2012 ASEE MODEL DESIGN COMPETITION

Sponsored by the Two Year College Division of ASEE

Date: June 9, 2011

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 14th Annual ASEE Lower Division MODEL DESIGN COMPETITION. This event will be held in conjunction with the 2012 ASEE Annual Convention, San Antonio, Texas, June 10 - June 13, 2012. This competition is open to 1st and 2nd year students at four and two year colleges and universities.

In this year's competition student teams will design and build two robots to complete a four lap relay in which a golf ball is passed between the robots after each lap. The robots 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

John Wadach
Phone: 585-292-2488
Email: jwadach@monroecc.edu

Results from the

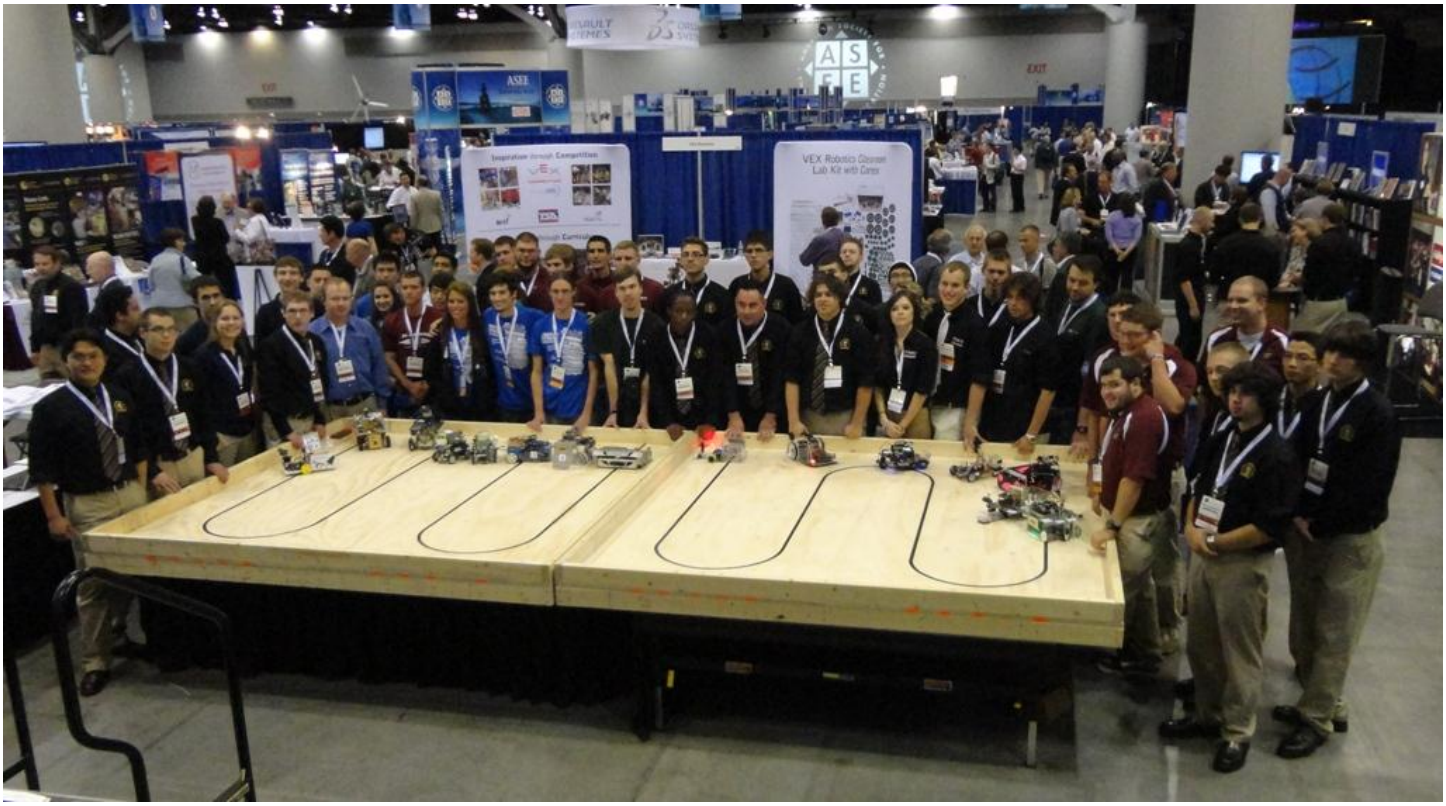
13th Annual ASEE Model Design Competition

