A Model for Curriculum Evaluation and Revision in Bioengineering  
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Abstract
Curriculum evaluation and revision are often driven by student comments and satisfaction, but they may not reflect the attainment of learning outcomes, impact on educational objectives, or long-term knowledge retention. This poster uses a number of direct and indirect assessment on student learning outcomes to holistically revamp individual courses and as a yardstick for curriculum evaluation and revision. Assessment plays an integral role in shaping behavior and values. Some of the assessment strategies include course-based assessment activities, closing the feedback loop, developing course portfolios, and connecting the gaps between formative and summative evaluations.

Proposed Evaluation Plan
Bioengineering is a diverse multidisciplinary field that often presents challenges for striking a balance between the breadth and depth. While the current assessment methods suggest a general attainment of learning outcomes, it is deemed important to place more emphasis on specific senior courses where more summative assessments take place. In BEN 485 (Senior Lab) and BEN 487 (Senior Capstone Design), students are found to be generally weak in creating, evaluating and analyzing knowledge, all top levels in the Bloom’s Taxonomy.

Finite element analysis (FEA) and computed aided design (CAD) are then added in the curriculum following a spiral curriculum approach. Spiral curriculum aims to introduce the same topic throughout the entire 4 years of college, with each encounter increasing in complexity and reinforcing previous learning. This change is expected to shift the predominantly mathematical approach in biomedical engineering curriculum to a more constructivist and concept-based pedagogy. At Syracuse University, Autodesk Inventor and COMSOL Multiphysics are introduced and reinforced with required courses along the 4-year curriculum. Both formative and summative assessment are used.

Current Assessment Method
The Accreditation Board for Engineering and Technology (ABET) stipulates the following Student Outcomes, which are measured by assessing student performance in certain courses. The figure shows the aggregate program-wide assessment results in 2017-18. The expected Student Outcomes, which are measured by assessing student performance in certain courses.

Finite Element Analysis
3D-printed Prosthetic Socket
The proposed problem requires a new design of a prosthetic socket for a transradial amputee. Currently, there are many options available for lower limb prosthetics, but not as many solutions for upper limb prosthetics. Issues areas when the terminal device is attached to the prosthetics socket.

Computer-Aided Design
BME Junior Lab
Quantitative physiology

Junior Course
Heat and Mass Transfer

Capstone Design Evaluation
2017 (n = 44) students not exposed to this sequence of software  2018 (n = 38) students were exposed to this sequence of software

Q1 Use techniques, skills, and modern engineering tools, necessary for engineering practice  3.5
Q2 Design a system, component, or process to meet desired needs  4.5

Assessment on Active Learning
Project evaluation is based on the Kirkpatrick’s model, with learning outcomes conceptualized at four levels. Reaction is assessed by perception surveys from students, faculty and clients. Learning is assessed by the knowledge, attitudes and skills gained. Behavior will be assessed by post-graduation surveys of alumni and surveys on employers on research attributes, skills and productivity. Results will be assessed by longitudinal studies on career tracking and career success.