MIDFIELD Institute Introduction

MIDFIELD INSTITUTE 2024

Share why you are here in the chat. ☺

MIDFIELD
Multiple-Institution Database For Investigating Engineering Longitudinal Development

to the Fourth MIDFIELD Institute!

Thanks for coming!!

MIDFIELD
Multiple-Institution Database For Investigating Engineering Longitudinal Development

Based on support from NSF award 2142087

Everything you need…

Is available on the website!

Recommend bookmarking the program (agenda)!

We will build in breaks!

Recording ●REC

MIDFIELD Institute

Welcome
Introduction
Before you arrive
Program
Tutorial links
Resources
License

Welcome

2024 MIDFIELD Institute
Location: Virtual
Dates: June 11 (office hours)
June 12–14 (workshop)
Time: 1–5 pm Eastern Time (US)

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MIDFIEL

https://midfieldr.github.io/2024-midfield-institute/

Facilitators

MIDFIELD
Multiple-Institution Database For Investigating Engineering Longitudinal Development

Matthew Ohland, MIDFIELD Director/PI
Associate Head and Professor of Engineering Education, Purdue

Russell Long, MIDFIELD Managing Director (Retired)

Richard Layton, MIDFIELD Data Display Specialist
Emeritus Professor of Mechanical Engineering, Rose-Hulman

Susan Lord, MIDFIELD Institute Director
Professor and Chair of Integrated Engineering, University of San Diego

Facilitators

Haleh Barmaki Brotherton, PhD student, Engineering and Science Education, Clemson University

Hayaam Osman, PhD Student, Engineering Education, Purdue University

MIDFIELD

Multiple-Institution Database For Investigating Engineering Longitudinal Development

Workshop Objectives (qualitative)

By the end of the MIDFIELD Institute, participants should be able to

- Describe the data available in MIDFIELD
- Describe how the MIDFIELD data are organized
- Describe key principles of effective data visualization
- Draft a research question that can be addressed using MIDFIELD

Workshop Objectives (computational)

- Use **midfieldr**, an R package specifically designed for use with MIDFIELD, to:
  - Subset MIDFIELD data to obtain a population to study
  - Classify student records by desired groupings
  - Summarize the data by groups and display results

Session 1: MIDFIELD Introduction

By the end of this session, you will be able to

- Describe where MIDFIELD comes from and how that affects research
- Describe different types of studies that can be done with MIDFIELD
- Outline process to join and access MIDFIELD

Multiple
I nstitution
Database
F or
I nvestigating
E ngineering
L ongitudinal
D evelopment

Whole-population data for institutions and time period

- No sampling, longitudinal, intersectional analyses

Current dataset (July 2023)

- 21 institutions NOT JUST ENGINEERING!!
- > 2.4 million unique students in all majors at institution
- > 240,000 unique engineering students, approximately 1/7 US engineering enrollment

Began with partners in the Southeastern University and College Coalition for Engineering Education (SUCCEED)

Is MIDFIELD representative?

- To the extent that we could measure, MIDFIELD is representative of national (USA) data in terms of race and sex for engineering overall and for "top 5 engineering fields" (Chemical, Electrical, Mechanical, Civil, and Industrial) at enrollment and graduation
- Hard to find datasets to compare to!

ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION	MIDFIELD Multiple-Institution Database For Investigating Engineering Longitudinal Development
Cross-sectional data for enrollment and degrees awarded by year (2013 used in this study)	Longitudinal: Multiple data points per student (1987 – 2014)
349 institutions including public and private	Whole-population data
Engineering majors only	11 institutions, large public
>500,000 engineering students in 2273 engineering programs	>1 million students, all majors
	> 200,000 engineering students: 10% of engineering enrollment