June 27, 2011 - Vancouver, British Columbia

The ASEE Model Design Competition is a design/build competition for freshmen & sophomore engineering students at 2-year and 4-year colleges. The competition is held each year during the ASEE Annual Convention. The competition typically involves building an autonomous, battery-powered vehicle to navigate some sort of challenging track to complete a prescribed task. The recent competition in Vancouver required robots to collect 6 red dowels while not moving any of the green dowels located in random patterns on an 8' X 8' track. Scoring for the competition was based on the number of dowels collected, the time to complete the task, and the points earned in the exhibition phase of the competition.

16 teams competed and the results were as follows:

1st Place – Monroe Community College, Team "Savion & The MOSFETs", 4 perfect runs for 623.21 pts
2nd Place – Monroe Community College, Team "Subject To Change", 4 perfect runs for 616.13 pts
3rd Place – Monroe Community College, Team "Paul Bunyan 2.0", 4 perfect runs for 600.72 pts



For complete results, including scores, pictures, videos, and more, visit the competition website at http://www.tcc.edu/faculty/webpages/pgordy/ASEE/index.html

Consider bringing a team from your college to next year's competition on June 11, 2012 in San Antonio, Texas. For more information or a copy of next year's rules, please contact Paul Gordy (Pgordy@tcc.edu, 757-822-7175) or John Wadach, Jwadach@monroecc.edu, 585-292-2488).

2012 ASEE TYCD MODEL DESIGN COMPETITION RULES
San Antonio, Texas
June 11, 2012

The American Society for Engineering Education (ASEE) Two-Year College Division (TYCD), Model Design Competition will be held Monday, June 11, 2012 in conjunction with the ASEE Annual Convention in San Antonio, Texas.

Event Name: Pony Express

Objective:

To design and build two autonomous robots (A and B) that can complete a total of four laps of a relay race. At the start, Robot A must begin behind the start line with a golf ball onboard that represents a mailbag. After completing the first lap, Robot A must 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 4th lap. Teams will have a maximum time of 120 seconds to complete the four laps.

Track Specifications:

Figure 1: Isometric View of Track showing both the day side (white plywood with black tape) and the night side (black plywood with white tape). Dowels are placed at the center of each arc and must not be knocked down by the robots.

