

Project Summary

The scope of this project is the development of a multidisciplinary robotics course that emphasizes the integrated system development nature of robotics and cross-functional teamwork. The project will adapt aspects of the General Robotics course at CMU, the Robot Building Laboratory Project developed jointly at Swarthmore College and Bryn Mawr College, and robotics tools developed at Drexel University.

The curriculum in any specific area of study tends to narrowly focus students on that area. Real-world systems, however, are generally comprised of interdependent components creating complex integrated systems that include electrical, mechanical, and computing mechanisms. The development of these systems is done in cross-functional teams with members bringing expertise from these different fields. Robots are a perfect example of such integrated systems. The proposed General Robotics course will be available for undergraduate students across these different engineering fields: Electrical and Computer Engineering, Computer Science, Mechanical Engineering, and Industrial Engineering. Accordingly, it will emphasize the multidisciplinary nature of robotics by surveying the different fields with respect to robotics.

The course will use a hands-on approach to teaching the subject where laboratory exercises complement lecture material. This provides students in the different engineering fields an opportunity to experience how their discipline interfaces with other disciplines. Another aspect of the course will create cross-functional teams comprised of students from the different areas that will develop a robotics project. This is an important experience that provides students opportunities to learn about functioning in multidisciplinary teams. To enhance this learning experience, material will be presented that teaches students principles of teamwork and group dynamics.

The adaptation of the materials will include two major innovations. The first is to include material specifically on teamwork and integrated system design. The second innovation is the way the course is taught. The course at CMU is taught by researchers from CMU's very active robotics lab. While we have the full range of engineering expertise to teach the subject, we do not have specific faculty in robotics. Therefore, the material must be developed with sufficient detail for each area so that any one or two engineering faculty members may teach the course.