

Supplemental Material

CBE—Life Sciences Education

Thompson *et al.*

MABRC Network – Employer Survey

BioHealth Capital Region Employer Partnership Survey

Thank you for taking the time to complete this survey. The survey should take no more than 10 to 15 minutes to complete. Your participation is critical to helping ensure that an adequate pipeline of well-trained individuals exists for the BioHealth Capital Regions workforce. Should you have any questions, please contact Dr. David Rivers, Loyola University Maryland, Department of Biology at (410) 617-2057, or drivers@loyola.edu, or Dr. Michael Tangrea, Director of Clinical Research, Sinai Hospital in Baltimore at (410) 601-5643, or mtangrea@lifebridgehealth.org.

1. Which of the following best describes your company's focus? Check all that apply.

Biotechnology
Biopharmaceutical
Diagnostics
Devices
IT
Service
Other...

2. How many people does your company employ in Maryland?

5 or fewer
6-25
26-100
101-500
501-1000
More than 1000

3. How many people does your company plan to hire for full-time positions during the next 12 months (this includes new and replacement hires)?

0
1-10
11-25
26-100
More than 100

4. For which positions do you expect to hire for full-time positions during the next 12 months (this includes existing and new positions)? Check all that apply.

Entry-level
Interns
Professional scientific staff
Other professional staff
Administrative support
Other...

5. In which areas will these new entry-level positions report? Check all that apply.

Manufacturing
Research and Development
Clinical Development
QA/QC
Other...

6. What educational levels do your employees have when hired? Check all that apply.

High School Diploma/GED
Certificate
Associate of Arts or Sciences
Bachelor of Arts or Sciences
Masters of Arts or Sciences
Masters of Business Administration
Doctorate (Ph.D. or M.D.)

7. What is the typical average starting salary for full-time, entry-level positions with bachelor's degrees at your company?

Under \$30,000
\$31,000-40,000
\$41,000-50,000
\$51,000-60,000
\$61,000-70,000
More than \$70,000

8. If you were to hire someone for a full-time position (existing or new position), what discipline background would be most important for your company? Check all that apply.

Agriculture
Biochemistry
Bioinformatics
Biology
Bioengineering
Cellular and Molecular Biology
Chemistry
Clinical Chemistry
Environment
Genetics
Microbiology
Statistics
Virology
Other...

9. If you were to hire someone for a full-time position (existing or new position), what technical skills would be most important for your company? Check all that apply

Recombinant DNA technology
Nucleic Acid Isolation
Gel electrophoresis
Aseptic technique
Cell/Tissue culture
Chromatography
PCR
Protein purification
Lipid analysis
Immunoassays
Basic animal care/handling
Basic microscopy
Advanced microscopy (e.g. confocal, immunofluorescence, electron)
General chemistry (e.g. solution making, titrations)
Statistical analysis
General laboratory skills
Error handling
Literature familiarity
Lab notebook keeping/documentation
Computer literacy
Next-Generation Sequencing
Mass Spectrometry
Other...

10. If you were to hire someone for a full-time position (existing or new position), which of the following are the THREE most important soft skills for your company? (Please select only three.)

Work Independently
Team skills
Effective communication skills
Integrity/Honesty
Work ethic
Dependability
Maturity
Desire to learn
Understanding of business environment/goals
Motivation
Other...

11. What is the biggest deficiency in APPLICANTS for a full-time position (existing or new position) at your company? Check all that apply.

Discipline background

Technical skills

Soft skills

Commercial experience

12. What is the biggest deficiency in NEW HIRES for a full-time position (existing or new position) at your company? Check all that apply.

Discipline background

Technical skills

Soft skills

Commercial experience

13. Which is of greater concern to your company, hiring qualified applicants or retaining trained employees?

Hiring

Retention

14. Would it be advantageous for your company to form partnerships with colleges and universities in order to develop a pipeline of future employees?

