



## 2013 ASEE MODEL DESIGN COMPETITION

Sponsored by the Two Year College Division of ASEE

Date: June 22, 2012

Dear Colleague,

On behalf of the American Society for Engineering Education (ASEE) - Two Year College Division (TYCD), we invite you to encourage the submission of student design projects for the 15<sup>th</sup> Annual ASEE Lower Division MODEL DESIGN COMPETITION. This event will be held in conjunction with the 2013 ASEE Annual Convention, Atlanta, Georgia, June 23 - 26, 2013. This competition is open to 1<sup>st</sup> and 2<sup>nd</sup> year students at four and two year colleges and universities.

In this year's competition student teams will design and build a robot to collect 12 orange colored golf balls and deposit them in a box in the center of the 8' X 8' track. The robot must adhere to the rules of the model design competition (attached). An exhibit session is included as part of the competition.

The main reason for this competition is for students to gain a better understanding of the design process from start to finish. Designing and building something from an idea is probably why they chose engineering in the first place. Use this design competition as a platform to reinforce their ideas and have some *engineering fun!* We hope to see you and your students' entries in San Antonio.

Please find enclosed the guidelines and registration forms for this event. The interest and registration forms are on the back of this letter.

Sincerely,

Paul E. Gordy  
Phone: 757-822-7175  
Fax: 757-427-0327  
Email: [pgordy@tcc.edu](mailto:pgordy@tcc.edu)

John Wadach  
Phone: 585-292-2488  
Email: [jwadach@monroecc.edu](mailto:jwadach@monroecc.edu)

Results from the  
**14<sup>th</sup> Annual ASEE Model Design Competition**  
June 11, 2012 - San Antonio, Texas

The recent competition in San Antonio required teams to design and build two autonomous robots (A and B) that could complete a total of four laps of a relay race. At the start, Robot A would begin behind the start line with a golf ball onboard that represents a mailbag. After completing the first lap, Robot A would pass the golf ball to Robot B in the space between the start and finish lines. This sequence continues until Robot B crosses the finish line on the 4<sup>th</sup> lap. Teams had a maximum time of 120 seconds to complete the four laps.

18 teams competed and the results were as follows:

- 1<sup>st</sup> Place – Monroe Community College, Zellerbotics
- 2<sup>nd</sup> Place – Illinois Central College, ρ-bot
- 3<sup>rd</sup> Place – Cedarville University, Roadrunner and Coyote



For complete results, including scores, pictures, videos, and more, visit the competition websites at <http://www.tcc.edu/faculty/webpages/pgordy/ASEE/index.html> and at [asee2012.posterous.com](http://asee2012.posterous.com).

Consider bringing a team from your college to next year's competition on June 24, 2013 in Atlanta, Georgia. For more information or a copy of next year's rules, please contact Paul Gordy ([Pgordy@tcc.edu](mailto:Pgordy@tcc.edu), 757-822-7175) or John Wadach, ([Jwadach@monroecc.edu](mailto:Jwadach@monroecc.edu), 585-292-2488).

**2013 ASEE TYCD MODEL DESIGN COMPETITION RULES**  
**Atlanta, Georgia**  
**June 24, 2013**

The 15<sup>th</sup> Annual American Society for Engineering Education (ASEE) Two-Year College Division (TYCD), Model Design Competition will be held Monday, June 24, 2013 in conjunction with the ASEE Annual Convention in Atlanta, Georgia

