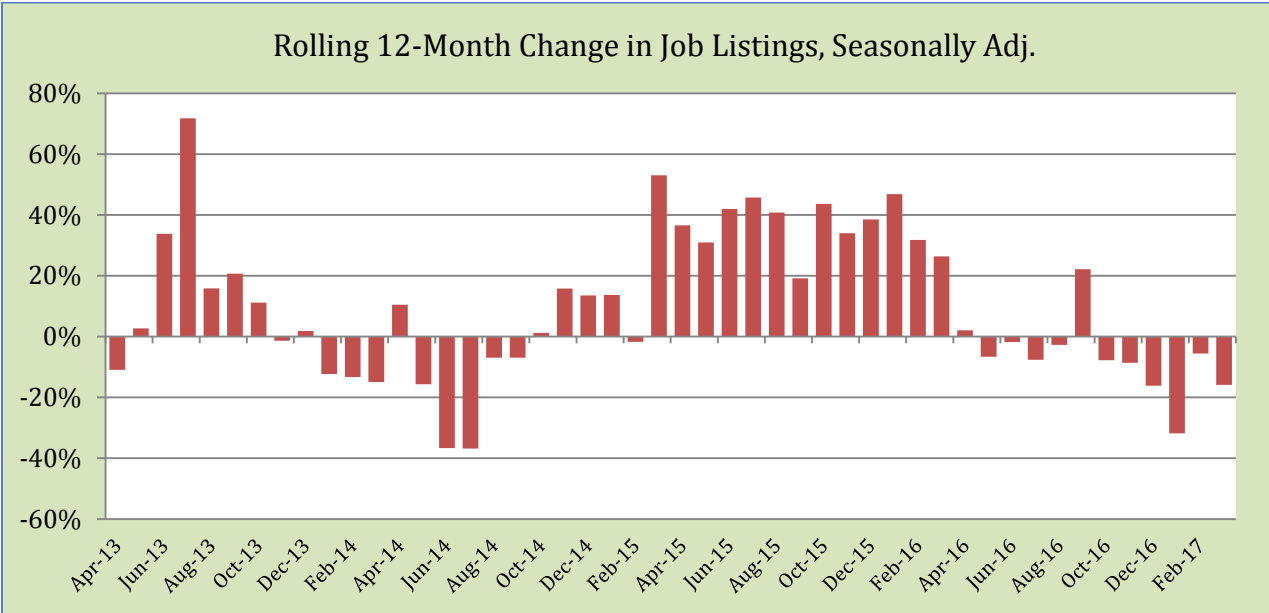
As with the raw employee totals, August and September witnessed a slowdown in growth, albeit in the year-over-year growth rate. A slowing of the pace of expansion from 6.1% in July to 5.6% in September – still impressive numbers when compared to the previous rates of growth both inside the biopharma industry and the economy writ large. The gulf between the pace of growth in biopharma compared to the US and Massachusetts economy remained large in Q3 2016, outpacing both by four percentage points in those three months.

While the industry remains on an upward trajectory, the steepness of its growth can rise or moderate fairly quickly due to a litany of exogenous factors emanating from financial markets, federal policy, and around the country. It remains to be seen if the drop in job listings over the course of the spring and summer of 2016 will continue to have a negative effect on industry employment totals.



In ten of the past eleven months, monthly job postings have been lower than the year prior, the only exception being this past September.

The ensuing graph includes the year-over-year change in the seasonally-adjusted monthly average of job listings since 2013. Growth has continued to flag in the past year, after an impressive run of expansion in job listings. Raw growth in job listings is much lower in the past year than it was in 2015.



