Is MIDFIELD for me?

2021 FIE Special Session

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2021-10-13

Contents

Chapter 1

Introduction

1.1 Objectives

MIDFIELD—as of May 1, 2021—contains individual Student Unit Record (SUR) data for 1.7 M undergraduates at 19 institutions with ABET-accredited engineering programs. Of those, 302,631 students declared engineering as a major at some point in their undergraduate education. MIDFIELD is a comprehensive resource that includes demographic, enrollment, course performance, and graduation data. A total of 33 institutions have completed Memoranda of Understanding and are expected to be included in the next release.

At the conclusion of the session, participants should be able to:

- describe MIDFIELD and the data it contains
- describe student record data
- describe some key research results that have been obtained using MIDFIELD
- determine if MIDFIELD would be useful for their research
- outline process to access MIDFIELD
- plan for future workshops if interested in learning more about MIDFIELD

1.2 Description

This special session introduces participants to the Multiple-Institution Database for Investigating Longitudinal Development (MIDFIELD). MIDFIELD includes longitudinal, whole population data for multiple institutions. This enables researchers to examine student characteristics such as race/ethnicity, sex, or age and curricular pathways,including coursework, by institution and over time. Because the data set contains records of all students matriculating over a period of time, researchers can study students in all disciplines, not just engineering.

1.3 Agenda

Min	Topic
5	Session introduction
15	Key research results usng MIDFIELD
35	Finding stories in the data
20	Resources to facilitate use of MIDFIELD
5	Wrap-up

1.4 Facilitators

Susan Lord Director of the MIDFIELD Institute and Professor and Chair of Integrated Engineering at the University of San Diego. She is a Fellow of the IEEE and the ASEE. Dr. Lord has considerable experience facilitating workshops including the National Effective Teaching Institute (NETI) and special sessions at FIE. (slord@sandiego.edu)

Matthew Ohland MIDFIELD Director and Principal Investigator. He is Professor and Associate Head of Engineering Education at Purdue University and a Fellow of IEEE, ASEE, and AAAS. Dr. Ohland has considerable experience facilitating workshops including the NETI and CATME training. (ohland@purdue.edu)

Marisa Orr MIDFIELD Associate Director and Associate Professor in Engineering and Science Education with a joint appointment in Mechanical Engineering at Clemson University. She received the 2009 Helen Plants Award for the best nontraditional session at FIE, "Enhancing Student Learning Using SCALE-UP Format." (marisak@clemson.edu)

Richard Layton MIDFIELD Data Visualization Specialist and Professor Emeritus of Mechanical Engineering at Rose-Hulman Institute of Technology. He is the lead developer of the R packages used with the MIDFIELD practice data sets. Dr. Layton has considerable experience facilitating workshops, including FIE workshops on data visualization (2014) and midfieldr (2018). (graphdoctor@gmail.com)

Russell Long MIDFIELD Managing Director and Data Steward. He developed the stratified data sample for the R packages used in this workshop. Mr. Long is a SAS expert with over twenty years of experience in institutional research and assessment. (ralong@purdue.edu)

1.5 Licenses

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1.6 Acknowledgement

Funding provided by the National Science Foundation Grant 1545667 “Expanding Access to and Participation in the Multiple-Institution Database for Investigating Engineering Longitudinal Development.”

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Chapter 2

Explore the data

2.1 Guiding questions

Here are some guiding questions for exploring a student's academic "story"

1. What can you tell about their demographics?
2. What were their pre-college test scores?
3. When did they start?
4. What major did the student start in?
5. Did they change majors? If so, from what to what and when?
6. What courses did they do well in?
7. Did they repeat any courses?
8. Did they graduate? How long did it take them?

We will go through Case 1 together. Then, we will break into small groups to summarize the story of Case 2.

2.2 Case 1

We selected a student from the midfielddata practice data and extracted their unit records from the four MIDFIELD tables. In the first table below we decode the CIP program codes that appear in this student's record.

`cip` Link to data dictionary

decoding the CIP

cip6

cip4name

140102

Engineering, General

140801

Civil Engineering

2.2.1 Case 1 `student` record

`student` Link to data dictionary

student data for the selected student (part 1)

row

mcid

institution

transfer

hours_transfer

race

sex

1

MID25836044

Institution M

First-Time in College

NA

White

Female

student data for the selected student (part 2)

row

age

us_citizen

home_zip

high_school

sat_math

sat_verbal

act_comp

1

17

Yes

29469

411425

690

596

27

2.2.2 Case 1 `term` record

`term` Link to data dictionary

term data for the selected student (part 1)

row

mcid

institution

term

cip6

level

standing

coop

1

MID25836044

Institution M

20001

140102

01 Freshman

Good Standing

No

2

MID25836044

Institution M

20003

140102
01 Freshman
Good Standing
No
3
MID25836044
Institution M
20011
140801
02 Sophomore
Good Standing
No
4
MID25836044
Institution M
20013
140801
02 Sophomore
Good Standing
No
5
MID25836044
Institution M
20021
140801
03 Junior
Good Standing
No
6
MID25836044
Institution M

