| ME 254: Compliant Mechanisms | | |
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| Assigned: Feb. 5, 2026 | Design Assignment 1 (80 points) | Due: Feb. 17, 2026 |

*If you use AI-agents, include your prompts just like you would cite any references that you use.*

**Question 1 (40 points)**

Design a Displacement-amplifying Compliant Mechanism (DaCM) using the instant centre method and any other concepts and methods we have discussed so far. You should integrate your DaCM into either a single-axis micromachined accelerometer or a vision-based force sensor. Full finite element analysis using Matlab beam code or COMSOL should be done to support your results. A 3D-printed prototype should be made too. You can also make it using the CNC milling machine or laser machining in Mech Works of Mechanical Engineering.

If you choose the accelerometer, show that for the same footprint, the accelerometer gives improved displacement at the sensing combs.

If you choose the force sensor, show that you can resolve 0.1 N and test it out by hanging weights or by other means.

**Question 2 (40 points)**

Design a Force-amplifying Compliant Mechanism (FaCM) for your own specifications. using the instant centre method and any other concepts and methods we have discussed so far. Full finite element analysis using Matlab beam code or COMSOL should be done to support your results. A 3D-printed or a CNC-milled prototype should be made too. You should be able break a nut by hand (your choice, groundnut, betelnut, walnut, or any other nut or even a metal nut of a screw if you want a challenge).

What you need to submit:

1. A paper copy of your answers clearly written down with all details.
2. Graphs and pictures of your results with proper annotation (paper copy).
3. Prototypes that demonstrate that your DaCM and FaCM work as intended.