

A Blueprint for Success: Using Curricular Analytics to Unlock Degree Progress

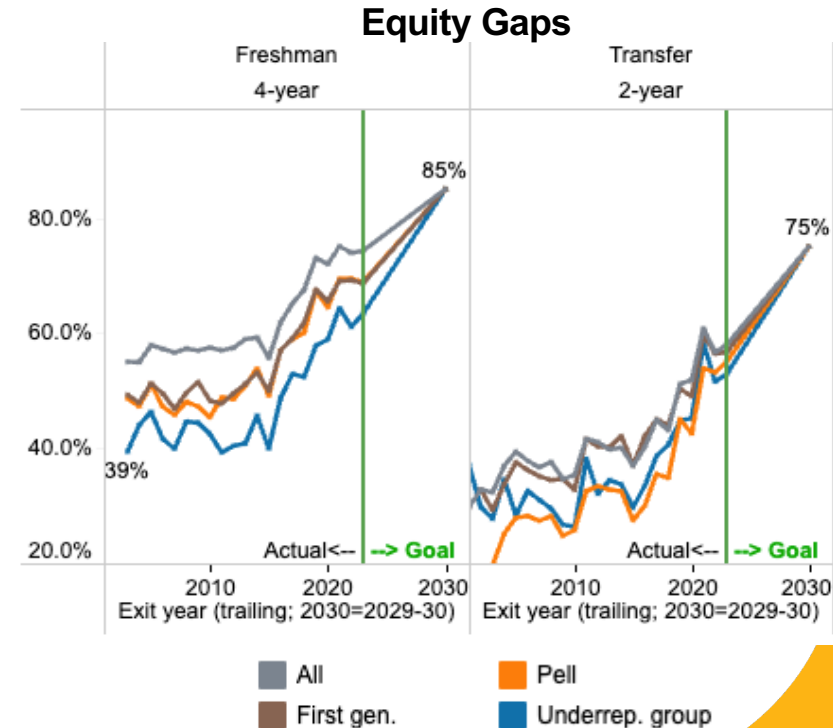
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Dean of Undergraduate Academic Affairs

Context: Work at UC San Diego

- Intensively working to improve student success and close opportunity gaps since 2010
- Gains getting incrementally harder to achieve
- Need to take a deeper look at our curriculum:
 - Credit loads matter
 - Barriers to access matter
 - Sequencing of courses matters
 - The structure of the curriculum matters

No magic, iterative continuous improvement work



Fix
Student
Success!!!

**WHERE DO
I START?**



Student Success Data

Tells you what is going on, not “WHY”.
Often too much information

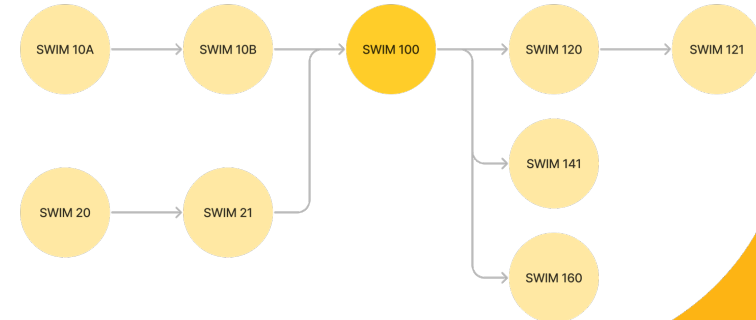
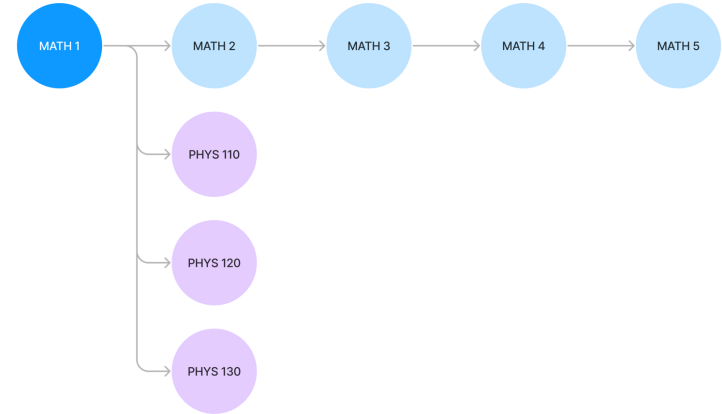