Yes

No

If "Yes" to 14. When considering educational partnerships, which types of degree programs would be useful for your company? Check all that apply.

High School Diploma/GED

Certificate

Associate's degree

Bachelor's degree

Masters degree

Ph.D. or M.D.

15. Do you make hiring decisions for your company?

Yes

No

Further Involvement with the Network

Thank you for taking the time to complete this survey. Your responses will be kept confidential. However, we will use a summary of collective anonymous responses to help us to develop undergraduate life science curricula that best prepare graduates for your organization.

Please let us know if you would like to be involved in the Mid-Atlantic Biology Research and Career Network, an NSF funded, collaborative, volunteer network.

Would you like to be further involved with the MABRC network?

Yes

No

If “Yes” to 15. We are excited to partner with you!

16. In what way(s) would you or someone in your company like to be involved with the Mid-Atlantic Biology Research and Career Network? Select all that apply.

I am willing to participate in future surveys or to be contacted to provide further information related to the BioHealth Capital Region workforce development.

I would like to join the Mid-Atlantic Biology Research and Career Network.

I am interested in learning more about forming university partnerships with my company.

I would like access to the database (all information will be anonymous).

I would like to be added to your mailing list.

I do not wish to be further involved in the MABRC network.

If “Yes” to 15. If you indicated that you would like to partner with the MABRC Network, please provide the following information. (Optional)

Your name or preferred company contact person

Your current position

Title of your company

Email address

Phone number

If “Yes” to 15. How would you prefer to be contacted?

Email

Phone

MABRC Curricular Survey

The Mid-Atlantic Biology Research and Career Network (MABRC)
BioHealth Capital Region University Partnership Survey

Thank you for taking the time to complete this survey. The survey is only 20 questions, which we hope should take no more than 10 to 15 minutes to complete. Your participation is critical to helping insure that an adequate pipeline of well-trained individuals exists for the BioHealth Capital Regions workforce. Should you have any questions, please contact Dr. David Rivers, Loyola University Maryland, Department of Biology at (410) 617-2057, or drivers@loyola.edu, or Dr. Michael Tangrea, Director of Clinical Research, Sinai Hospital in Baltimore at (410) 601-5643, or mtangrea@lifebridgehealth.org.

Student Research

Approximately how many of your majors participate in research each year?

- 0-5
- 6-15
- 16-30
- 31-50
- More than 50

Approximately how many of your majors participate in research off-campus each year?

- 0-5
- 6-15
- 16-30
- 31-50
- More than 50

Graduates and Careers

Approximately how many students graduate from your program each academic year?

- 0-10
- 11-25
- 26-50
- 51-100
- More than 100

Approximately how many of your graduates pursue a career associated with bioscience industries?

- 0-5
- 6-15
- 16-30
- 31-50
- More than 50

BioHealth Capital Region

(Maryland, Washington, D.C., and northern Virginia)

Approximately how many of your graduates pursue a career associated with the bioscience industries located within the BioHealth Capital Region (Maryland, Washington, D.C., and northern Virginia)?

0-5

6-15

16-30

31-50

More than 50

How many bioscience companies do you think exist within the BioHealth Capital Region?

0-100

101-250

251-500

501-1000

More than 1000

Approximately how many of your graduates pursue a career with a government agency located within the BioHealth Capital Region?

0-5

6-15

16-30

31-50

More than 50

Approximately how many of your graduates pursue a career in healthcare (e.g., medicine, allied health, health services) located within the BioHealth Capital Region?

0-5

6-15

16-30

31-50

More than 50

Curriculum

Which technical skills does your curriculum emphasize in *all* graduates? Check all that apply.

Recombinant DNA technology

Nucleic acid isolation

Gel electrophoresis

Aseptic technique

Cell/tissue culture

Chromatography

PCR

Protein purification

Lipid analysis

Immunoassays
Basic animal care/handling
Basic microscopy
Advanced microscopy (e.g. confocal, immunofluorescence, electron)
General chemistry (e.g. solution making, titrations)
Statistical analysis
General laboratory
Error handling
Literature familiarity
Lab notebook keeping/documentation
Computer literacy
Next-Generation Sequencing
Mass Spectrometry
Other...

