



ASCE UESI Surveying Competition Rules

The following set of rules will be used for the 2021 ASCE Student Conferences and the 2021 ASCE Surveying Championship Finals Competition. The top team from each student conference - that meets ASCE eligibility rules - will be invited to the ASCE Surveying Championship Finals Competition June 26-28, 2021 in Platteville, Wisconsin. In-person and virtual rules are presented so that the competition can adapt to different student conference formats.

The educational and professional goals of this competition include a recognition of the importance of basic surveying principles to all civil engineering projects. Students will be required to use standard field and office equipment and procedures to solve common problems encountered in industry. A clear understanding of and ability to apply basic surveying principles will assist the graduate civil engineer in communicating and working with the surveying professionals on the job site and during the design process.

The top surveying team at each 2021 ASCE Student Conference will receive a plaque and will be invited to participate in the 2021 ASCE Surveying Championship Finals Competition June 26-28, 2021 in Platteville, Wisconsin. The top three (3) teams at the 2021 ASCE Surveying Championship Finals Competition will receive a plaque and monetary award to be given to their ASCE student chapter.

The UESI Surveying and Geomatics Division is pleased to announce that the 1st Annual ASCE Surveying Championship Finals Competition will be held in conjunction with the Concrete Canoe Competition and Sustainable Solutions Competition finals at the University of Wisconsin-Platteville. This Competition will provide students the opportunity to display their surveying skills to other students and practitioners in the field.

Eligibility to Advance

Eligibility to advance to the 2021 ASCE Surveying Championship Finals Competition includes those eligibility standards set by ASCE. These standards can be found at <https://www.asce.org/eligibility-for-society-wide-competitions/>.

The student conference host student chapter shall promptly submit the completed official scoring spreadsheet for the conference competition to Student@ASCE.Org. Teams will not be invited to Society Wide Finals event until this spreadsheet is received and eligibility is confirmed.

Requests for Information (RFI)

Requests for information (RFI) regarding the 2021 surveying competitions should be sent to UESI@asce.org with the subject line “**2021 Surveying Competition RFI**”. Clarifications will be posted on the [ASCE UESI Surveying Competition Collaborate Site](#) every other Friday starting September 25, 2020 until February 12, 2021. Each post will address the questions received from the previous two weeks through the Wednesday before 11:59PM EST. The



cutoff date for submitting a RFI is Friday, February 12, 2021. Those received after this date will not be acknowledged or addressed. **Teams are strongly encouraged to contact the Surveying Rules Committee to avoid misinterpretation of rules at the Competitions. All RFIs will be made public.** Teams are also responsible for all information provided in the Rules and Regulations and RFI responses posted to the Collaborate site.

Ethics

According to the ASCE Code of Ethics, Canon 5, "Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others".

In the context of this contest, "unfair competition" may include conduct such as the following:

- Failure to provide proper credit for past teams, plagiarism, or any other false statements concerning the source of material used in the contest.
- Taking other people's designs, artwork, or other creative content without permission (for an overview of Intellectual Property Laws, including Trademark and Copyright, visit <https://fairuse.stanford.edu/overview/introduction/intellectual-property-laws/>).
- Any false or malicious statements about other teams, members, or others involved in the competition.

Required Conduct

All participants shall act professionally and respectfully at all times. Failure to act appropriately can result in sanctions, disqualification, and loss of invitations to future competitions or Society-wide competitions. The inappropriate use of language, alcohol, or materials, uncooperativeness, or general unprofessional or unethical behavior will not be tolerated.

In-Person Field Competition

Overview

Participation in the surveying competition is limited to one (1) team per college/university. Each team may consist of a single team of up to six (6) total students for the field exercises. The teams shall consist of undergraduate students enrolled during all or part of the current competition academic year. Students must be members of an ASCE Student Chapter in good standing and be Society Student Members of ASCE. In keeping with the values of ASCE, each surveying team that registers 2, 4, or 6 members shall be comprised of 50% males and 50% females. Each surveying team that registers 3 members shall include at least one male and one female member. Each surveying team that registers 5 members shall include at least 2 male and 2 female members.

The surveying field competition will involve four (4) separate tasks, each comprising a maximum of four (4) team members to demonstrate the ability to apply the techniques of land surveying. Members for each task will be randomly chosen on the day of the competition. One member of the team may only perform a maximum of three (3) tasks.



