



Student Design Competition

The Ohio Water Environment Association (OWEA) launched a Student Design Competition in 2017 modeled after the Water Environment Federation’s (WEF) Student Design Competition held annually at WEFTEC®. The purpose of this competition is to promote “real world” design experience for students interested in pursuing an education and/or career in water and environmental science and engineering. The competition is geared towards upper class students and/or graduate students; however, all students are encouraged to participate. In addition to gaining real world design experience, the student design competition provides numerous networking opportunities with young and experienced water professionals in the industry. The judging panel for the competition consists of water industry experts from government and engineering consulting firms.

The table below provides a summary of universities and students participation in the Student Design Competition since 2017.

YEAR	TOTAL # of STUDENTS	UNIVERSITY	OPPORTUNITIES
2017	9	<ul style="list-style-type: none">• Cleveland State University	
2018	27	<ul style="list-style-type: none">• Cleveland State University• Case Western Reserve University	Winning team attended 2018 One Water Conference in Columbus and represented Ohio at WEFTEC 2018
2019	25	<ul style="list-style-type: none">• Cleveland State University• Case Western Reserve University• Youngstown State University	Winning team attended 2019 OWEA State Conference in Sandusky and represented Ohio at WEFTEC 2019
2020	12	<ul style="list-style-type: none">• Cleveland State University	Winning team presented to water and wastewater

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YEAR	TOTAL # of STUDENTS	UNIVERSITY	OPPORTUNITIES
		<ul style="list-style-type: none"> Case Western Reserve University Kent State University 	professionals in Ohio and represented Ohio at WEFTEC 2020
2021	20	<ul style="list-style-type: none"> Baldwin Wallace University Cleveland State University Case Western Reserve University University of Akron 	Winning team presented at 2021 Ohio One Water Conference in Cincinnati and represented Ohio at WEFTEC 2021
2022	16	<ul style="list-style-type: none"> Cleveland State University Case Western Reserve University University of Akron 	Winning team presented at 2022 Ohio One Water Conference in Cleveland and represented Ohio at WEFTEC 2022
Competition was not hosted in 2023			
2024	9	<ul style="list-style-type: none"> Case Western Reserve University University of Akron 	Winning team presented at 2024 Ohio One Water Conference in Sandusky and represented Ohio at WEFTEC 2024

Student Design Competition – 2017

The inaugural competition was held on Friday, April 28, 2017 at Cleveland State University (CSU) where three student teams competed and presented their ideas on wastewater and stormwater topics in Northeast Ohio. Young Professionals from OWEA advised the students throughout the process by providing input and feedback on the projects. The judging panel selected graduate students *Saisantosh Vamshi Harsha Madiraju, Nikitha Shamirpet, Rutambara Sonawane* and *Venkatesh Kummarakuntla* from *Cleveland State University* as winners of the 2017 Student Design Competition. The winning team presented on *Enhanced Phosphorus Removal to Reduce Algal Blooms in Lake Erie*. The students performed survey of an agricultural farm in Northwest Ohio to understand runoff discharge from the land to a nearby stream. The winning team received plaques and award certificates. The students were also recognized in the quarterly issue of NESOWEA Sparkling Waters and OWEA Buckeye Bulletin.

Student Design Competition – 2018

The 2018 Student Design Competition was held on Friday, April 27, 2018 at Cleveland State University where seven teams presented their innovative ideas to a panel of judges from OWEA. For the Spring 2018 semester, Cleveland State University (CSU) initiated a new

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inter-disciplinary course built around the competition. Twenty (20) students enrolled in this course and participated in the competition to meet the class requirements. Case Western Reserve University (CWRU) team was a new addition to the SDC in 2018. Young Professionals from OWEA advised the students throughout the process by providing input and feedback on the projects. The students had the opportunity to visit the City of Solon's Water Reclamation Facility, hosted by Paul Solanics, Director of Water Reclamation Department, to understand the wastewater treatment process and design an optimal treatment process. The judging panel selected *Aaron Mann, Madeleine Harris, Nicholas Merchant-Wells* and *William Worsham* from *Case Western Reserve University* as the winners of the 2018 Student Design Competition. The winning team presented on *Please Do Not Feed Medicate the Fish: Pharmaceuticals in WRRF Effluent*.