Top 30 Job Listings by Occupation, January 1 – March 31, 2017

Q1 17 Rank	Q1 16 Rank	Rank +/-	Occupation	Q1 2016	Q1 2017	Change +/-	Pct. Change
1	1	--	Medical Scientist	672	625	-47	-7%
2	2	--	Researcher / Research Associate	306	299	-7	-2%
3	6	+3	Chemical / Process Engineer	178	235	+57	32%
4	3	-1	Administrative Manager	248	213	-35	-14%
5	4	-1	Chemist	217	189	-28	-13%
6	5	-1	Biologist	189	152	-37	-20%
7	9	+2	Healthcare Administrator	145	122	-23	-16%
8	10	+2	Quality Control Analyst	129	121	-8	-6%
9	11	+2	Business Development / Sales Manager	126	120	-6	-5%
10	12	+2	Office / Administrative Assistant	124	109	-15	-13%
11	18	+7	Program Manager	101	103	+2	2%
12	19	+7	Biostatistician	101	102	+1	1%
13	7	+6	Sales Representative	178	101	-77	-43%
14	13	-1	Project Manager	118	93	-25	-21%
15	14	-1	Medical Director	111	85	-26	-23%
16	8	-8	Marketing Manager	150	82	-68	-45%
17	15	-2	Compliance Manager	106	82	-24	-22%
18	16	-2	Clinical Research Coordinator / Manager	104	82	-22	-21%
19	25	+6	Software Developer / Engineer	77	79	+2	3%
20	114	+94	Operations Manager / Supervisor	10	76	+66	668%
21	17	-4	Laboratory Technician	102	74	-28	-27%
22	31	+9	Biological Technician	59	68	+9	15%
23	21	-2	Quality Control Systems Managers	85	66	-19	-23%
24	30	+6	Technical Writer	61	60	-1	-1%
25	42	+17	Natural Science Research Manager	39	59	+20	51%
26	26	--	Product Manager	76	58	-18	-23%
27	27	--	HR / Labor Relations Specialist	70	58	-12	-17%
28	29	+1	Laboratory Technologist	61	56	-5	-8%
29	20	-9	General Manager	92	56	-36	-40%
30	22	-8	Financial Manager	85	55	-30	-7%

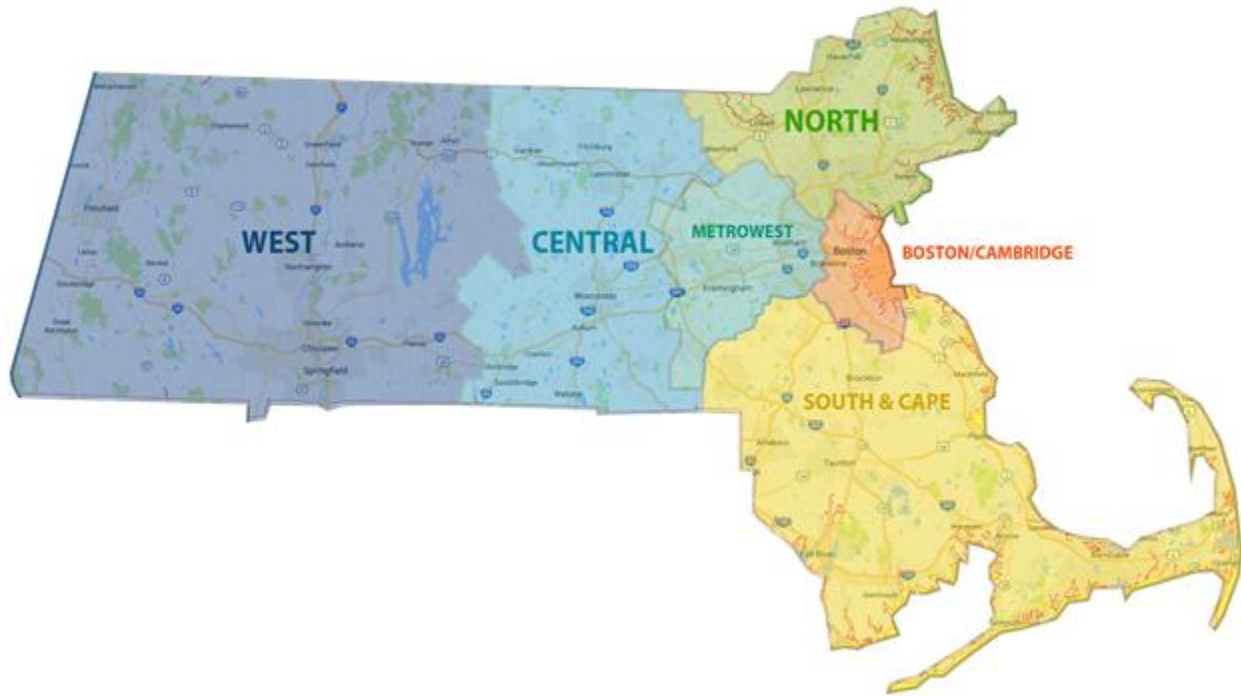
Methodology: For calculating occupational totals and monthly total of job postings MassBioEd used the following method – for non-STEM positions, the MassBio percentage for each NAICS code. For STEM positions – all postings within 3254, MassBio percentage used for 5417, and the Burning Glass Filter: Biotech for the remaining NAICS codes of 622, 6113, 6215, 3345, and 5413. All *Medical Scientist, Biochemist, Microbiologist, Biomedical Engineer, Biological Technician, Chemical Technician, and Quality Control Analyst* openings were counted, regardless of NAICS code.

