



NOTE:

This competition is for
Pennsylvania schools
and organizations only.

**A Competition for
Middle School & High School
Aged Students**

Funded by



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INITIAL SUBMISSION DEADLINE:

Friday, March 8, 2024 by 5:00 p.m.

Calling all middle school and high school students! This agriculture challenge invites you to design, build, and test a hydroponic or aquaponic system. Hydroponics is the practice of using nutrient rich water to grow plants. Aquaponics is an extension of hydroponics that utilizes the ammonia that fish produce and converts it to something that plants can use as nutrients to grow.

The Challenge

We challenge your organization to prepare a **design plan for a NEW hydroponics or aquaponics system** to be constructed for less than \$1500 (Level 1 or Level 2) or \$2000 (Level 3-Aquaponics Division). Upon submission, design plans will be reviewed by program judges. Division winners will receive necessary funding to build systems in line with submission plans. They will also receive a team trip (up to 10 individuals per team, including one mentor) to Millersville University (MU) on Friday April 12th, 2024. Each winning team will be provided lunch at the MU dining hall and reimbursement allotment for travel at the IRS approved rate (\$0.655/mi) up to 150 miles for one vehicle.

Paul Nickerson, Vice President of Applied Sciences at INTAG Aquaponics, will present to competition winners and facilitate a follow-up Q & A session. There will be a tour of MU hydroponics/aquaponics systems and other related educational facilities. Competition winners will be at Millersville University from 10:00 am to 3:00 pm.

As winning groups develop their systems, they will receive at least one site visit from Tommy Kuhns, an undergraduate student in Technology & Engineering Education at MU. Instrumental in the development of the systems at MU, Mr. Kuhns is a proponent for the dissemination of education and information around these innovative, novel implementations. He will be accompanied on a site visit by industry professionals from INTAG Aquaponics to provide insight into the viability and longevity of proposed implementations and designs.

Division Rules

Level 1

- Open to student groups in grades 5-9 or ages 10-15 in PA schools and organizations
- System design may be hydroponic or aquaponic.
- Maximum proposed budget: \$1500

Level 2

- Open to student groups in grades 9-12 or ages 14-18 in PA schools and organizations
- System design may be hydroponic or aquaponic.
- Maximum proposed budget: \$1500

Level 3 (Aquaponics)

- Open to student groups in grades 5-12 or ages 10-18 in PA schools and organizations
- This system **MUST** be an aquaponic system.
- Maximum proposed budget: \$2000

What to Submit

Every team must submit a system design plan for their proposed system **IN A SINGLE PORTABLE DOCUMENT FORMAT (PDF) FILE**. Winners will build and test their design if selected from their respective division. This PDF submission must include the following criteria:

1. COVER PAGE stating the following:

- Your team name (Create a clever team name)
- Your affiliation (School district, TSA club, 4H chapter, Scout Troop, etc.)
- Adult Sponsor Name, Address, Phone, Email Address, & T-shirt Size*
- Team Members' Names, Grade or Age levels, & T-shirt sizes*
- Division that you are seeking to enter (i.e., Level 1, Level 2, Level 3)

**T-shirts are only provided to winning teams.*

2. EVIDENCE OF THE DESIGN PROCESS used to create the design plan, including:

- Statement of the problem
- Research documentation
 - Provide links to any online resources consulted.
 - Include citations for any physical items (e.g., books or other resources).
- Evidence of having considered at least 3 different initial designs (e.g., thumbnail sketches of different design options)
- Clear drawing(s) of the chosen system to build with components labeled and overall dimensions to help communicate about your idea and how it will work
 - Photos of any 3D models you create are optional, but highly recommended.

3. LIST OF ITEMS ON HAND, DONATED, or RECYCLED

- Detailed list of what items you will be providing that have no additional cost involved

4. ITEMIZED BUDGET following the format of the table below

Item	Price Per Unit in US \$	Quantity Needed	Overall Cost in US \$	Link to website or store where purchased
One item per line. Add as many rows as needed.				

5. LETTER OF SUPPORT CONTAINING:

- Confirmation that permission has been granted to build/test this system.
- Defined space where this system will be housed, if funded
- Formatted with Organizational Letterhead and/or Seal of Authenticity
 - Examples of Documentation Include:
 - Letter from mentor, principal, organizational leader
 - Email from mentor, principal, organizational leader

6. DEMONSTRATED NEED:

- In this section, teams should:
 - Explain what systems are already at the school/site
 - Justify how the proposed system would benefit students in the program.
- The intended purpose of this competition is to expand the number of educational sites with hydroponic and aquaponic systems and to encourage more exposure of these systems to young people. Sites that already have robust systems in place are encouraged to offer their expertise to others instead of trying to expand their own systems.

