

2019 Engineering Olympics Rules

Previous Engineering Olympics Gold Medalists

- 2018 Vilonia Middle School
- 2017 Forest Heights STEM Academy
- 2016 Forest Heights STEM Academy
- 2015 Forest Heights STEM Academy
- 2014 Horace Mann Middle School
- 2013 Bryant Middle School
- 2012 Mt. Ida Middle School
- 2011 Bethel Middle School
- 2010 Hot Springs Intermediate School
- 2009 Hot Springs Middle School
- 2008 Pulaski Heights Middle School

March 2, 2019



GEORGE W. DONAGHEY
COLLEGE OF ENGINEERING
AND INFORMATION TECHNOLOGY

2019 UALR Pre-College Diversity Engineering Program
ENGINEERING OLYMPICS – JUNIOR DIVISION
RULES AND REGULATIONS
Middle School

COMPETITION STRUCTURE:

The competition is open to any 6th, 7th, and 8th grade students attending school (including home school) in Arkansas.

The competition is free to any 6th, 7th, or 8th grade student registered in a UALR Pre-College Diversity Engineering Program (PCDEP) Club or any student who participated in the 2016 - 2017 Exxon Mobil Bernard Harris Summer Science Camp or any student who attended an EIT summer program. All other participants are required to pay an entry fee of \$5 per student. Fees charged will be based upon the number of names submitted on each school's roster form. No more than three (3) teams from the same school may participate in the 2019 Engineering Olympics.

No more than 10 members per Engineering Olympics team plus one alternate will be allowed. The minimum number of students needed to comprise a team is four (4). Sponsors (teachers) will be required to submit the names of all participants prior to the event by completing a team registration form. The alternate can participate on the day of the event only if one of the other registered members cannot attend. Team members are to be selected either by volunteering or through a selection process, which is determined by the sponsor (teacher).

The competition will consist of 3 events: CO₂ Dragster Competition, Critical Thinking Problems, and Popsicle Stick Tower Competition. UALR will supply all materials, except as noted in the rules and regulations.

COMPETITION DETAILS:

General Description

Each school will select members to participate in the 3 events. Each team member must participate in at least one of the three events. Each team must follow the instructions for each event. No exceptions will be allowed.

General Rules

- A. A team consists of a maximum of ten members plus one alternate. A team can be as small as four (4) members. The maximum number of participants per event is as follows:
- | | |
|--------------------------------------|------------------|
| CO ₂ Dragster Competition | Up to 3 students |
| Critical Thinking Problem | Up to 3 students |
| Popsicle Stick Tower Competition | Up to 4 students |
- B. Each school is allowed to have no more than three (3) teams entered in the Engineering Olympics.
- C. Pre-fabrication of devices will be allowed per individual event guidelines.
- D. In the event of a tie, there will be a special seven question quiz bowl between the teams. Each team will be permitted to have up to three team members on their quiz bowl team.

General Rules (cont.)

- E. Due to the necessity of pre-fabrication work, teams will be required to pre-register using the registration form on page 9 prior to receiving their materials (CO₂ Dragster and Popsicle Stick Tower Competition materials).
- F. Sponsors must bring a competition list at the registration table on the day of the event. The competition list is a document which contains the names of each student and what event they will compete in. Once this list is provided at registration, there can be no substitutions.
- G. Good sportsmanship will be observed at all times.
- H. At least two adults are recommended to accompany each participating team.
- I. The decision of the judges is final.

Safety Rules

- A. All devices must use only the materials as prescribed by the rules and supplied for that particular device/event. Use of materials not permitted by the rules will result in the disqualification of the team from the event.
- B. The judges will monitor/inspect construction of all devices as necessary during the event.
- C. Participants should follow the directions of the event official at each event.

Eligibility Requirements

- A. All student teams are required to pay a registration fee of \$5 per student. Students who participated in the Exxon Mobil Bernard Harris Summer Science Camp (from 2016 – 2017) or attended an EIT summer program are not required to pay a registration fee. These fees are necessary to make sure teams are committed to participating in the event.

Individual Event Guidelines/Scoring:

CO₂ Dragster Competition

Objective: From given design specifications, design and build a fast, lightweight balsa wood dragster and calculate its rate of speed.