Curricular Analytics

Shows a roadmap, but with “unreliable”
ratings or suggestions

Curricular Analytics

- Framework for looking at the **structural complexity** of a degree program.
- Structural complexity points to **potential barriers** to on-time graduation. The potential impact of not passing a class.
- Generates a numeric score for each program, and higher score programs tend to, nationally, have longer time to degree.
- <https://www.ueru.org/ueru-communities/curricular-analytics-project>



Curricular Analytics

- Complexity is an abstract concept for most faculty, and many push back against the notion that less is better, or that there is one ideal way.
 - Conflation of Complexity and Rigor
- Structural complexity mostly works with STEM majors. Non-STEM majors tend to have very low complexity.
- Structural complexity biases interventions towards the first course in a sequence. This is not always where students struggle.

Complexity doesn't matter if no one is held back!

From DFW and Curricular Complexity to Course Impact

- What we care about is student success
 - Master learning outcomes and get from Point A to point B in a degree plan
- DFW rates represent failure to attain learning outcomes, but don't tell us **WHY** students struggle
 - Is the course too difficult? Is there something wrong with pedagogy? Is it a sequencing/pre-requisite problem? Is it the combination of courses taken (workload)? Are students not motivated?
 - Ignores the problem of waitlists and sequencing hurdles for time to degree

From DFW and Curricular Complexity to Course Impact

$$\text{Course impact} = \frac{\# \text{students} * \text{DFW} * \text{waitlist} * \text{complexity} * \text{achievement gap}}{\text{Frequency of offering}}$$

Course Impact Score

Courses Affecting Progress to Degree

Fall 2021 - Spring 2024, excludes summer

*Click any course or metric for additional details.



Department

Mathematics

Select Breakdown

No Selection

Department Courses - All Majors

Course ID	Breakdown	Disproportionate Impact	N	N Qtrs w/Enrollment	Count of DFW Grades	% DFW	Avg. End Waitlist Count/Qtr	Avg. N Students Affected/Of..	N Courses Blocked	Max. Complexity	Impact Index
MATH20B	All	Null	6,212	9	862	14%	2	98	28	37	454
MATH20C	All	Null	8,325	9	999	12%	2	113	22	31	448
MATH18	All	Null	8,221	9	877	11%	11	108	20	26	360
MATH10A	All	Null	6,888	9	847	12%	4	98	24	30	350
MATH20A	All	Null	3,938	9	445	11%	4	53	33	43	276
MATH10B	All	Null	7,309	9	1,136	16%	2	128	9	16	248
MATH20D	All	Null	5,231	9	570	11%	3	66	15	25	208
MATH20E	All	Null	5,209	9	498	10%	2	57	11	20	138
MATH11	All	Null	4,762	9	463	10%	2	53	4	11	72

Courses Required by the Major - Major Students Only

Course ID	Breakdown	Disproportionate Impact	N	N Qtrs w/Enrollment	Count of DFW Grades	% DFW	Avg. End Waitlist Count/Qtr	Avg. N Students Affected/Of..	N Courses Blocked	Max. Complexity	Impact Index
MATH20C	All	Null	1,227	9	109	9%	2	14	8	14	80
MATH20B	All	Null	861	9	129	15%	2	16	9	15	79
MATH18	All	Null	1,380	9	133	10%	11	26	6	11	78
CSE11	All	Null	973	9	106	11%	36	48	3	6	57

By Department -

Course Impact :

- # students taking course
- DFW rate
- Average waitlist
- # courses blocked
- Equity gaps

DFW distributions and Consistency of Experience

Distribution of Grades - Major Students Only

Data on this page are dependent on a selection from "Courses Affecting Progress to Degree".



Select Breakdown

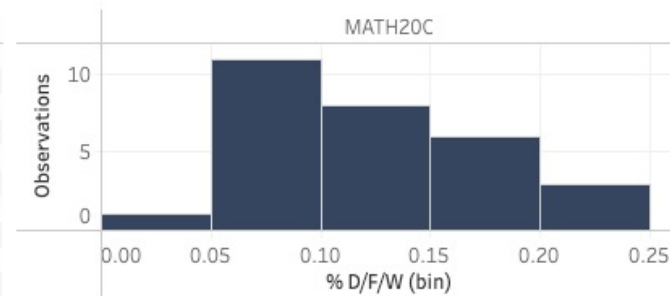
No Selection

Distribution of D/F/W Rates by Instructor and Term (all majors)

*where course enrollment >19

Hover here for more information.

