Information Science, Curriculum Development, and Scheduling Strategically

Jean-Francois Chamberland

Electrical and Computer Engineering

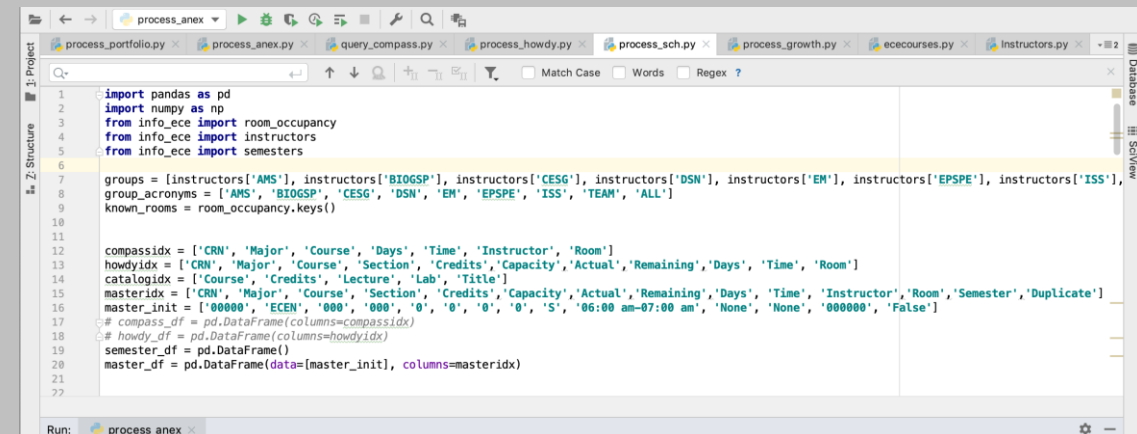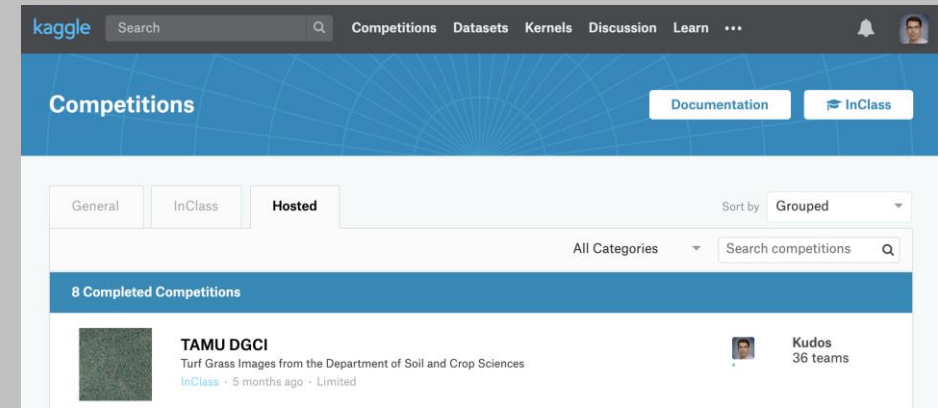Texas A&M University

Background & Pertinent Experience

Profile

- Faculty member in Department of Electrical and Computer Engineering

- Statistical Information Processing

- Coordinated Data Science & Machine Learning group in ECE for years

- Former Associate Department Head

Tools

- Python, PyCharm, Anaconda, Kaggle

- Git, Gephi, Bokeh

Friends…

Challenge

- The task of assessing quality of **education program** is complex and requires dedicated thinking

- Such questions are prone to *substitution* or *heuristics*

- Information Science and Visualization can help faculty focus on right questions

