

# Using the ASBMB Certification Exam as a direct assessment of the Biochemistry and Molecular Biology Program



Chip Celenza - March 16, 2018

# BMB

- *Intense cutting-edge focused program accredited by the ASBMB*
- *Provides a strong foundation in Biology and Chemistry*
- *Prepares one to think critically about questions in biomedical research and biotechnology*

# Careers

- research
- medicine and health-related fields
- secondary education, patent law, science policy, bioethics, science and technology writing

# General features of the BMB program

- ~ 30 participating faculty from Biology and Chemistry
- ~ 250 majors
- courses are based in the Bio and Chem Depts
- faculty teach and advise undergraduate
- almost all faculty have funded research programs

# The BMB curriculum

- Foundation courses in biology, chemistry, math and physics
- **BMB core courses in molecular biology, biochemistry, and physical biochemistry**
- BMB advanced electives (at least 3 including independent research)

# Assessment of the BMB program

- Learning outcomes developed with help from Biology and Chemistry
- Assessment carried out with the help of the Biology Department's assessment committee

# Learning Outcomes

- Demonstrate mastery of both fundamental and advanced concepts in Biology and Chemistry, with a strong focus on the molecular biological and biochemical components of these disciplines
- Demonstrate expertise in the scientific method, including experimental design, critical assessment of the scientific literature, and an understanding of the principles and best practices for the ethical conduct of research.
- Attain the technical and/or analytical skills required for employment or post-graduate education in BMB or BMB-related careers, including professional careers and science education.

# Current Assessment Methods

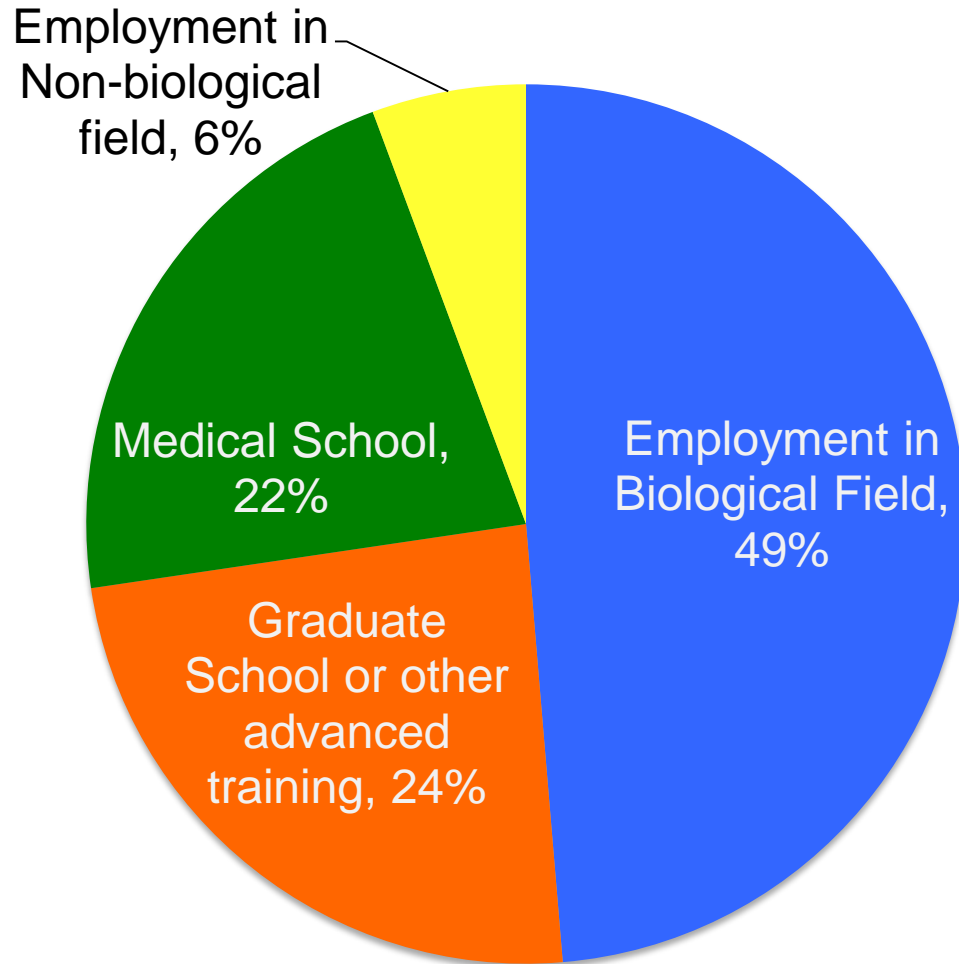
- Senior survey that includes demographic questions, self-reporting of proficiencies and technical skills, and questions from validated concept inventories in BMB.
- Performance in BMB core courses relative to other majors
- **ASBMB certification exam taken in 2017**



# Some Findings

- Concept inventory questions were answered correctly by a majority of students
- 84% of our students participate in independent research
- Academic advising was identified as an area for improvement and with the help of CAS advising and Stacy Straaberg Finfrock in Biology student satisfaction with advising is improving
- BMB majors perform better in BI 522 and BI 421 than other majors

# BMB graduates over the past three years



# ASBMB Certification Exam

- offered annually only to ASBMB accredited programs
- tests both the students' knowledge of core BMB concepts and the ability to apply these concepts in analytical ways
- \$25 per student fee that was covered by the mini-assessment grant
- Exams are graded by the ASBMB and results are sent out the following summer