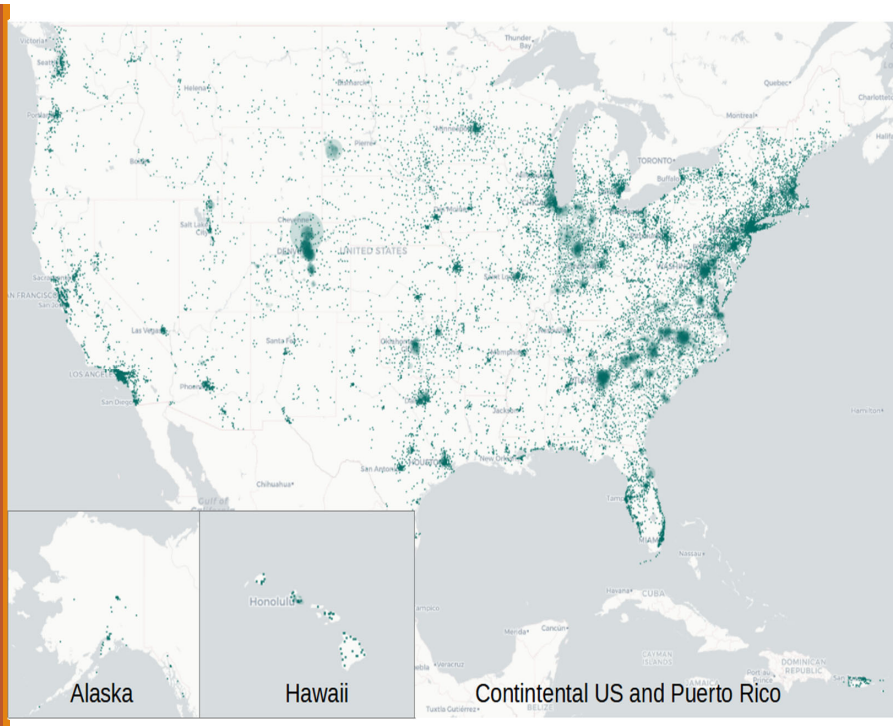
M. K. Orr, M. W. Ohland, S. M. Lord, and R. A. Layton, "Comparing the Multiple-Institution Database for Investigating Engineering Longitudinal Development with a National Dataset from the United States," *International Journal of Engineering Education*, **36**(4), 1321-1332, 2020.

How the design of MIDFIELD affects research

- Southeastern bias – population growth / diversification
- "Large institution" bias – the experience of students at smaller institutions isn't well-represented
- Public institution bias – the experience of students at private institutions isn't well-represented
- Two Historically Black Colleges and Universities (HBCUs) – can't discuss the "typical experience"
- No Hispanic Serving Institution (HSIs) or institutions with high Asian student enrollment, institutions with larger populations being added

Students in MIDFIELD based on home zip code

Lord et al., "MIDFIELD: A Resource for Longitudinal Student Record Research," *IEEE Transactions on Education*, vol. 65, 245-256, 2022. https://doi.org/10.1109/TE.2021.3137086



Resources to help in using MIDFIELD

midfielddata

https://midfieldr.github.io/midfielddata/

midfielddata

Sample of the MIDFIELD Student Unit Record Data

The goal of midfielddata is to provide a sample of MIDFIELD data for practice working with longitudinal, de-identified, individual student unit records.

midfieldr

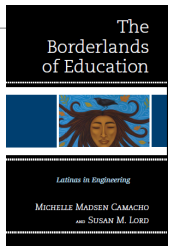
https://midfieldr.github.io/midfieldr/

midfieldr

Tools for Studying MIDFIELD Student Unit Record Data in R

The goal of midfieldr is to provide tools for working with MIDFIELD data, a resource of longitudinal, de-identified, individual student unit records.

What have MIDFIELD researchers accomplished?



- Many publications in journals and conference proceedings, conference presentations, multiple book chapters, & a book.
- 5 journal best paper awards (JEE, IEEE ToE), 2 conference best paper awards, and other recognitions (e.g., WEPAN, ECEDHA).

- Panel discussions, invited workshops and talks, keynote addresses, publicity in various media outlets.

MIDFIELD Impact: Research

- Citations - thousands
- Promoting the use of more sophisticated graphical displays
- Promoting an intersectional approach
- Promoting ecosystem thinking
- Promoting the use of new metrics

MIDFIELD Impact: Policy and Practice

- Citations of our work in papers describing
  - How our metrics and/or graphical displays are being used by others
  - Cases of policy and practice reform based on MIDFIELD findings
- Example: *change in policy* – changed criteria for continuing study
- Example: *new program creation* – the University of Colorado's Gold Shirt program

Accessing the Data

- Contact Joe Roy (j.roy@asee.org)
- Consult local IRB
- Access is free for doctoral dissertation research. Others should discuss with Joe Roy.

