Studio Description: This week you will work in groups of three to four students to design and build a catapult with the objective of maximizing launch distance and under the constraint of weight. You are provided with the following building materials: 50 popsicle sticks, 1 roll of tape, 10 rubber bands, 2 dowel rods and a ping pong ball. The assignment will consist of two trials as described below. Each catapult is to be built using only the materials listed above. You will have two trials. You may iterate on your first design in the second trial. The catapult will be tested and the average of 5 launches measured in each trial. The catapult must be located behind the starting line and may be affixed to the ground using tape if needed. You will be responsible for cleaning up all materials, including the removal of all tape. You must return all undamaged, non-consumable materials (e.g., popsicle sticks, rubber bands, dowel rods, ping pong ball) free of tape. Appropriate personal protective equipment (PPE) – safety glasses – is required during construction activities and will be provided during studio.

Trial 1: You have 45 minutes to make a catapult. You should spend 15 minutes planning your catapult (not building) and 30 minutes building it. Do not start construction of your catapult during the 15-minute planning period. After 45 minutes, the instructor will measure the launch distance of each catapult. Distance will be measured from the starting line to the approximate position on which the ball falls. After your instructor has recorded its distance, you will have 10 minutes to make any notes, take pictures and clean-up your first catapult. The final metric of interest is the average distance divided by the number of popsicle sticks used. This number is to be maximized.

Trial 2: This is a repeat of Trial 1 under the same conditions described above in terms of time and materials to be used. Now you have some understanding of what worked and didn’t work in your first approach and can undergo a design iteration to explore and/or refine your team’s approach.

Deliverable due at the end of this studio: A draft report and figures (one per team) following the guidelines below. If time allows, this is to be reviewed by your instructor with your team in studio.

Deliverables due at the beginning of studio next week: An updated report (one per team) that takes into consideration the comments provided to you by your instructor and TA. Be sure to read and follow the report guidelines below.

Deliverable and Report Guidelines: Your team must produce a brief report to be turned in at the start of studio next week. All reports should be uploaded to Canvas before the start of studio. The report should include a maximum of 1.5 pages of text. The cover page, abstract and appendix do not contribute to this limit. The report should use 12-point font, 1-inch margins and 1.5 line spacing (unless otherwise specified). Use page numbers at the bottom of each page. This report should containing the following:

- **Cover Page:** See below for example cover page. This should indicate the title of the assignment, the section information (e.g., name/number), instructor name, TA name, team member names. It should be on its own separate page. Does not count toward page limit.
- **Abstract:** This is a one-paragraph summary of the report including any key findings and/or results. It should be on its own separate page. Does not count toward page limit.
• **Report**: Consider presenting your work in the following progression for clarity. Limited to 1.5 pages.
  o **Introduction**: Restatement of the problem, goal of the study and inherent design challenges associated with achieving this goal.
  o **Trial 1 Discussion**: Describe the approach taken. Start with the overall conceptual design and then provide details regarding the construction/fabrication of the actual built system. Provide labeled visuals (e.g., figures, sketches or photographs) of the product to support your discussion and utilize the exact same labels in the text to reinforce the writing. Describe the results of the first trial and comment on relative performance of your section. Use technical wording where possible.
  o **Trial 2 Discussion**: Repeat as in the Trial 1 discussion.
  o **Conclusions**: Summary of report with any final thoughts and future modifications that could be taken to improve results.

• **Appendix**: **Any figures/tables should NOT be included in the report body, they should be placed in an Appendix.** This is a separate page or pages. These displays should be put into an appendix so it is straightforward to determine the total number of pages. Each figure/table should be presented to match the sequential order of citation in the report body. Figure captions should be provided for all figures and go below the figure. Table captions for any tables are to be placed above the table. Figures and tables must be cleanly formatted for a professional environment. All font in figures and tables must be easily visible (e.g., at least sized equivalent to 10 pt Times New Roman). Figures and tables must be cited in sequential order in the text and all figures/tables must be cited in the report body. Does not count toward page limit.

• **Contributions statement**: See below for example statement. Your team should include a brief statement for each member indicating the respective contributions in terms of content writing and editing/reviewing. It should be on its own separate page. Does not count toward page limit.
**EXAMPLE COVER PAGE**

ME2110 – Section A1

Studio 1 Report

Team 1:
Team Member 1
Team Member 2
Team Member 3
Team Member 4

Submitted to: Instructor Name

TA: TA Name

Date: #######
Contributions Statement

1. Student 1 – Contributed toward writing the introduction section and final editing.
2. Student 2 – Contributed toward writing the discussion.
3. Student 3 – Contributed toward writing the discussion.
4. Student 4 – Contributed toward generation of figures and tables, as well as writing the discussion.