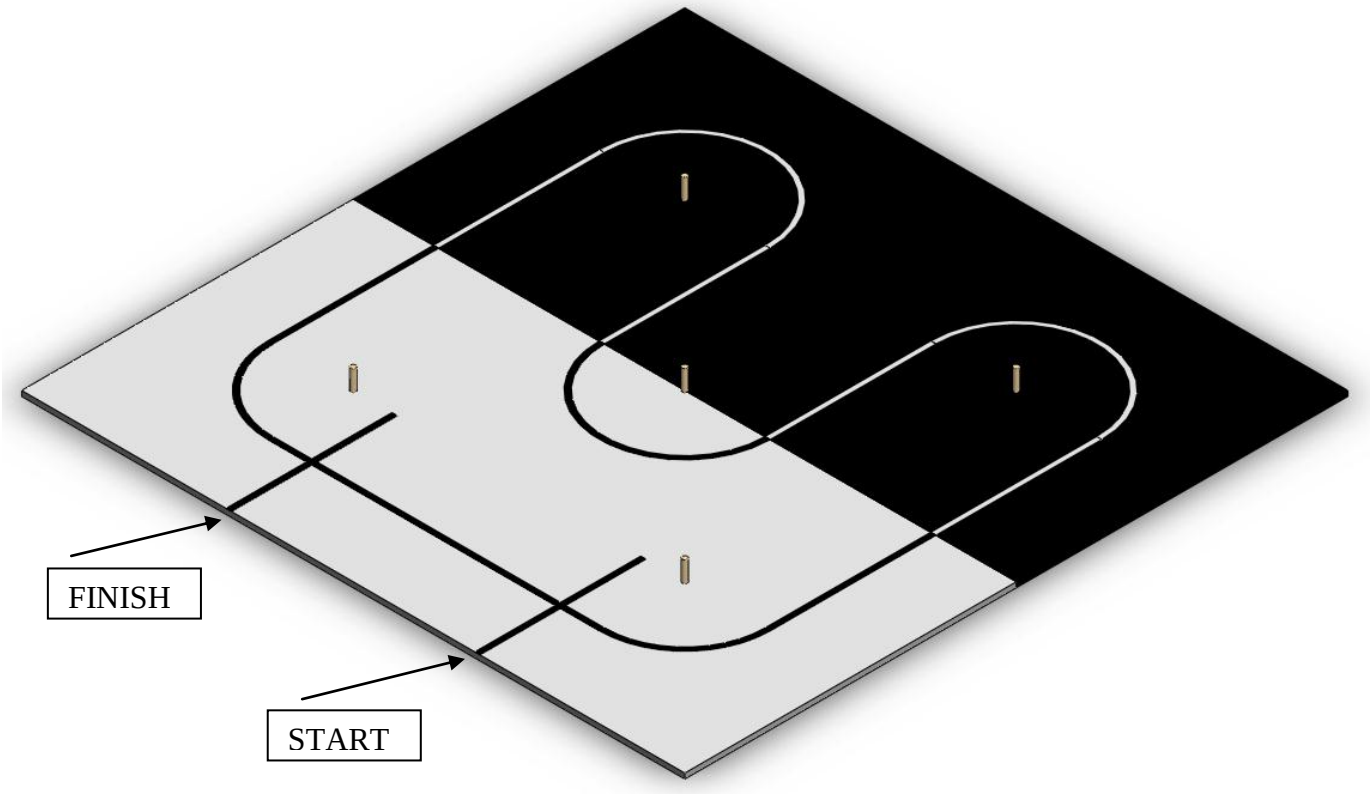
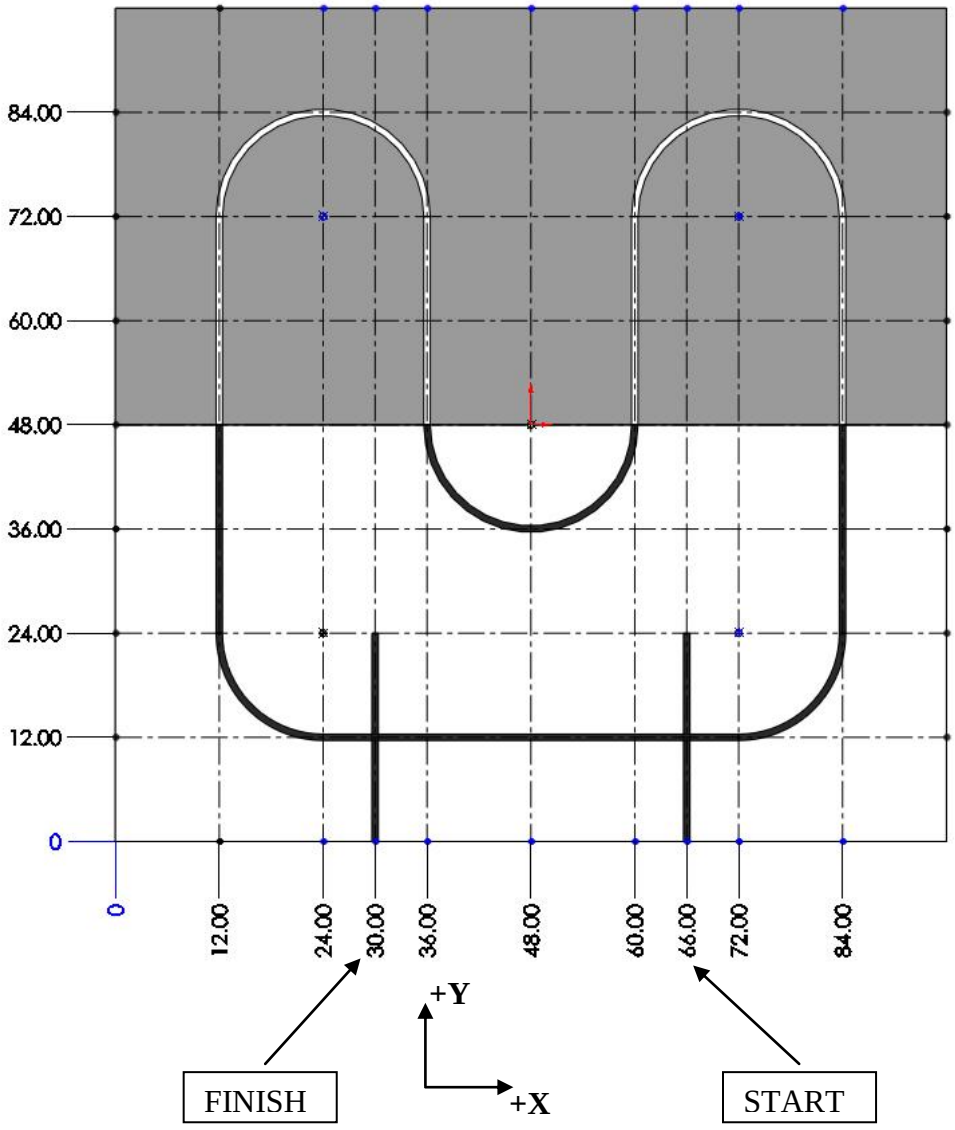