Resources: A CO₂ Dragster kit will be provided to each team once a team registration form is received. The kit will contain enough materials to design and build two dragsters. The kit will contain the following:

- | | |
|---|-------------------------|
| 2 – Balsa Wood Dragster Body Blanks | 2 - Straws |
| 8 – Wheels (4 large and 4 small wheels) | 2 – Pieces of Sandpaper |
| 4 – Screw Eyes | 1 – Instruction Book |
| 8 – Brass Washers | 4 – 1/8” Axles |

Resources (cont.):

Note: CO₂ cartridges will be provided (by UALR) the day of the event
Pencils (4) will be provided (by UALR) the day of the event
Paper (4 sheets) will be provided (by UALR) the day of the event
Calculators (not provided by UALR) are the responsibility of the team

Regulations:

1. Each team can enter only one dragster.
2. Dragsters may be altered any way possible such that it enables the vehicle to travel faster.
3. CO₂ cartridges will be the sole source of power for the dragster. No other direct or indirect power sources will be permitted.
4. Any dragster not meeting the specifications listed on the specification sheet (page 4) will be disqualified.
5. Prior to starting the drag races, each team's dragster will be weighed without the CO₂ cartridge installed.
6. Dragsters will be impounded after weigh-in.
7. Race officials will determine race pairings.
8. Team members will be responsible for aligning their dragster on the monofilament line prior to starting each race. Although event officials will provide assistance, the actual alignment on the monofilament line will be performed by team members.
9. Each team will be given a CO₂ cartridge on race day (prior to the start of the race) and will be responsible for placing it inside their dragster.
10. Each dragster will be allowed to participate in two (2) time trials. Only the best time between the two trials will count towards the final rankings.
11. The drag strip will be seventy-five feet (75') in length.
12. After each time trial, team members will be given raw data (distance and time) to calculate their dragster's speed in miles per hour (mph). Teams will have no more than three minutes thirty seconds (3:30) to calculate their dragster's speed.
13. Failure to accurately calculate within three minutes thirty seconds (3:30) the dragster's speed will result in disqualification of that particular time trial. Team members should be prepared to show their work to event officials.
14. Judges reserve the right to give full credit to teams that show their work, but make an error in multiplying numbers.
15. Pre-programming of calculators is not allowed.

CO₂ Dragster Specification Chart

	PRODUCTION SPECIFICATIONS	MIN	MAX
	Dragster Body		
A	Dragster body length	200 mm	305 mm
B	Dragster body mass/weight with wheels	45 g	175 g
C	Dragster body width (including wheels)		95 mm
	Axles/Axle Holes/Wheelbase		
D	Number of axles	2	2
E	Bottom of axle hole above bottom of dragster	5 mm	
F	Rear axle hole from rear of dragster	9 mm	
G	Wheelbase	100 mm	270 mm
	Spacers/Washers/Clips		
H	Spacer washers		8
	Power Plant (CO₂ Cartridge Hole)		
I	Power plant: depth of hole	Do not alter	Do not alter
J	Power plant: housing thickness (around entire housing)	4 mm	
K	Power plant: housing diameter	Do not alter	Do not alter
	Screw Eyes		
L	Screw eyes (2) distance apart at farthest point	155 mm	270 mm
	Wheels		
M	Wheels: front diameter	31 mm	38 mm
N	Wheels: rear diameter	29 mm	41 mm

Scoring:

1. Points will be awarded to the dragsters with the six fastest times in which their team was able to compute equivalent rate of speed (miles per hour) within three minutes thirty seconds (3:30).
2. Ten (10) points will be awarded to the first place dragster team, with 8, 6, 4, 2, and 1 points respectively being awarded to second through sixth place.
3. The weight of the dragster will break any ties, with the lighter weight car winning the tie-breaker.

Critical Thinking Problems

Objective: To analyze and solve word problems using mathematical and possibly science concepts within a specified time period (30 minutes).

Resources:

8-1/2" x 11" standard copier paper/ruled paper (supplied by UALR)

Pencils (supplied by UALR)

Graph paper (if needed, supplied by UALR)

Ruler or straight edge (supplied by UALR)

Calculator (**NOT** supplied by UALR)

Regulations:

1. Each team will sit at a table/as a group together.
2. A brief review of the rules for judging/scoring will be given.
3. Team members may consult each other.
4. Pencils and all necessary materials will be given to each team member. It is highly recommended that one member from each team bring their own calculator for familiarity purposes. Each team is allotted no more than one calculator per team member.
5. The problem will be handed out to each team face down. Three copies of the problems will be handed out to each team.
6. At the instructions of the event official, the problems will be turned over.
7. The event official will read the problems aloud once.
8. The time to solve the problems (30 minutes) will begin after the event official has read all of the problems.
9. Students may not ask anyone in attendance or event officials any questions once the event official has completed reading the problems.
10. A representative from each team must bring the problems to the event official. The judges will review the answer and inform the team (via its representative) only which answers are correct.
11. Students should present their solutions in a **clear** form and show their work to prevent the judges from being confused as to whether the students guessed to arrive at their answer.
12. If all of the answers are deemed correct, the team members must remain quiet for the remaining time as to not to disturb the remaining contestants.
13. If the solutions presented are not correct, the team has one more opportunity to present correct answers before being eliminated from competition.
14. Teams will be allowed two opportunities to present their results to the judges. If a team still has an incorrect answer after presenting their results a second time, they will not be allowed to complete the problem and try to receive credit for a correct answer a third time. However, such a team can receive points (second through sixth place) provided the remaining teams are unable to provide correct answers for second through sixth place.