Fastest Growing Occupations by Job Listings, Q1 2017 v. Q1 2016

Q1 17 Rank	Q1 16 Rank	Rank +/-	Occupation	Q1 2016	Q1 2017	Change +/-	Pct. Change
20	114	+94	Operations Manager / Supervisor	10	76	+66	+668%
69	122	+53	Logistician / Supply Chain Specialist	9	16	+8	+88%
84	126	+42	Manufacturing Machine Operator	8	13	+5	+66%
83	120	+37	Software QA Engineer / Tester	9	14	+5	+56%
47	79	+32	Computer Support Specialist	19	29	+10	+53%
56	100	+44	Office Manager	15	22	+8	+52%
25	42	+17	Natural Science Research Manager	39	59	+20	+51%
31	43	+12	Attorney	39	55	+17	+42%
33	45	+12	Customer Service Representative	38	52	+14	+37%
45	66	+21	Chemical Technician	23	31	+8	+35%
42	60	+18	Data / Data Mining Analyst	27	36	+9	+33%
48	72	+24	Bookkeeper / Accounting Clerk	22	29	+7	+32%
3	6	+3	Chemical / Process Engineer	178	235	+57	+32%
50	73	+23	College Professor / Instructor	21	27	+6	+29%
62	93	+31	Recruiter	16	20	+4	+28%
64	99	+35	PR / Communications Specialist	15	19	+4	+28%
72	105	+33	Data Scientist	13	16	+3	+23%
79	108	+29	Fundraising Manager	12	14	+2	+20%
82	107	+25	Health Technician / Technologist (Other)	12	14	+2	+17%
22	31	+9	Biological Technician	59	68	+9	+15%
68	101	+33	Sterile Processing Technician	14	16	+2	+14%
37	39	+2	Executive Assistant	43	45	+2	+6%
61	77	+16	Manufacturing / Production Technician	19	20	+1	+5%
19	25	+6	Software Developer / Engineer	77	79	+2	+3%
36	38	+2	Accountant	45	46	+1	+2%
76	98	+22	Market Research Analyst	15	15	--	+2%
11	18	+7	Program Manager	101	103	+2	+2%
12	19	+7	Biostatistician	101	102	+1	+1%
78	102	+24	Contract Administrator	14	14	--	--
55	67	+12	Biochemist	23	23	--	--

Methodology: For calculating occupational totals and monthly total of job postings MassBioEd used the following method – for non-STEM positions, the MassBio percentage for each NAICS code. For STEM positions – all postings within 3254, MassBio percentage used for 5417, and the Burning Glass Filter: Biotech for the remaining NAICS codes of 622, 6113, 6215, 3345, and 5413. Only occupations with at least 15 listings in Q4 2016 were included. All *Medical Scientist, Biochemist, Microbiologist, Biomedical Engineer, Biological Technician, Chemical Technician, and Quality Control Analyst* openings were counted, regardless of NAICS code.

Regional Breakdown



For the second consecutive quarter, job listings in the Boston/Cambridge region experienced a

Region	Q1 '16	Share	Q1 '17	Share	% Chg.
West	99	1%	78	1%	-21%
Central	480	6%	461	7%	-4%
Metrowest	1,294	17%	1,383	21%	+7%
North	682	9%	743	11%	+9%
Boston/Cambridge	4,896	63%	3,718	56%	-24%
South & Cape	277	4%	254	4%	-8%

large decline. In Q4, the year-over-year decline in job listings in the region was 905; this past quarter it was 1,178. The exodus continues the year-long trend from 2016.