	MATH20C
Observations	29
Min. Enrollment	87
Max Enrollment	676
Min. % D/F/W	3.0%
Percentile (25) of % D/F/W	7.0%
Avg. % D/F/W	11.9%
Median % D/F/W	10.0%
Percentile (75) of % D/F/W	17.0%
Max. % D/F/W	23.0%
Std. Dev.	5.4%

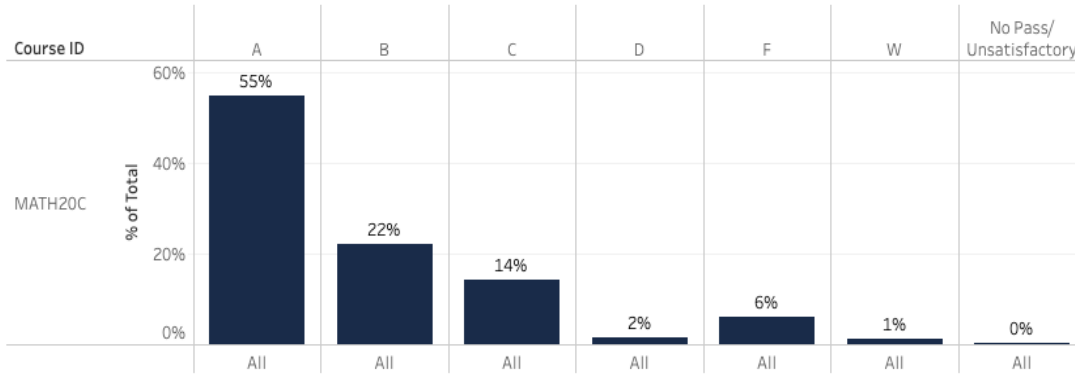


by Term

				ABC		DFW		Grand Total	
				N	%	N	%	N	%
MATH	20C	Calculus&An	FA21	192	96%	7	4%	199	100%

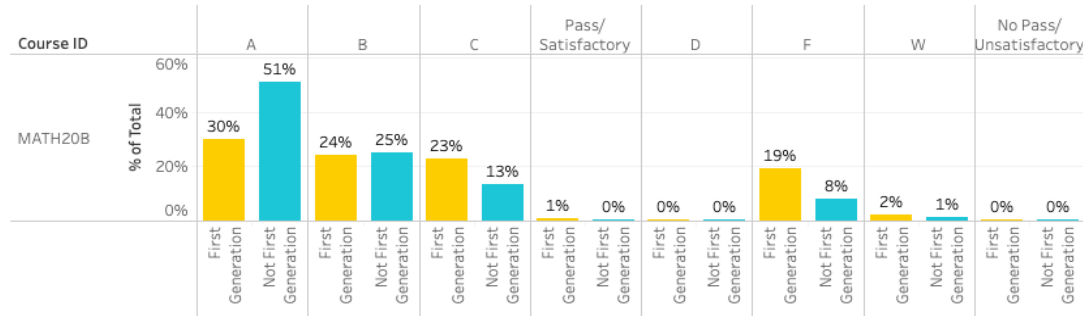
Grade Distributions and Achievement Gaps

3 Year Grade Distribution



Breakdown ■ All

3 Year Grade Distribution - All Majors



Breakdown ■ First Generation ■ Not First Generation

Cross-Major Enrollment and Success

Courses Affecting Progress to Degree - Major Detail Fall 2021 - Spring 2024, excludes summer