20023

140801

03 Junior

Good Standing

No

7

MID25836044

Institution M

20025

140801

04 Senior

Good Standing

No

8

MID25836044

Institution M

20031

140801

04 Senior

Good Standing

No

9

MID25836044

Institution M

20033

140801

04 Senior

Good Standing

No

term data for the selected student (part 2)

row

hours_term

hours_term_attempt

hours_cumul

hours_cumul_attempt

gpa_term

gpa_cumul

1

11

15

11

15

3.07

3.07

2

15

15

26

30

3.80

3.43

3

15

15

41

45

2.93

3.26

4

12

15

53

60
2.86
3.16
5
16
16
69
76
3.13
3.15
6
16
16
85
95
3.06
3.13
7
7
7
92
99
3.00
3.13
8
15
15
107
114
3.00
3.11

9

15

15

122

129

3.20

3.12

2.2.3 Case 1 `course` record

`course` Link to data dictionary

course data for the selected student (part 1)

row

mcid

institution

term

course

abbrev

number

1

MID25836044

Institution M

20001

MTHSC

106

2

MID25836044

Institution M

20001

SOC

201

3

MID25836044
Institution M
20001
ENGL
102
4
MID25836044
Institution M
20001
CH
101
5
MID25836044
Institution M
20001
ENGR
101
6
MID25836044
Institution M
20003
CH
102
7
MID25836044
Institution M
20003
CU
101
8
MID25836044

Institution M
20003
CP SC
120
9
MID25836044
Institution M
20003
ENGR
120
10
MID25836044
Institution M
20003
MTHSC
108
11
MID25836044
Institution M
20003
PHYS
122
12
MID25836044
Institution M
20011
C E
253
13
MID25836044
Institution M

20011

E M

201

14

MID25836044

Institution M

20011

MTHSC

206

15

MID25836044

Institution M

20011

C E

251

16

MID25836044

Institution M

20011

C E

255

17

MID25836044

Institution M

20013

E M

202

18

MID25836044

Institution M

20013

E M

201

19

MID25836044

Institution M

20013

E G

209

20

MID25836044

Institution M

20013

A A H

210

21

MID25836044

Institution M

20013

PHYS

221

22

MID25836044

Institution M

20013

MTHSC

208

23

MID25836044

Institution M

20021

ECON

211
24
MID25836044
Institution M
20021
EX ST
301
25
MID25836044
Institution M
20021
ENGL
314
26
MID25836044
Institution M
20021
C E
351
27
MID25836044
Institution M
20021
C E
200
28
MID25836044
Institution M
20023
C E
331

29
MID25836044
Institution M
20023
C E
352
30
MID25836044
Institution M
20023
C E
353
31
MID25836044
Institution M
20023
C E
311
32
MID25836044
Institution M
20023
C E
341
33
MID25836044
Institution M
20023
C E
301
34

MID25836044
Institution M
20025
SPCH
250
35
MID25836044
Institution M
20025
C E
321
36
MID25836044
Institution M
20031
ECON
212
37
MID25836044
Institution M
20031
EE&S
401
38
MID25836044
Institution M
20031
C E
421
39
MID25836044

Institution M
20031
C E
406
40
MID25836044
Institution M
20031
C E
342
41
MID25836044
Institution M
20033
C E
433
42
MID25836044
Institution M
20033
C E
402
43
MID25836044
Institution M
20033
C E
459
44
MID25836044
Institution M

20033

SOC

310

45

MID25836044

Institution M

20033

ENGL

206

course data for the selected student (part 2)

row

section

type

faculty_rank

hours_course

pass_fail

grade

1

007

Duplicate Credit

4

No

B

2

006

Lecture

3

No

B

3

004

Lecture
3
No
B
4
006
Lecture
4
No
B
5
005
Lecture
1
No
A
6
Lecture
4
No
CR
7
001
Lecture
2
No
A
8
007
Lecture
3

No
A
9
003
Lecture
3
No
B
10
001
Lecture
4
No
A
11
001
Lecture
3
No
A
12
002
Lecture
2
No
A
13
003
Lecture
3
No

D
14
011
Lecture
4
No
B
15
001
Lecture
3
No
A
16
001
Lecture
3
No
B
17
Lecture
3
No
CR
18
004
Duplicate Credit
3
No
B
19