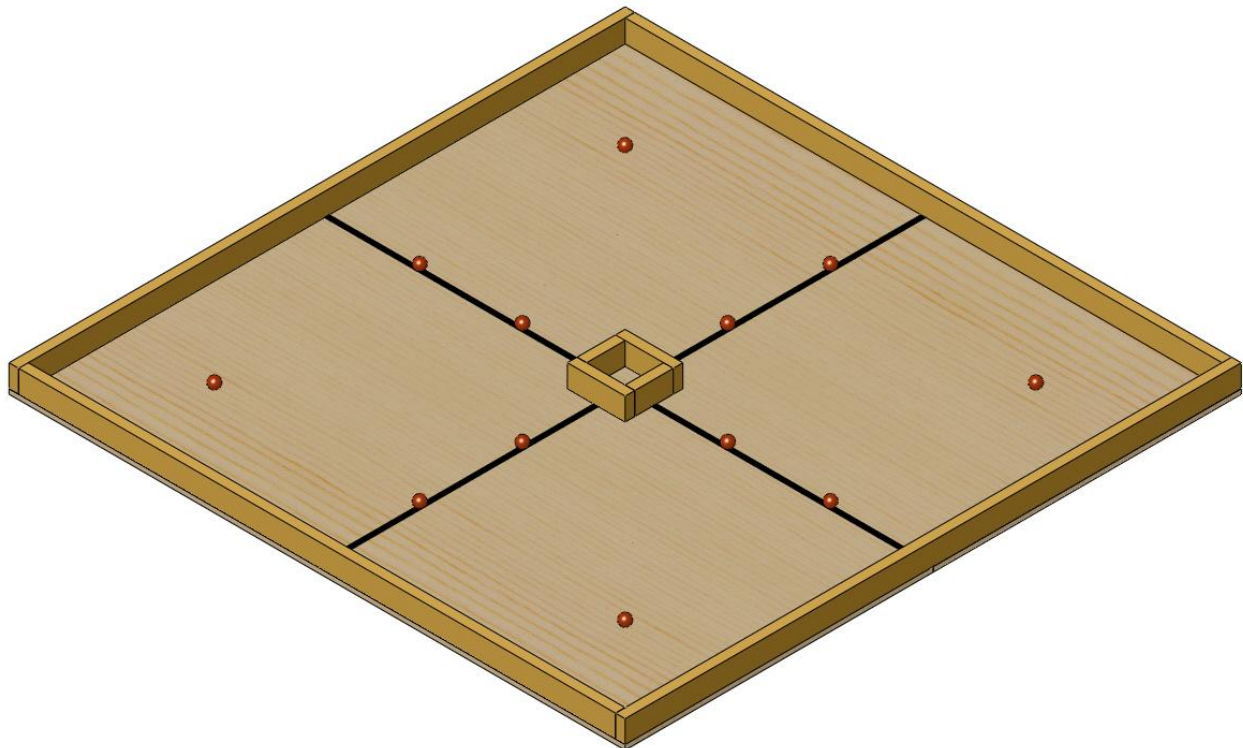
**Event Name:** Peach Harvest

**Objective:**

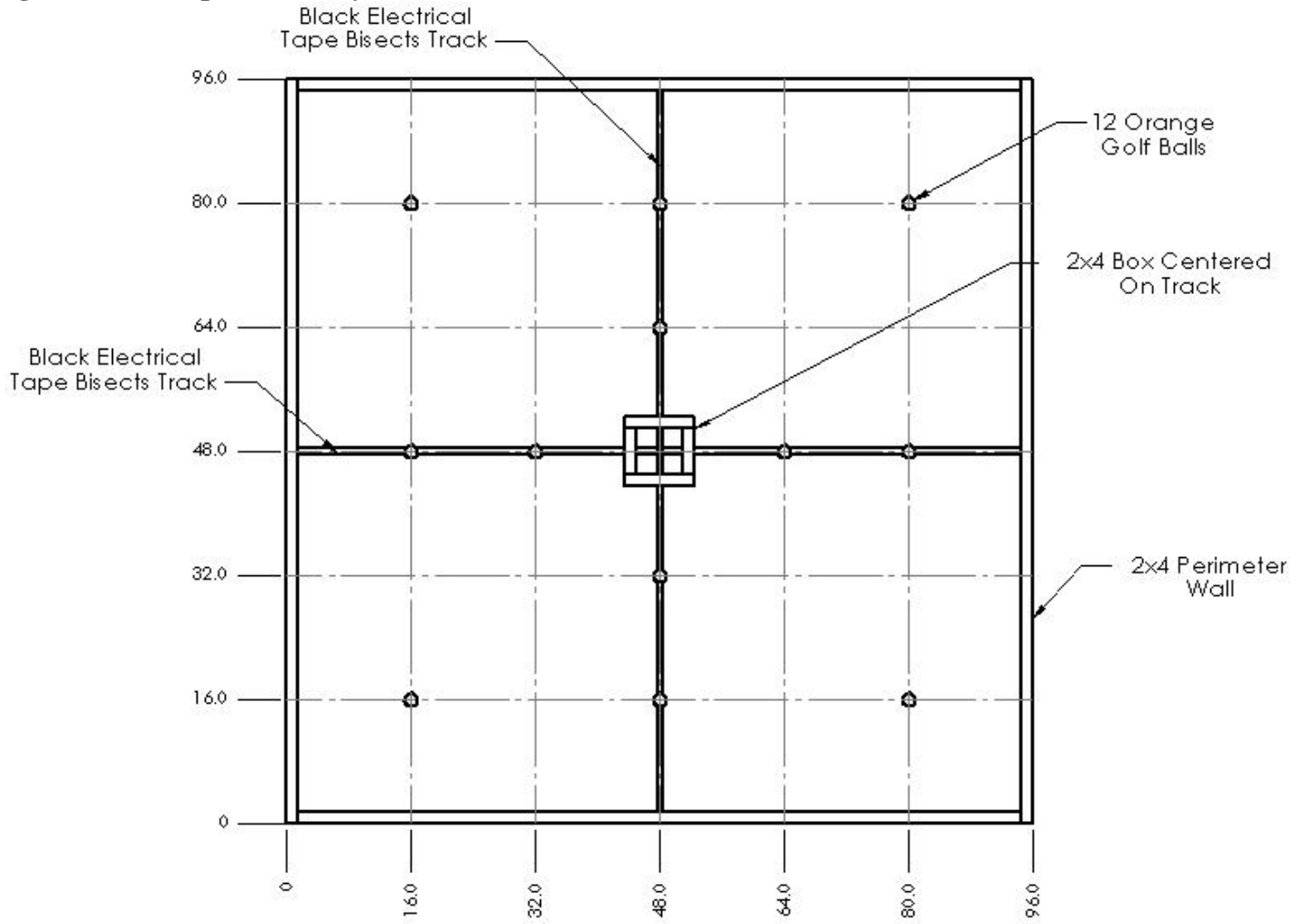
To design and build an autonomous robot that can collect 12 orange colored golf balls that represent ripe Georgia peaches and deposit them in the peach basket in the center of the track. The robot must begin within the 8" X 12" X 10" high size but