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## **NEWEA – Student Design Competition**

### **INTRODUCTION**

The NEWEA Student Design Competition (SDC) is intended to promote a “real world” design experience for students interested in pursuing an education and/or career in water engineering and sciences. This competition tasks teams of student members within NEWEA to design and present a project solution meeting the requirements of a problem statement that they have worked on together as a team. This competition is intended for both undergraduate and graduate students, typically completing a capstone project.

For More Information, contact:

Nick Tooker chair for the NEWEA Student Activity Committee (SAC): (413) 313-6217 or [nbtooker@umass.edu](mailto:nbtooker@umass.edu)

The NEWEA Student Activity Committee (SAC) is always looking for interested people to help further the activities supported by the committee. If you are interested in helping or becoming a member please contact Nick Tooker.

### **STUDENT DESIGN COMPETITION**

Student Design teams compete in one of two categories, wastewater design (WW) and water environment design (ENV). Students will need to specify which group they believe their project falls into. Final grouping is at the discretion of the SAC Chair. The wastewater design competition is intended to include traditional wastewater collection and treatment design projects, such as hydraulic capacity design, upgrades to existing treatment systems, biosolids handling, etc. The water environment design competition is intended to include contemporary engineering topics, such as stormwater management design, green infrastructure, low impact development, water reuse, wetland construction, distributed treatment systems, systems in developing countries, etc. Both competitions will follow the same guidelines and the same scoring system.

The competition consists of two portions, the written submittal and the presentation, which will take place in Spring at a location TBD.

The scope and extent of the project should be consistent with the level of a senior or graduate engineering/science design or capstone course. Students are expected to work with little assistance from an advisor, professor, and/or industry professionals/consultants. The students are expected to work together as a team to recommend a complete engineering design solution. Students may use whatever printed or digital references or resources they choose, with appropriate citations.

Students are expected to perform the necessary calculations for the project. This is not intended to be a study or research project or literature review. Although some initial literature review and/or research will be required, the bulk of the project should incorporate pertinent calculations for the design.

For example, if the project involved a wastewater treatment plant expansion, judges will look that each team performed the following:

- Decision matrix (provide why you ended up with that particular process or design etc.);
- Hydraulic profile;
- Preliminary sizing of major equipment (aeration basins, clarifiers, chlorine contact chambers, etc.);
- Incorporated information from different manufacturers;
- Population analysis to determine design flow rates; and
- Preliminary cost evaluation for both capital and operational costs.

All of the design work should be submitted in the design report, clearly labeled and referenced.

See below for information regarding the report.

Scoring of the project will be determined through an evaluation by a panel of judges selected from the NEWEA community of the written and oral presentation skills. Written and oral skills will be evaluated separately and the scores will be added for the total score (see Exhibit A for the example judges scoring sheets).

Written data (submitted in electronic format) will be evaluated by the judges prior to the oral presentations. The data will be available to the judges during the oral presentation for their reference. After the oral presentation, judges are permitted to ask questions based on information provided in both the written submittal and oral presentation.

## ENTRY FORM

Each team shall submit an entry form for the competition. Each university is permitted to send up to two teams to the competition, one in each category (WW and ENV). The team names shall be referred to in the following manner: University-Category. For example, ABC-WW or ABC-ENV. There is no entry fee for the SDC. Students and other audience members are responsible for their own travel arrangements to attend the SDC. Each team must also submit the Presentation Form at a later date that includes the names of team members and presenters.

## PRIZES

NEWEA is providing prizes for the 2018 program. The prizes shown below, which are subject to change each year, will be awarded following the Student Design Competition. Please note that each team participating in the event will receive a participation bonus for their team regardless of placement based upon the presentations and written submittals. Students will indicate on the Entry Form where the check should be sent.

PRIZE	AWARD	MONETARY VALUE
First Place (Wastewater Design)	NEWEA SAC Award WEFTEC. Travel Allowance*	\$600 TBD
First Place (Environmental Design)	NEWEA SAC Award WEFTEC Travel Allowance*	\$600 TBD
All other teams	Participation Bonus	\$100

\*The first place teams will be required to present their projects at the Water Environment Federation (WEF) Student Design Competition, to be held at WEFTEC in the Fall.

The winning teams from each category (Wastewater and Environmental) should follow the WEF deadlines and guidelines for the national competition, located on their website at <https://www.wef.org/membership/students-and-young-professionals2/student-design/>. Note that some items may be due as early as May.

The first place winners in each category will be announced at the conclusion of the SDC. The Awards presentation will be held at the NEWEA spring meeting Awards Luncheon. Team members or designees of the team are encouraged to attend the Awards presentation.