The 2018 Student Design Competition winning team received plaques, award certificates and one-year FREE WEF and OWEA membership. The winning team also received an all-expense paid trip to One Water Ohio Conference to present their project in Columbus, OH. The students had the opportunity to network with water professionals, learn about career opportunities in the industry and attend various technical sessions on leading water and wastewater topics. The students were also recognized in the quarterly issue of NESOWEA Sparkling Waters and OWEA Buckeye Bulletin.

The winning team also received an all-expense paid trip to attend WEFTEC® in New Orleans, LA and competed with 22 teams from across the United States and around the world at the 2018 WEF Student Design Competition. At WEFTEC®, the students had the opportunity to interact with experts in the water industry and attend a career fair hosted by more than 50 companies.

The following problem statements were provided to the students at the kickoff meeting:
Wastewater: Please Do Not Feed Medicate the Fish: Pharmaceuticals in WRRF Effluent at Solon's Water Reclamation Facility
Stormwater: Innovative Urban Stormwater Treatment Technologies

Student Design Competition – 2019

The 2019 Student Design Competition was held on Friday, April 26, 2019 at Cleveland State University where seven teams presented their innovative ideas to a panel of judges from OWEA. The nine (9) students from CWRU enrolled in Dr. Kurt Rhoads's class and the eight (8) students from Cleveland State University enrolled in Dr. Sanda Kaufman's class are participating in the 2019 Student Design Competition to meet the class requirements. Youngstown State University (YSU) team was a new addition to the SDC in 2019. Young Professionals from OWEA advised the students throughout the process by providing input and feedback on the projects. The students had the opportunity to visit the City of Lorain's Wastewater Treatment Plant, hosted by Doug Dietzel, Environmental Manager, to understand the wastewater treatment process and design an optimal treatment process. The judging panel selected *Christopher Metzinger, Spencer Desalvo, Tyler Stratton*, and

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*Walter Wasilewski from Youngstown State University as the winners of the 2019 Student Design Competition. The winning team presented on *Outside, Looking In: Determining Toxicity from Trickling Filters*. Jack Worsham, Maddie Hart and Sharon Kang from Case Western Reserve University and Ashley Kirk, Corey Czinger, Joe Gyorky and Tena Petrovic from Cleveland State University received an Honorable Mention Award.*

The 2019 Student Design Competition winning team received plaques, award certificates and one-year FREE WEF and OWEA membership. The winning team also received an all-expense paid trip to OWEA State Conference to present their project in Huron, OH. The students had the opportunity to network with water professionals, learn about career opportunities in the industry and attend various technical sessions on leading water and wastewater topics. The students were also recognized in the quarterly issue of NESOWEA Sparkling Waters and OWEA Buckeye Bulletin.

The winning team also received an all-expense paid trip to attend WEFTEC® in Chicago, IL and competed with more than 20 teams from across the United States and around the world at the 2019 WEF Student Design Competition. At WEFTEC®, the students had the opportunity to interact with experts in the water industry and attend a career fair hosted by more than 50 companies.

The following problem statements were provided to the students at the kickoff meeting:
Wastewater: Outside, Looking In: Determining Toxicity from Trickling Filters at Lorain's Wastewater Treatment Plant

Stormwater: Valley View Stormwater Drainage Area Study to Mitigate Flooding (Akron, OH)

Student Design Competition – 2020

The 2020 Student Design Competition was held Virtually through Zoom on Friday, April 24, 2020 where four teams presented their innovative ideas to a panel of judges from OWEA. Kent State University (KSU) team was a new addition to the SDC in 2020. The students had the opportunity to visit Summit County's Wastewater Treatment Plant, hosted by Christen Wood, Operations Administrator, to understand the wastewater treatment process and design an optimal treatment process. The judging panel selected *Aaron Mann, Kevin Pataroque, and Peter Thompson* from Case Western Reserve University as the winners of the 2020 Student Design Competition. The winning team presented on *No Waste, Problem Aced: Optimizing Beneficial Reuse of Biosolids Prior to BNR Upgrades*. *Matt Ellerbrock, Sam Harbol, Martin Maratani and Brandon Thompson* from Cleveland State University received an Honorable Mention Award.