Scoring: Points will be awarded for first through sixth place (10, 8, 6, 4, 2, 1 points respectively). The first team to provide the judges with the most correct answers and proofs in the shortest amount of time will be awarded first place points. Second place will be awarded to the second team with the most correct answers and proofs in the second shortest amount of time, and so on. The decision of the judges is final.

In case of a tie, judges will select a winner based upon clarity and neatness of presented work.

Popsicle Stick Tower Competition

Objective: To design and build an efficient tower made of popsicle sticks in accordance with a specific set of design specifications.

Resources:

1000 - Popsicle Sticks (4-1/2" long x 3/8" wide x 1/16" thick)

1 – 16 ounce Bottle of Glue

Regulations and Scoring:

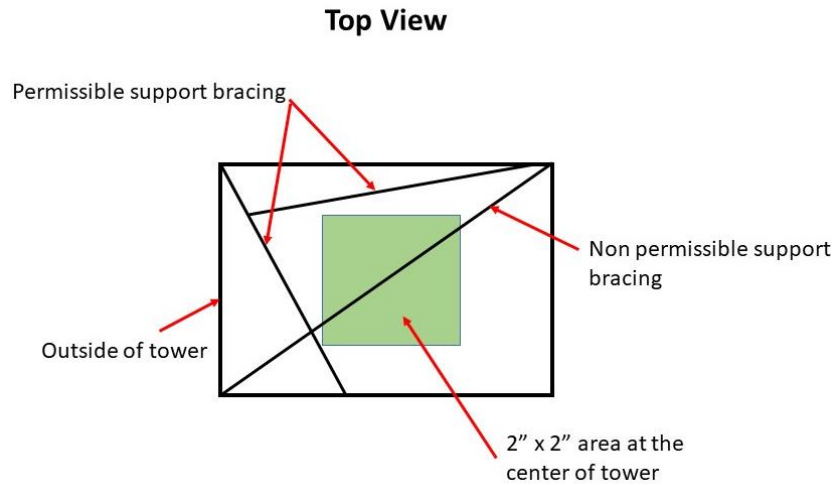
1. Each team can enter one tower.
2. Popsicle sticks may be altered by cutting and by placing glue (supplied by UALR) on them. Laminating popsicle sticks is permitted. However, please keep in mind the efficiency calculation.
3. Only the glue supplied by UALR can be used to join the popsicle sticks together.
4. Towers must adhere to the minimum design specifications as described in the design specifications.

Design Specifications

Tower Specifications	Minimum	Maximum
Height of Tower	15"	18"
Base of Tower	4" wide	10" wide
Top of Tower	1.75" wide	12" wide

5. Cross bracing used for support should be used such that the bracing does not touch a 2" x 2" internal area as shown on the next page.

Regulations and Scoring (cont.):



6. Prior to starting the competition, each tower will be inspected and weighed by the judges.
7. One team member will place their team's tower onto the testing device such that the tower rests only on the base of the testing device. Any tower that rests on any other part of the testing device will be disqualified.
8. With assistance from the judges, the load bucket will be lowered onto the tower with the safety device secured.
9. One team member will place stones into the load bucket. The team member must call out the number written on the stone as he/she places it into the load bucket. Each stone will have its weight painted on it.
10. A judge will enter the weight into the efficiency calculator spread sheet. A team member will be need to ensure all weights are entered by the judge.
11. Once the tower starts to collapse, no additional weight will be placed into the load bucket. Collapse will be measured as 1/2" deflection or reduction in height of the tower. The sum of the weights will be determined to facilitate the calculation of structural efficiency. The weight of the stone which caused the collapse will not be used in the calculations.
12. The decision of the judges is final.

Scoring: Points will be awarded for first through sixth place (10, 8, 6, 4, 2, 1 points) for the six most structurally efficient structure. Structure efficiency will be a ratio where it measured using the equation: Total weight in load bucket/Mass of tower = Structural Efficiency

OVERALL COMPETITION SCORING

- Points will be awarded from 1st – 6th place in each event as described under event descriptions.
- Team points will be tabulated at the end of the day. Medals will be awarded to the 1st (Gold Medal), 2nd (Silver Medal), and 3rd (Bronze Medal) place participants in each individual event.
- In the event of a tie, there will be a special seven question quiz bowl between the teams. Each team will be permitted to have up to three team members on their quiz bowl team.