## **GENERAL REQUIREMENTS**

The general requirements for participation in the competition are:

- Team size will be limited to a maximum of eight students per team. One team per school is allowed in each design category. It is recommended that schools with more than one team interested in a design category host an internal competition to determine the team who will compete at the NEWEA Student Design Competition. A school may send two teams, one in each design category. Up to two graduate students could be part of the team, however teams of only graduate students will not be allowed.
- The sponsoring professor should provide limited assistance to the students on an as needed basis, keeping in mind that this project should be the students' opportunity to showcase their knowledge gained throughout their time in school.
- The engagement of the professional community and the local chapters of the NEWEA is strongly encouraged. Project topics, design data, and feedback may be obtained from members of the professional community.
- Attendance at the Student Design Competition in May.
- Each member of each team must be a WEF/NEWEA Student Member in good standing who:
  - Has been selected by his/her university to participate.
  - Have filed an application with their NEWEA student chapter and paid the required dues prior to the competition. The same holds true for continuing Student Members.
  - Student members who have graduated at the time of the NEWEA Competition will be allowed to participate, if they were a registered student within the last 6 months. Students who have graduated must also be a member of WEF/NEWEA.
- All entry materials become the property of the NEWEA.
- A representative of the NEWEA will preside during the competition and ensure that there is adherence to the time schedule and event rules.
- The first place team in each category should be prepared to participate in the National Student Design Competition at WEFTEC in September. Some travel funds are provided as part of the first place award.

## WRITTEN SUBMITTAL REQUIREMENTS

Design documents shall be created in a single PDF format file that is organized with cover pages, table of contents, report sections, and appendices, if used. The single PDF file shall be emailed to the SAC chair by the deadline.

The design report shall include, in the following order:

1. **Cover Page** – with project name, university name (team name), year, and entrants' names.
2. **Table of Contents**
3. **Abstract/ Executive Summary** – Provide a brief overview/ summary of the design, not to exceed 200 words. This section is not counted as part of the 20-page limit.
4. **Summary of Project Team Effort** – Provide a 1 – 2 page summary of the project team effort, including:
  - Each team member's name and role in the effort
  - Names of any other individuals that assisted in the effort. This section is not counted as part of the 20-page limit.
5. **Project Description** – Provide a description of the design problem, alternatives evaluation, and recommended design solution (not to exceed 20 pages\*), including the following information:
  - Statement of design problem.
  - Discussion of alternatives evaluation – Discussion should provide a clear description of the alternatives and evaluation technique.
  - Description of recommended design solution – Discussion must cover the salient facts upon which the recommendation is made, present a clear recommendation of action, and provide bases for design. Relevant data should be presented in a clear manner. All elements shown on the judging form should be addressed, including economic analysis.
  - Formatting to include a minimum of 0.75 inch margins on all sides; Calibri, Arial, or Times New Roman font with a minimum 11-point font size.
  - Pages of the Project Description portion of the report shall be continuously numbered.
  - Color diagrams, graphics, plots, and photographs may be included that reflect the unique features of the project. Each is to be identified with an appropriate descriptive caption. Graphics/photos included within the project description will count toward the 20-page limit.

\*The number of pages used in the Project Description is checked to ensure compliance with the 20 page limit. Non-compliance may result in penalties.

6. **Supporting Documentation** – If needed, provide drawings, calculations, tables, vendor submittals, detailed cost estimates, and other voluminous documents, as appendices.
7. **References/Acknowledgements** – All references and resources used for this project shall be cited appropriately.

The judges will be directed to focus their review on the Project Description section of the design reports. Teams shall develop their materials such that their complete analysis and design solution may be understood from the 20 pages of material provided in the Project Description.

Teams are encouraged to use a checklist to ensure all necessary documents are included in the design reports. Failure to ensure all documents are accounted for may result in a team penalty.

## **PRESENTATION REQUIREMENTS**

**A presentation describing the teams design problem, approach, evaluation, design effort, and recommendations shall be created in PowerPoint format.**

Each team will be allowed a thirty (30) minute block of presentation time, including a two (2) minute setup, twenty (20) minute presentation directly followed by an eight (8) minute question and answer session. There will be time warning signs held up during the presentation when there are 5 minutes and 1 minute remaining to help the students from going over their time allotment. To stay on schedule, the presentation will be kindly cut off after 20 minutes, even if there are slides remaining. Therefore, time management and practice are important.

Teams may consist of up to eight members. However, a maximum of four team members shall be permitted to present and answer questions. If there are four or less team members on the presentation platform, each member is expected to have a role in the presentation and in answering questions. If required, one additional team member (a fifth team member) may be on the presentation platform but shall be dedicated solely to advancing the presentation slides. Additional team members are not permitted on the presentation platform or allowed to speak during the presentation or the question and answer period. However, they are encouraged to show their support as audience members. All presenting team members (excluding the A/V member) are encouraged to participate in the question and answer session. Questions are drawn from the judging panel only. The presentation rooms will have a standard podium, screen, laptop, and projector.

## **SIGNIFICANT SUBMITTAL ITEMS AND DATES**

Each entry will consist of the following:

- An official Entry Form submitted to the SAC Chair by 11:59pm on March 1, 2019. This submittal does not need to identify team members, but must include contact information for each team planning a submittal. Please contact the SAC Chair in advance if a university has multiple teams interested in one category and is intending to hold an internal competition after the Entry Form deadline.
- A Participation Form showing final team member names and roles, submitted to the SAC Chair by 11:59pm on April 15, 2019.
- A project written data submittal must be received by the SAC Chair no later than 11:59pm on April 23, 2019.
- The presentations will be made end of April or in early May 2019. The SAC Chair needs to receive the final presentation prior to the competition to check for technical difficulties prior to the start of the competition. Teams will need to verify that their presentation is on the general laptop before the competition. Students may bring their presentations on a portable flash drive to transfer it to the general laptop.