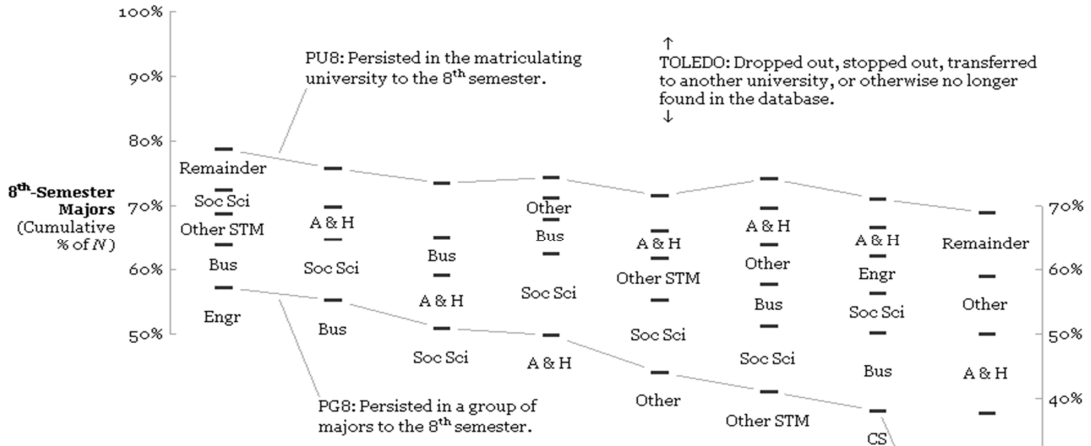
Joining MIDFIELD

- Identify someone at your institution with authority to share institutional data
- Facilitate a meeting of that person with Joe Roy of ASEE

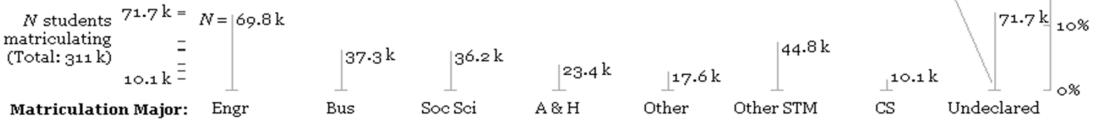
ASEE | MIDFIELD
Multiple-Institution Database for Investigating Engineering Longitudianl Develoment

Some award-winning results from research using MIDFIELD

MIDFIELD
Multiple-Institution Database For Investigating Engineering Longitudinal Development



Engineering isn't a weed out major…



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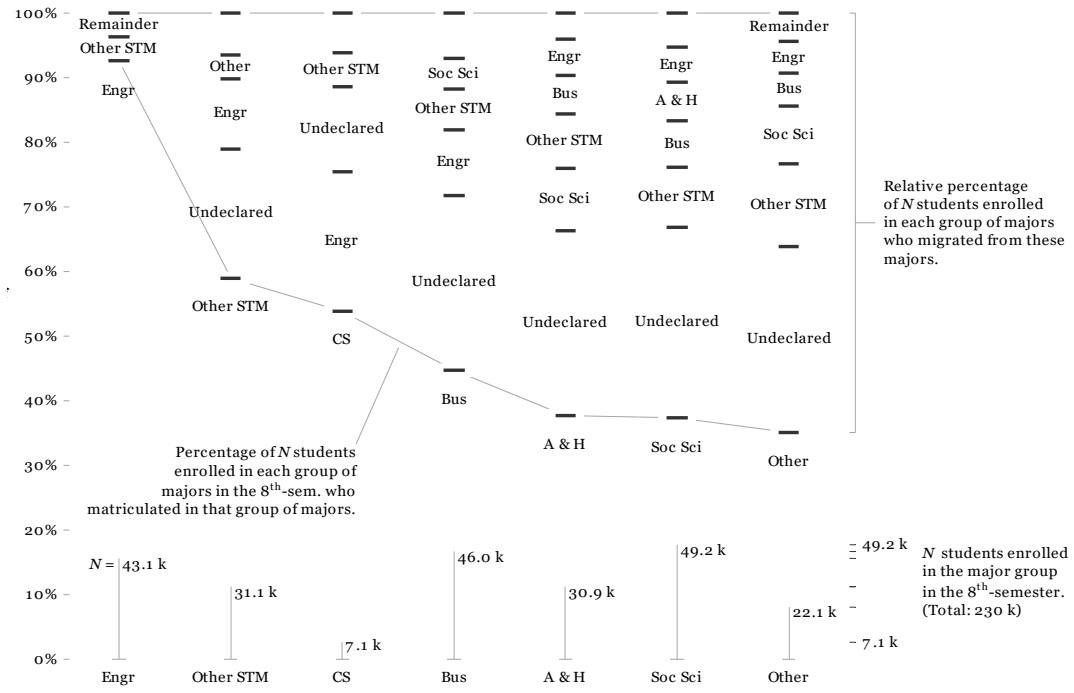
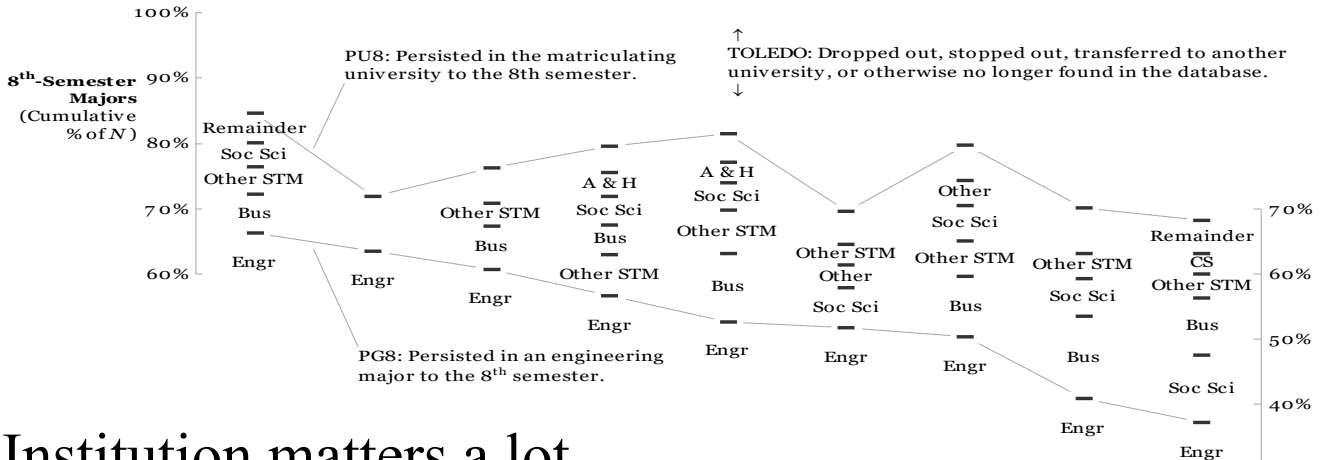
Students Matriculating in All Majors: all MIDFIELD institutions, 'native' (non-transfer) students.