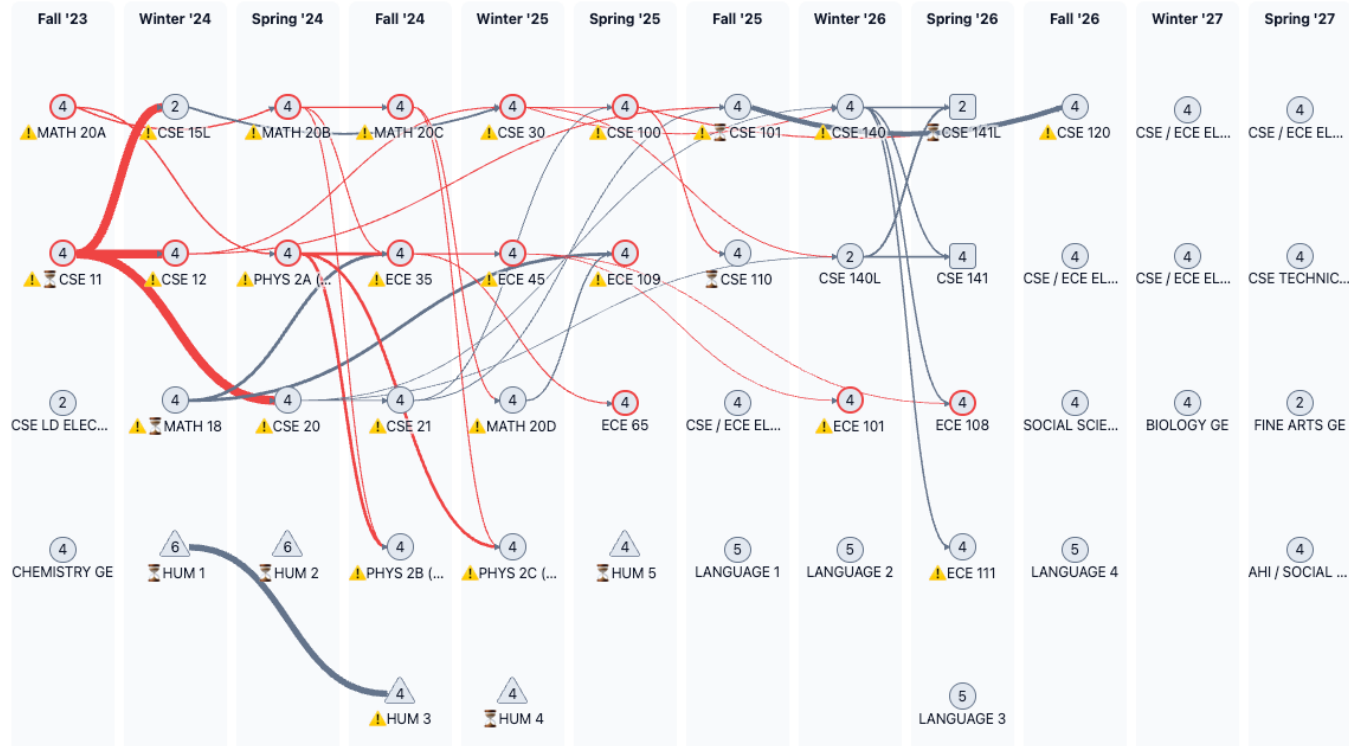
Course Department: Course ID: Major Department:

Department Courses - D/F/W Rates by Major *where major enrollment is >19

Course ID	Dept Cd	Breakdown	N	N Qtrs w/Enrollment	Count of DFW Grades	% DFW	Avg. End Waitlist Count/Qtr	Avg. N Students Affected/Offe..	N Courses Blocked	Max. Complexity	Impact Index
MATH10A	ANTH	All	57	9	3	5%	4	4	4	7	26
	BIOL	All	1,898	9	205	11%	4	27	18	24	94
	CHEM	All	416	9	46	11%	4	9	24	30	53
	COGS	All	439	9	51	12%	4	10	3	6	29
	ECON	All	625	9	68	11%	4	12			24
	ESYS	All	95	9	8	8%	4	5	15	22	35
	GLBH	All	91	9	14	15%	4	6	4	7	27
	HDS	All	88	9	9	10%	4	5			23
	HIST	All	26	8	1	4%	4	4			23
	INTL	All	394	9	55	14%	4	10	4	7	31
	POLI	All	102	9	11	11%	4	5			23
	PSYC	All	1,215	9	178	15%	4	24	2	5	36
	SIO	All	220	9	24	11%	4	7	12	17	35
	SPH	All	178	9	25	14%	4	7	5	9	30
	USP	All	71	9	8	11%	4	5			23
	VIS	All	87	9	8	9%	4	5			23

Department Courses - by First Take/Repeat

Course ID	Breakdown	First Class	N	N Qtrs w/Enrollment	Count of DFW Grades	% DFW	Avg. End Waitlist Count/Qtr	Avg. N Students Affected/Offe..	N Courses Blocked	Max. Complexity	Impact Index
MATH10A	All	First Take	6,464	9	722	11%	4	84	24	30	304
		Repeat	424	8	125	29%	4	20	24	30	96



EC26 (Revelle, 2023): Computer Engineering

Key

The number in each shape indicates the course's unit count. Complexity and centrality are explained on the [Curricular Analytics](#) page.