What technical skills do your graduates *lack* that you believe they should have for a career in research and/or a bioscience workplace? Check all that apply.

Recombinant DNA technology
Nucleic acid isolation
Gel electrophoresis
Aseptic technique
Cell/tissue culture
Chromatography
PCR
Protein purification
Lipid analysis
Immunoassays
Basic animal care/handling
Basic microscopy
Advanced microscopy (e.g. confocal, immunofluorescence, electron)
General chemistry (e.g. solution making, titrations)
Statistical analysis
General laboratory
Error handling
Literature familiarity
Lab notebook keeping/documentation
Computer literacy
Next-Generation Sequencing
Mass Spectrometry
Basic math/computation
Other...

Which soft skills does your curriculum emphasize in *all* graduates? Check all that apply.

Independent work

Team skills

Effective communication skills

Integrity/honesty

Work ethic

Dependability

Maturity

Desire to learn

Understanding of business environment/goals

Motivation

Other...

What soft skills do your graduates *lack* that you believe they should have for a career in research and/or a bioscience workplace? Check all that apply.

Independent work

Team skills

Effective communication skills

Integrity/honesty

Work ethic

Dependability

Maturity

Desire to learn

Understanding of business environment/goals

Motivation

Other...

Does your department offer a course in entrepreneurship?

Yes

No

Is an entrepreneurship course available to your students outside of the department?

Yes

No

How does your department assess its curriculum? Check all that apply.

Self-study

Major Fields Testing (e.g., ETS, ACT or similar)

Institutional Review

External Review

No formal review

Other...

Departmental Partnerships and Agreements

Which of the following statements accurately describe your department's connections with industry partners. Check all that apply.

Our department currently has industry partnerships for training students.

More of our students would pursue careers in bioscience if our department formed industry partnerships.

Our department would be interested in forming partnerships with industry.

Our department previously had partnerships with industry, but now no longer does.

Our department is not interested in forming partnerships with industry.

Which of the following statements accurately describe your department's articulation agreements with other academic institutions. Check all that apply.

Our department has one or more articulation agreements with other institutions for graduate training related to the bioscience workplace.

More of our students would pursue careers in bioscience industries if our department entered into articulation agreements with institutions offering training in biotechnology or related areas.

Our department would be interested in forming articulation agreements with institutions offering training in biotechnology or related areas.

Our department previously had articulation with agreements with other institutions, but now no longer does.

Our department is not interested in forming articulation agreements with other institutions offering training in biotechnology or related areas.

Career Preparation

How well-prepared do you feel the majority of your graduates are for jobs (e.g., in industry, private sector or government) in the biological sciences?

highly prepared

prepared

not sure

under prepared

poorly prepared

How knowledgeable is your Career Center about jobs (e.g., in industry, private sector or government) in the biological sciences?

very knowledgeable

knowledgeable

not sure

under informed

highly uninformed

How helpful is your Career Center in preparing your graduates for jobs (e.g., in industry, private sector or government) in the biological sciences?

very helpful

helpful

not sure

poor
very poor

MABRC Career Center Survey

The Mid-Atlantic Biology Research and Career Network (MABRC)

BioHealth Capital Region University Partnership Survey

Thank you for taking the time to complete this survey. The survey should take no more than 10 minutes to complete. Your participation is critical to helping ensure that an adequate pipeline of well-trained individuals exists for the BioHealth Capital Regions workforce. Should you have any questions, please contact Dr. David Rivers, Loyola University Maryland, Department of Biology at (410) 617-2057, or drivers@loyola.edu, or Dr. Michael Tangrea, Director of Clinical Research, Sinai Hospital in Baltimore at (410) 601-5643, or mtangrea@lifebridgehealth.org.

