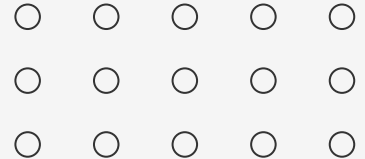




The Epsilon School

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Assumptions

- **Schedule has 6 classes per day**
 - Each teacher teaches 5 classes
 - Teachers are given 1 prep period
- **English and social studies are separated by grade**
 - Other classes can be taken by grade
- **Different level language classes can be grouped**
- **The proportions of classes each grade takes is the same**
- **The number of students in each grades english class is the number of students in the grade**
- **All lang teachers can teach more than one language**



Finding Number of Students Per Grade

Department	10th	11th	12th	Total
Art	31	33	35	99
Biology	198	95	26	319
Chemistry	59	126	109	294
English	183	155	152	490
French	41	32	49	122
German	19	22	10	51
Spanish	51	26	33	110
Math	184	201	262	647
Music	50	56	49	155
Physics	50	58	183	291
Social Studies	183	131	59	373
TOTAL	183	155	152	490

Given: 490
students enrolled
(2022)

Assumption: Each student is taking 1 English class. In courses that have enrollments higher than respective English class size, students are "doubling up"

Calculating New Class Size

(without dropout rates)

22-23

	Sophomores	Juniors	Seniors	TOTAL
TOTAL	183	155	152	490

23-24

	Sophomores	Juniors	Seniors	TOTAL
TOTAL	292	183	155	630

+140 students


Given: new sophomore class will have 140 more students than the graduating senior class.

Calculating Dropout Rate

Given: 5% of a class drops out over 3 years in the school

Assumption: percent of students dropping out each year is equivalent

	Sophomores	Juniors	Seniors	TOTAL
TOTAL	292	183	155	630

- $5\% \div 3 = p$
 - $p * \# \text{ of students} = \text{estimate of students per who drop out}$
- 
- $p = 1.666666$
 - $1.66666 * (\# \text{ of Students}) = x$
 - $\text{current size} - x = \text{new class size}$



	Sophomores	Juniors	Seniors	TOTAL
TOTAL	289	181	152	621

22-23 Proportions

Assumption: The proportions of classes each grade takes is the same

Department	10th	11th	12th
Art	$\frac{31}{182}$ =0.1693989071	0.2129032258	0.2302631579
Biology	1.081967213	0.6129032258	0.1710526316
Chemistry	0.3224043716	0.8129032258	0.7171052632
English	1	1	1
French	0.2240437158	0.2064516129	0.3223684211
German	0.1038251366	0.1419354839	0.06578947368
Spanish	0.2786885246	0.1677419355	0.2171052632
Math	1.005464481	1.296774194	1.723684211
Music	0.2732240437	0.3612903226	0.3223684211
Physics	0.2732240437	0.3741935484	1.203947368
Social Studies	1	0.8451612903	0.3881578947



Applying Proportions to 23-24

Assumption: The proportions of classes each grade takes is the same

Department	10th	11th	12th	Total
Art	$0.1693989071 * 289 = 42$	$0.2129032258 * 180 = 38$	$0.2302631579 * 152 = 35$	122
Biology	313	110	26	449
Chemistry	93	146	109	348
English	289	180	152	621
French	65	37	49	151
German	30	26	10	66
Spanish	81	30	33	144
Math	291	233	262	786
Music	79	65	49	193
Physics	79	67	183	329
Social Studies	289	152	59	500
TOTAL	289	180	152	621

22-23 Teacher to Student Ratio

Department	# of teachers	Teacher to student ratio grade 10	Teacher to student ratio grade 11	Teacher to student ratio grade 12
Mathematics	6	18.4	20.1	26.2
Chemistry	3	11.8	25.2	21.8
Physics	3	16.66666667	14	22.875
Biology	4	19.8	19	5.2
Social Studies	5	18.3	13.1	11.8
English	5	18.3	22.14285714	19
German	1	19	22	10
French	1	20.5	16	24.5
Spanish	1	25.5	13	16.5
Music	1	25	28	49
Art	1	31	16.5	17.5



Ratio:

- $n = 5 * \# \text{ of teachers}$
- n is distributed across 3 grades, accordingly

5 → number of classes each teacher teaches

22-23 Teacher to Student Ratio

Department	# of teachers	Teacher to student ratio grade 10	Teacher to student ratio grade 11	Teacher to student ratio grade 12		
Mathematics	6	184/10 = 18.4	10	20.1	10	n = 30
Chemistry	3	5	5	25.2	5	n = 15
Physics	3	3 16.66666667	4	14	8	
Biology	4	10	5	19	5	n = 20
Social Studies	5	10	10	13.1	5	
English	5	10	7	22.14285714	8	n = 25
German	1	19		22		
French	1	20.5		16		
Spanish	1	25.5		13		
Music	1	25		28		
Art	1	31		16.5		



Ratio:

- $n = 5 * \# \text{ of teachers}$
- n is distributed across 3 grades, accordingly for each subject

5 → number of classes each teacher teaches

23-24 Teacher to Student Ratio

Before implementing additional teachers

Department	# of teachers	Teacher to student ratio grade 10	Teacher to student ratio grade 11	Teacher to student ratio grade 12
Mathematics	6	29.0579235	23.34193548	26.2
Chemistry	3	18.63497268	29.26451613	21.8
Physics	3	26.32058288	16.83870968	22.875
Biology	4	31.26885246	22.06451613	5.2
Social Studies	5	28.9	15.21290323	11.8
English	5	28.9	25.71428571	19
German	1	30.00546448	25.5483871	10
French	1	32.37431694	18.58064516	24.5
Spanish	1	40.2704918	15.09677419	16.5
Music	1	39.48087432	32.51612903	24.5
Art	1	24.47814208	19.16129032	17.5



Ratio:

- $n = 5 * \# \text{ of teachers}$
- n is distributed across 3 grades, accordingly

5 → number of classes each teacher teaches

Redistribution of Teachers

Mathematics	7	24.21493625	23.34193548	20.15384615
Chemistry	3	23.29371585	24.38709677	21.8
Physics	4	26.32058288	23.34193548	26.14285714
Biology	5	22.33489461	23.34193548	26
<input type="radio"/> Social Studies	5	20.64285714	19.01612903	19.66666667
<input type="radio"/> English	5	24.08333333	25.71428571	25.33333333
<input type="radio"/> German	1	15.00273224	17.77419355	0
<input type="radio"/> French	2	16.18715847	12.38709677	16.33333333
<input type="radio"/> Spanish	2	16.10819672	15.7983871	0
<input type="radio"/> Music	2	19.74043716	21.67741935	16.33333333
<input type="radio"/> Art	2	12.23907104	12.77419355	11.66666667

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Language Redistribution

German	1	15.00273224	17.77419355	0
French	1	21.58287796	37.16129032	24.5
Spanish	1	26.84699454	31.59677419	0



German	1	15.00273224	17.77419355	0
French	2	16.18715847	18.58064516	16.33333333
Spanish	2	20.1352459	21.06451613	0

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Additional Teachers

+ 1

ART

+ 1

BIOLOGY

+ 1

MUSIC

+ 1

SPANISH

+ 1

PHYSICS

+ 1

FRENCH

+ 1

MATH

7 Total Teachers

Pros and Cons

PROS

- Simple
- We have a realistic class size expectation
- All of our student to teacher ratios were within our max class size
- We gave every teacher a prep period

CONS

- Dropout rate may not be indicative of real-world circumstances
- Grouping different level language classes isn't ideal
- Assuming the new classes course selection ratio to the new class might not be accurate



Sources of Error

- Drop out rates may not be equally distributed across all 3 grades resulting in an inaccurate number of students per grade
- We assumed that there were 5 classes taught per teacher and 6 classes taken per day per student
- There could be potential rounding errors with the teacher to student ratios



Future Work

- **Limit** the number of assumptions/limitations
- Develop a better method for determining **dropout rate**
 - Account for statistics that more dropouts occur during junior and senior years
- Test to see how this model could be **adapted for another school year** ('24-'25) to test if our model still works and what changes are necessary
- Approach **foreign language** courses differently



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