7. OPTIONAL VIDEO:

- Explanation of System Operation
- This is not essential but may aid judges in understanding the functionality of the proposed system.
- Ensure the videos are no longer than three (3) minutes.

How to Submit

- Email your PDF Design Plan file to kuhnsaquaponics@gmail.com
- Title your submission as “**YOUR TEAM NAME_Final Submission**”
- Submit your entry no later than 5:00 p.m. on Friday, March 8, 2024.

Other Criteria and Information

1. The design plan submitted should represent the work of the students, not the adult mentor(s). The mentor is welcome to provide input, advice, and feedback to the students, but the submission should represent the work of the students.
2. All design plans that are aquaponic systems may be considered for the Level 3 (Aquaponic Division) even if you specify Level 1 or Level 2 division.
3. The cover page is the **ONLY PLACE** in the document that should indicate your name(s) or affiliation. The cover page will be removed for judges. Judges should not know whose plan is being reviewed when reading the design plan.
4. When winning designs are chosen, teams will be provided with feedback from the judges that should be considered when moving forward with the plan.
5. Limited to one submission per school/site in PA.
6. Advisors may only contribute to one application.
7. Anticipated Timeline

Application Deadline	March 8, 2024 @ 5:00 p.m.
Final Judgement and Winners Chosen	March 18, 2024
Checks will be sent to winning teams	Approximately March 30, 2024
Winners construct, test, and cycle their systems	March 30-May 24, 2024
Winners visit Millersville University	Friday, April 12, 2024
Winners submit final documentation	May 24, 2024

Winners will receive Professional Development, Training and Insight from INTAG Aquaponics' Professionals after Final Implementation and Design (TBD).

Judging

- Judges will consist of selected MU faculty and students as well as representatives from an industry leader, INTAG Aquaponics.
- Blind judging will be utilized to ensure impartiality.
- Penalties may be levied for any violation of rules stated in this document.
- Judging criteria will be as follows:

Criteria	Weight
Design Process Submission demonstrates that students are engaged in the design process. There is documentation that students did research, considered solutions and potential issues, created a solution, etc.	20%
Effective use of budget Submission shows efficient and well-thought-out use of budget.	10%

Criteria	Weight
Constructability The system that is designed can be feasibly constructed. Specialized parts should be clearly marked to indicate how they will be acquired or produced.	10%
Functionality The system will likely function and be able to grow plants.	20%
Creativity The system demonstrates that the students created their own solution and did not just copy an existing design.	10%
Effective use of technology Submission demonstrates the use of appropriate technologies in developing the plans for the system (e.g., CAD drawings, 3D printing designs, research, word processing).	10%
Demonstration of Need Submission explains any existing systems in place and shows how this new system would benefit students.	20%

Resources

1. There are many online resources that provide useful information. YouTube sites can be a great source.
2. Look for books available on both hydroponics and aquaponics.
3. Consider viewing other successful systems that you know of in your region.
4. Tommy Kuhns will answer up to 3 questions per team (within reason). One of these questions may be a request to look over a draft of the design. These questions may be sent to kuhnsaquaponics@gmail.com. **In the subject line, please state your team name and question number.** Questions asking for clarification of the rules of the competition will not count against a team's total questions. Mr. Kuhns is not able to advise or comment on the competitiveness of your project. He reserves the right to determine what is a clarification question.
5. There is an **optional informational zoom meeting** scheduled on **Friday, February 9, 2024 at 3:30 PM**. See next page for access information. Participating students must have an adult representative present.

Join Optional Zoom Meeting

Friday, February 9, 2024 at 3:30 PM

<https://millersville.zoom.us/j/99265546497>

Meeting ID: 992 6554 6497

Dial by your location

Find your local number: <https://millersville.zoom.us/u/acbvptpaiH>

This meeting will be recorded and made available for those who cannot attend.

You must complete the form below to receive that information.

**For the Latest competition Information,
please fill out this Form ASAP.**

Let us know that you are working on a design plan to submit. We will
share additional information as it becomes available.



<https://forms.gle/kth9oWjLpovrddeo9>

Contact Information

If you have competition questions,
please contact:

Mr. Tommy Kuhns

College Student & Competition Leader

Millersville University

Applied Engineering, Safety & Technology

kuhnsaquaponics@gmail.com

All other inquiries, please contact:

Dr. Sharon Brusic

Professor, Student Advisor, & Grant Director

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