



BIOMEDICAL
ENGINEERING

UNIVERSITY OF MICHIGAN

THE BME INSTRUCTIONAL INCUBATOR AND BME-IN-PRACTICE COURSES

AILEEN HUANG-SAAD, CASSANDRA WOODCOCK, NICOLE FRIEND
DEPARTMENT OF BIOMEDICAL ENGINEERING, UNIVERSITY OF MICHIGAN

THE PROBLEM

U-M BME undergraduates, graduate students, and BME faculty share the common interest of identifying ways to develop a stronger BME community and improving BME education.

A 2016 survey of 120 U-M BME graduates found that:

- Students expressed the feeling of divergence of their career paths from what they expected commenting that they desired more career guidance in their academic experience.
- Fewer alumni enrolled in medical school (26%), and many more entered industry (45%), than students originally intended (46%, 17%, respectively).

A 2016 survey of BME faculty showed similar interest in curriculum reform.

- Over 50% of the faculty would like to improve the curriculum, but 73% indicate that lack of time inhibits curricular change.
- New hires agreed that they would have benefitted from a structured, departmental teaching mentorship.

A survey of current students showed they too share the feeling of disconnect between their future roles as biomedical engineers and the curriculum until the third or fourth year due to the high number of prerequisites.

- Students want to learn more about BME, research areas, and career opportunities earlier in their education.

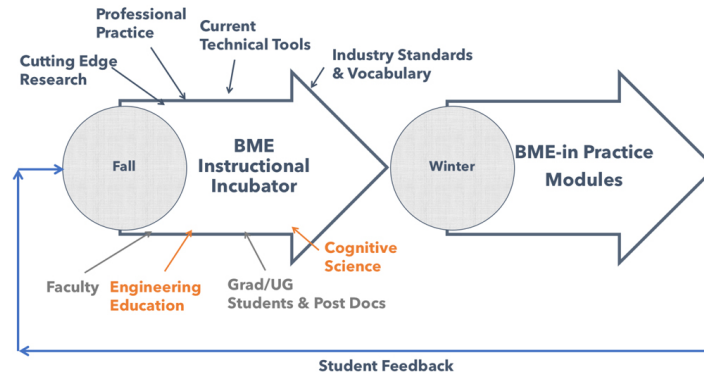
THE SOLUTION



Is there an opportunity for change?

Can we apply what we know about **design, education, and entrepreneurship** to our own curriculum in real time?

2 SEMESTER SEQUENCE



BME INSTRUCTIONAL INCUBATOR

Apply the design process to experiential education development

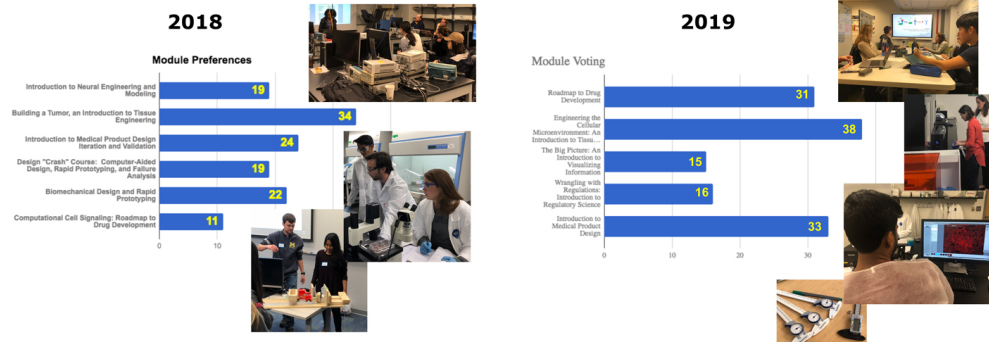
Critique current experiential learning curriculum in BME

Design introductory BME experiential courses in the context of student learning theory

Identify and Communicate with potential BME stakeholders to identify tangible, post-graduate skills and knowledge

| Phase | Tuesday (Experiential) | Thursday (Discussion) |
|-------|--|--|
| 1 | What is the current state of BME curriculum? What are the constraints on BME curriculum? What are the characteristics of strong instruction? | Active Learning Learning Theories Pedagogy |
| 2 | How do you design an exercise while taking into consideration: • student learning • pedagogy • misconceptions | Pedagogical Content Knowledge Metacognition Classroom Discourse and Effective Questioning Collaborative Learning/Cooperative Learning |
| 3 | Students design 1-credit modules | Problem/Project Based Learning Learning Cycles Assessment Revisiting Learning Theories and Active Learning |

BME-IN-PRACTICE COURSES



TO DATE

2 Iterations

| Incubator Participants | Number |
|------------------------|--------|
| Faculty | 3 |
| Post Docs | 3 |
| Phd Candidates | 12 |
| SUGS | 15 |
| 4th Year Students | 3 |
| Total | 36 |

7 BME-In-Practice Modules Offered

- Tissue Engineering (2)
- Medical Device Development (2)
- Drug Development
- Regulations
- Neural Engineering
- 62 undergraduates (**76% women**)

RELEVANT PUBLICATIONS

Woodcock, C., Antoine, H., Tarnowski, M., Huang-Saad, A. Graduate student instructional practice learning through Instructional Incubator engagement. *REES*. South Africa. (2019)

Handley, J., Huang-Saad, A., & Woodcock, C.S. Exploring biomedical engineering students self-raised motivations for engaging in instructional design. *American Society for Engineering Education: Annual Conference and Exposition*. Salt Lake City, UT. (2018)

Malaga, K., Nu, Chrono, & Huang-Saad, A.Y. "Introduction to Neural Engineering: Design and Development of a BME-In-Practice Course through the BME Instructional Incubator." *ASE - North Central Section Spring Conference 2018*. Akron, OH. (2018).

FUNDING

The Incubator and BME-in-Practice Courses are supported by NSF-EEC-1825669 and the CRLT Gilbert Whitaker Fund.

CONTACT INFORMATION

Aileen Huang-Saad, PhD, MBA
2218 LBME
1101 Beal Avenue
Ann Arbor, MI 48109
aileenhs@umich.edu