Design Project # 1 **Mr. Jamie Miles**
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Office: Head Hall E230B

Due: September 24th, 2024 at 12pm

Jib Crane

Your team has been tasked with designing a small-scale jib crane and building a prototype according to your specifications.

Design Criteria:

Functional Requirement:

- The mast must be outfitted to *receive* a standard ¼"-20 male connector on the base provided; the jib must be outfitted to *receive* a standard ¼"-20 male connector for attaching a load.
- The structure must be between 150mm and 300mm (height) and must be capable of supporting twice the weight of the structure (with limited deflection) at a minimum distance of 150mm along the jib. The completed structure can weigh no more than 250g.

Design Requirements:

- A force analysis must be completed to demonstrate that the design meets the functional requirement; load testing will be carried out to confirm this result during the lab session.
- Careful consideration must be given to materials selection to ensure a good strength-to-weight ratio.
- A set of dimensioned engineering drawings (orthographic and isometric) for the as-built structure must be submitted with the completed prototype.

Important Project Requirements:

- Students will work in groups of three or four.
- Draft hand-drawn sketches must be submitted at the **beginning of** your **week 2** lab time.
- A memo report along with the completed prototype must be submitted by **noon** on **Sept. 24th**.
- Peer evaluations must be submitted by the **end of** your **week 3** lab time; individual contributions will factor into your individual project grade.
- Late submissions will not be accepted for credit.

The memo report should be comprised of the following sections:

- Title Page
  - *Includes all of the key details (5 W's-who,what,when,where,why)*
- Introduction (Problem Definition, Design Criteria, etc.)
  - *Clearly defines the problem you have been tasked with.*
- Design Methodology and Proposed Design
  - *Clearly explains the decision-making process that led to the proposed design (materials of construction, connections, etc.)*
- Engineering Analysis
  - *Calculations showing the weight of the as-built components and a force balance on the relevant components to confirm the structure satisfies the design criteria.*
  - ***All assumptions made in the analysis must be clearly articulated.***
- Appendix
  - *Engineering Drawings*

∗ An emphasis must be placed on presenting your results in a clear and concise way. The main body of the memo report must be no more than 5 pages double-spaced.

Grading Scheme:

- Hand Sketches /15
- Memo Report /25
- Prototype Form and Function /60

Summary of Deliverables:

- September 19/20, 2024 – Hand-drawn sketches submitted at the beginning of lab time
- September 24, 2024 – Memo Report and Prototype submitted by noon
- September 26/27, 2024 – Peer Evaluation submitted by the end of lab time