Roller Coaster Overview

ENGR1182
Roller Coaster Project

- As part of the project in ENGR1182.01, your team will:
  - Innovate,
  - Design,
  - Build,
  - Document,
  - Test a model roller coaster.

- To obtain these deliverables, you will learn important tools like:
  - Time management and task scheduling,
  - Team communications and meetings,
  - Fair division of labor,
  - Team member responsibilities.
## Schedule

| Lab 1 | Review Project Design Description Document.  
Begin Project notebook |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Lab 2</td>
<td>Work on paper design. Update Project Notebook</td>
</tr>
<tr>
<td>Lab 3</td>
<td>Work on paper design. Update Project Notebook</td>
</tr>
</tbody>
</table>
| Lab 4 | **Due: Initial paper Design**  
**Due: Project Schedule**  
Update Project Notebook |
| Lab 5 | Begin construction. Update Project Notebook |
| Lab 6 | Construction. Update Project Notebook |
| Lab 7 | Construction. Update Project Notebook |
| Lab 8 | Preliminary testing. Update Project Notebook |
| Lab 9 | Final System testing. Update Project Notebook |
| Lab 10| **Oral Presentation**  
**Due: Final Written Report**  
**Due: Final Design Sketch**  
**Due: Completed Project Notebook** |

* Details for items in **bold** are provided in the Roller Coaster Description document in your lab packet
Configuration Requirements

- Your team will build an open-loop roller coaster that includes the following ‘minimum required features’:
  - Vertical loop
  - Horizontal loop
  - Bump
  - Straight horizontal

- Any additional features will receive extra points as specified in the RC Description document
Optional Features

- Cobra

- CorkSrew

Source: coastercommunity.com

Source: fr.academic.ru
Operational Requirements

- In addition to the minimum set of features, your coaster should also meet the following requirements:
  - Your roller coaster design must use the full 25 feet of track
  - Roller coaster track must fit on the lab table top, inside a space that is 5’ long, 4’ wide
  - The ball must fall into the safety catch bin constructed using cardboard sheet
Attendance and Grading Policy

- Attendance is mandatory for ENGR1182.01:
  - For each unexcused absence from a building session, 20 points (20%) will be deducted from the final system test grade.

- There are no supplemental lab hours. All construction work must be completed within the scheduled lab times.
Sequential Tasks for the Roller Coaster Project

- Read project description document and syllabus
- Team design brainstorming session(s)
- Team design meetings
- Initial paper design
- Revisions from design review meeting incorporated into paper design
- Initial construction begins
- Ball rolls through entire roller coaster
- Mounting of speed sensors
- Initial testing of completed design
- Verifying 30 minute build time
- Final Test
- Prepare final paper design
- Performance analysis using speed measurements
- Final Written report – Draft, Final
- Oral Presentation – Outline, Draft, Final, Actual Presentation
How to satisfy so many tasks?
Maintain a Project Schedule

## Sample Project Schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Team Member</th>
<th>Planned Start</th>
<th>Actual Start</th>
<th>Planned Completion</th>
<th>Actual Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read syllabus and project description</td>
<td>All</td>
<td>23-Sep</td>
<td></td>
<td>24-Sep</td>
<td></td>
</tr>
<tr>
<td>Team design brainstorming session</td>
<td>All</td>
<td>28-Sep</td>
<td></td>
<td>28-Sep</td>
<td></td>
</tr>
<tr>
<td>Team design meetings</td>
<td>All</td>
<td>1-Oct</td>
<td></td>
<td>8-Oct</td>
<td></td>
</tr>
<tr>
<td>Initial Paper Design</td>
<td>All</td>
<td>11-Oct</td>
<td></td>
<td>14-Oct</td>
<td></td>
</tr>
<tr>
<td>Start project notebook</td>
<td>rlk</td>
<td>27-Sep</td>
<td></td>
<td>1-Oct</td>
<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>etc.</td>
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<td></td>
</tr>
<tr>
<td>etc.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Project Notebook

- The purpose of the project notebook is to document all work undertaken by the team during the course of the semester.
  - Project notebook contains all information required for implementation of the project, in a sequential fashion.
  - The project notebook is worth 50 points.

- Project notebooks will be checked on a weekly basis from Lab4

- Final submission of Project Notebook within the first five minutes of the Oral Presentation session. Any late submissions are subject to a 30% deduction (50 x 0.3 ≈ 15 points).
Testing of the Roller Coaster

- The team will not be graded on the basis of the preliminary test
- The team will be graded on the basis of the final test

Scoring for the Final System Test
- Each team has up to three trials
  - Best score out of the three trials will be selected
    - Each trial consists of three consecutive runs of the ball along the track.
Grading Sheet for the Final Test

# Roller Coaster Final Test Grading Sheet

<table>
<thead>
<tr>
<th>TEAM NAME:</th>
<th>Total</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller Coaster Configuration Requirements:</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum score of all features included in the coaster (max. 50 pts or w/ allowed extra credit feature 50 pts)</td>
<td>50</td>
<td>X</td>
</tr>
<tr>
<td>Catch bin dimensions met</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Construction time less than 30 minutes</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Roller Coaster outside overall dimensions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 points will be deducted per wrong containment dimension (width and depth)</td>
<td>4</td>
<td>X</td>
</tr>
<tr>
<td><strong>Roller Coaster Operational Requirements:</strong></td>
<td>40</td>
<td>Trial 1</td>
</tr>
<tr>
<td>Ball stays on the track at all times until it reaches the end of the track</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Sum of three runs worth 8 points each. For each run, teams will be allotted points proportionally to the percentage of the coaster that the ball successfully stays on the track. There will be a two point deduction per run if the ball is not started within 6 inches of the beginning of the track.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ball triggers a sensor-based velocity monitoring circuit mounted on the track</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Teams successfully collects a velocity measurement during one of the trial runs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ball drops into an accurately located cardboard bin at the end of the run, slowly enough to prevent tipping. Bin should not be attached to the table in any way.</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

## Feature List

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Assignment Submissions

- Various documents/reports etc will be due during the entire project:
  - *Initial Paper Design*
  - *Outline and Draft of Oral Presentation Slides*
  - *Final Presentation Slides*
  - *Draft Final Report*
  - *Final written Report*
  - *Team Notebook etc.*

- Refer to the Daily Assignment List for due dates