## **JUDGES AND JUDGING CRITERIA**

The event will be judged by an impartial panel consisting of members of academia, public agencies and private consulting practices. The judging team shall have no direct affiliation/representation with any college participating, owner project, or engineering firm involved as part of the projects they will be judging. All written submittals and presentations will be judged by the same panel of judges for each category, Wastewater and Environmental.

NEWEA is a multi-disciplined environmental professional organization dedicated to quality in practice of the profession. Accordingly, judging will be based on the elements outlined below and in the scoring sheets provided in Exhibit A. The Student Activities Committee reserves the right to adjust the format and content of the scoring sheets provided in Exhibit A prior to commencement of the competition. Participating teams will be provided with a copy of the revised sheets prior to the competition if such adjustments are made.

Judges will use the scoring sheets provided as the basis for judging of the students' designs. The NEWEA presiding official will hold the results of the written submittal scores until after the presentations are complete and scored. The scoring sheets will be collected after the presentation and the scores will be added to the written scores and tallied. The team with the highest score in each category will be awarded First Place. In the event of a numerical tie, the winner will be decided by the scoring of the presentations. If this ranking also results in a tie, a coin shall be flipped to determine the first place finishers (and NEWEA representatives to WEFTEC 18). The final scores may not be released; however, comments and feedback from the judges will be compiled and provided to the students after the Student Design Competition.

## **DESIGN REPORT**

### **Technical**

Was the Project Description section of the report organized effectively with a Statement of Problem, appropriate background information, clear description of the alternatives evaluated, etc? Was a continuous, logical sequence of steps taken to solve the design problem? Was the recommended solution feasible and appropriate to address the problem statement? Was a creativity and innovative approach used? Was knowledge of subject matter demonstrated? Was the design solution analyzed for economic feasibility; was this analysis presented? Were works cited and credit to resources and assistance correctly presented? Was the complete analysis and design solution presented clearly within the 20 page Project Description?

### **Presentation**

Were visual aids (graphs, supporting info, pictures, etc.), presented clearly? Were correct grammar, correct spelling, and appropriate technical writing methods used? Was the formatting and organization of the report presented in a logical manner?

## **ORAL PRESENTATION**

### **Content**

Was subject technical or general in nature? Was technical subject matter relevant to design? To what extent was subject of interest to a technical audience? Was knowledge of subject and presentation content exhibited by team members? Was the work presented independent and original? Was credit given for source of material or contribution by others? Was there any novel approach to the solution?

### **Organization**

Was there sufficient background information provided in order to introduce the audience to the subject? Were facts developed in logical and continuous sequence? Was there a definite conclusion and was it adequately based on the facts or data presented?

### **Delivery and Effectiveness**

Was appropriate volume used to reach all audience members? Did team members use proper English? Was the vocabulary used sufficient? Were the words distinctly pronounced? Was personal appearance appropriate? Were there any distracting mannerisms? Was the manner of delivery (conversation, memorized, read from manuscript) satisfactory? If visual aids were used, how effectively were they used?

### **Discussion**

Did the presentation evoke spontaneous questions from the panel? Did questions indicate the need for clarification of facts presented or were they merely of the type seeking additional information? How readily and with what self-assurance did the speaker answer questions? Did the answers indicate knowledge of subject beyond that disclosed in the original presentation?

### **PENALTIES**

Penalties may be assessed for misconduct by any of the teams and are at the discretion of the SAC.

Penalties may include:

- Points taken off from the final score
- Disqualification of an individual team
- Disqualification of a school

Some of the items that can lead to penalties include:

- Failure to submit entries on time
- Failure to comply with abstract or report guidelines
- Failure to comply with presentation guidelines
- Inappropriate assistance from a mentor, professor or other outside source
- Plagiarism, all sources and resources must be properly cited
- Failure to obtain WEF/NEWEA memberships
- Misconduct by the team, sponsors or others associated with the team

### **SPONSORSHIPS**

In addition to NEWEA funding, the SDC is largely supported by the generous financial contributions of sponsors. If you know of an organization who is interested in sponsoring the SDC, please have them contact the SAC Committee Chair below. All sponsors will receive recognition for their support and their logo will appear on all SDC materials and the NEWEA webpage.

### **INTERNET LINKS**

[www.newea.org](http://www.newea.org)

### **QUESTIONS OR COMMENTS**

Please review the entire SDC Guidelines and contact the SAC Committee Chair for any clarification on any of the rules or guidelines of the program. The Chair may be contacted at:

Nick Tooker, University of Massachusetts Amherst; Work: 413-313-6217 Email: [nbtoker@umass.edu](mailto:nbtoker@umass.edu)

Good luck and thank you for your interest and support!