Ansys

CASE STUDY /

Ansys + McMaster University

"We developed a course with a design-led approach to materials science education. Ansys Granta EduPack was a crucial component of this course, allowing students to learn about the engineering design process in an intuitive and engaging way. On top of exposing students to the engineering design process, EduPack also has an excellent database and tools to teach students about materials science. It's the perfect 'sand box' for students to independently explore concepts of materials science through experiential learning activities."

Dr. Bosco Yu
Assistant Professor / McMaster University

CASE STUDY

Using Ansys Granta EduPack to Support Design-led Materials Engineering Education for First-Year University Students

At McMaster University, we decided to introduce materials science concepts to first-year engineering students through a design-focused lens. We developed a new experiential and project-based learning course for the general first-year engineering course (~1000 students) that involved four design challenges. To make these challenges meaningful, each one tackled one of the key United Nations global challenges.

We utilized the materials selection database in Ansys Granta EduPack as the engineering design tool to simultaneously introduce the design process and materials science concepts to the students.

Challenges

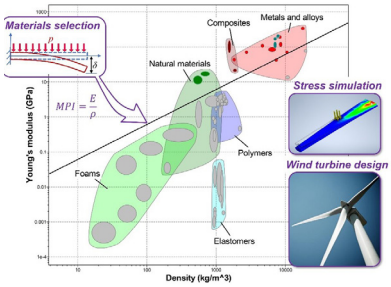
The traditional undergraduate engineering curriculum tends to be process-oriented, promotes memorization of knowledge, and is delivered through siloed standalone courses. Elements of design are only introduced to students in the final year.

However, engineering students are usually more motivated to learn about new theories and concepts when they can visualize the practical application of these topics. As materials science educators, it is our responsibility to help students connect the theory with practice (referred to as "design-led materials engineering education"). An educational engineering design tool can be incorporated into a first-year education to enhance the student learning experience. Granta EduPack is a great educational design tool and can help students to connect abstract scientific concepts to real-world engineering applications.

Engineering Solution

Granta EduPack is a materials design database that has a user-friendly platform and offers multiple levels of design and educational features. It is a perfect tool for materials science education, as it can serve as a "sandbox" for students to explore different design and science topics. It allows students to learn new subject matter on an as-needed basis, making it practically suitable for first-year engineering education.

Granta EduPack can also serve as an educational companion for students throughout their educational careers. Students who are exposed to this design tool in their first year can continue to explore other features and more advanced topics in their later years.



Students were asked to design wind turbine blades for a renewable energy application using Ansys Granta EduPack to learn about material properties and the process of materials selection.

Benefits

Course evaluations from student surveys indicated that the first-year engineering students thoroughly enjoyed both the design projects, as well as the materials science labs that utilized Granta EduPack. They found the Ansys software straightforward to use and capable of guiding them through complicated engineering design projects. The materials database was useful in researching and learning about different types of materials science topics. Overall, the software made the learning experience more interactive and engaging for the students, leading to better learning outcomes.

Company Description

Academic Institution: McMaster University, Hamilton, Ontario, Canada
Course: First-year General Engineering (ENG1P13)
Course Instructor and Developer: Bosco Yu (Ph.D.), Assistant Professor
Assistant Course Developer and Teaching Assistant: Ms. Liza Dicecco (Ph.D. candidate)


Dr. Bosco Yu, Assistant Professor, course developer and co-instructor for McMaster University's first-year engineering course


Liza DiCecco, Ph.D. candidate in materials engineering, assistant course developer and teaching assistant for McMaster University's first-year engineering course.

Ansys Products Used

- Ansys Granta EduPak

"Most first year students have not heard of materials engineering prior to joining university. They struggle to see the way in which materials engineers contribute to multidisciplinary design teams. Design problems involving materials selection are very effective at illustrating both the importance of materials for design, as well as showcasing the broad range of materials available and recent advances in material development".

- Dr. Hatem Zurob / Professor, Chair of the Department of Materials Science and Engineering