THINKING, FAST AND SLOW

DANIEL KAHNEMAN
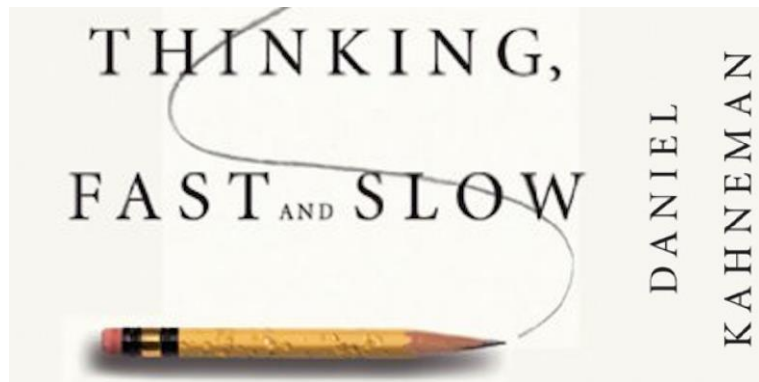
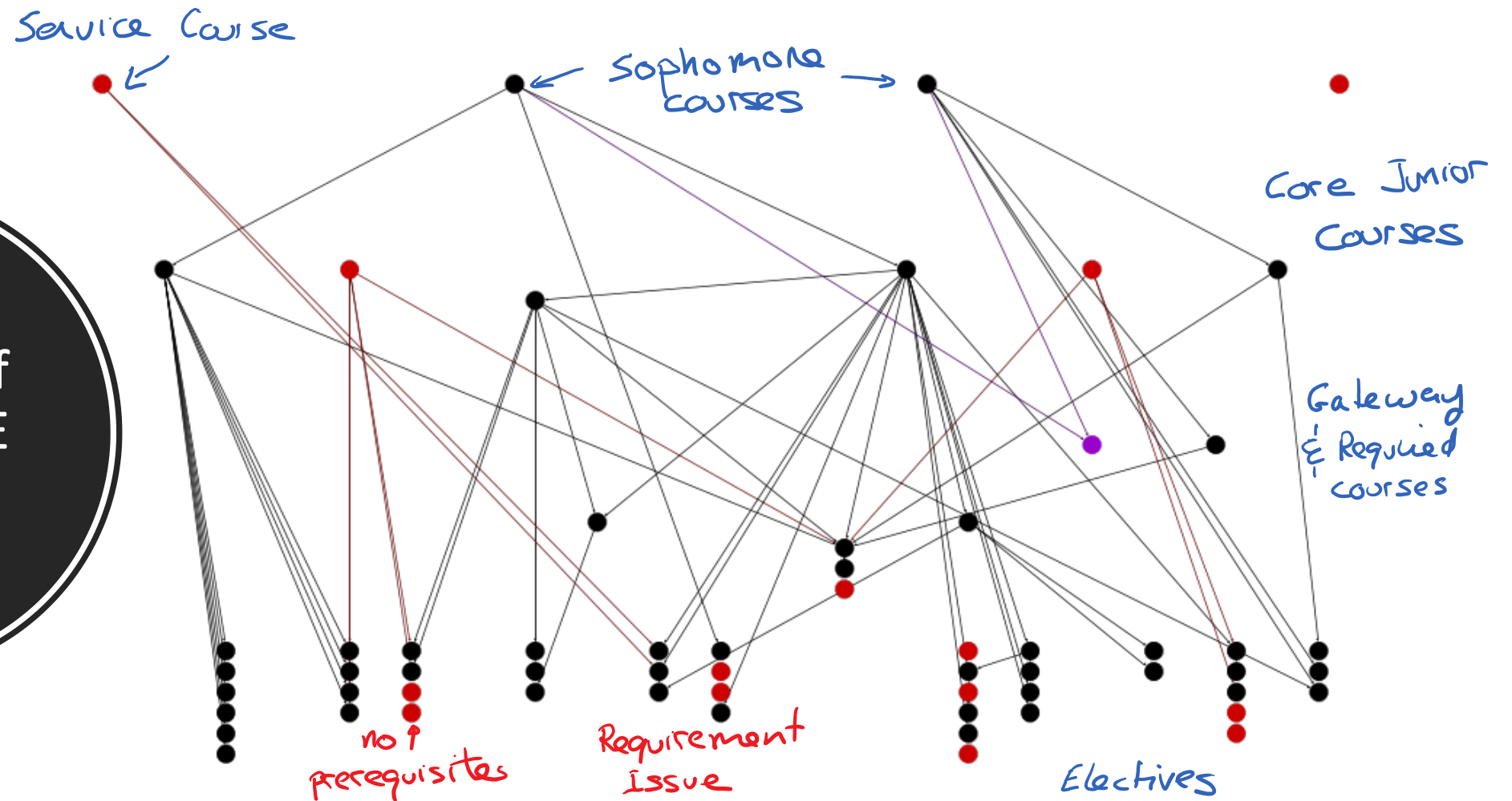# Enhance Student Learning with Information Science

Three Examples

- Program review

- Robust scheduling

- Calibration & student behavior

Goals

- Facilitate engagement

- Elicit thinking

- Maximize productivity

Overview of Original ECE Programs

- Several senior-level courses have no prerequisites
- Some courses require a vestigial course
- Some required gateway courses have no descendants