may expand to any size after the trial has begun. Teams will have a maximum time of 60 seconds to collect all the peaches and deposit them in the peach basket.

**Track Specifications:**

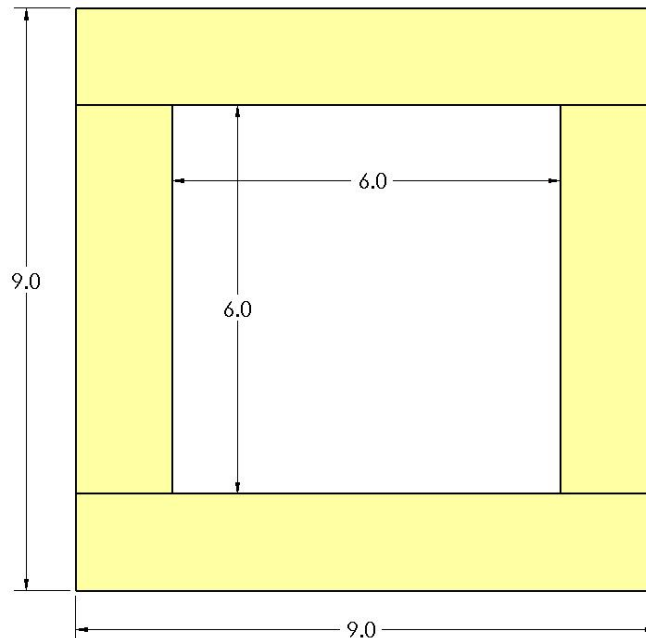
**Figure 1: Isometric View of Track showing the 12 orange colored golf balls and the center peach basket into which the balls must be deposited.**



