TECHNOLOGY/ENGINEERING/DESIGN (T/E/D) PROGRAM

The Technology/Engineering/Design (T/E/D) curriculum is a custom-designed, signature program developed by Notre Dame High School teachers with engineers and program managers that have 50+ years of collective experience at Fortune 500 engineering corporations. T/E/D courses are grouped into four categories Engineering Basics, Elective Skills, Specialized Engineering, and Capstone Project.. Junior year offers two Specialized Engineering courses, each with its own unique design projects, to familiarize students with the major engineering disciplines of electrical, mechanical, software, and aerospace. The signature Notre Dame T/E/D progression culminates in a senior year Capstone Project, where students apply all knowledge and hands-on skills acquired during the previous two years.

Engineering Basics

#D12A Introduction to Engineering as a Profession

0.5 Credit **Level 2**

Engineering disciplines and career options are broken down and cross-mapped to career tracks by foundational concepts, examples, comparison, and by their positioning across the design process: Research and Development, Prototyping, Preliminary and Advanced Design, Process Engineering, Manufacturing, Production, Engineering Change Process. During this interactive and scenario-based journey across engineering career fields, students are equipped with key professional skills such as public speaking, formal presentation, communication, collaboration & conflict resolution, task management, and critical thinking.

Requirements for placement: 75 or above in Algebra 1 and Conceptual Physics: signature of engineering teacher

#D12B Engineering Design Process

0.5 Credit **Level 2**

The engineering process is explored step-by-step through a hands-on group design project. The course introduces, but is not limited to, the Systems Engineering "V" and its global application across the engineering disciplines and career tracks explored in Introduction to Engineering. Project complexity is low, emphasizing proper utilization of the engineering design cycle and offering hands-on context for the material. Learning objectives are packaged into hands-on projects developing critical-thinking and problem-solving skills through repetitive decision-making exercises in a collaborative environment.

Requirements for placement: 75 or above in Algebra 1 and Conceptual Physics: signature of engineering teacher

Specialized Engineering Courses

#D22A Electrical and Mechanical Engineering

0.5 Credit **Level 2**

Electromechanical engineering is introduced as a global engineering discipline with direct applications ranging from aerospace and automotive to telecommunications and nuclear industries. Students are equipped with basic design and system integration skills. Career simulations as electrical and mechanical engineers are facilitated through the lens of a hands-on robotics design project. Throughout the hands-on project spanning the full semester, students take a modular approach to designing and building a rover equipped to traverse the Martian or lunar terrain and collect samples.

Requirements for placement: 80 or above in Introduction to Engineering as a Profession and Engineering Design Process and Problem Solving: signature of engineering teacher

#D22B Software Engineering and App Development

0.5 Credit **Level 2**

Software engineering is introduced as the dominant engineering discipline of the 21st century with applications in even the most hardware-oriented industries. Software development and integration skills are developed with emphasis on input/output interfaces, regression testing, and fault identification in complex systems. Life as a software engineer at a large company is simulated through a hands-on design project, where students analyze, integrate, and test code segments to create a smartphone app. The foundational objective of the design project is to accomplish a series of tasks identified by customer requirements in a variety of career scenarios.

Requirements for placement: 80 or above in Introduction to Engineering as a Profession and Engineering Design Process and Problem Solving: signature of engineering teacher

#D32A Project Management and System Engineering

0.5 Credit **Level 2**

Student teams combine technical know-how and problem-solving abilities with business planning and management skills to effectively evaluate, oversee, and report on the performance of a complex engineering program simulation. In addition to a broad technical understanding of ongoing projects, students manage schedules and budgets using real-world tools employed by large corporations, such as Earned Value Management (EVM). Students also execute system engineering responsibilities, providing technical oversight and facilitating cohesive progress between cross-functional teams.

Requirements for placement: 80 or above in Introduction to Engineering as a Profession and Engineering Design Process and Problem Solving: signature of engineering teacher

#D32B Aerospace & Flight Science

0.5 Credit **Level 2**

In this engineering course unlike any other, students will use a cutting-edge simulation software to design an aircraft using geometry-based principles and engineering requirements. The advanced design effort is not limited to aerodynamics. Students will also design the cockpit of their aircraft with endless possibilities after learning about Human Factors Engineering, which is heavily based on life sciences and focuses on the design of human-machine interfaces. In the final stage, students will render and fly their very own aircraft on a flight simulator

Requirements for placement: 80 or above in Introduction to Engineering as a Profession and Engineering Design Process and Problem Solving: signature of engineering teacher

Capstone Project

Full year requirement: all courses are required to fulfill the Capstone Project Requirement

#D42A Capstone I: Requirements Analysis and Engineering Design

0.5 Credit **Level 2**

Students are presented with a real world project which they need to bring to completion by the end of the year. During capstone I, students receive top-level customer requirements, which they analyze and break down into derived requirements ultimately developing a system specification and holding a System Requirements Review (SRR). From there students execute preliminary design followed by a formal Preliminary Design Review (PDR) based on basic design decisions to develop a product in compliance with the system requirements specification.. Upon approval of the preliminary design, critical design is initiated with multiple trade studies driving advanced design decisions. This process requires customer interaction and business-driven decision-making exercises to parallel real-world engineering development. Capstone I culminates is a Critical Design Review (CDR), where the student design is approved and baselined.

Requirements for placement: 80 or above in the following courses: Engineering Skills Courses and Specialized Engineering Courses: signature of engineering teacher

#D42B Capstone II: Manufacturing, Test and Verification

0.5 Credit **Level 2**

Students apply manufacturing engineering skills to produce high-quality, cost-effective prototypes of their selected design. Following the prototype demonstration and subsequent approval, student teams next challenge is the manufacturing, component testing, and assembly of the overall engineering system. They then move on to prove their manufactured system capabilities and whether it meets their baselined requirement specification. During this stage, they must generate a test plan, execute it, reattempt failed tests, and ultimately declare in detail what their system does and does not do. At the end of the project, the students produce a presentation and report reviewing the entire project and, most importantly, valuable lessons learned.

Requirements for placement: Completed Capstone I: signature of engineering teacher