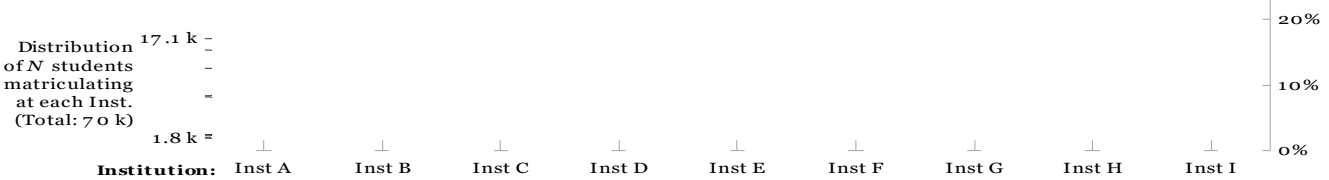


Groups of 8th-Semester Majors.
All MIDFIELD institutions, 'native' (non-transfer) students.

it just doesn't replace the students it loses.



Institution matters a lot…

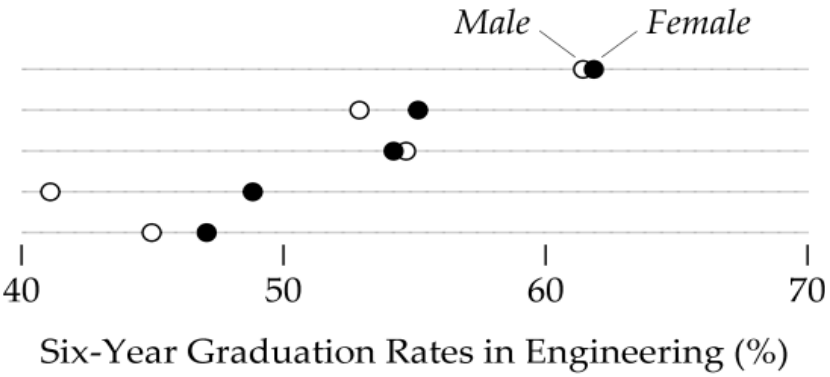


Students Matriculating in Engineering, By institution, 'native' (non-transfer) students.

