

Pacific Northwest Clean Water Association

PNCWA



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2018 STUDENT DESIGN COMPETITION GUIDELINES

December 2017



**PACIFIC NORTHWEST CLEAN WATER ASSOCIATION
2018 STUDENT DESIGN COMPETITION
GUIDELINES**

This event sponsored by the Pacific Northwest Clean Water Association (PNCWA) requires that student teams design and present a project of their choice that relates to either the fields of water reclamation/wastewater engineering or the larger water environment.

[PNCWA](#) is a Member Association of the [Water Environment Federation \(WEF\)](#), the non-profit technical and educational organization for water environment professionals, active in 39 countries. PNCWA is dedicated to preserving and enhancing water resources in the states of Idaho, Oregon, and Washington. To achieve this, we promote the professional development of our members, the dissemination of information to the public and policy makers, and the advancement of science and technology needed to protect human health and the environment.

Any questions regarding the program guidelines should be directed to the PNCWA Students and Young Professionals Committee Chairperson:

Kristi Steiner, P.E.
Clean Water Services
16060 SW 85th Ave.
Tigard, OR 97224
503-547-8132

SteinerK@cleanwaterservices.org

INTRODUCTION

The PNCWA Student Design Competition is intended to promote “real world” design experience for students interested in pursuing an education and/or career in water/wastewater engineering and sciences. This competition tasks teams of student members within PNCWA to design and present a program 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.

STUDENT DESIGN COMPETITION

The student design competition is based on problems relating to the environmental field as it pertains to the water. Student design teams will be able to compete in one of two categories: Wastewater Design or Water Environment Design. Both the Wastewater and Environmental Design Competitions follow the same guidelines and scoring system. The competition consists of three portions:

1. The written submittal/design notebook,
2. The presentation held via Zoom Video Conferencing platform, and
3. A Q&A following the presentation.

Written submissions will be due **Monday, April 23, 2018 by 11:59 PM PST.**

Examples of Wastewater Design Competition projects include traditional wastewater design projects (e.g. hydraulic capacity design, upgrades to existing systems, biosolids handling, nutrient removal, resource recovery, treatment reorganization, lagoon upgrades, etc.). The Environmental Design Competition includes design projects that address challenges within the water environment at large (e.g. water reclamation and reuse, stormwater management, wetlands, non-centralized treatment in emerging countries, green infrastructure, etc.). The scope and extent of the project should be at the level of a senior or graduate engineering/science student in a design or capstone course. **Students are expected to work with little assistance from an advisor and/or professor, and the students are expected to work together as a team to develop their recommended solution.** Students may use whatever references or resources they choose, provided they are properly cited.

Students are expected to perform the necessary calculations for the project. **This is not intended to be a 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. All of the design work should be submitted in the design notebook, clearly labeled and referenced.

For example, if the project involved a wastewater treatment plant expansion, judges would verify that each team:

- Developed a Hydraulic Profile
- Completed preliminary sizing of major equipment (aeration basins, clarifiers, chlorine contact chambers, etc.)
- Incorporated information from multiple manufacturers
- Performed a population analysis to determine design flow rates
- Completed a preliminary cost evaluation
- Developed a decision matrix (why you ended up with that particular process, design, etc.)

Projects will be scored through an evaluation by judges of written and oral presentation skills. Written and oral presentation skills will be evaluated separately, and the sum of these two scores will become the total score (see Exhibit B).

Written data submitted (in PDF format) to a PNCWA Share File site will be reviewed by the judges in advance of the oral presentation and will be available for judges to reference during the oral presentation. Teams will receive upload instructions for the Share File site after registering for the competition. Scores for the written report will not be released until all design teams complete the oral presentations.

One team from each category will be selected as the winner and sponsored (up to \$5,290) to compete in-person at the national WEF Student Design Competition, held in conjunction with the 2018 WEFTEC conference in New Orleans, LA. A participation bonus to benefit the teams' PNCWA Student Chapter will also be offered to teams who fulfill all submittal requirements of this competition, even if they do not advance to the national WEF Student Design Competition. See section on **AWARDS** for more information.

