

ENGINEERING APPLICATIONS

Course Description:

As an introduction to engineering applications, this elective course immerses students in salient issues concerning themselves and the City of Atlanta. From this immersion, learners will begin to articulate needs of selected users and design multiple prototypes to serve these identified needs. Students will be introduced to principles of engineering, explore various engineering fields, and apply these practical concepts within a specific field of engineering. Students will bring a human-centered lens to their work as they apply the design thinking process alongside the engineering design process. They will learn to define problems better, explore and evaluate possible solutions, and promote and advocate for change.

Course Objectives:

Students will:

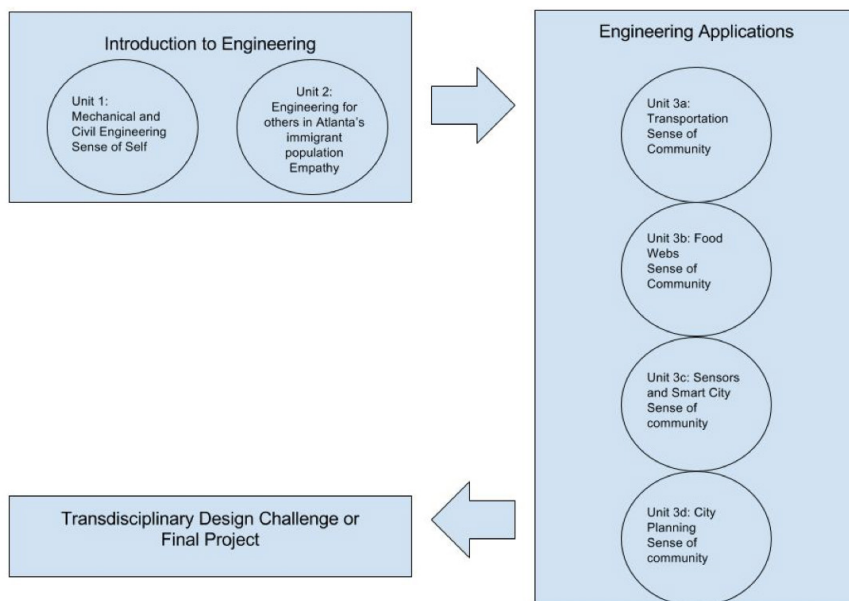
- Develop empathy for users of potential engineered solutions
- Learn to see the connections between science, technology, fine arts, engineering and math, and how their principles apply to public design
- Exhibit mastery of Georgia Department of Education standards: STEM-EA-4 thru STEM-EA-11
- Identify and explore various engineering fields and their applications
- Apply skills learned to re-designing existing systems

Learning Experiences:

The course is scaffolded so that learners develop the ability to identify and address a need in an area of their particular engineering interest. In units one and two, students will develop their sense of self and be introduced to the basic principles of engineering, building key skills like 3D-CAD modeling, engineering graphics, and different drawing perspectives. In addition to those skills, developing empathy towards the user will be emphasized to facilitate effective, innovative, and creative design.

After completing the introduction to engineering module, students will be given choices to investigate issues in four topics relating to the city of Atlanta: food, transportation, smart cities technology, and city planning. In conjunction with key partners, learners will be paired with mentors and specialists in these fields to articulate a salient issue and develop a prototype to test. This final prototype will be evaluated by faculty, mentors, and community members.

Learning Experiences (continued):



Instructional Resources:

Instructional Textbook:

Irwin's Engineering the Future: Science, Technology, and the Design Process, (Key Curriculum Press, 2008)

Physical and Consulting Resources:

Lovett Makerspace and Tech Theater Workshop, Georgia Institute of Technology Public Design Workshop, GA Tech School of Applied Physiology, and Project Lead the Way.

Assessment:

Each student's final grade will be determined using a combination of digital portfolios (blog posts, reflections, 2D/3D and CAD models), and individual/group presentations. To the extent that they apply in the context of the course, the GA DOE standards will be mapped to these elements in order to assess student mastery of relevant standards and skills for Engineering Applications (ENGR - EA).

Summative Engineering Applications Assessment:

Elements of the final transdisciplinary design challenge will serve as the summative assessment for the engineering applications course, featuring the skills and knowledge students learn during the semester. Since each transdisciplinary design challenge project will be student-initiated, we cannot know in advance what projects the students will undertake.

- 30%: digital portfolios (blog posts, homework assignments, plan drawings, reflections, 2D/3D and CAD models)
- 50%: individual group presentations, products
- 20%: Final Project

Classroom Behavior:

It is understood that you will comply with the Lab Atlanta student handbook for general behavior. Specifically in the classroom, I expect you to be On time, Prepared, and Respectful.

Classroom Behavior (continued):**Also:**

1. The graphing calculator is a powerful tool that makes it possible for students to analyze functions and sets of data and to complete complex computations. However, running programs and retrieving stored information when such actions contradict guidelines for assignments or assessments is a clear violation of the Honor Code. Any questions regarding appropriate use of a graphing calculator should be directed to individual teachers.
2. Absences and the make-up work that ensues sometimes create scheduling problems.
 - a. Missed assignments and assessments may be made up only in case of illness or other excused absence, and must be done so in a timely manner. Students must see teachers on the day of their return to school to determine a make-up schedule.
 - b. Any student who misses an Engineering class but who is present for some portion of that school day must contact his or her Engineering teacher on that day to make arrangements for the make-up of any assignments or assessments. The student should expect to take any assessment that day. Failure to do so may result in an academic penalty.
3. Tardies to class will be recorded.
4. All students are expected to maintain and routinely check their Lab Atlanta email account and each class's web page.
5. Students should keep cell phones and pagers turned off and in bookbags.

Curricular Alignment:

This course corresponds to Georgia Department of Education (DOE) course number 21.47207 (Engineering Applications (ENGR - EA)).