

# Teaching structural art: a multi-institution collaboration

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A group of five professors are collaborating on educating broad constituencies of students at five institutions (Johns Hopkins, Columbia, Dartmouth, Bucknell, and UMass, Amherst) in the traditions, ideas, and practice of structural art. David P. Billington has defined structural art as that subset of structural engineering design that achieves greatness in efficiency, economy, and elegance. These efforts build upon the course “Structures and the Urban Environment”, long a part of the curriculum at Princeton. This presentation, however, focuses on the novel contributions of the authors as they have adapted and transformed the core material offered at their own institutions, and also describes the authors’ attempts to modularize structural art content so that it can be offered at institutions without a dedicated course.

Key themes of the authors’ work have been to: (1) introduce contemporary examples of structural art and structural artists to curriculum; (2) enrich the course with in-class demonstrations and lab exercises related to structural form finding; (3) develop the idea of environmental loading as a force to be responded to by the designer, thereby introducing sustainability into the idea of structural art; (4) integrate computerized structural analysis into the course. All this must be done while maintaining broad accessibility of the course since at each institution the course enrolls a substantial fraction of non-engineering majors. Associated with these themes are substantial pedagogical challenges that we will describe: Managing a classroom that may have students with backgrounds as diverse as a freshman English major and senior student of civil engineering; developing quantitative assignments that are simple yet accurate and enriching; guiding students in writing about the built environment in unaccustomed to ways; integrating technology into the learning experience.

The authors have formed a close collaboration that is aimed at achieving the goals outlined in the previous package in a collective way, so that each may benefit from the others’ efforts. For this to be effective, the material must be modularized so that course components developed by one of the authors can easily be transferred to the others. Towards this end the authors have established guidelines for the content and format of lectures, assignments, case studies and demonstrations that make these course components easily transferrable. Adopting an open-source model, the authors are prepared to share these resources more broadly since the modular nature of the material makes it possible to use them in virtually any course in the civil engineering, or related, curriculum.

Finally, the authors are, for the first time, collecting data to assess the effect the teaching of structural art has on the minds of the students. Each author administered a pre-course assessment and at the time of the conference, post-course assessment will be available from Dartmouth, where the term ends early. These assessment results are summarized.

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