The 2020 Student Design Competition winning team received plaques, monetary award certificates and one-year FREE WEF and OWEA membership. The winning team presented their project to water and wastewater professionals in Ohio. The students were also recognized in the quarterly issue of NESOWEA Sparkling Waters and OWEA Buckeye Bulletin.

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The following problem statements were provided to the students at the kickoff meeting:

Wastewater: No Waste, Problem Aced: Optimizing Beneficial Reuse of Biosolids Prior to BNR Upgrades at Summit County Wastewater Treatment Plant

Stormwater: Stormwater Solutions for Mitigating Perennial Flooding Problems at Martin's Run in Lorain, Ohio

Student Design Competition – 2021

The 2021 Student Design Competition was held Virtually through Zoom on Friday, April 23, 2021 where five teams presented their innovative ideas to a panel of judges from OWEA. Baldwin Wallace University (BW) and University of Akron (UA) teams were a new addition to the SDC in 2021. The students had the opportunity to visit City of Lorain's Wastewater Treatment Plant, hosted by Doug Dietzel, Environmental Manager, to understand the wastewater treatment process and design an optimal treatment process. The stormwater teams received ArcGIS and PCSWMM modeling software training from NEORSD and CHI. The judging panel selected *Abby Slates, Andi Chakraborty, and Sofie Iwamasa* from *Case Western Reserve University* as the winners of the 2021 Student Design Competition. The winning team presented on *Methane Recovery for Lorain Wastewater Treatment Plant*. *Audrey Atzel, Emily Brown, and Michael Marefka* from *Cleveland State University* received an *Honorable Mention Award*.

The 2021 Student Design Competition winning team received plaques, monetary award certificates and one-year FREE WEF and OWEA membership. The winning team presented their project to water professionals at the 2021 Ohio One Water Conference in July. The team represented Ohio at 2021 WEFTEC in October. The students were recognized in the quarterly issue of OWEA Buckeye Bulletin.

The following problem statements were provided to the students at the kickoff meeting:

Wastewater: Methane Recovery for Lorain Wastewater Treatment Plant

Stormwater: Hemlock Creek Restoration (NEORSD)

Student Design Competition – 2022

The 2022 Student Design Competition was held Virtually through Zoom on Friday, April 22, 2022 where four teams presented their innovative ideas to a panel of judges from OWEA. The students had the opportunity to visit City of Akron's Water Reclamation Facility, hosted by Steve Baytos, Superintendent, to understand the wastewater treatment process and design an optimal treatment process. The judging panel selected *Noor Fahoum, McCallah Ferry and Anna Soehnlén* from *The University of Akron* as the winners of the 2022 Student Design Competition. The winning team presented on *A Comprehensive Assessment of the Akron Water Reclamation Facility*. *Arianna Killing, Molly Drews and Jillian Bastock* from *Cleveland State University* received an *Honorable Mention Award*.

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The 2022 Student Design Competition winning team received plaques, monetary award certificates and one-year FREE WEF and OWEA membership. The winning team presented their project to water professionals at the 2022 Ohio One Water Conference in July. The team represented Ohio at 2022 WEFTEC in October. The students were recognized in the quarterly issue of OWEA Buckeye Bulletin.

The following problem statements were provided to the students at the kickoff meeting:

Wastewater: Phosphorus Removal for City of Akron Water Reclamation Facility

Stormwater: Brook Park Stormwater Management (NEORSD)

Student Design Competition – 2024

The 2024 Student Design Competition was held Virtually through Zoom on Friday, April 26, 2024 where two teams presented their innovative ideas to a panel of judges from OWEA.