2019 UALR Pre-College Diversity Engineering Program Engineering Olympics – Junior Division Information Sheet

When?	March 2, 2019 from 9:00 a.m. until 2:30 p.m.
Where?	EIT Building at University of Arkansas at Little Rock
How many students can attend?	No more than eleven students can attend – ten team members and one alternate. As few as four students can participate as a team.
How do I register a team?	Mail, fax (501-569-3598), or e-mail (alhenry@ualr.edu) the team registration form and participant information forms to UALR no later than February 15, 2019. Sponsors must include the names of all team members and a mailing address for the kit. T-shirt sizes must also be included (s, m, l, xl, xxl), as UALR will distribute prior to the event. Teams registering after February 15, 2019 will not be guaranteed t-shirts and will lose valuable pre-fabrication time. <i>Once a team's registration form is received, the sponsor will receive materials.</i> <u>Registration fees</u> may be paid at any time including the day of the event.
What is the schedule of events?	Registration - 9:00 a.m. – 9:45 a.m. (EIT Building 1 st Floor) Welcome – 9:55 a.m. Critical Thinking Problem – 10:15 a.m. (EIT 321 & EIT 322) CO ₂ Dragster Competition – 10:30 a.m. (EIT 2 nd Floor) Lunch Break – 11:45 a.m. (approx. time) Popsicle Stick Tower Competition – 1:15 p.m. (EIT Auditorium) Awards – 2:15 p.m. (EIT Auditorium)
What do I bring the day of the event?	<ol style="list-style-type: none">1. Calculators – three (for each member of the Critical Thinking Problems team)2. Batteries (for calculators)3. Popsicle Stick Tower4. CO₂ Dragster5. Pens/Pencils6. Competition List – List of students competing in each event7. Participant Information Forms8. Payment for team (checks payable to UALR)
Where will students be allowed to eat?	There are a variety of places to eat on and near campus. The Diamond Cafe in the Donaghey Student Center will also be open.
What about parking?	All lots will be available for parking (gates will be up). Lot 8 (parking lot adjacent to EIT Building) will be open. See attached map for parking locations. School buses should park in Lot 13.
Questions?	Contact Ashley Henry-Saorrano at 569-8597 or alhenry@ualr.edu

Team Registration Form

PRE-COLLEGE DIVERSITY ENGINEERING PROGRAM

UALR Engineering Olympics (Jr. Division)
March 2, 2019

Please complete appropriate items below:

Our school (**will**) participate in the 2019 UALR Engineering Olympics on **March 2, 2019**

Names of Students (<i>please print</i>)	T-shirt size (s, m, l, xl, xxl – adult sizes)
1.)	
2.)	
3.)	
4.)	
5.)	
6.)	
7.)	
8.)	
9.)	
10.)	
Alternate:	

Sponsor/School

Sponsor/School

School Mailing Address: _____

Please mail/fax/e-mail this reply form before **February 15, 2019** to:
UALR Engineering Olympics
College of Engineering & Information Technology
2801 S. University Avenue
EIT Room 117
Little Rock, AR 72204
Attn: Ashley Henry-Saorrano
Fax: 501-569-3598; e-mail: alhenry@ualr.edu

UA Little Rock
College of Engineering and Information Technology
Outreach Participant Information Form

Student Information:	
Last Name: _____ First Name: _____ MI: _____	
School Name: _____ Current Grade: _____	
Date of Birth: _____ Gender: F M Expected Graduation Year: _____	
Ethnicity: American Indian/Alaskan Native Asian/Pacific Islander Puerto Rican Black/African American Hispanic/Latino Caucasian/White Other: _____	
Street Address: _____ Apt: _____	
City: _____ State: _____ Zip Code: _____	
Phone: _____ Student email address: _____	
Intended Major: _____	
What is your primary career interest at this time (circle one): Engineering Business Other Math Related Field Computer Programming Health Field Other Science Related Field Don't Know Other: _____	
Adult T-shirt Size (circle one): Small Medium Large XL 2XL	
Parent/Legal Guardian Information:	
Name: _____	
Email Address: _____	
Work Phone: _____ Cell Phone: _____	

I give my permission for UA Little Rock to use my photograph in UA Little Rock press releases.