- Prerequisite
- All prerequisites
- Directly blocked
- All blocked
- Course not offered in quarter
- Ignoring summer offerings,
 - Offered year-round
 - Offered twice a year
 - Offered once a year

- Longest path
- Prerequisite has high DFW
- Long waitlist
- Equity gap

Disclaimer

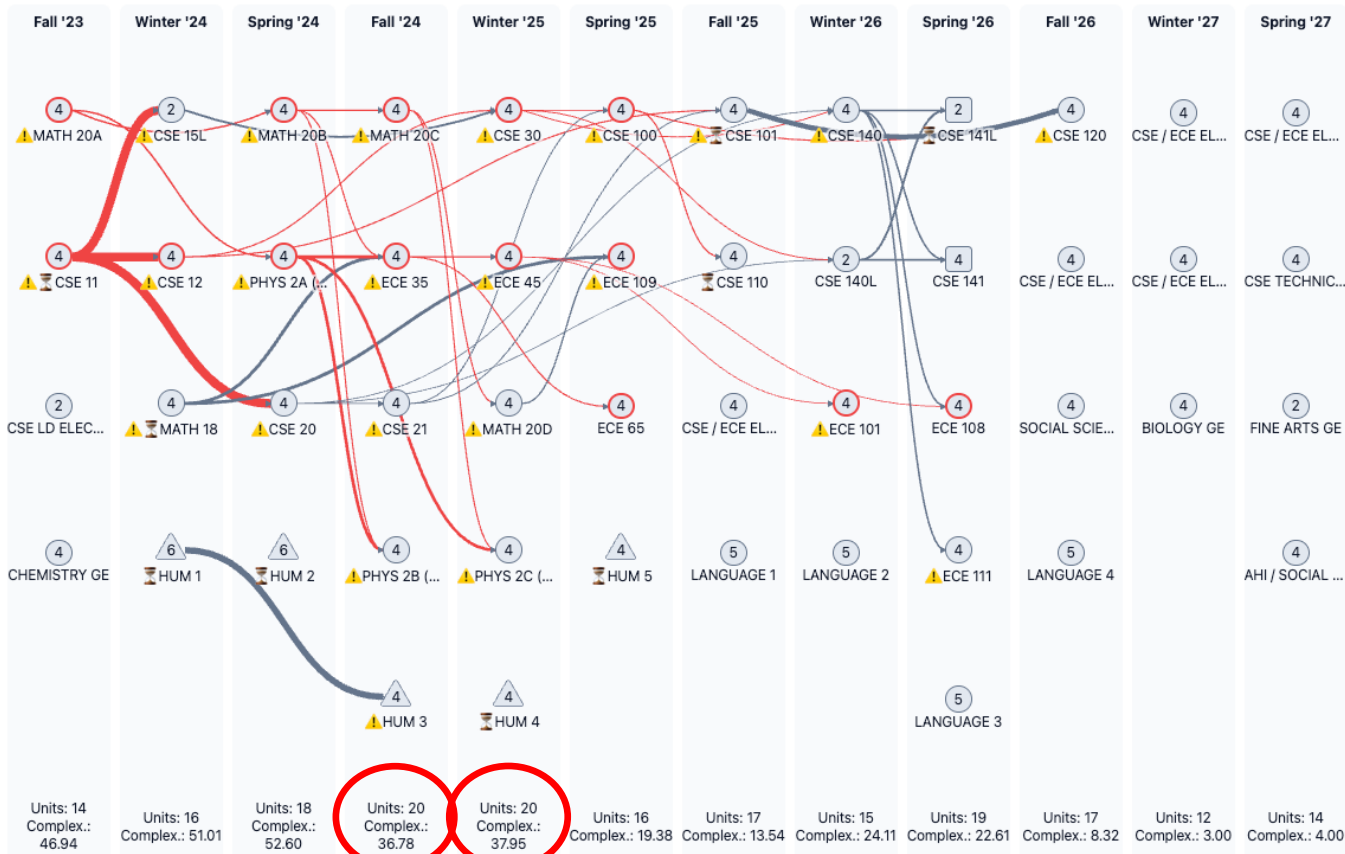
This demo is currently showing *real* protected data.