Overview of Updated ECE Programs

no longer a prereq

new core course

fixed prereq

fixed prereqs

reduced overlap

more work
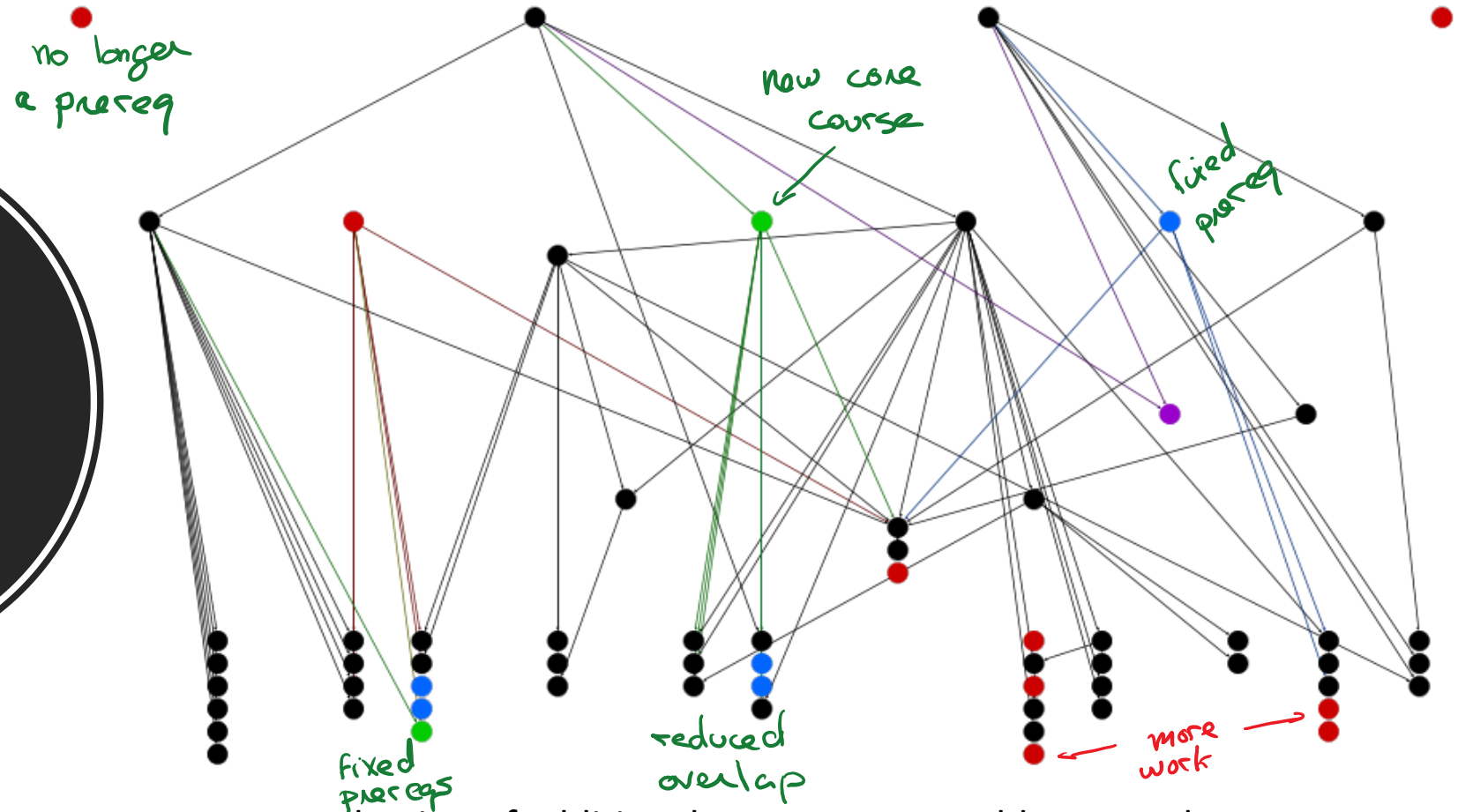
- Introduction of additional core course to address overlap
- Several prerequisites revised and added
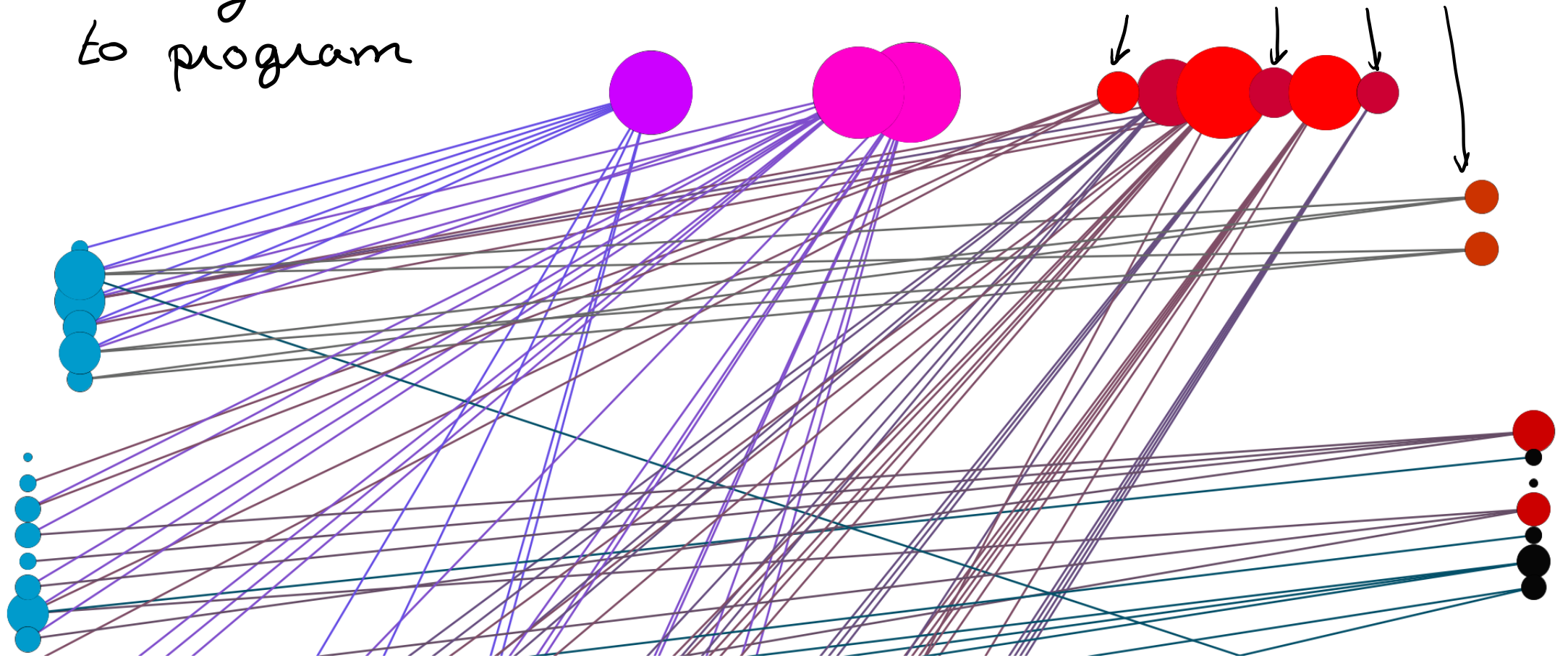- Change takes time...

