ENGINEERING I

Introduction to Engineering Design & Fabrication

COURSE INFORMATION	INSTRUCTOR
Grade Level: 9th - 12th **Credits:** 1.0 CTE/Elective **Duration:** 32 weeks (Full Year) **Schedule:** TBD **Prerequisites:** Pre-Algebra or concurrent Algebra I	**Michael Puckett, M.Ed.** michael@trceducation.com 615-796-4632 TennesseeRoboticsCenter.com

SMART CREDENTIAL: Fabrication Foundations — Carnegie Mellon Robotics Academy micro-certification

CLASS STRUCTURE (2.5 Hours)

INSTRUCTION	SNACK/DEVOTION	HANDS-ON LAB
4:30 - 5:30 PM	5:30 - 6:00 PM	6:00 - 7:00 PM
60 minutes	30 minutes	60 minutes

Students may bring a peanut-free snack. The devotion time focuses on character development and the 'Dare Mighty Things' mission mindset.

COURSE DESCRIPTION

This project-based course introduces the engineering design process through hands-on fabrication. Students learn to identify problems, brainstorm solutions, create technical drawings, build prototypes, and iterate based on testing. Using industry-standard CAD software and fabrication tools, students develop practical skills that bridge imagination and reality—from napkin sketch to working prototype.

REQUIRED TEXTBOOK

Foundations of Engineering & Technology

Michael Strimel, Scott Grubbs & Ryan Wright, 8th Edition (Goodheart-Willcox)

ISBN: 978-1685845407

TIME COMMITMENT

In-class instruction and lab time	2.5 hours/week
Textbook reading (chapters assigned weekly)	1 hour/week
CAD practice & project documentation	1-2 hours/week
TOTAL WEEKLY COMMITMENT	**5-6 hours/week**

COURSE UNITS (32 Weeks)

Unit	Topic	Weeks
1	**Introduction to Engineering** Design process, brainstorming, engineering notebooks, sketching	1-4
2	**Technical Sketching & CAD** Onshape/Fusion 360, orthographic views, isometric, dimensioning	5-8
3	**3D Printing & Additive Manufacturing ★ SMART** Design for 3D printing, slicing software, prototyping, iteration	9-12
4	**Materials & Fabrication ★ SMART** Hand tools, power tools, fasteners, material properties, safety	13-16
5	**Structural Engineering**	17-20

	Bridges, trusses, load testing, failure analysis, optimization	
6	**Mechanisms & Motion** Gears, linkages, cams, drivetrains, mechanical advantage	21-24
7	**Advanced CAD & Documentation** Assemblies, technical drawings, bill of materials, design reviews	25-28
8	**Capstone Project** Independent design challenge with full documentation and presentation	29-32

★ *SMART = Unit aligned to CMU SMART certification competencies*

GRADING

Reading Quizzes	10%
Engineering Notebook	15%
Unit Projects	35%
Skills Assessments	20%
Capstone Project	20%

Grading Scale:

A: 90-100% | B: 80-89% | C: 70-79% | D: 60-69% | F: Below 60%

REQUIRED MATERIALS

- *Foundations of Engineering & Technology* textbook
- Engineering notebook (graph paper, bound)
- Laptop with Onshape account (free educational license)
- Safety glasses (provided, but may bring own)
- Closed-toe shoes required every class

PATHWAY

Physical Science → **Engineering I** → Engineering II / Robotics Engineering

Engineering I provides the foundation for all advanced engineering and robotics courses. Students completing this course are prepared for Engineering II (electrical and systems integration), Robotics Engineering (programming and control systems), FTC competition teams, or college engineering programs.