

Four-Semester Design Clinic Involves Juniors and Seniors Collaborating on Project Teams

New Mexico Tech's unique communication-focused design clinic includes four consecutive semesters of design beginning in the junior year. A required one-semester linked technical writing course supports communication emphasis and promotes knowledge transfer of rhetorical strategies. The four-semester model also allows for seniors mentoring juniors.

NMT Mechanical Engineering Overview

- Publicly-funded STEM institution
- NMT undergraduate enrollment: 1700
- Mechanical Engineering: largest major (23%)
- Rigorous 135-credit curriculum
- ABET-accredited since 2005

Junior and Senior Design Clinic Overview

- 4 semester requirement
- Linked Technical Writing course
- Industry-sponsored, faculty-research driven, and competition teams
- 135 students distributed on 20 teams
- Team sizes range from 4-14 members
- All teams elect a lead and advised by faculty advisor



Figure 1. Augmented Reality team member presenting with Microsoft HoloLens

Communication Emphasis and Knowledge Transfer

Knowledge transfer: the impact and adaptation of prior communication instruction on similar or novel rhetorical situations [1].

Technical writing course promotes transfer of rhetorical strategies through:

- connected assignments
- dialogic environment
- assignments that foster knowledge building [2]



Figure 2: Lightning Receptor team members show prototype at Final Design Conference

Senior Students Mentoring Juniors

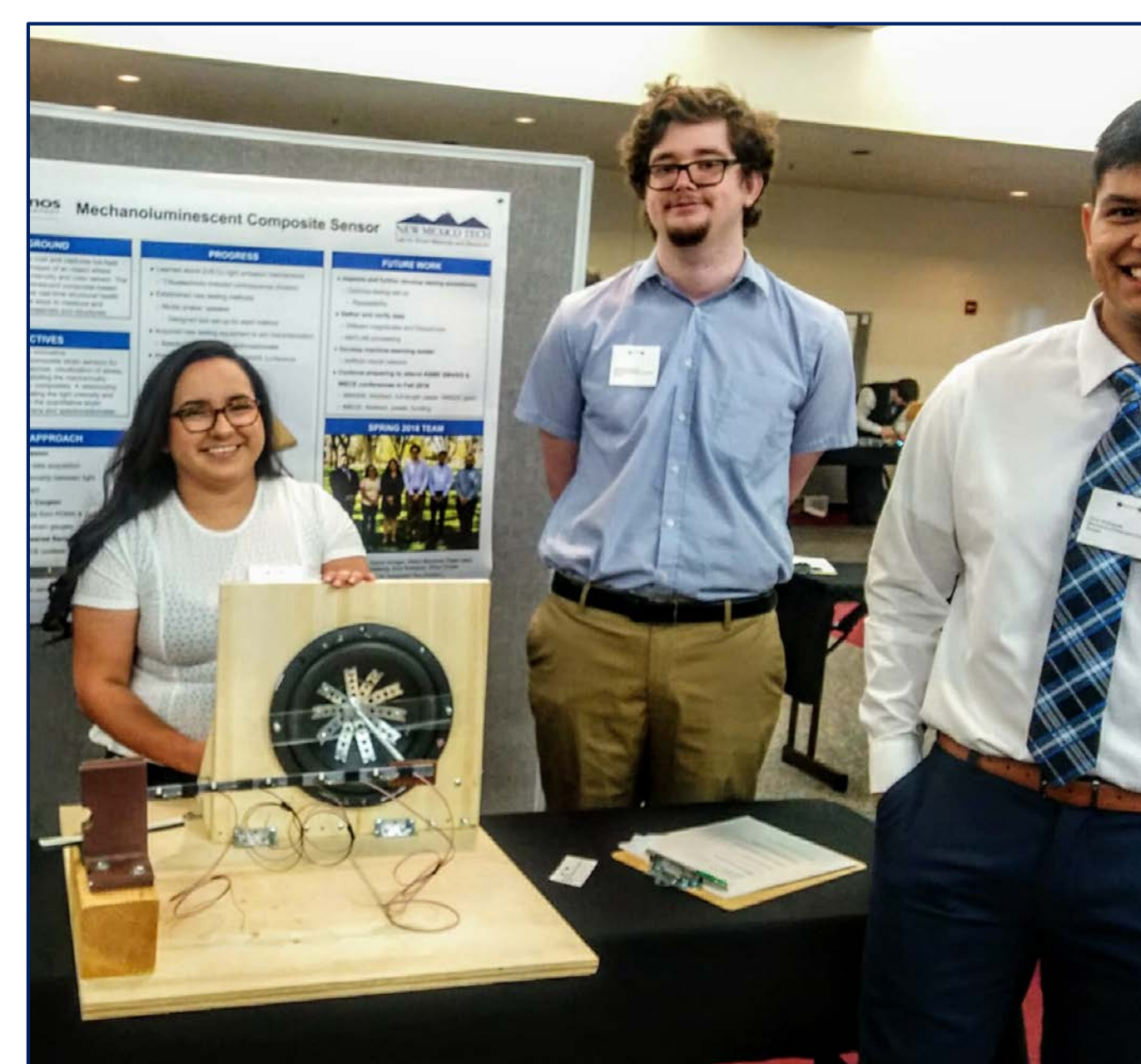


Figure 3: Mechanoluminescent Sensor team seniors taught new Spring '18 member design process overview

- Within teams
- Extracurricular Activities
 - Comsol modeling
 - Inventor seminars
 - Welding workshops
- Presentation rehearsals
- Student Design Clinic junior and senior assistants

Program Evaluation

Faculty and sponsors evaluate teams on:

- Definition of the problem
- Planning the project
- Alternative approaches considered
- Evaluation and selection of preferred approach
- Results and conclusions
- Effectiveness of presentation
- Overall evaluation of project

- 2011-2017 data indicates 100% of teams each year were evaluated as competent or above for overall evaluation of project
- 2011-2017 existing senior surveys consistently ranked design clinic as “best aspect” of department and “amount of time spent on design” as most valuable component of degree
- Lowest average competency found for any of the ABET outcomes assessed since 2014 was 4.10.
- ABET 2016 reaccreditation noted design clinic as program strength

Inherent Challenges

Mid-year team additions

- These students hear Junior and Senior course lectures in reverse order
- Senior mentoring helps

Scheduling

- Average graduation rate is 4.5 years
- Faculty currently considering how to improve graduation rate without sacrificing quality

Varying project lengths

- Projects may span 2, 3, or 4 semesters
- Students may receive experience on more than 1 project

References

1. R.E. Haskell, “Transfer of learning: Cognition and instruction,” San Diego, CA, Academic Press, 2000.
2. N. Artemeva, S. Logie, and J. St-Martin. “From page to stage: how theories of genre and situated learning help introduce engineering students to discipline-specific communication. *Technical Communication Quarterly*,” vol. 8, 301-316. 1999.