Data were sampled between fall 2021 and spring 2024. Academic plans were pulled from [plans.ucsd.edu](#).

*DFW rate is specific to majors in this department.

Options

Modified Curricular Analytics view which incorporates waitlists (thicker lines, warning triangles) and information about high DFW courses (course nodes and pre-requisite lines colored red). Thresholds can be customized to take into account disciplinary or institutional context. Shape of course nodes modified to indicate frequency of course offering (circle – all terms, square – 2/yr, triangle – 1/yr)



Key

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Disclaimer

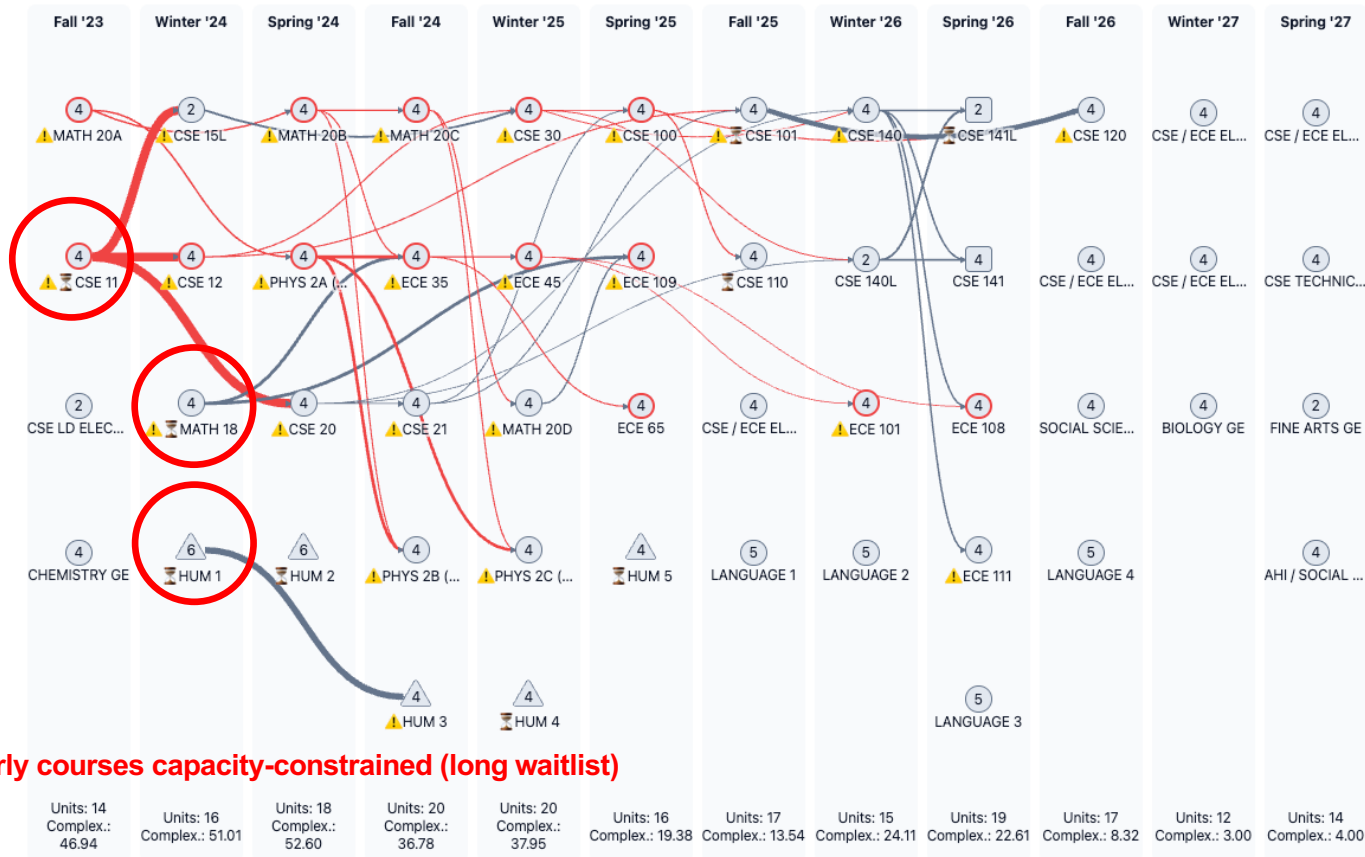
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► Options