Figure 2: Top View of Plywood with Dimensions in Inches
Note: The black sheet of plywood is shown in gray so that the centerlines are visible.



Notes:

1. All dimensions are in inches with the origin (0,0) located in the lower left corner of the plywood.
2. All dimensions are measured from the origin.
3. Dimensions to the centerline of the tape lines are shown.
4. The radii of all arcs are12.00 inches.
5. The (X,Y) coordinates of the five arc centers are: (24.00, 24.00) , (72.00, 24.00) , (24.00, 72.00), (72.00,72.00), and (48.00,48.00). The center of the dowels will be placed at each of these locations.
6. The joint between the two plywood sheets runs parallel to the X axis.
7. The Finish Line is the 24” long piece of black tape located 30.00” to the right of the origin.
8. The Start Line is the 24” long piece of black tape located 66.00” to the right of the origin.

Track Materials:

1. Two 4’ X 8’ X ¾” sheets BC or better grade plywood.
2. One quart of **White** Glidden Premium Flat Interior Paint (Home Depot # GLN9013-04).
3. One quart of Glidden Premium Flat Interior Paint (Home Depot # GLN9013-04) **tinted black**.
4. Five hardwood dowels with diameters of 0.75” and heights of 3.00”.
5. One roll of ¾” wide black vinyl electrical tape.
6. One roll of ¾” wide white vinyl electrical tape.
7. 2”x4” boards and fasteners for constructing a substructure to maintain flatness of the plywood.