Region	April '15 – March '16	April '16 – March '17	Pct. Chg.
West	1.5%	1.2%	-17%
Central	5.7%	6.5%	+14%
Metrowest	18.7%	20.1%	+8%
North	8.9%	12.1%	+36%
Core	62.1%	56.9%	-8%
South/Cape	3.0%	3.6%	+20%

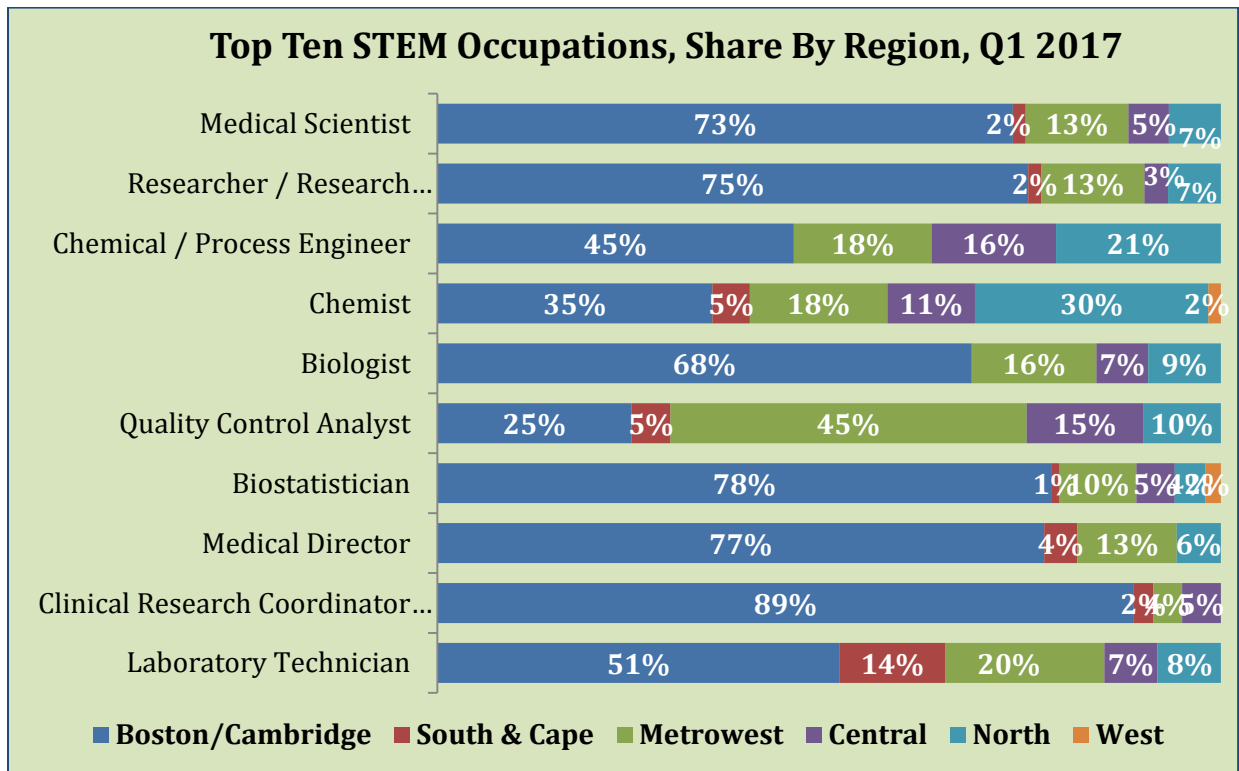
As job listings picked up by Burning Glass' Labor Insight tool may vary month-to-month or quarter-to-quarter, it may be more fruitful to look at the share of total biopharma job listings each region makes up, in order to discern any underlying trends.

For the past two years, the only discernable shift in the locale of job listings is a slight shift away from the Boston/Cambridge *Core*, where its share of all job listings dropped to 57% in the past 12 months from 62% in the preceding 12 months (April 2015 – March 2016). The *North* region saw the most sustained gains in job listings over the same time period, as it rose from 9% of total openings to 12% this past year – a 36% increase compared to the previous 12 months.