All teams completing participation requirements, regardless of ranking, will be invited and encouraged to give their presentation at the 2018 Pacific Northwest Clean Water Association Annual Conference, held in Boise, ID October 21-24.

ENTRY FEE

There is NO entry fee for the student design competition.

TIMELINE FOR STUDENT DESIGN COMPETITION

DATE	ACTION ITEM
February 19, 2018	All teams shall submit PNCWA Student Design Competition Entry Form (Exhibit A).
March 26, 2018	Teams shall submit amended entry form (Exhibit A) to the S&YP Chairperson, if necessary.
April 23, 2018	Teams shall submit electronic package containing the design notebook.
April 30, 2018	Oral Presentations via Zoom Video Conferencing
May 7, 2018	PNCWA Student Design Competition winners for each category will be announced and named the PNCWA regional winners.

Late May / Early June (exact date TBD)	Regional winners shall submit entry form and an abstract to WEF Sub-Committee Chair.
August 2018 (exact date TBD)	WEF Sub-Committee will notify regional winners regarding the design package submittal requirements for the national competition.
Mid-August 2018 (exact date TBD)	Teams shall submit package containing hard-copies of the design notebook per WEF requirements. Package cannot be postmarked later than this date.
September 30, 2018	WEFTEC Student Design Competition in New Orleans, LA
October 21-24, 2017 (exact date and times TBD)	Presentations at PNCWA Annual Conference in Boise, ID.

GENERAL REQUIREMENTS

The general requirements for participation in the competition are:

1. Team size will be limited to a maximum of eight students per team. One team per school per design category is allowed. It is recommended that schools with more than one team interested in a design category host an internal competition to determine which team will compete in the PNCWA Student Design Competition.
2. The advisor or advising 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 knowledge gained throughout their time at school.
3. Engagement of the professional community and the local chapters of the PNCWA is strongly encouraged. You may contact the S&YP Chair for a list of local PNCWA members in your area. Project scenarios may be obtained from members of the professional community.
4. Team attendance at the student design presentations at PNCWA in Boise on October 21-24, 2018 is highly encouraged. This provides students an opportunity to develop relationships with regional professionals and give back to the organization by sharing their presentations.
5. Each member of each team must be a WEF Student Member in good standing who:
 - A. Is a full-time student;

- B. Has been selected by his/her Student Chapter to participate (if applicable); and,
 - C. Has been certified by the PNCWA as a Student Member in good standing. To be thus certified, a new Student Member must have filed an application and paid the required dues prior to March 26, 2018. The same holds true for continuing Student Members.
6. All entry materials become the property of PNCWA.
 7. A representative of PNCWA will preside during the competition and ensure adherence to all event rules.
 8. The first place team should be prepared to participate in the National Student Design Competition at WEFTEC in New Orleans on September 30, 2018. Travel funds for up to 4 team members (up to a total of \$5,290) are provided as part of the first place award for each design category. See details in the AWARDS section.

WRITTEN PROJECT REQUIREMENTS

Written project requirements for this competition are intended to mirror those of the national WEF Student Design Competition. Design Notebooks shall be uploaded in Adobe Acrobat PDF format to the PNCWA Share File site. Special indices, bookmarks, or other features are appreciated but not required. Teams will be provided with upload instructions for the Share File site after registering for the competition.

The following, in the order shown, shall be included in the written data submittal:

1. Regional Entry Form – Please use a copy of the original amended entry form supplied (see Exhibit A).
2. Abstract – Provide a brief summary of the design, not to exceed 200 words.
3. Project Description – Provide a description of the project or program, including the following information:
 - A. Summary of the project team, including:
 - i. Each team member's role in the effort
 - ii. The names of any other individuals that assisted in the effort
 - B. A discussion of the design solution (**not to exceed 20-pages***). The discussion must cover the salient facts upon which the recommendation is made, give a clear analysis of the evaluation technique, and present a clear recommendation of action. Relevant data should be clearly presented in the discussion, and all elements shown on the judging form should be addressed.