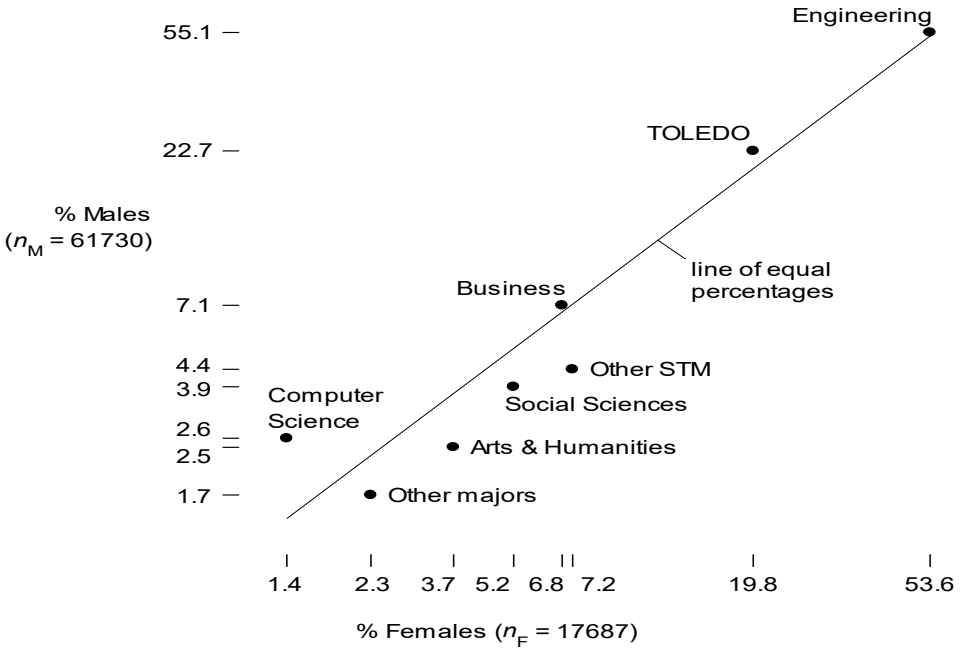
Women graduate at the same rates as men…

All Engineering Matriculants

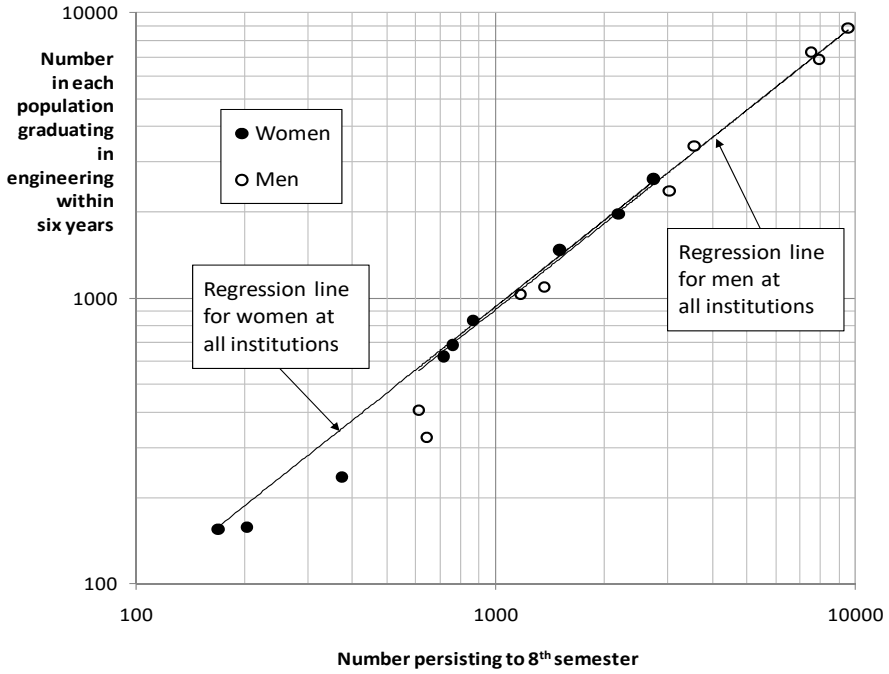
	n_F	n_M
Asian	1001	3927
Hispanic	390	1607
White	9997	45291
Black	3957	6624
Native-Am	68	258