**Figure 2: Top View of Plywood with Dimensions in Inches**



**Figure 3: Top View of 2x4 Center Box with Dimensions in Inches**



### **Track Materials:**

1. Two 4' X 8' X 3/4" sheets BC or better grade plywood.
2. Two 2" x 4" x 96" Perimeter Boards (Actual Size 1.5" x 3.5" x 96")
3. Two 2" x 4" x 93" Perimeter Boards (Actual Size 1.5" x 3.5" x 93")
4. Two 2" x 4" x 6" Center Box Boards (Actual Size 1.5" x 3.5" x 6")
5. Two 2" x 4" x 9" Center Box Boards (Actual Size 1.5" x 3.5" x 9")
6. One roll of 3/4" wide black vinyl electrical tape.
7. Twelve Neon Orange Golf Balls available at [golfballs.com](http://www.golfballs.com/Golf-Balls/Blank-Colored-Golf-Balls.htm?p2=NO) for \$12 per dozen  
<http://www.golfballs.com/Golf-Balls/Blank-Colored-Golf-Balls.htm?p2=NO>
8. 2"x4" boards and fasteners for constructing a substructure to maintain flatness of the plywood.

### **Construction Procedures:**

1. Place the two sheets of plywood on a flat surface to form the 8' X 8' base for the track.
2. Draw light construction lines as shown in figure 2 to locate the centerline of both pieces of tape and the location of the 12 balls.
3. Draw light construction lines for the outer perimeter of the Center Box so that it is located with its sides parallel to the perimeter boards and centered in the middle of the track.
4. Apply the 3/4" wide black vinyl electrical tape so that the track is bisected in two perpendicular directions.
5. Fasten the four perimeter boards onto the track.
6. Fasten the center box in the middle of the track.
7. To provide for maximum flatness, a 2"x4" substructure should be constructed and attached to the track.

## Vehicle Specifications:

### Allowable Energy Sources:

Any energy source is allowed as long as it is completely contained within the robot and does not create or emit any gaseous, liquid, or solid emissions. Energy sources must not present any safety hazards to participants or spectators.

### Maximum Robot Size:

The robot must fit inside a box with vertical sides having inside dimensions of 8.0" X 12.0" and have a maximum height of 10.0". The robot must begin a trial within this size constraint. After the start button is pressed the robot may expand to any size.

### Components, Fabrication, and Cost:

Team members using materials which are commonly available to the general public must perform all fabrication. Use of commercially available vehicles, robots, or entire kits such as RC cars, Legos, K-nex, Fischer-Technics, Parallax or erector sets may not be used. The use of **Lego Mindstorm microcontroller bricks are prohibited**. Individual components from these cars, robots, or kits (except the Mindstorm Brick) may be integrated into a team's robot as long as the majority of the robot's components are not from the same car, robot, or kit source. The cost of purchasing all components must not exceed **\$400**.

## Robot Time Trials:

- 1) It is the responsibility of the team to inspect the condition of the track and placement of balls before starting their robot to be certain that everything is in order. Once a team presses or pulls the start mechanism, the run counts as an official trial and may not be done over.
- 2) The order of testing will be determined by random draw.
- 3) While the preceding team is on the track for a trial, the on-deck team must have their robot on the on-deck table ready to run immediately after the previous team completes their trial. Each team will have one minute to begin a trial after being called.
- 4) All teams will be called for a trial in a current round before any teams begin the next round of testing.
- 5) Robot sizes will be tested with the measuring box prior to each team's first run and in subsequent runs if requested by the judges. Team members will be responsible for placing the measuring box over their robots one at a time. If a robot fails to meet the initial size constraint the judges will assess a penalty proportional to the severity of the violation.
- 6) The robot may start anywhere on the track as long as some part of the robot is touching one or more of the four perimeter walls. The robot must remain within the 8" x 12" x 10" high size constraint until the start button has been pressed.
- 7) The time for a trial will begin when the judge gives the team the command to start. Once the robot begins to move in any way team members may not touch the robot or communicate with it with any remote control device.
- 8) If a robot fails to move once the judge's start command is given, the team members may work on their robot to get it moving but the time will continue to run from the time when the start command was given. If the



robot has not moved within 60 seconds of the start command, a score of zero will be assigned for that trial.

