

2021 Roller Coaster Rules

What is Tau Beta Pi and What Does it Represent?

Tau Beta Pi is a National Engineering Honor Society. The members of Tau Beta Pi are chosen from among the top junior and senior engineering students on the basis of distinguished scholarship and exemplary character. They are also expected to participate in community service activities.

The Iowa Alpha Chapter at Iowa State University has been recognized nationally for the service projects that it has organized, and has undertaken the challenge of hosting a roller coaster competition for all K-12 students. Marc Hermon, an Urbandale High School teacher, started this competition in order to reach out to high school students who have an interest in mathematics, physics and engineering. The competition gives students an opportunity to apply theory to a project that is both fun and challenging.

Engineering

Creativity and problem solving are two skills that are hard to teach. This competition is designed to provide opportunities for students to apply and practice these skills. The problem solving skills that students learn will be invaluable in any field their career path takes them (engineering, science, or other areas). Experimentation and asking questions are essential to maximum performance. Students should not worry about making mistakes. They will run into many problems in the future that they have not foreseen. Engineering is a process by which ideas are tested and re-tested in an effort to produce the best working product. A good engineer knows one way to get something to work and many ways it won't work. This competition is designed to promote interest in engineering and science. The competition is open to all K-12 students.

Your mission:

Your mission, if you choose to accept it, is to build a roller coaster that utilizes multiple mechanisms and “tricks” while trying to complete the final task in 30 seconds $\pm$ 3 seconds. Generally, try to be creative as possible when trying to finish the challenge. Prefabricated construction toys such as Hot Wheel tracks or any other type of track, tinker toys, Lincoln Logs, Legos or K'Nex may not be used. Any type of energy may be used except chemical (includes fire!), human, NUCLEAR, and electric. Basically, power for the coaster must be mechanical (springs, mouse traps, rubber bands, magnets and gravitational potential energy) and once the Rube Goldberg Machine is going, no one can touch or help the coaster, or influence its performance in any way. Also, there is **no water allowed!**

This year's Rube Goldberg challenge:

This year the challenge will be announced on **March 15th, 2021**. Teams have broad latitude to determine how they want to accomplish this challenge.

Therefore, be creative!

Roller Coaster Structural Requirements

1. Must be able to run without assistance
2. No prefabricated toys can be used to create the functional parts of the roller coaster, although they can be used for the theme/decoration.

Competition Requirements

1. An oral presentation (1-2 minutes) consisting of the name of the roller coaster/team, the names of team members and information about the roller coaster and the physics concepts demonstrated by various components of the roller coaster.
2. The roller coaster should implement the Rube Goldberg challenge.
3. The roller coaster should have a specified starting point and a specified ending point.
4. A video submission with both a 1-2 minute oral presentation followed by an approximately 30 second run of the roller coaster by each team will need to be submitted by **11:59 p.m. on April 15th, 2021**.

Judging & Awards

Judging will be based on the three categories: **Presentation, Overall Theme, and Technical Skill**. Before operating your roller coaster you must clearly state in the video where your starting and ending points are located. Once this decision has been made it CANNOT be changed. If the mechanisms are able to complete the course without assistance AND does so in a time of 30 seconds +/- 3 seconds, then your technical score will be DOUBLED.

Presentation: (20 points) Judges will examine your professionalism, technical knowledge, and general speaking style (posture, eye contact). All team members should participate in the video presentation). Team members should point out starting and ending points and describe all of their technical "tricks" at this time.

Overall Theme: (30 points) Judges will examine the team's use of a theme and how it is integrated into their roller coaster, the design of the roller coaster, the naming of the roller coaster, costumes, etc.

Technical Skill: (70 points) Judges will examine how many technical "tricks" were performed and assign a technical score out of 35 points. Your technical score is very important because if the mechanisms complete the course without assistance and does so in 30 seconds (± 3 seconds) the technical score will be doubled to a maximum of 70 points.

Members of the Iowa State University Tau Beta Pi - Engineering Honor Society will do the judging. Teams of high school students, middle school students, and friends/family groups will be judged separately. Awards will be presented for 1st, 2nd and 3rd places for the middle school, high school, and friends/family teams.

When & Where

The video submissions for each team will be due by **11:59 p.m. on April 15th, 2021**. The submission link will be sent out and opened on **April 1st, 2021**. For more information visit, <http://iowaalpha.tbp.org/roller-coaster-competition/>.

Teams & Coaches

On-line registration for the competition is available on the Roller Coaster website: <http://iowaalpha.tbp.org/roller-coaster-competition/>, or at the following link: https://docs.google.com/forms/d/e/1FAIpQLScHF1jKafRgFkUoWDZD0ql4fRfOhwrYDSnEoUoNHzwjaducBQ/viewform?usp=sf_link. Each team (1-4 students/people) may enter only one roller coaster. Each school may enter as many teams/roller coasters as they would like. Coaches that are parents or teachers may participate with the team by expressing ideas and suggestions and providing workspace and tools; however, the coach should not actively participate in construction of the roller coaster.