Below are the **top ten employers**, by job listings, in Q1 '17

Boston/Cambridge		Listings	Metrowest		Listings
Takeda Pharmaceuticals		298	Sanofi Genzyme		141
Biogen		269	Shire		105
Massachusetts General Hospital		248	Sunovion		61
Novartis		221	Biogen		48
Sanofi Genzyme		217	Amag Pharmaceuticals		47
Pfizer		174	Quest Diagnostics		44
Amgen		116	Lincoln Laboratory		42
Dana Farber Cancer Institute		116	Astrazeneca		39
Merck & Company		95	Alkermes		38
Harvard University		90	Life Technologies		36
Northeast		Listings	South & Cape		Listings
Pfizer		194	Merck & Company		43
Merck & Company		128	Life Technologies		15
Life Technologies		29	Cape Cod Healthcare		10
Parexel		24	Collegium Pharmaceutical		9
Millipore Sigma		14	Cardinal Health		8
Bruker Company		10	Sanofi Genzyme		8
Danaher Corporation		10	Upsher Smith Laboratories		6
Cutis Pharma		9	Quest Diagnostics		6
Emd Serono		7	Corbus Pharmaceuticals		5
Cell Signaling		7	Southcoast Health System		5
Central		Listings	West		Listings
Pfizer		94	UMass Amherst		13
Bristol-Myers Squibb		89	Baystate Health		11
Sanofi Genzyme		49	Smith College		5
UMass Medical School		42	Pfizer		3
AbbVie		37	Takeda Pharmaceuticals		3
Laboratory Corporation of America		20	Providence Health & Services		3
Danaher Corporation		17	Cooley Dickinson Health Care		2
IDEXX Laboratories, Inc.		9	Williams College		2
Karl Storz		7	Bayer Corporation		2
Charles River Labs		5	Boehringer Ingelheim		2

The number of jobs that an organization will post will rise and fall according to that organization's business plan. A high number of listings in one quarter or year and a small number of listings by the same organization in another quarter or year may reflect a number of different factors, including that the organization met its hiring goals in keeping with its business plan in one quarter and as a result has fewer listings in a subsequent quarter. A rise or fall in the number of job listings in one quarter should not be used as a barometer of an organization's health. We provide these listings for the more basic purpose of showing which companies influenced talent supply and demand in hiring in one particular quarter.



Skills & Competencies

Continuing an analysis we introduced in past quarterly reports, we attempt to examine which core competencies are trending upwards or downwards in recent months. We have compiled the top specialized skills for job listings

STEM Listings, Min. Degree Level - Q1 '17	Postings	Share
Associate & Under	439	10%
Bachelor's Degree	2,734	62%
Master's Degree	448	10%
Ph.D.	1,248	18%

across the state at four levels of minimum educational attainment – Ph.D., Master's, Bachelor's, and Associate & Under. To narrow our scope, we only looked at biotech-related positions, so as to exclude supporting occupations (e.g. Administrative and Financial) from the aggregate totals (see above). These are the occupational categories which are growing the fastest. In doing so, it gives us insight into the skills demanded of new hires in positions essential to the continued expansion and success of the industry here in Massachusetts.

We compared the data collected from Q1 '17 to the 12 months immediately preceding it, or full year 2016, thus establishing a baseline to which we measure the growth or decline in skills. The first series of tables describes the fastest growing skills at each educational level, by percentage point increase in Q1 2017.

At all levels of education, employers in Q1 2017 increased their demand for knowledge of many software programs and other data-adjacent skills, namely programming languages and some statistical software packages. Knowledge of production-related techniques such as Six Sigma and use of SAP also saw increases.

Decreases in demand for skills, techniques, and knowledge bases varied much, depending on the level of educational attainment required. Associate degree candidates for technician roles saw a decrease in requests for *buffer prep*, *aseptic technique*, and *cell culturing*. Higher level jobs saw a wide array of decreases in demand for skills this past quarter.

The tables on the following page rank every skill by its **percentage point change** in Q1 2017 versus full year 2016. Also included, for perspective, is the percentage of all listings the skills appeared in in Q1 '17, as well as the growth in demand in comparison to the baseline period of full year 2016.