Excessive workload terms



Early courses capacity-constrained (long waitlist)

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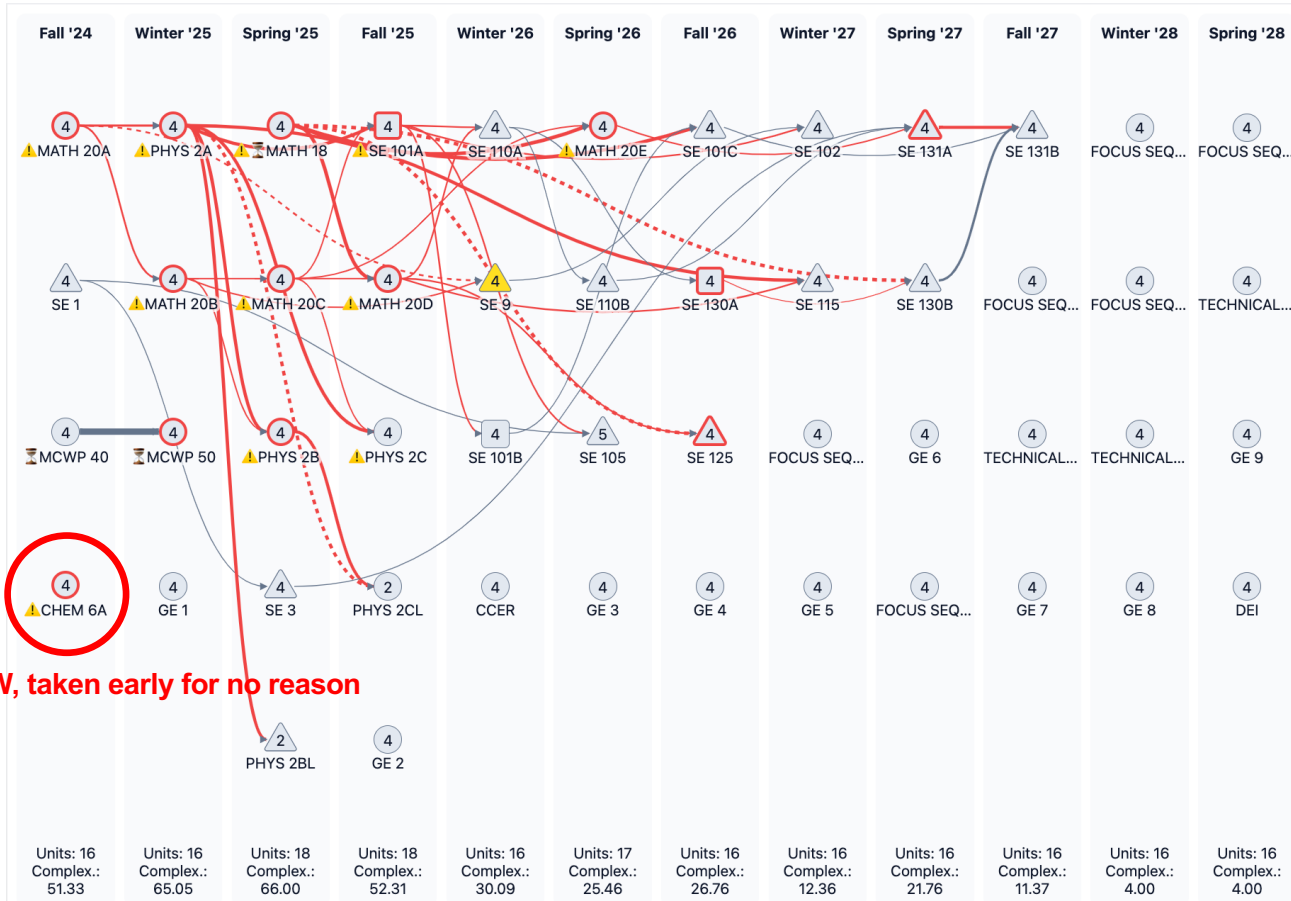
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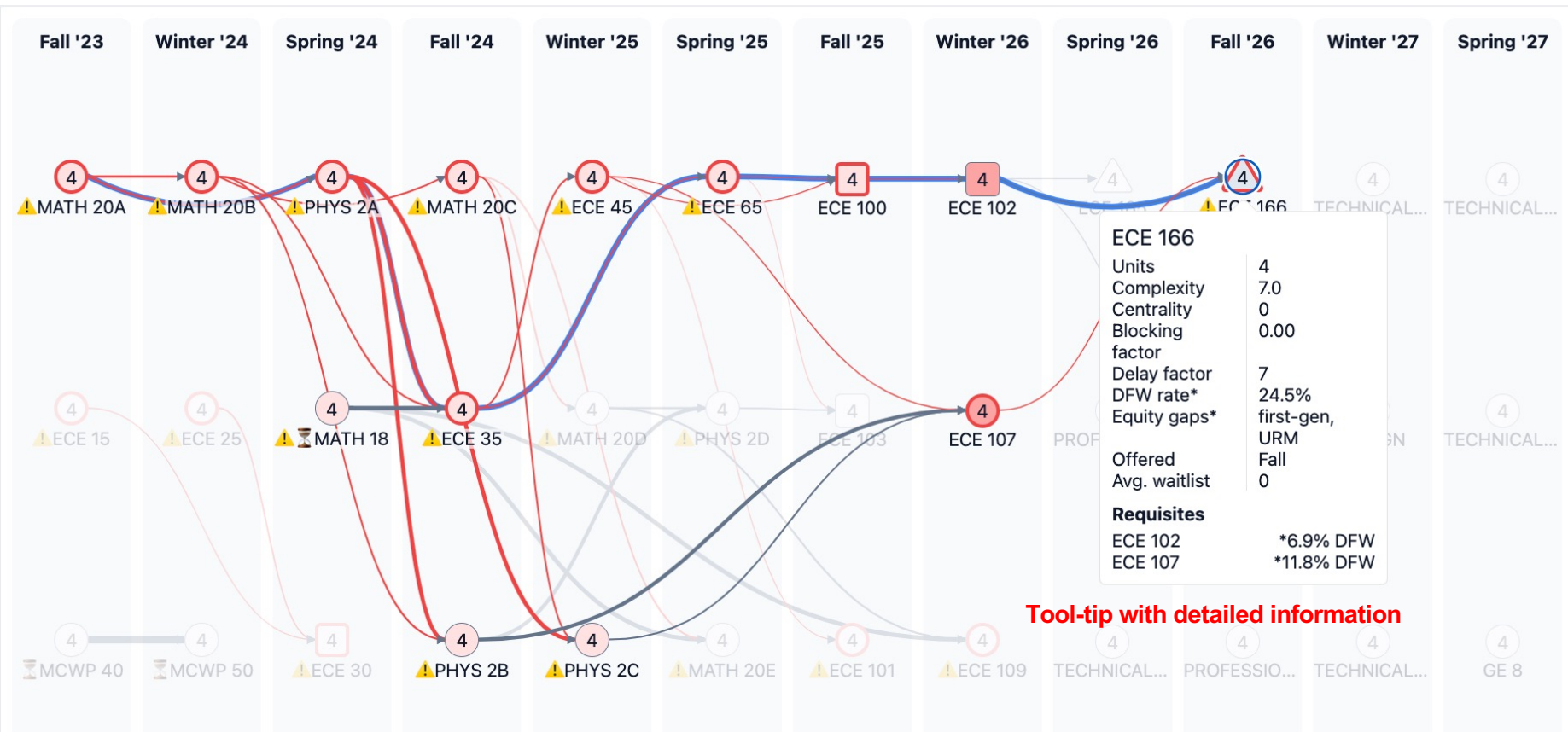
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Options



High DFW, taken early for no reason





From Impact Score to Action – Can this be Successfully Applied?

- Track evolution year over year, and yes!
 - Plans being modified to remove bottlenecks, waitlists being addressed, high DFW courses with high impact being redeveloped (*)
 - In part because these tools take the guesswork out of identifying problems,
 - In part because Chancellor and EVC (President & Provost) require reporting on action plans from chairs and deans & Senate incorporated it into program review
- Being used to help with accreditation and ABET storytelling
- Being adopted by advising & made available to students (*)
- Being used to prioritize key student success decisions/investments:
 - Supplemental instruction/tutoring priorities & resourcing
 - Summer session course offerings
 - Even impacting major capacity discussion



Thank you