Construction Procedures:

1. Paint the best side of one sheet of plywood with one coat of flat white paint.
2. Paint the best side of one sheet of plywood with one coat of flat black paint.
3. Place the two sheets of plywood on a flat surface to form the 8’ X 8’ base for the track.
4. Draw light construction lines as shown in figure 2 to locate the centers of the arcs and centerlines of the electrical tape.
5. Draw dark ¾” diameter circles in the locations where dowels will be placed (see page 4, note 5).
6. Apply the 3/4"’ wide black vinyl electrical tape so that the centerline of the tape is coincident with the appropriate centerlines on the white sheet of plywood.
7. Apply the 3/4"’ wide white vinyl electrical tape so that the centerline of the tape is coincident with the appropriate centerlines on the black sheet of plywood.
8. 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:

Each robot when measured individually 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". Neither of the two robots may exceed this size constraint at any time during a trial.

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 Mindstrorm 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 **$600.**

Robot Testing:

1) It is the responsibility of the team to inspect the condition of the track and placement of dowels 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.

6) Robot A must start with the golf ball onboard and all wheels or components in contact with the track between the start and finish lines. Portions of Robot A may hang over these lines but the wheels or other components may not touch either the start or finish lines or be outside of the zone between them.

7) Robot A must travel around the track in a counterclockwise direction as viewed from above with all points in contact with the track passing on the side of each dowel that the vinyl tape is on as in a slalom race. While Robot A is outside the zone between the finish and start lines, all points of Robot B in contact with the track must remain between the finish and start lines. When any part of Robot A crosses the finish line after the first lap with the golf ball onboard, 15 points will be awarded.

8) After crossing the finish line, Robot A must pass the golf ball to Robot B as in a relay race. No components other than the golf ball may be passed to Robot B. Robot B must receive the golf ball with all its wheels or components in contact with the track between the start and finish lines. Portions of the Robot B may hang over these lines but the wheels or other components may not touch either the start or finish lines or be outside of the zone between them.

9) While Robot B is outside the zone between the finish and start lines, all points of Robot A in contact with the track must remain between the finish and start lines. When any part of Robot B crosses the finish line after the second lap with the golf ball onboard, 15 points will be awarded.

10) Steps 6-9 are repeated a second time so that Robot A and Robot B both complete 2 laps for a total of 4 laps.

11) The trial ends if any of the following events occur:

a. A robot's wheels or other components in contact with the track touch or cross the finish or start lines without being in possession of the golf ball.

b. A robot knocks down a dowel or any part of a robot in contact with the track passes on the opposite side of a dowel as the vinyl tape.

c. The robot carrying the golf ball is not able to move or drives off the surface of the plywood.

d. Neither robot is in possession of the golf ball.

e. Components other than the golf ball are passed between the robots.

f. Robot B crosses the finish line on the fourth lap with the golf ball onboard. This is a perfect run.

12) The robot must be capable of completing the tasks without any input from the team. Team members may not operate radio, infrared, ultrasonic, electrical, or other remote controls at any time. Communication between the robots via wireless methods is allowable as long as this communication is autonomous.

13) The robots may operate for a maximum of 120 seconds after the judge gives the command to start.

14) 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 Scoring:

Robots will earn points as described below.

1. **15 Points** will be awarded for each lap that is completed while in compliance with all the rules.

2. A time bonus will be added to robots that complete a perfect run. A perfect run is defined as one in which four laps are completed while in compliance with all the rules.

   Time Bonus = (120 – Time for a Perfect Run in Seconds)

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 11th.

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.

Teams are encouraged to participate in an optional T-shirt exchange during this session where captains exchange one of their school T-shirts with the captain from each of the other participating schools.

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.

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 Robot Testing + Exhibition Session Point Total

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

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

Please find the entry forms on pages 11 and 12. The Interest Form must be received no later than March 1, 2012. 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 Seesion 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 2012. SUNY TYESA will use the same rules and project as the 2012 ASEE Design Competition. Teams interested in participating in the SUNY TYESA competition should contact Mark Courtney mcourtne@sunydutchess.edu or visit the SUNY TYESA website at: tyesa.org

2012 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**

Will your school participate in the T-shirt exchange? 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

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

2012 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

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