- C. Formatting to include 1-inch margins on all sides; Calibri, Arial, or Times New Roman Font with a minimum 11-point font size.
- D. Color diagrams, charts, and photographs that reflect the unique features of the project. Each graphic/photo is to be identified with an appropriate descriptive caption and included at the end of the submittal. Graphics/photos are not included in the 20-page limit.

*The number of pages used in the discussion is checked to ensure compliance with the 20-page limit. Noncompliance may result in penalties (see Judges and Judging).

- 4. Supporting Documentation – Provide drawings, calculations, tables, vendor submittals, cost estimates, and other voluminous documents as appendices. There is no limit on the amount of appendices or length of the appendix to include within the report. The appendices will not be scored in the design notebook scoring, however will be referenced by the judges during the scoring process and must accurately reflect the design.
- 5. References/Acknowledgements – A reference list must be provided. Acknowledgements are optional. The judges will be directed to focus their review on the Project Description section of the design notebooks and not the references/acknowledgments section.

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

The Sub-Committee will not be able to review any submittal prior to submission.

PRESENTATION REQUIREMENTS

Each team will be allowed twenty-five (25) minutes for their presentation; each team may have up to five members on their presentation team, one of whom will provide audio visual services only (non-speaking). During the regional competition, there will be no opportunity for warning signs to be used. The national competition will have time warning signs held up during the presentation when there are 5 minutes and 1 minute remaining to help teams stay within their allotted presentation time.

For the national WEF Student Design Competition, each team may have up to five members on their presentation team, one of whom will provide audio-visual services only (non-speaking role). If additional members of the team attend, they may not speak during the presentation or question and answer period. 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. The presentation room at the national

competition will have a standard podium, screen, laptop, and projector. The laptop supports PowerPoint.

SIGNIFICANT SUBMITTAL ITEMS AND DATES

Each entry will consist of the following:

- ❑ An official entry form (Exhibit A) submitted to the PNCWA S&YP Chairperson by **February 19, 2018**. This submittal does not need to identify team members, but must include contact data for each team planning a submittal.
- ❑ An amended entry form (Exhibit A) showing final team contact info and presentation team information including membership numbers submitted to the PNCWA S&YP Chairperson by **March 26, 2018**.
- ❑ The design notebook must be received by the PNCWA S&YP Chairperson (via Share File) no later than **April 23, 2018 at 11:59 PM PST**.
- ❑ All presentations will be judged remotely via Zoom on **April 30, 2018**. All teams must participate in the live presentation. A member of the judging panel will work with the teams on scheduling the presentation.

JUDGES

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 or engineering firm involved as part of the project. All written submittals and presentations will be judged by the same panel of judges.

The PNCWA is a multi-disciplined environmental organization dedicated to quality in practice of the profession. Accordingly, judging will be based on the elements outlined below and in the score sheets provided in the exhibits. Judges will use the scoring sheets provided as the basis for judging of the student teams. The PNCWA presiding official will hold the results of the written submittal scores until after the presentations are complete and scored. The score sheets will be tallied after completing review of the design notebook and presentation evaluation. The team with the highest all-around score will be awarded First Place and be designated as the PNCWA regional winner for their specific design category. 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 regional team representative to WEFTEC 2018 Conference).

JUDGING CRITERIA

Presentation:

1. Content: Was technical subject matter relevant to design? To what extent was subject of interest to a technical audience? Was credit given for source of material or contribution by others? How much knowledge of subject was exhibited? Was work independent and original? Was subject technical or general in nature?
2. Organization: Was there any novel approach to the subject? 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?
3. Delivery and Effectiveness: Were the words distinctly pronounced and was proper volume used to be heard by all? Did the contestant use proper English and was the vocabulary sufficient? Was personal appearance appropriate? Were there distracting mannerisms? Was the manner of delivery (conversation, memorized, read from manuscript) satisfactory? If visual aids were used, how effectively were they used? Was the presentation completed within the time limit of 25 minutes?
4. 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?

