

Ioponics
2021-2022 STEM Scale-Up Program

Grade Levels: PreK-12, available in or out of school

Information Sessions: Any one of the 6 synchronous remote opportunities
(Wednesday, January 27 or Friday, February 19 - 7:30, 11:30, or 3:30)

Website: <https://www.wartburg.edu/ioponics/>

Video Link: <https://www.youtube.com/watch?v=94RS3T5hBTw&feature=youtu.be>

Award Provides:

- One complete 1-gallon or 30-gallon Ioponics system
- 4 hours of professional development with \$120 stipend (or sub reimbursement)
- Standard-aligned lesson plans for grades PreK-4, 5-8 and 9-12
- Technical support

30-gallon System Includes:

- 30-gallon aquarium
- Plant grow bed
- Base and stand
- UV light
- Timer
- Water pump & tubing
- Air pump & tubing
- PVC piping
- Seeds
- Fish & starter pellets

1-gallon System Includes:

- Two 1-gallon containers
- Net cup and plug
- Aquarium rocks
- Plant
- Fish

Additional Cost(s) to Awardee In 2021-2022:

- Travel to training
- Additional aquaponics fish pellets
- Seeds & plants (personal choice)

Approximate Sustainability Cost After Award Period:

Consumables such as aquaponics fish pellets, fish, seeds, plants, etc.

Program Summary:

Ioponics, a classroom aquaponics system, based on E.O. Wilson's concepts of biophilia. The term "biophilia" puts a label on humanity's innate tendency to seek connections, or attachments, to other living things. Ioponics is an educational tool that easily incorporates biophilia in the classroom with NGSS (Next Generation Science Standards) and AFNR (Agriculture, Food, and Natural Resources) standards into a "living" learning setting. The model provides a hands-on, minds-on approach to STEAM (Science, Technology, Engineering, Agriculture and Mathematics) curriculum. The 1-gallon and 30-gallon Ioponics systems allow for any educational setting to actively engage with living organisms for agricultural and scientific purposes, independent of an outdoor environment. Beyond the STEAM and AFNR lessons, the Ioponics system engages with natural andragogical practices, builds student self-efficacy, strengthens 21st century skills and provides a classroom foundation for other curricular disciplines. Understanding the process of food production develops vested community members and creates engaged and knowledgeable citizens.

Ioponics creates a foundation for students to understand where their food comes from, how it is grown and its integration into curricular disciplines. While plants and animals are common in classrooms, typically they are not part of a food production cycle. The Ioponics systems naturally provide a linchpin which support the seven NGSS crosscutting concepts and the eight AFNR pathways. The overarching NGSS concepts are: 1) patterns, 2) cause and effect, 3) scale, proportion, and quantity, 4) systems and system models, 5) energy and matter, 6) structure and function, and 7) stability and change. The AFNR pathways (systems) include: 1) agribusiness, 2) animal, 3) biotechnology, 4) environmental service, 5) food products, 6) natural resources, 7) plant, and 8) power, structural, and technical. Ioponics provides a context to address all standards and pathways in one self-contained model.

Ioponics is different from other aquaponics systems because it couples an easily modifiable hands-on unit with academic supports; standard-aligned lessons, systems support network and the ability to add personally created lessons to the composite system. Participating educators can create their own lessons to be shared with the Ioponics community or provide ideas for lessons which will be created by pre-service educators at Wartburg College.

What is Required to Implement the Program:

Educator must attend a half-day of professional development and participate in the Iowa STEM Council program evaluation. Educator must choose between the 1-gallon and 30-gallon system. For 30-gallon system (minimum): 1) Square floor/ counter space 41" (104 cm) wide by 16" (41 cm) deep, 2) Height availability of 52" (132 cm), and 3) accessibility to an outlet. For participant(s): 1) construct, use, and maintain the system, 2) teach the lessons, 3) communicate successes and problems with Ioponics. Educators must participate in the Iowa STEM Council program evaluation.

Professional Development:

A half-day professional development session includes lesson presentation and hands-on system construction. Educators may also choose to attend virtual one-hour training opportunities throughout the year.

Duration: One half-day of training (4 hours)

Date(s): Training dates will be offered in late summer between July 15 – September 15 (8:30am to 12:30pm or 1:00pm to 5:00pm)

Location: Trainings may be held in each of the six STEM regions