

Pacific Northwest Clean Water Association

# PNCWA



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## 2017

# STUDENT DESIGN COMPETITION

## GUIDELINES

October 2017



**PACIFIC NORTHWEST CLEAN WATER ASSOCIATION  
2017 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 the field of water reclamation/wastewater engineering.

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:

Eleanor Key, P.E.  
Washington State Department of Ecology  
PO Box 47600  
Olympia, WA 98504  
360-407-6433

ekey461@ecy.wa.gov

## **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 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. Student design teams will be able to compete in one category: wastewater design. The competition consists of three portions: the written submittal/design notebook, the pre-recorded presentation, and a 15 minute Q&A session via conference call. Submissions will be due Monday, April 10, 2017 by 11:59 PM PST. All submissions will be uploaded to YouTube. The Student Design Committee will provide detailed instructions for the upload at a later date.

Examples of wastewater 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 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 recommend a 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 look that each team performed the following:

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

Scoring of the project will be determined through an evaluation by judges 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 B). Oral presentations must be pre-recorded and should not have any production value. Edited presentations will not be accepted. Oral presentations will only be accepted as an upload to YouTube. Specific instructions will be provided to design teams on the upload procedure.

Written data (submitted as a PDF) submitted to a PNCWA Share File site (upload instructions to be provided at a later date) will be reviewed by the judges prior to the evaluation of oral presentations. Scores on the written data will not be released until the completion of the oral presentations. The data will be available to the judges during the oral presentation for their reference.

One team 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 2017 WEFTEC conference in Chicago, IL. A participation bonus to benefit the teams' PNCWA Student Chapter will also be offered to teams who fulfil 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 2017 Pacific Northwest Clean Water Association Annual Conference, held in Vancouver, WA October 21-25.

## **ENTRY FEE**

There is NO entry fee for the student design competition.

## **TIMELINE FOR STUDENT DESIGN COMPETITION**

<b>DATE</b>	<b>ACTION ITEM</b>
<b>February 6, 2017</b>	All teams shall submit PNCWA Student Design Competition Entry Form (Exhibit A).
<b>March 6, 2017</b>	Teams shall submit amended entry form (Exhibit A) to the S&YP Chairperson.
<b>April 10, 2017</b>	Team shall submit electronic package containing the design notebook and pre-recorded oral presentation.
<b>April 28, 2017</b>	Deadline for completion of conference call Q/A session with judges. A member of the judging panel will work with the teams on scheduling the conference call.
<b>May 5, 2017</b>	PNCWA Student Design Competition winner will be announced and named the PNCWA regional winner.
<b>Early May (exact date TBD)</b>	Regional winner shall submit entry form and an abstract to WEF Sub-Committee Chair.
<b>August 2017 (exact date TDB)</b>	WEF Sub-Committee will notify regional winner regarding the design package submittal for the national competition.
<b>Mid-August 2017 (exact date TBD)</b>	Team shall submit package containing hard-copies of the design notebook per WEF requirements. Package should not be postmarked later than this date.
<b>October 1, 2017</b>	WEFTEC Student Design Competition in Chicago, Illinois
<b>October 21-25, 2017 (exact date and times TBD)</b>	Presentations at PNCWA Annual Conference in Vancouver, WA.

## **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. 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 in the PNCWA Student Design Competition.
- ❑ 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 their knowledge gained throughout their time at school.
- ❑ Engagement of the professional community and the local chapters of the PNCWA is strongly encouraged. Project scenarios may be obtained from members of the professional community.
- ❑ Team attendance at the student design presentations at PNCWA in Vancouver on October 21-25, 2017 is highly encouraged. This provides students an opportunity to develop relationships with regional professionals and to give back to the organization by sharing their presentations.
- ❑ Each member of each team must be a WEF Student Member in good standing who:
  - Is a full-time student;
  - Has been selected by his/her Student Chapter to participate (if applicable); and,
  - 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 6, 2017. The same holds true for continuing Student Members.
- ❑ All entry materials become the property of PNCWA.
- ❑ A representative of PNCWA will preside during the competition and ensure adherence to all event rules.
- ❑ The first place team should be prepared to participate in the National Student Design Competition at WEFTEC in Chicago on October 1, 2017. Travel funds for up to 4 team members (up to a total of \$5,290) are provided as part of the first place award. See details in the AWARDS section.

## **WRITTEN PROJECT REQUIREMENTS**

Design Notebooks shall be submitted in Adobe Acrobat PDF format. Competition notebook entries shall be uploaded onto the PNCWA Share File site (instructions to follow at a later date). Special indices, bookmarks, or other features are appreciated, but not

required. These requirements are intended to mirror those required to participate in the national WEF competition.

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

- ❑ Regional Entry Form – Please use a copy of the original amended entry form supplied (see Exhibit A).
- ❑ Abstract – Provide a brief summary of the design, not to exceed 200 words.
- ❑ Project Description – Provide a description of the project or program, including the following information:
  - A summary of the project team, including:
    - Each team member's role in the effort
    - The names of any other individuals that assisted in the effort
  - 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 presented in the discussion in a clear form. All elements shown on the judging form should be addressed.
  - Formatting to include 1-inch margins on all sides; Calibri, Arial, or Times New Roman Font with a minimum 11-point font size.
  - 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 and not part of 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).

- ❑ 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.
- ❑ 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 a twenty-five (25) minute pre-recorded presentation; each team may have up to five members on their presentation team, one of whom will provide audio visual services only (non-speaking). An individual conference call will be held with each team and the panel of judges by April 28, 2017. 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 the teams from going over their time allotment.

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 2007.

