The Storyline & Challenge

Unmanned Aerial Vehicles (UAVs) are driving one of the most exciting areas of innovation today. Pilots, engineers and entrepreneurial leaders are teaming up to change the way we think of videography, disaster recovery, agriculture, conservation, marketing and so much more.

The ultimate Ten80 UAV Challenge is to apply lessons-learned through the curriculum to tackle team-based challenges that parallel some of these innovative drone applications.

Standards

All programs align to the Common Core State Standards for Mathematics and English Language Arts and Next Generation Science Standards (NGSS). The Student UAV Challenge also aligns to CSTA level 3 standards.

Technology

Students use a quadcopter that's remotely controlled with a personal or school-owned smartphone or table and operated autonomously through custom code. They investigate the principles of aeronautics using a powered paper airplane that's piloted using a phone app.

With the optional Hacker's Kit, students dive into the electronics of a more basic drone and physical computing activities that explore the major systems of the UAV's flight control system. Ultimately they replace the stock controller with a custom version based on an Arduino microprocessor.

Curriculum Overview

Students fly, configure, reverse engineer, design, build and code.

After an introduction to drone safety and regulations, students systematically improve performance through Good Investigation Practices (GIP) and the application of aeronautics principles. Students then learn about major features of drone hardware, and about the local and global infrastructure that supports drone activities. Software and coding round out the experience as students program their drones to perform tasks. As a culminating challenge, students apply lessons-learned to showcase their piloting, programming, troubleshooting and teamwork skills.

An optional Hacker's extension guides students through a series of focus lessons that reverse engineer how each system of the UAV brain works. The culminating challenge is to replace the stock system with a customized Arduino-based flight controller.

As with all Student STEM Challenges, these concepts and skills are cultivated through the framework of innovation. Students model a business or organization that applies the technology to improve society.

Competition Overview (Optional)

UAV teams can compete locally in Face-to-Face (F2F) Ten80 Challenge competitions and in an online Points Race. Winners can qualify to advance to the National STEM League Finals.

Get Involved
Ten80Education.com
Toll free 855.836.8033
info@Ten80Education.com

Option to Collaborate & Compete in the NSL

Published and Organized By

1. CURRICULUM: CHOOSE LICENSE TYPE

Class

Click-through lessons direct students' physical activity and analysis. Educators assess students with a mix of embedded online quizzes and rubric-based evaluation of documentation, results and physical products. Class licenses include one login per student, and the number of teams included depends on the class size.

Size	Educator Licenses	# Student Logins	Team Registrations Included
Home	2	5	1
Small	2	10	1
Medium	2	15	2
Full	2	25	3

Club

Teams access the online curriculum through a shared team login. The modular curriculum allows students to specialize at any time. Choose the number of team licenses you require. See the order forms for details.

Camp

This camp-specific curriculum is organized into a 5-day format with 25-40 contact hours. Camp leaders use a hyperlinked agenda to navigate electronic and print resources, with minimal preparation time required.

What Are Team Registrations?

The purchase of Ten80 STEM Challenge curriculum includes one (or more) Team Registrations. A Team Registration allows groups of students to unite and compete against other schools (Face-to-Face and in online Points Race), and to qualify for an invitation to the NSL Finals.

Each Team Registration is represented with a team identity on the Ten80 online dashboard, where they can share ideas with other teams via the forum, swap assets such as 3-D printer time or CAD files, and participate in occasional challenges.

Registered teams are also invited to compete in Face-to-Face (F2F) competitions (remote or in-person) and the online Points Race. Local F2F competitions are free with your Ten80 registration. The online Points Race is an optional add-on.

2. KITS: CHOOSE TYPE AND QUANTITY

Returning teams are not required to purchase kits. Because the curriculum and competitions require a specific technology, materials kits are required in your startup year.

Each UAV station serves up to 3 students with a very hands-on experience or 4-6 students who divide & conquer the various aspects of operating a team. In addition to actively working with the UAV, team roles can include user interface design, graphic design, web design, marketing, public relations, project management, research & development, fabrication, etc.

Complete UAV Kit

Includes Aeronautics & Hacker's Kits described below

Base Aeronautics Kit (UAV-AER)

Includes quadcopter, batteries, charger, LiPo safety bag, spare parts and powered-paper airplane.

UAV Hacker's Kit (UAV-FCB)

Includes a basic quadcopter that can be hacked and all the materials required to customize its brain and complete focus lessons on electronics and physical computing.

In addition to the materials described above, all kits provide student access to the SolidWorks® Student Edition and web consultation to help organize your program.

3. COMPETITIONS: COLLABORATE, CREATE, COMPETE

Ten80 teams can collaborate and compete in 1-2 day Face-to-Face (F2F) Competitions (virtual or in-person) and in an online Points Race that runs from October to May each year.

Online Points Race: (Optional) Register Now

No Travel Required! Between October and May, student teams use an online dashboard to get feedback from remote STEM mentors and to earn points. Points categories are aligned to the Ten80 STEM Challenges curriculum so educators can use the site to stay up to date on student work.

Points Race entries are submitted between October 1st and the first week in May. A leader board celebrates teams achievements throughout the season. Points leaders are invited to the NSL Finals throughout the season. The ultimate Points Race winners are celebrated in an online awards ceremony and with custom-designed trophies shipped to their school or meeting place.

An additional fee is required. See the order form for details.

Face-to-Face (F2F) Competitions: (Optional) Prepare for Local, Regional and National Events

Whether in-person or remote, Face-to-Face (F2F) events combine the excitement of head-to-head competition with the innovative energy of a STEM Fair.

All registered Ten80 teams can compete in **locally-organized Ten80 Challenge events**, in **remote competitions** organized by Ten80's team, and in **National STEM League (NSL) Regional competitions** organized by the iNSL, a 501(c)(3) organization. An entry fee may be required for NSL Regional competitions.

Teams earn invitations to the **NSL Finals** by leading in the online Ten80 Points Race or placing in sanctioned Ten80 Challenge events. The NSL Finals is hosted in late April each year, and will include remote and in-person participation.

UAV Competition Categories

Ten80 Teams compete in the **Intro or Hacker Series**. Hackers must fly a UAV that has a custom flight controller (see Rules & Guidelines for details). F2F categories include:

- Head-to-Head Events and time trials testing pilot agility and "finesse", programmed flight patterns as well as collaboration, communication and teamwork required by drone operation teams.
- Data-Driven Design Project
- Enterprise
  - Project Planning
  - Pitches & Presentations
  - Graphic Design, Team Identity and Vehicle Design

Online Points Race categories include the above and more. For example, website design, media exposure and specialization projects like 3D CAD.