Growth & Decline, Q1 2017 vs FY2016, by Degree Level

Skills – Assoc.	Share	Ppt Inc	% Chg	Skills – Assoc.	Share	Ppt Inc	% Chg
SAP	10%	+3.3	+51%	GMP	15%	-6.4	-30%
Oracle	2%	+2.2	+1251%	Aseptic	3%	-3.9	-56%
Validation	12%	+2.1	+21%	Bioreactors	5%	-2.7	-33%
Assay Development	3%	+1.7	+129%	Specimen Collection	1%	-2.6	-79%
Animal Models	2%	+1.6	--	Cell Culturing	10%	-2.6	-20%
Lean Manufacturing	2%	+1.6	+2736%	Buffer Preparation	4%	-1.4	-25%
Manufacturing Resource Planning	1%	+1.2	--	Centrifugation	4%	-1.4	-25%
Tissue Collection	1%	+1.2	--	Technical Writing / Editing	2%	-1.4	-38%
Western Blot	3%	+1.1	+55%	Calibration	7%	-1.4	-17%
Data Analysis	4%	+1.0	+30%	Sample Preparation	3%	-1.2	-31%
Skills- B.A.	Share	Ppt Inc	% Chg	Skills- B.A.	Share	Ppt Inc	% Chg
Validation	17%	+2.6	+18%	GMP	10%	-2.2	-18%
SAP	5%	+2.3	+99%	Aseptic	2%	-1.5	-44%
Data Analysis	12%	+1.5	+15%	HPLC	5%	-1.4	-23%
SQL	3%	+1.0	+47%	Cell Culturing	9%	-0.8	-8%
UNIX	1%	+1.0	--	Mass Spectrometry	2%	-0.7	-29%
C++	1%	+1.0	--	Process Validation	2%	-0.7	-30%
Regulatory Affairs	5%	+0.9	+19%	Technical Writing / Editing	4%	-0.6	-13%
Six Sigma	2%	+0.7	+51%	Labeling	3%	-0.5	-16%
Protein Characterization	1%	+0.7	+374%	Electrophoresis	3%	-0.4	-15%
FACS	1%	+0.7	+184%	LINUX	1%	-0.4	-34%
Skills - Grad	Share	Ppt Inc	% Chg	Skills - Grad	Share	Ppt Inc	% Chg
Data Integration	2%	+1.7	--	Cell Culturing	6%	-1.6	-20%
STATA	1%	+1.4	--	Calibration	0%	-1.4	-84%
Scientific Writing	1%	+1.4	--	HPLC	5%	-0.9	-15%
Regulatory Affairs	6%	+1.4	+27%	Process Validation	2%	-0.8	-33%
Gel Electrophoresis	2%	+1.3	+457%	Assay Development	5%	-0.7	-11%
Six Sigma	1%	+1.2	--	Sample Preparation	2%	-0.7	-26%
Relational Databases	1%	+1.1	--	Experimental Design	5%	-0.6	-10%
Database Design	1%	+1.1	--	FACS	2%	-0.6	-25%
SAS	7%	+1.1	+19%	MATLAB	3%	-0.5	-17%
GMP	7%	+1.0	+17%	Technical Writing / Editing	3%	-0.4	-10%

Top Entry Level Occupations by Educational Requirements

Occupations with Most Entry Level Listings, Q1 2017	Entry Level Listings	Assoc. Min.	Bach. Min.	Master's Min.	PhD Min.
Medical Scientist	171	0%	73%	10%	17%
Researcher / Research Associate	114	17%	68%	3%	12%
Chemist	59	0%	81%	5%	14%
Chemical / Process Engineer	43	0%	60%	10%	31%
Laboratory Technician	40	55%	45%	0%	0%
Biologist	35	0%	72%	9%	19%
Quality Control Analyst	33	9%	84%	6%	0%
Biological Technician	31	3%	97%	0%	0%
Biostatistician	27	0%	60%	24%	16%
Clinical Research Coordinator / Manager	25	0%	100%	0%	0%
Sales Representative ⁱ	20	0%	100%	0%	0%
Manufacturing / Production Technician ⁱⁱ	18	94%	6%	0%	0%
Natural Science Research Manager	16	0%	93%	7%	0%
Laboratory Technologist	16	20%	80%	0%	0%
Chemical Technician	12	8%	75%	17%	0%
Program Manager	11	0%	50%	50%	0%
Quality Inspector / Technician	10	40%	50%	0%	10%
Software Developer / Engineer	10	0%	70%	30%	0%
Data / Data Mining Analyst	9	0%	78%	22%	0%
Database Administrator	9	0%	100%	0%	0%