Instructors
Electrical and Computer Engineering

- Approximately 80 Instructors

- Two undergraduate programs

- 12 required courses (reddish)
  - 55 sections

- 1 service course (purple)
  - 11 sections

- Node size based on degree
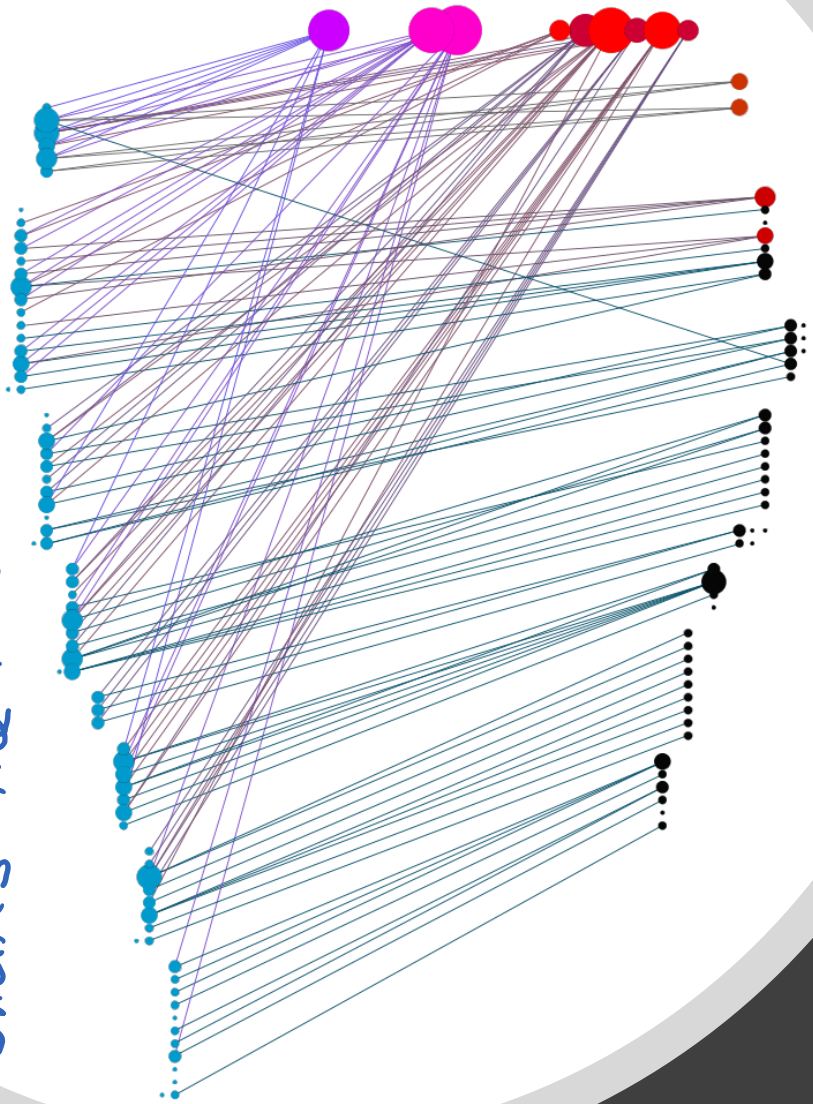
- Visualizing program robustness
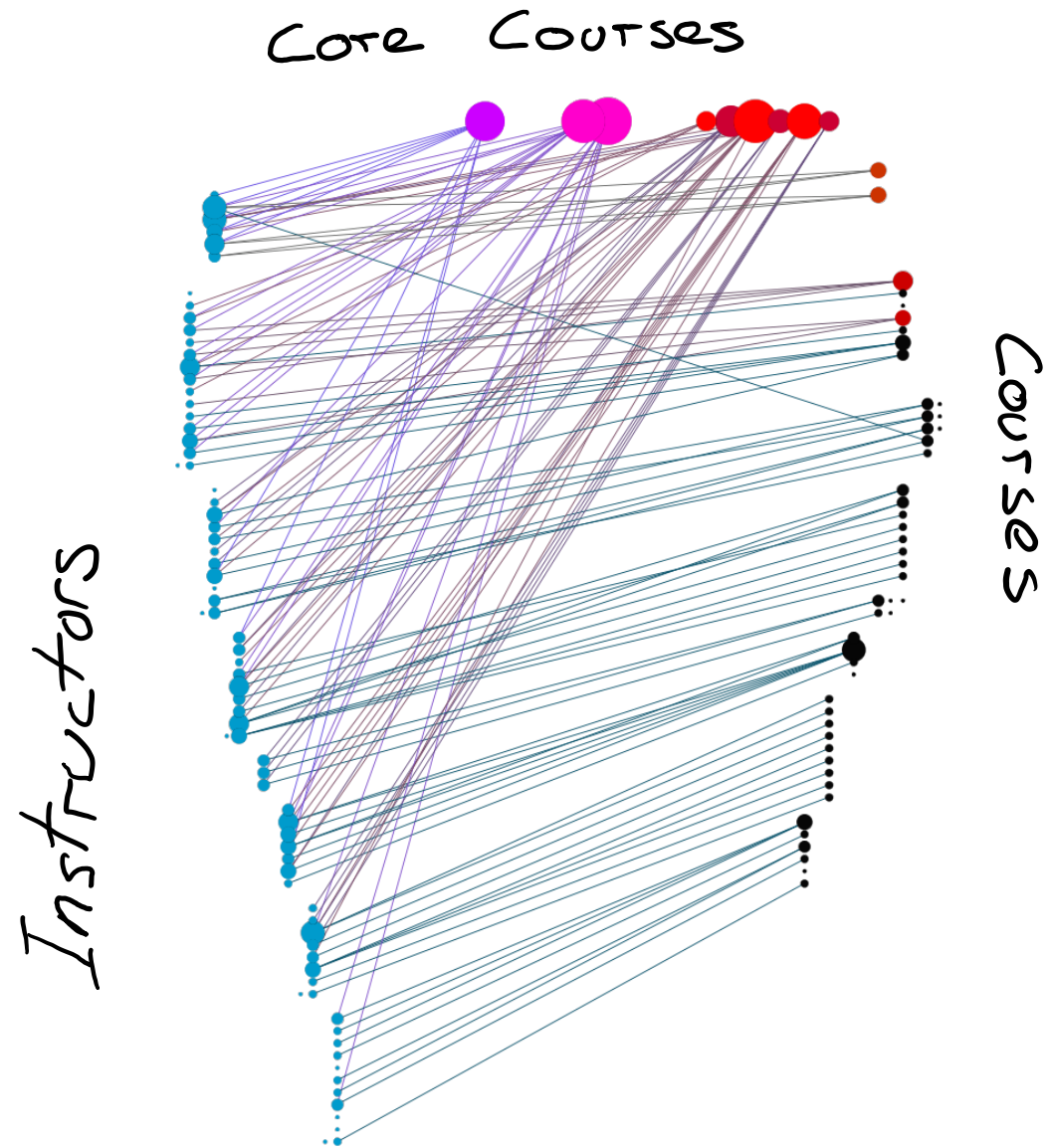
Adding Robustness to program

Few Instructors for Required Courses

Core Courses are 1/3 of overall offering

Departmental Citizenship

For the ECE Department to operate fluidly, faculty members must teach a variety of courses, from core undergraduate courses to advanced graduate courses. To maintain a well-balanced offering, faculty members should strive to meet the following guidelines.

- Teaching Load – 3 courses: Teach one core course, one elective course, and one graduate course per year.

While these guidelines are not enforced individually, they are employed to determine the number of core courses that must be covered by the various groups.

Faculty members are encouraged to develop a portfolio of courses that includes at least one core course, one elective, and one graduate course. Larger portfolios greatly help the scheduling process, which can be viewed as an instance of a bipartite graph matching problem.

