

## **Build Cool Things: A first-year course for students with little-to-no hands-on skills**

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“Build Cool Things” is a first-year course for students with little-to-no hands-on building and fabrication skills. The course was designed to give students multiple experiences with manual fabrication and disassembly of mechanical and electrical devices. The course has objectives of increasing student understanding of how things work, and improving competencies including hands-on skills; confidence when placed in an unknown situation; troubleshooting (making it work); teamwork; decision making; communication, and learning how to learn. The students work on various projects using manual tools, soldering stations, and the machine shop, in order to gain and increase skills. The projects include hovercraft, audio equipment (amplifiers and speakers), as well as myriad electronic and mechanical devices for their culminating personal final projects. Iteration (doing something multiple times) and practice are explicitly built in to the project fabrication in order to help the students gain mastery and confidence. Daily lab notebooks (implemented as electronic notebooks) were kept by each student; these notebooks entries were used in a competency-based assessment to monitor student progress. Initial assessment data indicate that students gained troubleshooting skills, and learned to not be afraid of breaking things or not having things work, as those situations were an opportunity to learn more by fixing things. Evidence of increases in student patience, with themselves and with the building process, was also seen in the lab notebook entries, and in observations of student behavior in class.