Student Signature

Date

Parent/Guardian Signature

Date

Engineering Olympics Competition List

This form must be turned in at the registration table on March 2, 2019

School: _____

Team Number (if more than one team from the same school, i.e., A, B, C): _____

Instructions – **Print** the names of your students competing in each event listed

CO₂ Dragster Competition	No more than 3 students
Critical Thinking Problem	No more than 3 students
Popsicle Stick Tower Competition	No more than 4 students

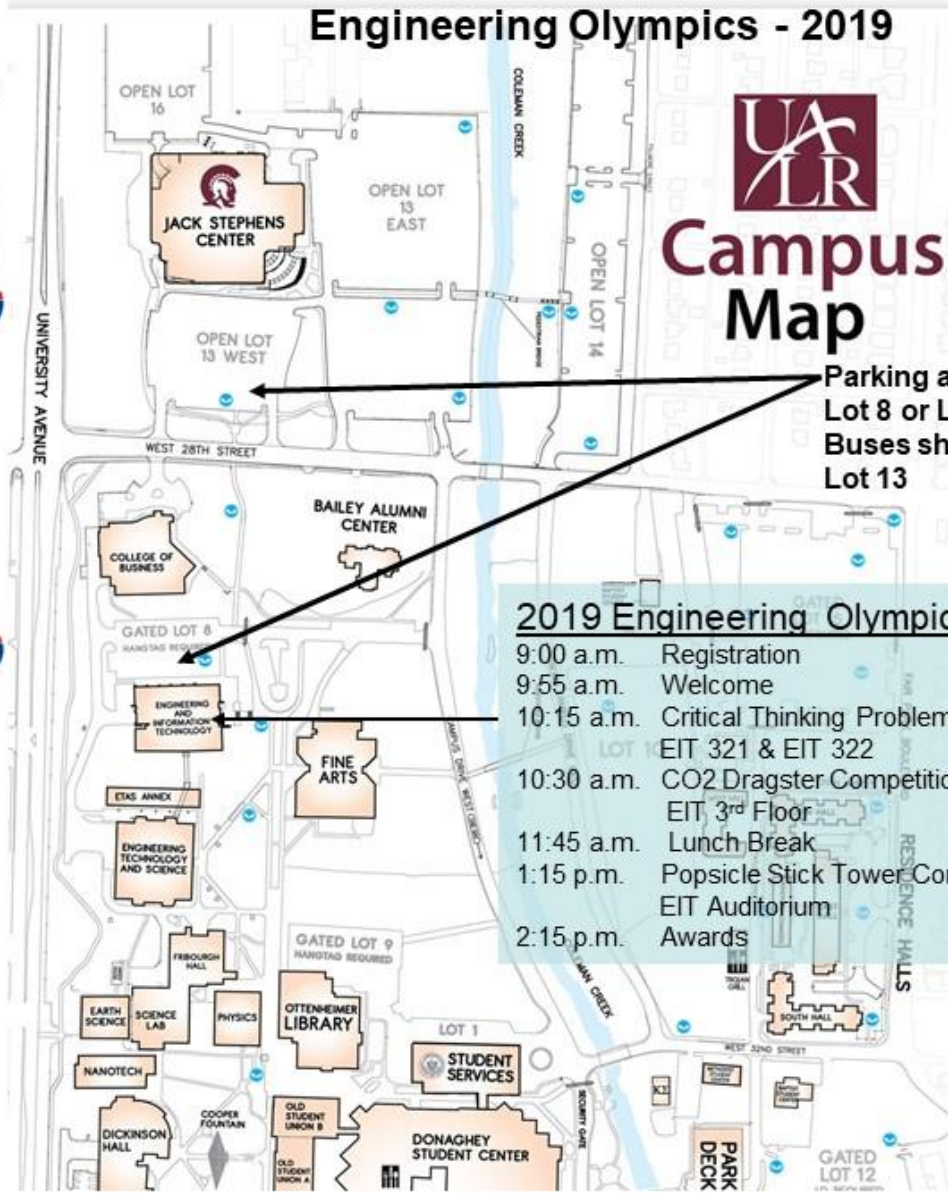
Engineering Olympics - 2019



Campus Map

1.3 miles

3.5 miles



Parking available in Lot 8 or Lot 13; Buses should use Lot 13

2019 Engineering Olympics Agenda	
9:00 a.m.	Registration
9:55 a.m.	Welcome
10:15 a.m.	Critical Thinking Problems EIT 321 & EIT 322
10:30 a.m.	CO2 Dragster Competition EIT 3 rd Floor
11:45 a.m.	Lunch Break
1:15 p.m.	Popsicle Stick Tower Competition EIT Auditorium
2:15 p.m.	Awards