002
Lecture
2
No
C
20
002
Lecture
3
No
B
21
001
Lecture
3
No
B
22
002
Lecture
4
No
B
23
027
Lecture
3
No
B
24
003

Lecture
3
No
A
25
018
Lecture
3
No
A
26
001
Lecture
3
No
B
27
001
Lecture
4
No
C
28
001
Lecture
3
No
C
29
001
Lecture

2
No
B
30
001
Lecture
1
No
A
31
001
Lecture
3
No
A
32
001
Lecture
4
No
B
33
001
Lecture
3
No
B
34
157
Lecture
3

No
B
35
001
Lecture
4
No
B
36
004
Lecture
3
No
B
37
001
Lecture
3
No
B
38
001
Lecture
3
No
A
39
001
Lecture
3
No

C
40
001
Lecture
3
No
B
41
001
Lecture
3
No
B
42
001
Lecture
3
No
B
43
001
Lecture
3
No
A
44
002
Lecture
3
No
B

45

009

Lecture

3

No

B

2.2.4 Case 1 `degree` record

`degree` Link to data dictionary

degree data for the selected student

row

mcid

institution

term

cip6

degree

1

MID25836044

Institution M

20033

140801

Bachelor of Science

2.3 Case 2

We selected a second student from the midfielddata practice data and extracted their unit records from the four MIDFIELD tables. In the first table below we decode the CIP program codes that appear in this student's record.

`cip` Link to data dictionary

decoding the CIP

cip6

cip4name

140701

Chemical Engineering

141001

Electrical, Electronics and Communications Engineering

2.3.1 Case 2 `student` record

`student` Link to data dictionary

student data for the selected student (part 1)

row

mcid

institution

transfer

hours_transfer

race

sex

age

1

MID26035311

Institution C

First-Time in College

1

Hispanic/Latinx

Male

18

student data for the selected student (part 2)

row

us_citizen

home_zip

high_school

sat_math

sat_verbal

act_comp

1

Yes

80521

HC0602

NA

NA

22

2.3.2 Case 2 `term` record

`term` Link to data dictionary

term data for the selected student (part 1)

row

mcid

institution

term

cip6

level

standing

coop

1

MID26035311

Institution C

20041

140701

01 Freshman

Good Standing

No

2

MID26035311

Institution C

20043

140701
01 Freshman
Good Standing
No
3
MID26035311
Institution C
20051
140701
02 Sophomore
Good Standing
No
4
MID26035311
Institution C
20053
141001
02 Sophomore
Good Standing
No
5
MID26035311
Institution C
20054
141001
03 Junior
Good Standing
No
6
MID26035311
Institution C

20061

141001

03 Junior

Good Standing

No

7

MID26035311

Institution C

20063

141001

03 Junior

Good Standing

No

8

MID26035311

Institution C

20071

141001

04 Senior

Good Standing

No

9

MID26035311

Institution C

20074

141001

04 Senior

Good Standing

No

term data for the selected student (part 2)

row

hours_term

hours_term_attempt

hours_cumul

hours_cumul_attempt

gpa_term

gpa_cumul

1

11

11

11

11

2.76

2.80

2

14

14

25

25

2.07

2.40

3

15

15

40

40

2.31

2.40

4

15

15

55

55
2.41
2.36
5
7
7
62
62
2.87
2.52
6
14
14
76
76
2.48
2.51
7
13
16
89
92
2.21
2.45
8
14
14
103
106
3.00
2.62

9

9

9

112

128

3.56

2.77

2.3.3 Case 2 `course` record

`course` Link to data dictionary

course data for the selected student (part 1)