The four tasks will be as follows:

1. Pacing
2. Differential Leveling
3. Building Stakeout
4. Determining the depth of a proposed sewer line and the cut at each station

The time to complete each task will be recorded by a judge and will be used as a tie breaker.

Scoring Breakdown

For each task, teams will be evaluated according to the parameters provided within the description of each task. The team with the highest number of points from the sum of all four (4) tasks will be the overall winner. In the event that multiple teams receive the same overall score, the shortest overall time for all of the events will be the tie breaker. See the attached Scoring Summary Sheet for a detailed scoring breakdown.

Materials

The tasks are project-oriented problems; therefore, the field methods may vary amongst teams. The use of traditional surveying equipment (transits/theodolites/total stations, tapes, prisms, prism poles, conventional optical levels, level rods) is recommended for individual team practice and at each regional competition. Proper safety equipment is required. Examples of appropriate safety equipment include eye protection for the staking crew, safety vests, and protective head and foot-ware. Digital levels, robotic total stations, GPS – RTK receivers are **NOT** permitted.

ASCE UESI will provide all necessary surveying and safety equipment with the exception of appropriate footwear at the Society-wide Competition only. ASCE UESI's representative will provide training on the equipment the day of the event for the Society-wide Competition only. Teams are responsible for all necessary surveying and safety equipment for student conference competitions.

Judging

Each task will be scored out of 100 total possible points; therefore, each team will have the opportunity to achieve a possible total of 400 points. The decision of the judges is final. The top three teams with the highest overall score will be recognized.



Task Descriptions

1. Pacing

At the site, there will be a triangle staked out. Up to three (3) participating members will start at a different vertex of the given triangle. Once the signal has been given to begin, each participating member will pace the perimeter of the triangle in a clockwise fashion, returning to the point at which they began. Each member may pace the perimeter of the triangle up to 3 times. Each team will submit a final recorded ground distance for each side of the triangle upon conclusion of their pacing. Teams will be evaluated on their accuracy and will be given a maximum of thirty (30) minutes to complete this task. Each team's overall time for this task will be recorded by a task judge.

2. Leveling

At the site, each team will be required to start from a benchmark of known elevation and perform differential leveling operations to establish the elevation of a temporary point of unknown elevation. Each team will submit a final recorded elevation for the temporary point of unknown elevation upon conclusion of their differential leveling operation. Teams will be evaluated on their accuracy and will be given a maximum of forty five (45) minutes to complete this task. Each team's overall time for this task will be recorded by a task judge.

3. Building Stakeout

At the site, using line and grade stakeout techniques, teams will be required to stake out a proposed building with appropriate offsets. Two (2) designated control points for set up and backsight will be given to measure the angles and distances to the proposed building points. The angles and distances to be calculated and measured will be given on the day of the event. The judges will measure the hubs/tacks as set by teams upon conclusion of their line and grade stakeout. Teams will be evaluated on their accuracy and will be given a maximum of forty five (45) minutes to complete this task. Each team's overall time for this task will be recorded by a task judge.

4. Determining depth of proposed sewer line and the cut at each station

At the site, teams will find centerline and offset stakes for a proposed sewer line. On the day of the competition, each team will be given the invert of the existing pipe where the proposed sewer line will connect. Teams will also be given the slope and size of the proposed sewer line. Teams will have to determine the amount of cut at each predetermined station location and the elevation of the invert at the opposite end of the proposed sewer line. Station numbers will be supplied on the centerline stakes. Calculations will be recorded by each team in the field and turned into the judge upon conclusion of the task. Teams will be evaluated on their accuracy and will be given a maximum of thirty (30) minutes to complete this task. Each team's overall time for this task will be recorded by a task judge.

**** Please submit RFIs regarding these rules to: UESI@asce.org ****



Virtual Competition

Overview

Participation in the virtual surveying competition is limited to one (1) team per college/university. Each team may consist of up to four (4) total students. The teams shall consist of undergraduate students enrolled during all or part of the current competition academic year. Students must be members of an ASCE Student Chapter in good standing and be Society Student Members of ASCE. In keeping with the values of ASCE, each surveying team that registers 2 or 4 members shall be comprised of 50% males and 50% females. Each surveying team that registers 3 members shall include at least one male and one female member. The surveying competition will involve two (2) separate tasks completed by a single team of up to four (4) team members to demonstrate the ability to apply the techniques of land surveying.