Soft Skill Development and Business Acumen

Which soft skills does your university emphasize in *all* graduates? Check all that apply.

Independent work

Team skills

Effective communication skills

Integrity/honesty

Work ethic

Dependability

Maturity

Desire to learn

Understanding of business environment/goals

Motivation

Other...

Upon graduation, what soft skills do your typical biology/chemistry students still *lack* that you believe they should have for a career in research and/or a bioscience workplace? Check all that apply.

Independent work

Team skills

Effective communication skills

Integrity/honesty

Work ethic

Dependability

Maturity

Desire to learn

Understanding of business environment/goals

Motivation

Other...

What business acumen and cultural skills do you think your typical biology/chemistry student still *lacks* upon graduation? Select all that apply.

Project Management

Return on Investment

Continuous improvement

Simplification

Cultural sensitivity

Positive attitude and resilience

Flexibility and adaptability

Decision making in the face of ambiguity and uncertainty

Ability to build trust quickly

Risk-based decision making

Respect and understanding of a hierarchy

Career Preparation and your Career Center

How well-prepared do you feel the majority of your biology/chemistry graduates are for jobs in the biological sciences? (e.g., in industry, private sector or government)

highly prepared

prepared

not sure

under prepared

poorly prepared

Approximately how many people do you think are in the average biology/chemistry student's professional network upon graduation?

None

Less than 10

11-25

26-50

More than 50

Approximately what percentage of biology/chemistry students come to your Career Center for help at least once?

Less than 10%

11-25%

26-50%

More than 50%

Approximately what percentage of biology/chemistry students come to your Career Center for help at least once *per year*?

Less than 10%

11-25%

26-50%

More than 50%

Of the biology/chemistry students who come to your Career Center, approximately what percentage are seeking help in finding a job (in contrast to seeking help preparing for professional school)?

Less than 10%

11-25%

26-50%

More than 50%

How knowledgeable do you feel your Career Center is about jobs in the biological sciences? (e.g., in industry, private sector or government)

very knowledgeable

knowledgeable

not sure

under informed

highly uninformed

How helpful is your Career Center in preparing your graduates for jobs (e.g., in industry, private sector or government) in the biological sciences?

very helpful

helpful

not sure

poor

very poor

Careers in the BioHealth Capital Region

(Maryland, Washington, D.C., and northern Virginia)

Approximately what percentage of your graduates pursue a career associated with bioscience industries (e.g. Biology, Chemistry, Medicine, Food Science, etc.)? This does not include attending graduate or professional school- only direct entry in to the workforce.

Less than 10%

11-25%

26-50%

More than 50%

Approximately what percentage of your graduates pursue a career associated with the bioscience industries located within the BioHealth Capital Region (Maryland, Washington, D.C., and northern Virginia)? Please answer based on careers only, not graduate/professional school.

Less than 10%

11-25%

26-50%

More than 50%

Approximately what percentage of your graduates pursue a career with a government agency located within the BioHealth Capital Region of Maryland, Washington, D.C., and northern Virginia?

Less than 10%

11-25%

26-50%

More than 50%

Approximately what percentage of your graduates pursue a career in healthcare (e.g., medicine, allied health, health services) located within the BioHealth Capital Region of Maryland, Washington, D.C., and northern Virginia?

Less than 10%

11-25%

26-50%

More than 50%

Of the following education levels, which do you think has the most job prospects in the BioHealth Capital Region of Maryland, Washington, D.C., and northern Virginia?

High School diploma/G.E.D.

Associate's Degree

Bachelor's Degree

Master's Degree

Ph.D./M.D./D.V.M or other doctoral degree

What do you think is the typical average starting salary for full-time, entry-level positions with bachelor's degrees at a typical Biotechnology/Biopharma company?

Under \$30,000

\$30,000-40,000

\$40,000-50,000

\$50,000-60,000

\$60,000-70,000

More than \$70,000

How many bioscience companies do you think exist within the BioHealth Capital Region of Maryland, Washington, D.C., and northern Virginia?