The students had the opportunity to visit City of Lorain’s Philip Q. Maiorana (PQM)

Wastewater Treatment Plant, hosted by Doug Dietzel, Environmental Manager, to

understand the wastewater treatment process and design an optimal treatment process.

The judging panel selected *Violet Huang, Zul Kazeem and Adrianna Navarro Garriazo* from *Case Western Reserve University* as the winners of the 2024 Student Design Competition.

The winning team presented on *Enhancing Biosolids Production at Philip Q. Maiorana (PQM) Wastewater Treatment Plant*.

The 2024 Student Design Competition winning team received plaques, monetary award certificates and one-year FREE WEF and OWEA membership. The winning team presented their project to water professionals at the 2024 Ohio One Water Conference in August. The team represented Ohio at 2024 WEFTEC in October. The students were recognized in the quarterly issue of OWEA Buckeye Bulletin.

The following problem statements were provided to the students at the kickoff meeting:

Wastewater: Enhancing Biosolids Production at City of Lorain’s Philip Q. Maiorana (PQM) Wastewater Treatment Plant

Stormwater: Stormwater Solutions for Mitigating Perennial Flooding Problems at Martin’s Run in Lorain, Ohio

Faculty Feedback

This excellent initiative started out well and is getting better every year! It offers students the opportunity to sharpen their skills, experience interdisciplinary teamwork, and help solve real environmental problems.

~Dr. Sanda Kaufman, Professor at Cleveland State University

This was a fantastic competition once again. The biggest benefit to our students was working with so many wonderful water professionals. One the students told me that she finally has learned what it might be like working as an engineer and loved it!

~Dr. Kurt Rhoads, Professor at Case Western Reserve University

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What a fantastic opportunity for the students from this area! And the professionalism and excellence they witnessed from the entire NESOWEA contingent is to be commended.

~Dr. Christopher Miller, Professor at University of Akron

Student's Feedback

The overall experience was amazing! It was inspiring to see the incredible work other students are doing to improve their communities—it made me want to do even more! Even though I had no prior knowledge of wastewater management before the competition, the event provided me with the skills and knowledge to participate confidently, as if I had been doing it for a long time. I felt really proud, and I am so grateful for the opportunity OWEA provided. It is an experience I will cherish forever. **~Zul Kazeem, CWRU**

My experience at WEFTEC was truly impressive, especially seeing the incredible work and research from others, along with their innovative ideas for solving various problems. WEFTEC offers a fantastic opportunity for students to connect with industry professionals and get exposed to the latest technologies in the field. It is a great platform for exploration and growth, especially for students looking to broaden their knowledge and understanding of real-world challenges. There were definitely moments of doubt throughout the process, where I questioned whether I should keep going because of the many difficult challenges I encountered. But looking back, I am truly happy that I persevered and made it to the end—it's all been worth it. The experience opened my eyes and taught me how to improve my research skills, manage time more effectively, and coordinate better with others. It has been an invaluable journey that helped me grow both personally and professionally.

~Violet Huang, CWRU

Participating in the NESOWEA Student Design Competition and consequently having the opportunity to attend the One Water conference and WEFTEC has been a great experience all around. During the student design competition in the spring, we gained a lot of research skills as we learned more about different technologies, worked with our mentor, and reached out to suppliers and wastewater treatment plants for advice. At the conferences, I enjoyed being able to network with countless professionals in the water and environmental industries and hear about their experience. I would highly recommend the experience to anyone that is even remotely interested in water and/or the environment! **~Abby Slates, CWRU**

The NESOWEA Student Design Competition gave me the opportunity to experience engineering outside of the classroom. Researching as a team about technologies we had never heard about made me excited about learning, while conversing with experts made me feel welcomed into the field. After presenting at the One Water conference and WEFTEC, I felt so accomplished and proud of what my team had done. This experience is so accessible and definitely worth your time. **~Sofie Iwamasa, CWRU**