The two tasks will be as follows:

1. Topographic mapping project
2. Differential and profile leveling with engineering design

Scoring Breakdown

For each task, teams will be evaluated according to the parameters provided within the description of each task. The team with the highest number of points from the sum of the two (2) tasks will be the overall winner. See the attached Surveying Competition Judging Form for a detailed scoring breakdown.

Materials

The tasks are project-oriented problems; therefore, the methods may vary amongst teams. The use of any civil design software is recommended for individual team practice and at each student conference competition. ASCE UESI can recommend free educational civil design software and online training videos upon request. Teams are responsible for all necessary software and safety equipment for student conference competitions, if needed.

Judging: Task 1 will be scored out of 150 total possible points and task 2 will be scored out of 50 total possible points; therefore, each team will have the opportunity to achieve a possible total of 200 points. The decision of the judges is final. The top three teams with the highest overall score will be recognized.

The site location and data files will be provided to host schools on January 8, 2021. Competition team submittals shall be received at the host school by 5:00 pm, Friday, February 26, 2021. This will ensure each team has an equal amount of time to complete the project and the judges have time to evaluate the submittals. The virtual competition allows for live presentations, in person or virtually, or pre-recorded presentations based on the conditions existing at the time of the data release on January 8, 2021 and the discretion of the host school.



Task Descriptions

1. Topographic Mapping Project

Mapping:

A point file in a text format of PNEZD (point-northing-easting-elevation-description) and a description of map boundary will be provided. Each team will be required to prepare a 1-foot contour topographic map with details specified by competition committee. A final submittal will be a 24"x36" PDF and landXML file, each team will be expected to comply with all required items listed in the specifications. Specifications will be listed in the judging form. Teams will be evaluated on the map accuracy and aesthetics.

Presentation:

Presentations shall be a maximum of 5 minutes with a minimum of 2 presenters from the competition team. Presentations will be live presentations, in person or virtually, or pre-recorded based on the conditions existing at the time of the data release. The presentation should focus on how to create the given topographic map. Briefly summarize the process from receiving the point file to producing a 24"x36" PDF and landXML. Teams should demonstrate competency in mapping the topographic map, such as identifying the boundary, control points, breaklines, etc... The intent of this presentation is to showcase the understanding of topographic mapping and drafting. Specifications will be listed in the judging form.

2. Differential and Profile Leveling with Engineering Design

Each team will be required to calculate elevations at each turning point and side shots of a differential and profile combined leveling circuit. Each team will submit a final record with ADJUSTED elevations for all required points listed in this task. Upon finishing the leveling calculation, each team will be given the invert of the existing pipe where the proposed sewer line will connect. Teams will also be given the slope and size of the proposed sewer line. Teams will have to determine the sewer invert elevations of the proposed sewer line, and the amount of cut/fill at each station to the invert as listed in the leveling sheet. A final submittal will be a PDF that includes a table with all adjusted elevations, a sketch of the profile with stations and cut/fill labeled. Teams will be evaluated on their accuracy.

**** Please submit RFIs regarding these rules to: UESI@asce.org ****

ASCE UESI Surveying Competition

In-Person Field Competition

Judging Form

TEAM NUMBER AND NAME _____

EVENT

1	<u>PACING</u>	COURSE _____	DIFFERENCE
		DISTANCE A-B _____	_____
		DISTANCE B-C _____	_____
		DISTANCE C-A _____	_____
		<u>TOTAL</u>	_____

TIE BREAKER TIME _____ POINTS _____

SCORING: 1ST CLOSEST = 100 POINTS
2ND =95 POINTS
3RD =90 POINTS
UNITL ALL TEAMS SCORED (-5 POINT SCALE)
0 IF TEAM DOES NOT COMPETE

2 **LEVELING**

ELEVATION OF LOWER BENCHMARK = _____

SCORING: 1ST CLOSEST = 100 POINTS
2ND =95 POINTS
3RD =90 POINTS
UNITL ALL TEAMS SCORED (-5 POINT SCALE)
0 IF TEAM DOES NOT COMPETE

POINTS _____

TIE BREAKER- NONE. EACH TEAM RECIEVES THAT PLACE POINTS
(EXAMPLE TWO TEAMS TIE FOR 3RD. EACH RECIEVES 90 POINTS)

TIE IS VERY UNLIKELY

Judging Form

TEAM NUMBER AND NAME _____

EVENT

BUILDING STAKEOUT

COURSE _____

JUDGES MEASURE THE
HUBS/TACKS
AS SET BY THE TEAMS
AND SCORE

MEASURE TO 0.01FT
PRECISION

	MEASURED	DIFFERENCE (ABSOLUTE VALUE)
DISTANCE D-E	_____	_____
DISTANCE E-F	_____	_____
DISTANCE F-G	_____	_____
DISTANCE G-H	_____	_____
DISTANCE H-C	_____	_____