- 9) Nothing other than the 12 golf balls may be deposited into the center box. If anything other than the golf balls is within the four vertical planes of infinite height defined by the four interior 6" sides of the box, a score of zero will be recorded for that trial. Please note that at the end of the trial no portion of the robot may either be in the box or overhang inside the four infinite planes described above.
- 10) The time for a trial will end when all 12 balls have been deposited in the center box and all parts of the robot are outside the four vertical planes of infinite height defined by the four interior 6" sides of the box. Alternately a trial will end if 60 seconds has elapsed since the judge's start command.
- 11) If a robot becomes disabled prior to 60 seconds have elapsed the trial will end and a time of 60 seconds will be recorded. Points will be awarded for any balls deposited into the center box prior to becoming disabled as long as only golf balls are contained in the center box at the end of the trial.
- 12) Each team will be allowed to make four trials.
- 13) Teams may make changes or repairs to their robots between trials but they must be ready within one minute of being called to the track.
- 14) **Teams may not make practice runs during the exhibit session or after the start of the robot testing session.**

### **Robot Time Trial Scoring:**

Robots will earn points as described below.

1. **5 Points** will be awarded for each golf ball that is contained in the center box at the end of the trial while in compliance with all the rules.
2. A time bonus will be added to robots that complete a perfect run in less than 60 seconds. A perfect run is defined as one in which all 12 golf balls have been deposited into the center box while in compliance with all the rules.

**Time Bonus** = ( 60 – Time for a Perfect Run in Seconds)

3. The total Robot Time Trial score for a team will be equal to the sum of the points earned in each of the four trials.

### **Exhibit Session Scoring:**

A maximum score of 120 points may be earned in the Exhibit Session. Scoring details are described on the next page.

### **Overall Scoring:**

The overall score for a team will be equal to the sum of the scores for the Exhibition Session and the four robot testing trials. A team will be disqualified from the competition if they fail to participate in the entire Exhibition Session.

**Overall Score = Sum of the Points from all four Robot Time Trials + Exhibition Session Point Total**

## **Exhibit Session:**

Prior to the testing of the vehicles, each team must participate in an exhibit session where they will create a booth to promote their project to judges, other students, and conference attendees. Each team will be supplied with a 6' long table, room for tripod displays behind the table, and electrical power. The entire session is scheduled to last approximately 3 hours during the grand opening of the Exhibition Hall on Monday, June 24<sup>th</sup>.

All participants must be present during the entire exhibit session. Teams may use posters, written documents, physical prototypes, multimedia displays, and other visual aids at their booths. In addition, each team's robot must remain on display at their booth for the entire duration of the exhibit session. **Team members may neither work on, nor test their robots during this session.** The number of entries from a given school will be limited by the available space during the exhibit session.

Students from each team are required to visit the exhibits from all other schools. A captain from each school will score each team from other schools on a scale from 0-20 (20 being best) based upon the criteria that the judges will use. Each school will designate a single captain even if that school has multiple teams. The captains' score will be computed by deleting the highest and lowest scores from the captains and then computing the average of the remaining scores.

The judges will visit each booth for approximately 10 minutes depending on the number of teams competing. During this visit, team members will guide the judges through their display for the first five minutes. In the second 5 minute period, the judges will ask the team questions. Each judge will score teams on a scale of 0 to 20 (20 being best) on the first five items below. The score in each category will be computed by deleting the highest and lowest scores from the judges and then computing the average of the remaining scores.

1. Design Evolution:

Guide the judges through the design process that your team followed from the initial ideas to the final solution. Describe your rationale for making design decisions.

2. Robot Operation:

Discuss how your robot works.

3. Fabrication Methods:

Explain how you fabricated your robot.

4. Design Analysis:

Convince the judges that your design is optimal based upon its performance, cost, and environmental impact.

5. Exhibit Quality:

Your exhibit quality will be judged on the following items: team and exhibit appearance, technical expertise displayed, communication skills, and effectiveness of visual aids.

6. Captain Scoring:

The score from the captains will be added to the judges' scores from the five categories above.



## **Rule Interpretation Questions:**

**Prior** to the date of the competition direct your inquiries to:

John Wadach  
Monroe Community College  
1000 E. Henrietta Road  
Rochester, NY 14623  
Phone: 585-292-2488  
Email: [jwadach@monroecc.edu](mailto:jwadach@monroecc.edu)

### **On the date of the competition:**

The judges will interpret the intent of the rules and make all decisions. If the judges determine that a team is in violation of the intent of any rule or specification, they will deduct points in proportion to the severity of the violation. All decisions by the judges are final and may not be appealed. Teams have shown respect for the judges, participants, and spectators in the past, and this positive attitude is expected from each participant this year.