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Participating in the NESOWEA student design competition has opened so many doors for me and my teammates, between attending two major conferences including the One Water conference in Cincinnati and WEFTEC in Chicago, my teammates and I have been able to converse with professionals in the field in which we wish to enter after graduation and set up contacts with many major engineering firms. In addition to networking opportunities and meeting up and coming professionals, the research experience alone is valuable and really gives you an inside look into what environmental engineering is truly like! 10/10 would participate again. ~ **Andi Chakraborty, CWRU**

Participating in the OWEA Student Design Competition was one of the best decisions of my career. My lack of industrial experience in the engineering field was certainly a concern for me entering this competition, but I now feel confident in my ability to enter the environmental engineering industry. I was able to develop my skills in project management as well as in literature review in order to fulfill the needs of this project. Looking back on all the in-person and remote meetings and all the hours spent planning and developing our compost facility design, I could not be more grateful for this experience. ~ **Peter Thompson, CWRU**

Participating in the OWEA Student Design Competition was an illuminating experience. Stepping from a research environment into a real-world engineering team, I was able to learn so much in a collaborative environment. Prior to the competition, I was worried about my background as a non-civil engineer, but I was able to use my chemical engineering knowledge and the coursework I have taken into our design. It is really satisfying to have the opportunity to apply all that I have learned in my undergraduate career through this challenge, and I know that my experience in the Student Design Competition will help me wherever I end up in the future. ~ **Kevin Pataroque, CWRU**

Attending One Water conference was an absolute blast, and I am so grateful to everyone who helped facilitate my group's attendance. It was so exciting to be surrounded by professionals who are working every day to solve the issues we learn about in class. The Student Design Competition is an excellent way for students to apply their skills to real world issues and meet industry professionals along the way. I would recommend more students get involved in them. ~ **Madeleine Harris, CWRU**

Attending One Water Ohio was a great experience for me, especially as I begin my career. I learned so much in just a few days, from the technical sessions to the exhibition hall to the 5S induction ceremony. The highlight for me was getting the chance to meet and learn from so many experienced and knowledgeable water professionals. I left the conference confident that the water environment industry is the right place for me. ~ **Nicholas Merchant-Wells, CWRU**

One Water was a phenomenal experience for me and my team. In addition to presenting on our project for the WEF Student Design Competition, I had the opportunity to attend

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numerous technical sessions and talk to industry professionals throughout Ohio at both the YP networking event and the evening event at Brother's. Seeing so many people come together to celebrate accomplishments and address challenges in water and wastewater has reinvigorated my love of both the subject and the industry. My team and I are unendingly grateful to OWEA for such a formative and exciting experience so early in our careers. ~*William Worsham, CWRU*

2017 Student Design Competition



2018 Student Design Competition



2019 Student Design Competition



2020 Student Design Competition

Conclusion

- The superior cost, better environmental impact, and overall reliability of biogas and compost enabled us to choose these methods.
- From current parameters, 36 cubic meters per day of biogas can be produced
- 244.8 kWh of energy daily
- Compost superior option, capital cost for biogas too high

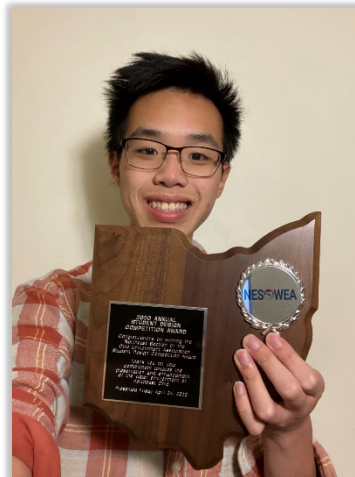
- Both processes divert sludge disposed to landfill
- If needed, potential to be paired to eliminate almost all waste

Case School of Business Case Western Reserve University

NESOWEA

Zoom Meeting (00:05:31)

Kevin Padroque
Mauritshree
colleen
Peter Thompson
mike wolke
Aaron Mann



2021 Student Design Competition



2022 Student Design Competition



2024 Student Design Competition