TOTAL

Start Time _____ End Time _____

SCORING: BASED UPON SUM OF DIFFERENCES

- 0.1 FEET = 100 POINTS
- 0.2 FEET = 95 POINTS
- 0.3 FEET = 85 POINTS
- 0.4 FEET = 80 POINTS
- 0.5 FEET = 75 POINTS
- 0.6 FEET = 70 POINTS
- 0.7 FEET = 65 POINTS
- 0.8 FEET = 60 POINTS
- 0.9 FEET = 55 POINTS
- 1.0 FEET = 50 POINTS

- 1.1 FEET = 45 POINTS
- 1.2 FEET = 40 POINTS
- 1.3 FEET = 35 POINTS
- 1.4 FEET = 30 POINTS

- 1.5 FEET = 25 POINTS
- 1.6 FEET = 20 POINTS
- 1.7 FEET = 15 POINTS
- 1.8 FEET = 10 POINTS
- 1.9 FEET = 5 POINTS

TEAM NUMBER AND NAME _____

EVENT

CUT & FILL OF SEWER COURSE _____ L/R _____ DIFFERENCE absolute value

JUDGES SCORE THE CUT SHEET
ANSWERS TO 0.01 FEET
FIND DIFFERENCE AT STATION/ OFFSET
SUM DIFFERENCES (USE ABSOLUTE VALUE
DO NOT ACCOUNT + AND -

STATION _____
STATION _____
STATION _____
STATION _____
STATION _____
STATION _____
TOTAL _____

TIE BREAKER TIME _____ POINTS _____

SCORING: SMALLEST ERROR TOTAL

1ST CLOSEST = 100 POINTS

2ND =95 POINTS

3RD =90 POINTS

UNITL ALL TEAMS SCORED (-5 POINT SCALE)

0 IF TEAM DOES NOT COMPETE

**ASCE UESI Surveying Competition
Virtual Competition
Judging Form**

Team Number and Name

EVENT 1 Topographic Mapping Project Grading Rubric

Mapping:

	Possible points	Score
Title Block		
Map title	2	
Location of survey description	2	
ASCE Region, school name	2	
Survey by: Crew members	2	
Sheet # of # sheets	2	
Written description of horizontal and vertical controls	10	
Map Contents		
Contour map accuracy (rectify incorrect elevations, create breaklines and survey boundary)	20	
Triangulated Irregular Network (TIN), display with 1 foot elevation banding in color	10	
1-foot contours with major contours (5 foot contour lines) labeled	5	
Key elevations labeled (walks, top of curbs, ground shots, etc.)	5	
Topography features labeled (i.e. sidewalks, tree sizes, utilities, etc.)	5	
Line types	2	
Line weights	2	
Legend	5	
North arrow	2	
Map scale (written and graphical)	2	
Symbols (for trees, utilities, etc.)	2	
Vicinity Map	5	
Presentation and aesthetic (15 points Excellent, 10 points Good, 5 points Fair, 2 points Poor)	15	
Mapping Total	100	

Submission Date: _____ **Time:** _____

Presentation:

	Possible points	Score
Presenters		
Preparation Level	10	
Confidence/Voice Projection	3	
Overall Demeanor	2	
Presentation		
Quality of Audio/Visuals	5	
Content	20	
Professionalism	10	
Subtotal	50	
Deductions:		
Failure to observe time limit: A 15-point penalty shall be assessed when the official time exceeds 5 minutes 5 seconds (5:05). An additional 15-point deduction shall be assessed for exceeding each additional minute or fraction thereof, i.e., 6:00, 7:00, etc.		
Failure to have at least 2 presenters: 15 points		
Presentation Total		

EVENT 2 Differential and Profile Leveling with Engineering Design
Grading Rubric

	Possible points	Score
Differential leveling: 2.5 points per each correct turning point adjusted elevation	7.5	
Profile leveling: 2.5 points per each correct station elevation	15	
Sewer line cut/fill: 2.5 points per each correct station cut/fill	15	
Sewer line invert elevation at the end of proposed design	2.5	
Sketch of the profile, sewer line with invert elevations and Cut/Fill at each station	10	
Leveling Total	50	

Submission Date: _____ **Time:** _____