## **Competition Registration Questions:**

Questions related to registering for the competition should be directed to:

Paul Gordy  
Tidewater Community College  
1700 College Crescent  
Virginia Beach, VA 23453  
Phone: 757-822-7175  
Email: [pgordy@tcc.edu](mailto:pgordy@tcc.edu)

Please find the entry forms on pages 11 and 12. The Interest Form should be received no later than April 1, 2013. A Registration Form for each model design team must be received no later than June 1, 2012.

## **PROJECT TEAM / ENTRY LIMITATIONS:**

Each team must have at least one faculty advisor and at least 2 student members but no more than 10 student members. Each team member must primarily be enrolled in freshmen or sophomore level classes. The number of entries from each school will be limited by the space available in the Exhibit Session. If a school has more than one entry then each team must represent a unique solution to the design problem. Multiple copies of the same solution are prohibited.

## **ASEE ANNUAL CONVENTION PASSES:**

It is not required that student team members or faculty advisors be registered for the ASEE Annual Convention. Passes will be provided for all team members and advisors so that they can enter the conference area and exhibition area on the day of the competition. Details for obtaining passes will be made available a couple of weeks prior to the competition.

## **COMPETITION TIMELINE:**

The specific time and location of the Exhibit Session and Robot Testing will be sent to all teams and published in the ASEE Final Program and Proceedings booklet. The overall format of the competition is given below.

**Morning: Exhibit Session**

**Afternoon: Robot Testing Session and Awards**

## **PRACTICE SESSION:**

The official track will be available in the Exhibition Hall for teams to practice on prior to and following the Exhibit Session. Teams should be considerate and only use the track for brief periods if other teams are waiting to use the track. No practice runs may be made during the Exhibit Session or after the Robot Testing Session has begun.

## **AWARDS:**

First, second, and third-place teams will receive plaques.

## **SUNY TYESA COMPETITION**

The State University of New York Two Year Engineering Science Association (SUNY TYESA) will host a design-build competition on at the end of April 2013. SUNY TYESA will use the same rules and project as the 2013 ASEE Design Competition. Teams interested in participating in the SUNY TYESA competition should contact Mark Courtney [mcourtne@sunydutchess.edu](mailto:mcourtne@sunydutchess.edu) or visit the SUNY TYESA website at: [tyesa.org](http://tyesa.org)

**2013 ASEE Model Design Competition Registration Form**

Name of college/university: \_\_\_\_\_

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

Name of faculty advisor(s): \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email (print clearly): \_\_\_\_\_

Student team captain: \_\_\_\_\_

Other student team members:

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_

4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_

7. \_\_\_\_\_ 8. \_\_\_\_\_ 9. \_\_\_\_\_

Which students/advisors need badges for the convention center? (Badges are needed if you are not registered for the convention).  
Circle one: **All need badges**   **None need badges**   **Only those listed below need badges**

Will your team require electrical power at your Exhibition Table? Circle one: **YES**   **NO**

Please submit this form to :      Paul E. Gordy  
   Tidewater Community College  
   1700 College Crescent  
   Virginia Beach, VA 23453  
   Phone: 757-822-7175  
   Fax: 757-822-7334  
   Email: [PGordy@tcc.edu](mailto:PGordy@tcc.edu)

**Return one copy of this form for each team entered by  
June 1, 2012 (by US mail , fax, or email)**

**2013 ASEE Model Design Competition Interest Form**

Name of college/university: \_\_\_\_\_

Name of faculty advisor(s): \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email (print clearly): \_\_\_\_\_

Number of model entries desired : \_\_\_\_\_

Please submit this form to: Paul E. Gordy  
Tidewater Community College  
1700 College Crescent  
Virginia Beach, VA 23453  
Phone: 757-822-7175  
Fax: 757-822-7334  
Email: [PGordy@tcc.edu](mailto:PGordy@tcc.edu)

**Return this form by April 1, 2012 (by US mail , fax, or email)**