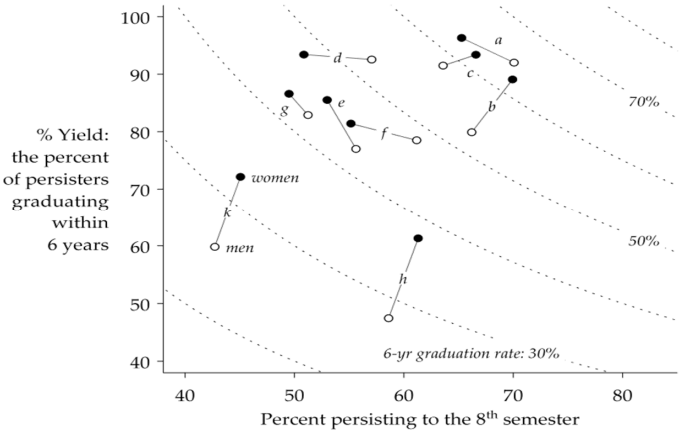
…and have surprisingly similar outcomes.

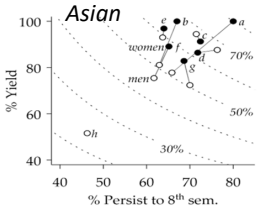


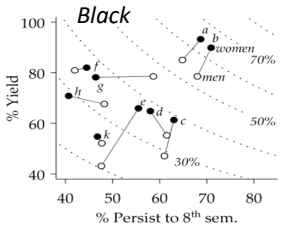
Eight-semester persistence is a good predictor of six-year graduation… but not for everyone.

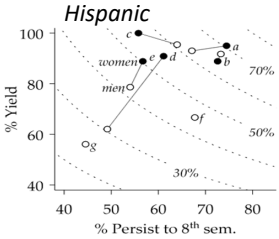


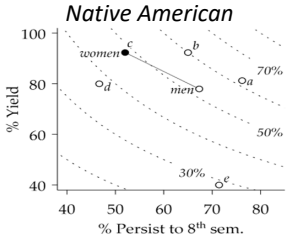
The aggregate doesn't represent any racial/ethnic group.

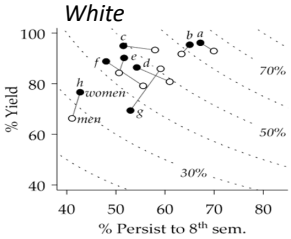




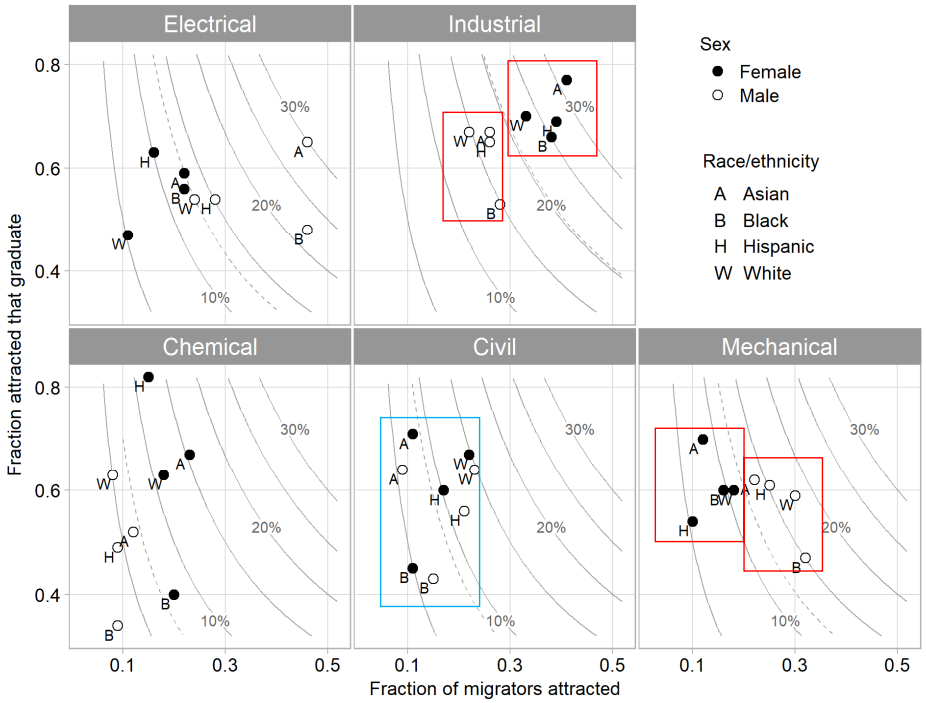








Some disciplines show gender differences …others show racial/ethnic differences.



Some disciplines are better than others at graduating students… but some of the students who leave will graduate in other engineering majors.