## **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 6, 2017**. 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 6, 2017**.
- ❑ The design notebook and final presentation materials must be received by the PNCWA S&YP Chairperson (via Share File and YouTube upload) no later than **April 10, 2017 at 11:59 PM PST**.
- ❑ All presentations will be judged remotely after April 10, 2017. All teams must participate in the Q/A session to be held by April 28, 2017. A member of the judging panel will work with the teams on scheduling the conference call.

## **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 the Q/A conference call, 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. 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 2017 Conference).

## **JUDGING CRITERIA**

### **Presentation:**

- a. 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?
- b. 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?
- c. 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?
- d. 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:**

- a. 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?

b. 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 but 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 2017 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 2017 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 2017 in Chicago, Illinois. The value of the award will reflect actual travel costs to attend WEFTEC 2017 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 5, 2017. The official award acknowledgment will be held at the PNCWA Awards Banquet held on October 24 at the PNCWA2017 Annual Conference in Vancouver, WA. 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](http://www.PNCWA.org) and [www.wef.org](http://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 is offered at a very low annual cost and includes complimentary registration at both WEFTEC and at 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 field.

## **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:

Eleanor Key, P.E.  
Washington State Department of Ecology  
PO Box 47600  
Olympia, WA 98504  
360-407-6433

[ekey461@ecy.wa.gov](mailto:ekey461@ecy.wa.gov)

Good luck and thank you for your interest and support!



## EXHIBIT A

## ENTRY FORMS

# 2017 PNCWA STUDENT DESIGN COMPETITION ENTRY FORM

**Important Dates:**

February 6, 2017	Submit this form in PDF format to Eleanor Key (ekey461@ecy.wa.gov)
March 6, 2017	Amended Entry Form due to e-mail above
April 10, 2017	Written report/Presentation submission deadline
October 1, 2017	Winning Team Presentation @ WEFTEC 2017 Design Competition
October 21-25, 2017	Presentation at Pacific Northwest Clean Water Association 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:**

\_\_\_\_\_

# **2017 PNCWA STUDENT DESIGN COMPETITION AMENDED ENTRY FORM**

Due March 6, 2017  
Send PDF to [ekey461@ecy.wa.gov](mailto:ekey461@ecy.wa.gov)

## University:

Name: \_\_\_\_\_

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

Name: \_\_\_\_\_ WEF Member # \_\_\_\_\_  Presenter

## Final Title of Presentation:

**Special Needs:** (describe any special equipment needed)

## EXHIBIT B

### SAMPLE SCORING SHEETS



## 2017 PNCWA STUDENT DESIGN COMPETITION

### SCORING SHEET – DESIGN NOTEBOOK

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**University:**

Judge's Name: \_\_\_\_\_

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**Title of Presentation:**

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#### FORMAT

##### SCORE

*Followed Instructions:* All sections included, in proper order

	Poor										Excellent	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

**Appearance:** Neatness, organization, professional appearance

	Poor										Excellent	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

#### PROJECT DESCRIPTION

**Grammar/Spelling:** Description is free from grammatical and spelling errors

	Poor										Excellent	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

**Project Knowledge:** Demonstrates understanding of background, meets objectives with use of facts, not supposition

	Poor										Excellent	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

<b>Continuity:</b>	<b>Essential facts, organized in logical and clear sequence</b>											
	<u>Poor</u>					<u>Excellent</u>						
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____
<b>Acknowledgements:</b>	<b>Sources of information and participants' roles identified</b>											
	<u>Poor</u>					<u>Excellent</u>						
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____
<b>Conclusion:</b>	<b>Conclusions/recommendations are clearly drawn and presented</b>											
	<u>Poor</u>					<u>Excellent</u>						
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

## SUPPORTING DOCUMENTATION

<b>Photos/Figures:</b>	<b>Relevant to project and description with concise captions</b>											
	<u>Poor</u>					<u>Excellent</u>						
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____
<b>Organization:</b>	<b>Easily located and referenced to/from text</b>											
	<u>Poor</u>					<u>Excellent</u>						
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____
<b>Visual Aids:</b>	<b>Legibility and effectiveness are apparent</b>											
	<u>Poor</u>					<u>Excellent</u>						
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

## GUIDELINES

**Does this project conform to the PNCWA Student Design Competition Guidelines?**  
 Judges may subtract up to 10 penalty points. \_\_\_\_\_

**TOTAL SCORE** \_\_\_\_\_



## 2017 PNCWA STUDENT DESIGN COMPETITION

### SCORING SHEET – PRESENTATION

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**University:**

Judge's Name: \_\_\_\_\_

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**Title of Presentation:**

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#### CONTENT

##### SCORE

**Subject Matter:**

	General										Technical	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

**Contribution:**

	Library Research					Independent					Innovative			
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____		

**Knowledge of Subject:**

	Little										Complete	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

#### ORGANIZATION

**Introduction:** Background, objectives, outline are clearly presented

	Poor										Excellent	
(circle one)	0	1	2	3	4	5	6	7	8	9	10	_____

**Continuity:** **Facts presented in logical sequence, transitions well**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

**Conclusion:** **The conclusion is given, and is reasonable from the presentation**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

## DELIVERY EFFECTIVENESS

**Schedule:** **Teams made effective use of the time allotted**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

**Organization:** **Conversational vs. monotone, proper volume and proper diction, timing of discussion matches presentation**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

**Body Language:** **Good eye contact, no distracting mannerisms, good motion**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

**Visual Aids:** **Visuals were clear, free of clutter, related to discussion items**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

## CONFERENCE CALL

**Question & Answer:** **Clear delineation of expertise, answers reflect true knowledge**

<u>Poor</u>	<u>Excellent</u>
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(circle one) 0 1 2 3 4 5 6 7 8 9 10 \_\_\_\_\_

**TOTAL SCORE** \_\_\_\_\_