row

mcid

institution

term

course

abbrev

number

1

MID26035311

Institution C

20041

Physics-Scientists&Engineers I

PHCC

141

2

MID26035311

Institution C

20041

College Algebra I

M

CC1

3

MID26035311

Institution C

20041

General Chemistry Laboratory I

C

CC1

4

MID26035311

Institution C

20041

Strategies of Engineerng Desgn

CH

192

5

MID26035311

Institution C

20041

College Algebra II

M

CC1

6

MID26035311

Institution C

20041

General Chemistry I

C

CC1

7

MID26035311

Institution C

20041

College Composition

COCC

150

8

MID26035311

Institution C

20043

Aerospace Group Study I

AS

196

9

MID26035311

Institution C

20043

Foundations of Air Force II

AS

102

10

MID26035311

Institution C

20043

Java Programming

CSCC

153

11

MID26035311

Institution C

20043

Calculus-Physicl Scientists II

M

CC1

12

MID26035311

Institution C

20043

Digital Circuit Logic

EE

102

13

MID26035311

Institution C

20043

Physics-Scientists&Engineers I

PHCC

141

14

MID26035311

Institution C

20051

Electrical Engr Fundamentals

EE

192

15

MID26035311

Institution C

20051

Physics-Scientist&Engineers II

PHCC

142

16

MID26035311

Institution C

20051

Calculus-Physicl Scientst III

M

261

17

MID26035311

Institution C

20051

U.S. History to 1876

HYCC

150

18

MID26035311

Institution C

20053

Public Speaking

SPCC

200

19

MID26035311

Institution C

20053

Circuit Theory Applications

EE

202

20

MID26035311

Institution C

20053

Digital Circuit Logic
EE
102
21
MID26035311
Institution C
20053
Intro-Ordinary Differen Equatn
M
340
22
MID26035311
Institution C
20054
Statistics-Engrs & Scientists
STCC
309
23
MID26035311
Institution C
20054
Calculus-Physicl Scientst III
M
261
24
MID26035311
Institution C
20061
Introduction-Microprocessors
EE
251

25

MID26035311

Institution C

20061

Electromgntc Fields&Devices I

EE

341

26

MID26035311

Institution C

20061

Linear System Analysis I

EE

311

27

MID26035311

Institution C

20061

Electronics Principles I

EE

331

28

MID26035311

Institution C

20063

Linear System Analysis II

EE

312

29

MID26035311

Institution C

20063

Psychology of Human Sexuality

PYCC

228

30

MID26035311

Institution C

20063

Music Theory Fundamentals

MUCC

111

31

MID26035311

Institution C

20063

Electronics Principles II

EE

332

32

MID26035311

Institution C

20063

Electromgntc Fields&Devices II

EE

342

33

MID26035311

Institution C

20071

Digital System Design

ECE

451

34

MID26035311

Institution C

20071

Senior Design Project I

ECE

401

35

MID26035311

Institution C

20071

Digital System Design Lab

ECE

450

36

MID26035311

Institution C

20071

Control Systems

ECE

411

37

MID26035311

Institution C

20071

Semiconductor Devices

ECE

471

38

MID26035311

Institution C

20073

Senior Design Project II

ECE

402

39

MID26035311

Institution C

20073

Intro to C Programming I

CS

156

40

MID26035311

Institution C

20073

Introduction to Unix

CS

155

41

MID26035311

Institution C

20073

Digital Contrl&Digital Filters

ECE

412

42

MID26035311

Institution C

20073

Analog Integrated Circuit Lab

ECE

535

43

MID26035311

Institution C

20073

Analog Integr Circuit Design

ECE

534

44

MID26035311

Institution C

20073

Intro to C Programming II

CS

157

45

MID26035311

Institution C

20073

Computer Networks

ECE

456

46

MID26035311

Institution C

20074

Current World Problems

POLS

131

47

MID26035311

Institution C

20074

Independent Study

ECE

495

48

MID26035311

Institution C

20074

Introduction-Thermal Sciences

MECH

237

49

MID26035311

Institution C

20074

Principles of Microeconomics

ECON

202

course data for the selected student (part 2)

row

section

type

faculty_rank

hours_course

pass_fail

grade

1

001

Associate Professor

5
2
550
1
S
3
L04
Graduate Assistant
1
B
4
L01
Instructor
3
B-
5
550
1
S
6
002
Professor
4
C+
7
084
Instructor
3
B+
8
001

1
S
9
001
1
B
10
001
Instructor
4
C
11
004
Graduate Assistant
4
C
12
001
Instructor
4
13
001
Professor
5
C
14
001
Professor
3
C-
15

001
Professor
5
B+
16
001
Graduate Assistant
4
D
17
002
Assistant Professor
3
B
18
016
3
B-
19
001
4
C
20
001
Instructor
4
B-
21
003
Professor
4

C+
22
001
Graduate Assistant
3
B-
23
001
Graduate Assistant
4
B
24
001
Instructor
4
C+
25
001
Professor
3
C
26
001
Assistant Professor
3
B+
27
001
Instructor
4
C+

28

001

Instructor

3

C+

29

001

Professor

3

F

30

002

Graduate Assistant

3

B

31

001

Associate Professor

4

B+

32

001

Professor

3

C

33

001

Instructor

3

B-

34

L01
Instructor
3
A-
35
L02
Instructor
1
B-
36
001
Associate Professor
4
B
37
001
Professor
3
B-
38
L01
Instructor
3
A-
39
001
1
A
40
001
1

B

41

001

Associate Professor

3

B

42

L01

1

B+

43

001

3

B+

44

001

1

A

45

001

Professor

4

W

46

001

Instructor

3

A

47

001

Professor

2

I

48

001

Graduate Assistant

3

B-

49

001

Associate Professor

3

A

2.3.4 Case 2 `degree` record

`degree` Link to data dictionary

degree data for the selected student

row

mcid

institution

term

cip6

degree

1

MID26035311

Institution C

20084

141001

Bachelor of Science

top of page