Teaching Flexibility and Summer Programs

Strategic Opportunity

Regular Semesters
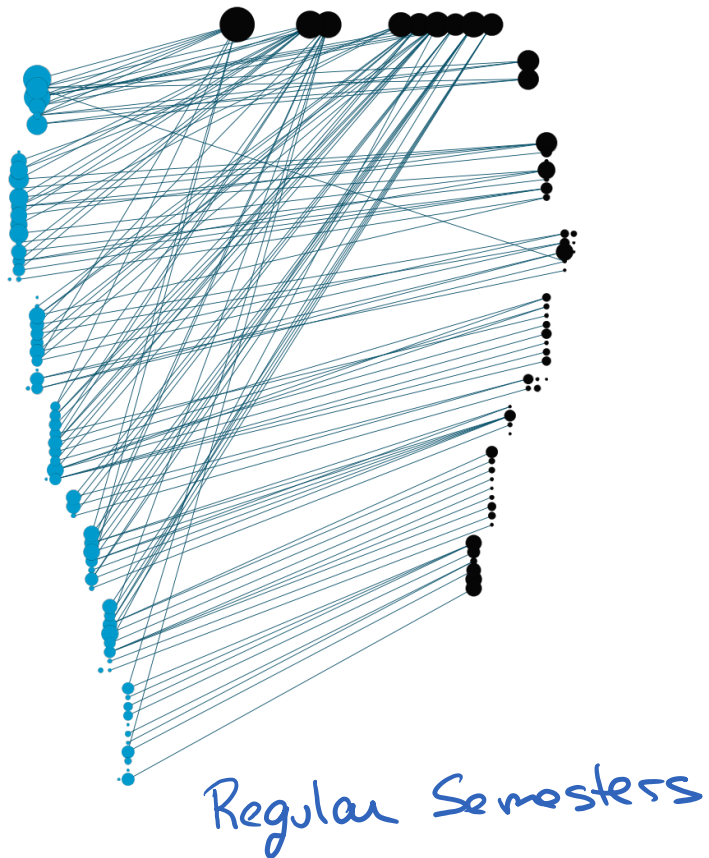
Many More Links Here!

Summers

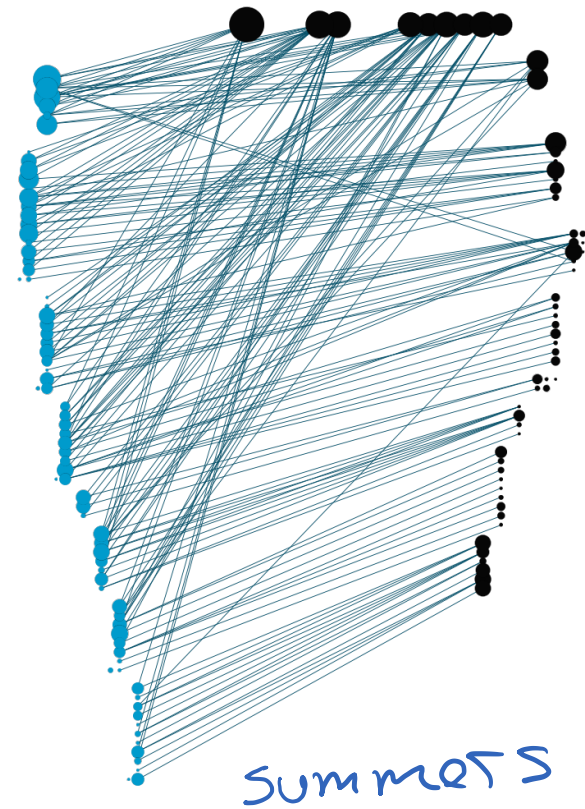TEXAS A&M UNIVERSITY
GRADE DISTRIBUTION REPORT FOR FALL 2018
Undergraduate