0-100

101-250

251-500

501-1000

More than 1000

What could the MABRC Network (or other agencies) do that would most help your Career Center better prepare students for a career in the BioHealth Capital Region?

Summary Report

If you would like to receive a summary report of our findings, please provide the information below. Otherwise, you may skip this question. This information will not be shared and will only be used to send you the summary report.

Name

Email address

Institutional Affiliation

MABRC Student Survey

The Mid-Atlantic Biology Research and Career Network (MABRC) BioHealth Capital Region Student Preparedness Survey

Thank you for taking the time to complete this survey, which we hope will take no more than 10 minutes to complete. Your participation is critical to helping ensure that post-secondary educational programs are focused on the preparedness of students for the BioHealth Capital Region workforce. Should you have any questions, please contact Dr. David Rivers, Loyola University Maryland, Department of Biology at (410) 617-2057, or drivers@loyola.edu, or Dr. Michael Tangrea, Director of Clinical Research, Sinai Hospital in Baltimore at (410) 601-5643, or mtangrea@lifebridgehealth.org.

Please rate how well your undergraduate education and experiences prepared you with the following technical skills. Consider everything you have learned in lectures, labs, internships, independent research, volunteering, etc. during your time in college.

I did not learn about this during any part of my undergraduate experience

I learned about this, but never performed it

I performed this at least once

I have done this enough that I could now do it on my own with written instructions

Recombinant DNA technology

Nucleic acid isolation

Gel electrophoresis

Aseptic technique

Cell/tissue culture

Chromatography

PCR

Protein purification

Lipid analysis

Immunoassays

Basic animal care/handling

Basic microscopy

Advanced microscopy (e.g. confocal, immunofluorescence, electron)

General chemistry (e.g. solution making, titrations)

Statistical analysis

General laboratory skills

Error handling

Scientific/Primary literature reading and familiarity

Lab notebook keeping/documentation

Computer literacy

Next-Generation Sequencing

Mass Spectrometry

Please rate how well your undergraduate education and experiences emphasized the following transferable skills.

	Never introduced or discussed	Discussed, but never practiced	Practiced repeatedly	Highly emphasized and/or graded
Working independently				
Teamwork				
Communication				
Leadership				
Self-educating				
Motivation				
Initiative				
Time Management				
Prioritization of tasks				
Delegation of work				
Active Listening				
Independent thinking				
Critical thinking				
Research				
Resourcefulness				
Technical/Scientific writing				
Public Speaking				

Please rate how well your undergraduate education and experiences prepared you with the following business acumen and cultural skills.

	Never introduced or discussed	Discussed, but never practiced	Practiced repeatedly	Highly emphasized; I have mastered this
Project management				
Return on Investment				
Continuous improvement				
Simplification				
Cultural sensitivity				
Positive attitude and resilience				
Flexibility and adaptability				
Decision making in the face of ambiguity and uncertainty				
Ability to build trust quickly				
Risk-based decision making				
Respect and understanding of a hierarchy				

How knowledgeable is your university's Career Center about jobs (e.g., in industry, private sector or government) in the biological sciences?

- Very knowledgeable
- Knowledgeable
- Not sure
- Under-informed
- Very under-informed
- I have never gone to my university's Career Center

How helpful has your Career Center been in preparing you for jobs (e.g., in industry, private sector or government) in the biological sciences?

Very helpful

Helpful

Not sure

Poor

Very poor

Which of the following best describes how often you've visited your Career Center?

Weekly

Monthly

Once or twice per semester

Once per year

Once or twice ever

Never

Thinking about the career you might pursue, approximately how many people in that field are in your professional network today?

None

Less than 10

11-25

26-50

More than 50

Demographic Information

The information you provide here will be used for classification purposes only.

What college or university do you currently attend?

What is your major?

What is your class year?

Freshman

Sophomore

Junior

Senior

Other...