Design Notebook:

1. Technical: Was the notebook organized effectively with Introduction, Statement of Problem, Background information, etc.? Was a continuous, logical sequence of steps taken to solve the design problem? Was the solution feasible and logical for problem statement? Was creativity and innovative approach shown? Was knowledge of subject demonstrated? Was the solution analyzed for economic feasibility; was this analysis presented? Were works cited and credit to resources correctly presented? Was the complete analysis and design solution presented clearly in the 20-page Project Description?
2. Presentation: Were visual aids (graphs, supporting info, pictures, etc.) presented clearly? Correct grammar, spelling, and technical writing? Logical formatting, organization of report, table of contents?

Penalties:

Failure to comply with the above requirements may result in penalties to a team's final score. Cumulative penalties shall not exceed 10 points. Penalties are at the discretion of the judges and may include the following:

- Failure to submit an abstract within the guidelines set forth – 1 point
- Failure to submit a design notebook within the guidelines set forth – 1 point; and
- Failure to submit entries on-time – 1 point per day, up to a maximum of 3 points for late entries

AWARDS

PNCWA 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 and fulfilling all submittal requirements will receive \$200 participation bonus for their PNCWA Student Chapter (if applicable) regardless of placement based upon the presentations and written submittals.***

PRIZE	AWARD	MONETARY VALUE
First Place (Wastewater Design)	WEFTEC 2018 Travel Allowance*	Up to \$5,290*
First Place (Water Environment Design)	WEFTEC 2018 Travel Allowance*	Up to \$5,290*
All other teams	Participation Bonus (if applicable)	\$200

*The first place team will be required to present their project at the National Student Design Competition to be held at WEFTEC 2018 in New Orleans, Louisiana. The value of the award will reflect actual travel costs to attend WEFTEC 2018 but will not exceed \$5,290. The award is intended to fund airfare and miscellaneous travel for up to 4 team members, 2 shared rooms, and a meal allowance.

The first place winner will be announced at the conclusion of the PNCWA Student Design Competition and no later than May 7, 2018. The official award acknowledgment will be held at the PNCWA Awards Banquet held on October 23 at the PNCWA2018 Annual Conference in Boise, ID. Team members or designees of the team are encouraged to attend the awards presentation. Award support for team travel to WEFTEC will be provided prior to this official acknowledgment.

INTERNET LINKS

Internet links that may be of use for this event are www.PNCWA.org and www.wef.org

MEMBERSHIP

As noted, team participants must be WEF Student Members. WEF membership includes membership in PNCWA for members in Washington, Oregon, and Idaho. Dues for full-time students in WEF/PNCWA are offered at a very low annual cost and include complimentary registration at both WEFTEC and the PNCWA Annual Conference. WEF and PNCWA technical and career resources give you the keys to launch a successful career in the water and wastewater industry.

QUESTIONS OR COMMENTS

Please review the entire package and contact the PNCWA Student and Young Professionals Committee Chairperson for any clarification on any of the rules or guidelines of the program. The Chair may be contacted at the information listed below:

Kristi Steiner, P.E.
Clean Water Services
16060 SW 85th Ave.
Tigard, OR 97224
503-547-8132

SteinerK@cleanwaterservices.org

Good luck and thank you for your interest and support!

EXHIBIT A

ENTRY FORMS



2018 PNCWA STUDENT DESIGN COMPETITION ENTRY FORM

Important Dates:

February 19, 2018

March 26, 2018

April 23, 2018

April 30, 2018

September 30, 2018
Competition

October 21-24, 2018

Submit this form in PDF format to Kristi Steiner
(SteinerK@cleanwaterservices.org)

Amended Entry Form due to e-mail above

Written report submission deadline

Design Presentation via Zoom

Winning Team Presentation @ WEFTEC 2018 Design

Presentation at PNCWA2018 Conference

All qualifying teams encouraged to attend. Exact date/time TBD.