# How did we do?

**BU 20/29 (69%) passed**

**Nationally 367/667 (55%) passed**

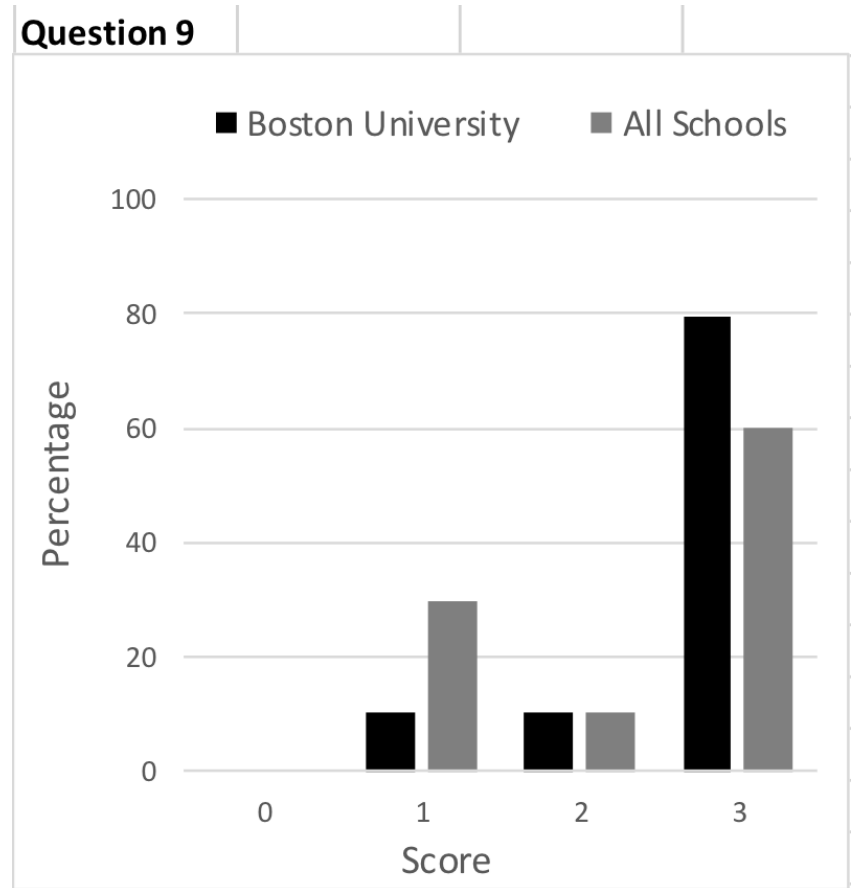
(BU also had a higher percentage earn **distinction** compared to the national average)

# Observations

- Students who opted to take the exam had a higher average GPA than those who did not (3.47 vs 3.24)
- Students who passed the exam had higher average GPA than those failed (3.57 vs 3.26)
- Two students who failed the exam were in the top 10 % of the class and are now in top tier graduate programs (Duke and Johns Hopkins)
- No correlation between exam performance and when core courses were taken

# More Useful Observations

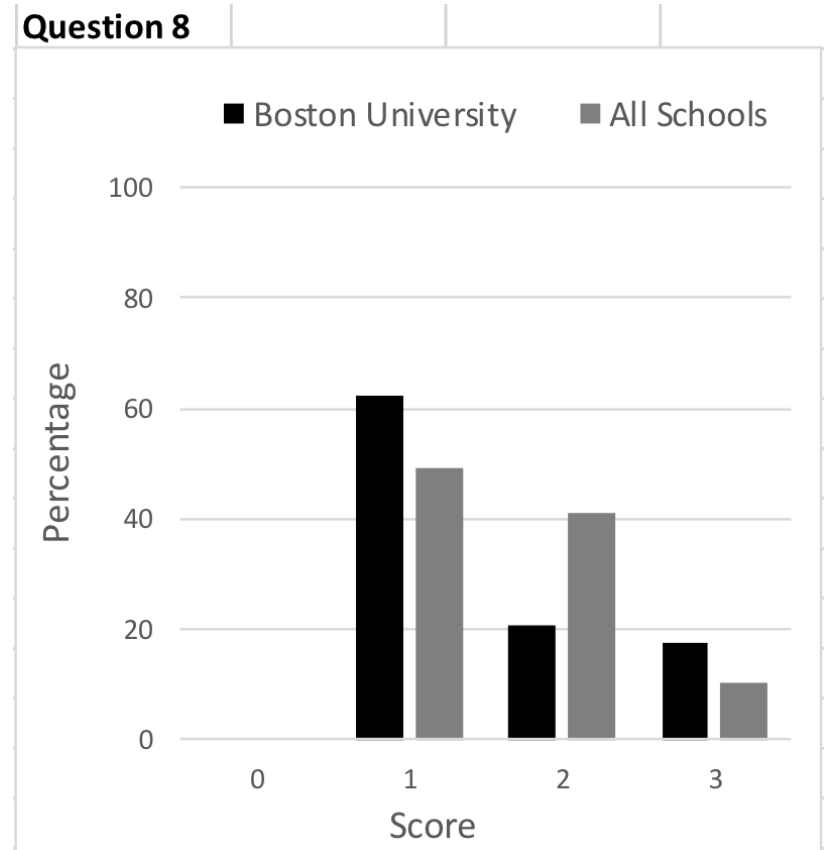
BMB students performed proficient or highly proficient on questions covering ASBMB Core Concepts in Quantitative Reasoning, Information Storage, and Structure/Function



*Example question on quantitative reasoning*

# More Useful Observations

BMB students did not do well in questions relating to Energy Transfer



*Example question on Energy Transfer*

# Moving Forward

- Continue offering exam to determine if observed trends are continue (*yes, we are applying again for a mini-grant*)
- Encourage greater participation in taking the exam
- Evaluate courses that teach core concepts identified as weaknesses in our students (e.g. Energy Transfer is covered in several BMB foundation and core courses)



# Thanks to:

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