COLLEGE: ENGINEERING
DEPARTMENT: ELECTRICAL & COMPUTER ENG

SECTION	A	B	C	D	F	TOTAL A – F	GPA	I	S	U	Q	X	TOTAL	INSTRUCTOR
ECEN-214-200	4	2	0	0	0	6	3.666	0	0	0	0	0	6	MOREIRA-TAMAYO O
	66.67%	33.33%	0.00%	0.00%	0.00%									
ECEN-214-501	5	5	2	1	0	13	3.076	0	0	0	1	0	14	MOREIRA-TAMAYO O
	38.46%	38.46%	15.38%	7.69%	0.00%									
ECEN-214-502	4	3	6	1	0	14	2.714	0	0	0	0	0	14	MOREIRA-TAMAYO O
	28.57%	21.43%	42.86%	7.14%	0.00%									
ECEN-214-504	3	5	2	3	0	13	2.615	0	0	0	1	0	14	MOREIRA-TAMAYO O
	23.08%	38.46%	15.38%	23.08%	0.00%									
ECEN-214-505	6	4	2	1	0	13	3.153	0	0	0	0	0	13	MOREIRA-TAMAYO O
	46.15%	30.77%	15.38%	7.69%	0.00%									
ECEN-214-506	4	2	4	0	2	12	2.500	0	0	0	2	0	14	MILLER S
	33.33%	16.67%	33.33%	0.00%	16.67%									
ECEN-214-507	5	2	1	1	0	9	3.222	0	0	0	6	0	15	MILLER S
	55.56%	22.22%	11.11%	11.11%	0.00%									
ECEN-214-508	8	1	3	1	0	13	3.230	0	0	0	2	0	15	MILLER S
	61.54%	7.69%	23.08%	7.69%	0.00%									
ECEN-214-510	5	3	3	0	1	12	2.916	0	0	0	2	0	14	MILLER S
	41.67%	25.00%	25.00%	0.00%	8.33%									
ECEN-214-511	7	2	2	0	0	11	3.454	0	0	0	3	0	14	MILLER S
	63.64%	18.18%	18.18%	0.00%	0.00%									
ECEN-214-512	1	4	8	2	0	15	2.266	0	0	0	0	0	15	TYLER J
	6.67%	26.67%	53.33%	13.33%	0.00%									
ECEN-214-513	0	8	4	1	0	13	2.538	0	0	0	0	0	13	TYLER J
	0.00%	61.54%	30.77%	7.69%	0.00%									

Office of The Registrar

"The Grade Distribution Report represents a statistical analysis of grades given in each course and section. For courses with more than one section, the report also provides totals for all sections. Department and college totals reflect composite grade distribution."

webas.tamu.edu/gradereport/

TAMU Grades Online
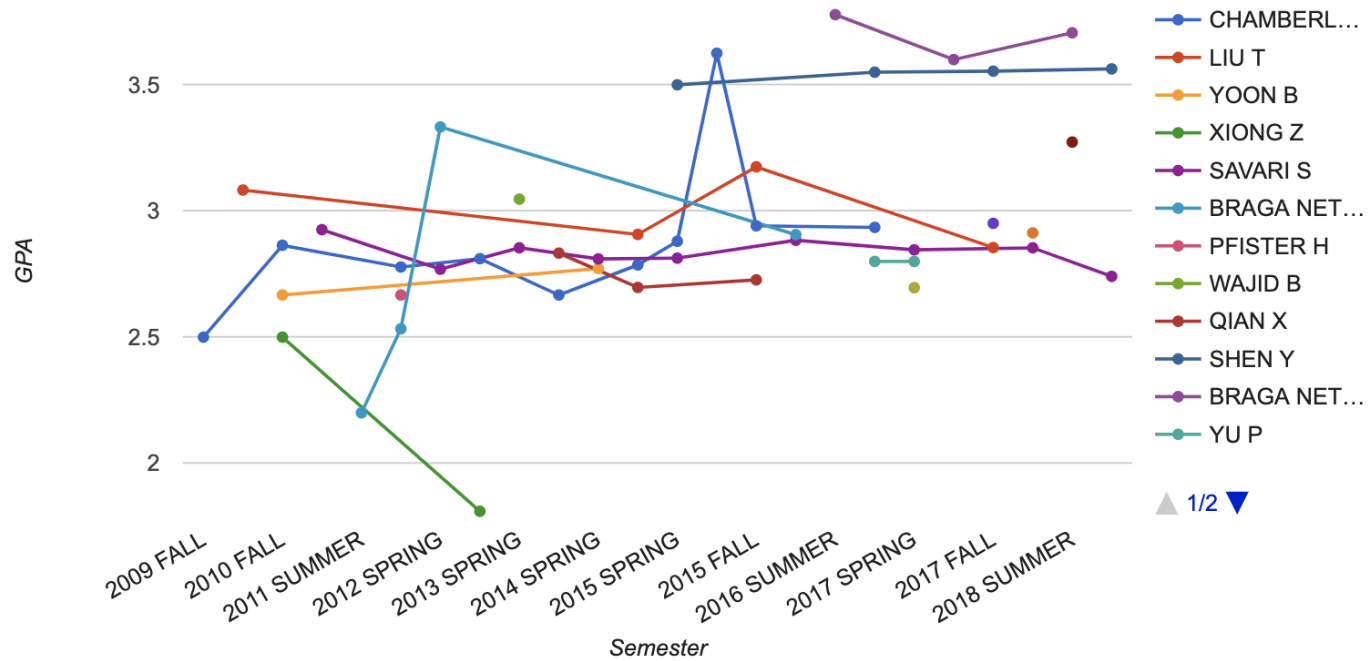
# Online Visualization Tool by TAMU Student

anex.us

- > whois anex.us
  - Registrant City: College Station
  - Registrant State: TX
  - Registrant Postal Code: 77841
  - Admin Name: Ross Dixon

