INTRODUCTION

• IBEHS 1P10 is a first-year integrated learning course offered in McMaster’s new Integrated Biomedical Engineering and Health Sciences (iBiomed) program.

• An integrated approach to learning is based on the principle that combining topics across disciplines identifies and reinforces connections across curricula, helping students to arrive at more meaningful and authentic understanding of the course material [1, 2].

• The existing first-year engineering curriculum at McMaster is a common curriculum offering an introduction to engineering through discrete courses in graphics design, computing, materials science, and the engineering profession.

• IBEHS 1P10 was designed to take a broad fields approach to integrated learning [3], by grouping the aforementioned subjects together in a single course.

• A broad fields approach to integrated learning can be challenging when the topics each have their own unique identity and framework, since the success of this approach typically requires an effective and consistent organizing framework for instruction [3].

• Although teaching within a common framework is naturally conducive to true integration of course topics, this approach risks losing the identity of the parent fields, potentially impacting students’ ability to properly understand key topics.

• To address this concern, rather than integrate the course topics through a didactic teaching model, IBEHS 1P10 takes a project-based approach to learning, and instead integrates the various topics through a series of five design projects.

• This paper presents initial findings and impressions of an ongoing study investigating the impact of integrated learning in first-year engineering.

• We are specifically interested in investigating:
  • The extent to which integrated learning contributes towards students’ development of technical skills in graphics design and computing.
  • The extent to which integrated learning impacts students’ perceptions of skills in communication teamwork, and giving and receiving feedback.

COURSE STRUCTURE

• This full-year first-year course is required for all students enrolled in the iBiomed program.

• The course takes an integrated approach to learning; through lectures and labs, students are introduced to a broad range of course topics.

• Application of these topics is through a series of 5 design projects, each requiring students to apply elements of 2 or more of the aforementioned topics.

• The projects, while stress, are overall both enjoyable and memorable

• Students’ perceptions of their own skills in communication, teamwork, and giving and receiving feedback are being evaluated through surveys.

DELIVERABLES

• Design projects are the primary means of assessment, and include both individual and team submissions, that emphasize teamwork and communication.

• Each student keeps an active learning portfolio through the year for documentation and reflection.

• Individual assessments that evaluate specific technical skills have been designed into the course, to offer an appropriate comparison of learning between IBEHS 1P10 and the first-year engineering curriculum.

PRELIMINARY RESULTS

• Although data analysis is ongoing, preliminary results indicate the following trends:
  • Improved understanding and application of graphics design content, based on end-of-year assessments
  • Comparable skills development in computing, based on end-of-year assessments
  • Improvement in technical writing skills
  • Improvement in reflective activities

INITIAL IMPRESSIONS AND OBSERVATIONS

• A mid-year course refinement and an end-of-year focus group was held and reported the following:
  • The projects, while stress, are overall both enjoyable and memorable
  • Some students have indicated that they struggled early on to understand fundamental concepts in specific technical domains.
  • However, this was often resolved throughout the projects, with many students commenting that the projects increased their interest in these domains.
  • Overall, students reported a high degree of satisfaction with the course, both in terms of the structure and execution.

REFERENCES

[3] Herschbach DR, J of sTEm Teacher Education. 48:1, 2011

ACKNOWLEDGEMENTS AND FUNDING

• Funding for this project was provided by the MacPherson Leadership in Teaching & Learning Fellowship Program