The industrywide share of openings categorized as “entry level,” or listings requiring less than two years’ experience required, consistently hovers around 23% of all job listings. The occupations in the table above were by and large available to those who have attained at least a four-year degree, with a few notable exceptions (*Laboratory Technician, Quality Technician, and Manufacturing/Production Technician*).

The total amount of entry level listings for top occupations is roughly in-line with prior quarters, indicating that there is no fundamental shift occurring in the experience preferences of companies for these key positions. As was the case in past reports, the top of this list consists mainly of research or technician roles that require a four-year degree in a science/biotech-related field.

Top Companies by Job Listings

Firms – Q1 2016	Listings	Firms – Q1 2017	Listings
Sanofi Genzyme	1,012	Pfizer	459
Biogen	717	Takeda Pharmaceuticals	419
Vertex	693	Sanofi Genzyme	411
Takeda	359	Biogen	317
Pfizer	334	Merck & Company	287
Novartis	314	Novartis	226
Merck & Company	152	Amgen	118
Alnylam	133	Life Technologies	94
Quest Diagnostics	113	Bristol-Myers Squibb	89
Amgen	104	Ironwood Pharmaceuticals	81
Bristol-Myers Squibb	74	Shire	74
Cardinal Health	74	Sunovion	61
Astrazeneca	48	Agios Pharmaceuticals	60
Danaher Corporation	39	Quest Diagnostics	60
Thermo Fisher	31	AbbVie	50
AbbVie	27	Amag Pharmaceuticals	47
Charles River Labs	25	Danaher Corporation	43
Medtronic	25	Astrazeneca	42
Quintiles	23	Alkermes	38
Ariad	21	Cardinal Health	38

Non-Profits, Universities, and Hospitals – Q1 2016	Listings	Non-Profits, Universities, and Hospitals – Q1 2017	Listings
Massachusetts General Hospital	265	Massachusetts General Hospital	259
Boston Children's Hospital	94	Dana Farber Cancer Institute	100
Boston University	59	Harvard University	90
Harvard University	59	Boston University	63
UMass Medical School	56	UMass Medical School	51

Join our Skills Advisory Group! MassBioEd depends on input from industry experts in our Skills Advisory Group to interpret workforce data and provide guidance on skills needed for jobs in the industry.

For more information on the Skills Advisory Group and its role, please contact Mark Bruso at mark.bruso@massbio.org or **617.674.5131**.

Appendix

MassBioEd utilizes Burning Glass Labor Insight for the bulk of its real-time online job listing data. Per the description on Burning Glass' website, their Labor Insight software, "collects millions of online job postings [everyday] from close to 40,000 sources and applies [their] patented technology to mine and code detailed data from each posting describing the specific skills, education, experience, and work activities required for the job – going well beyond the occupation and industry codes offered in other sources."

All job listings data is sourced from Burning Glass Labor Insight, unless otherwise noted.

Employment numbers were derived from the Department of Labor, Bureau of Labor Statistics' *Quarterly Census of Employment and Wages (QCEW)*, a survey of employers that covers 98 percent of all workers in the country.

Staffing patterns, or the count of individual occupations by industry in the state, were found by using Department of Labor, Bureau of Labor Statistics' *Occupation Employment Statistics (OES) Research Estimates*. These are derived from sample surveys and thus are approximations subject to sampling error, as well as non-sampling errors by respondents filling out the surveys.

ⁱ Contains both of the following Burning Glass Occupations: *Sales Representative & Medical/Pharmaceutical Sales Representatives*

ⁱⁱ Contains both of the following Burning Glass Occupations: *Manufacturing/Production Technicians & Production Workers*