- Ross Dixon (LinkedIn)
  - Graduated from Texas A&M University in 2015
  - BS in Computer Science
  - Minor in Psychology

Instructor Selection Tool by GPA

- Color scheme based on GPA
  - Progression from red to blue in increasing average GPA
- Calibration of instructors
- Students shop during registration on

  https://anex.us
- Faculty may not be attuned to Data Science and Viz Tools, but students are…

Core Sophomore Courses

Core Junior Courses

Color is average GPA
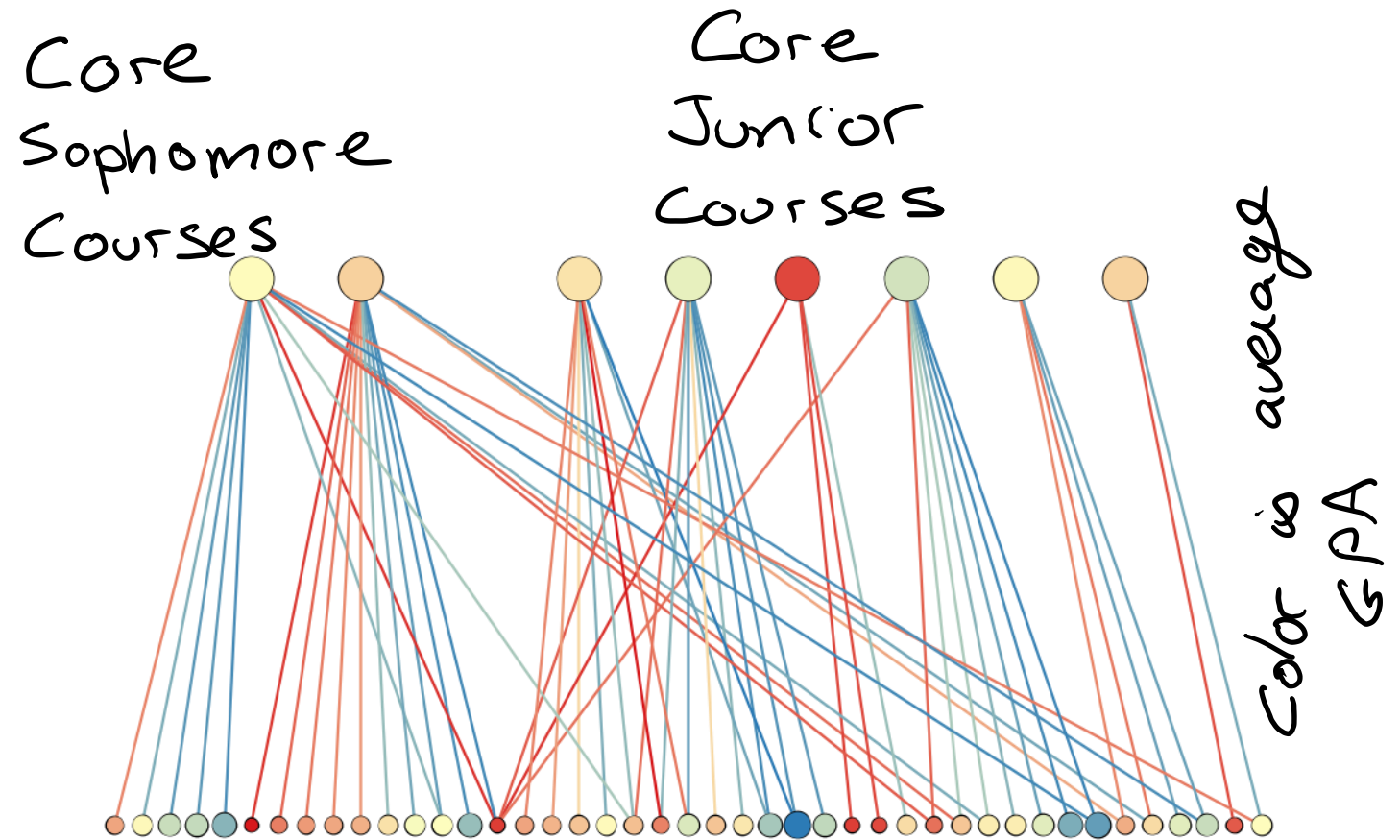
Instructors

- Average GPA varies much
- Need for calibration?
- Short changing late enrollment?

Past and Future Steps

Public Information

- Howdy/Compass
- Office of The Registrar
- Texas A&M Catalogs
- Texas A&M University Libraries
- anex.us

Possible Avenues

- Research in conjunction with Institute for Engineering Education and Innovation
- Student traces with Compass and Argos
- Student success, background assessment, traces through curriculum

THANK YOU!

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Electrical and Computer Engineering

Texas A&M University

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