University Data

Name: _____ Team #: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Person

Name: _____ Team #: _____

Email & Phone: _____

Address: _____

City: _____ State: _____ Zip: _____

Contact Person

Name: _____ Team #: _____

Email & Phone: _____

Address: _____

City: _____ State: _____ Zip: _____

Title of Presentation:



2018 PNCWA STUDENT DESIGN COMPETITION AMENDED ENTRY FORM

Due March 26, 2017

Send PDF to SteinerK@cleanwaterservices.org

University:

Name: _____

Team Members: (check box if presenting – refer to rules)

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Name: _____ WEF Member # _____ Presenter

Final Title of Presentation:

Special Needs: (describe any special equipment needed)

EXHIBIT B

SAMPLE SCORING SHEETS



2018 PNCWA STUDENT DESIGN COMPETITION

DESIGN NOTEBOOK SCORE SHEET

Name of University: _____

Title: _____

Judge: _____

Technical – 70 pts

1. Appropriate introduction, statement of problem, background information provided? (5 pts)... _____
2. Continuous, logical sequence of steps to solution presented? (10 pts) _____
3. Was conclusion (design solution) based on logical steps presented? (10 pts) _____
4. Was design solution feasible and appropriate to address problem statement? (15 pts) _____
5. Were creativity and innovative approaches applied? (5 pts)..... _____
6. Was knowledge of subject matter demonstrated? (10 pts) _____
7. Were appropriate economic and feasibility analyses presented? (10 pts) _____
8. Were appropriate citations used to credit all resources? (5 pts) _____

TOTAL (70 pts) _____

Report Presentation – 30 pts

1. Were visual aids (graphs, supporting info, pictures, etc.) presented clearly? (10 pts)..... _____
2. Were correct grammar, correct spelling, and technical writing methods used? (10 pts)..... _____
3. Was formatting and organization of report presented in a logical manner? (10 pts) _____

TOTAL (30 pts) _____

GRAND TOTAL (100 pts) _____

COMMENTS:



2018 PNCWA STUDENT DESIGN COMPETITION PRESENTATION SCORE SHEET

Name of University: _____

Title: _____

Judge: _____

Content – 45 pts

1. Presentation included sufficient depth of technical information (15 pts)..... _____
2. Technical information presented was relevant to design (10 pts) _____
3. Team displayed adequate knowledge of subject and presentation content (15 pts) _____
4. Recommended design solution was original and innovative (5 pts) _____

TOTAL (45 pts) _____

Organization – 25 pts

1. Sufficient background information was provided (5 pts) _____
2. Essential facts were developed in a logical and continuous sequence (10 pts)..... _____
3. Recommended design solution was based on facts and data presented (10 pts).. _____

TOTAL (25 pts) _____

Delivery & Effectiveness – 20 pts

1. Presentation and visual aids were clear, legible, and effective (10 pts)..... _____
2. Vocal delivery was appropriate (not memorized nor read directly; proper volume and pronunciation, relevant jargon, and appropriate vocabulary used) (5 pts) _____
3. Professional presence and performance, no distracting mannerisms or gestures (5 pts) _____

TOTAL (20 pts) _____

Discussion – 10 pts

1. Answers to questions posed by judges were clear and technically correct (5 pts)..... _____
2. Answers indicated knowledge of subject beyond presented material (5 pts)..... _____

TOTAL (10 pts) _____

GRAND TOTAL (100 pts) _____

COMMENTS:



2018 PNCWA STUDENT DESIGN COMPETITION SCORING TALLY SHEET

Team:			
Title:			
	Report Score	Presentation Score	Total
Judge #1			
Judge #2			
Judge #3			
Average Score			
Penalties (Determined by all Judges)			
FINAL SCORE (Sum of Average Scores minus Penalties)			