

Hiring New Teachers

A new wing is being added to the magnet school for Mathematics, Science, and Technology. At MST, students must enroll as sophomores and spend three years at the school. Historically, the size of the incoming sophomore class has been equal to that of the graduating senior class (plus any students who dropped out during the year) so the size of the school has been fixed at 490. With the new wing, the size of the school will increase to 630. Next year (2021-22), the new sophomore class will have 140 more students than the graduating senior class. To accommodate this increase, seven additional faculty will be hired. There is a great deal of discussion on campus about which departments should get the extra teachers. At the time of the increase there are:

6	mathematics	5	English faculty
3	chemistry faculty	3	foreign language faculty
3	physics faculty	1	music instructor
4	biology faculty	1	art instructor
5	social studies faculty		

Should every major discipline (English, Social Studies, Mathematics, Physics, Biology, Chemistry, and Foreign Language) each receive one new teacher, or does the demand for courses argue that some departments should receive two new teachers while others receive none?

Devise a method for hiring the new teachers that the faculty will see as being *fair*.

Departmental Enrollment Totals -- August 2020

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
Mathematics	184	201	262	647
Music	50	56	49	155
Physics	50	58	183	291
Social Studies	183	131	59	373

All courses are year-long. It is possible to hire a foreign language instructor who can teach two different languages, but other faculty teach only in their discipline. Information from the Registrar's office suggest that 5% of the incoming class drop out prior to graduation.

Outline for Each Written Report

- A summary sheet (limit to half a page).
- A clarification or restatement of the problem.
- A clear exposition of all assumptions and hypotheses you made. Even if the assumptions seem obvious to you, they should be stated in your report.
- An analysis of the problem, justifying or motivating the modeling to be used.
- The design of the model.
- Justification of the model, including a discussion of how the model can be tested. If appropriate, use your model to predict an outcome and then conduct an additional trial to demonstrate that your model gives predicted results.
- Your solution to the problem.
- A discussion of the strengths and weakness of the model, including error analysis and consideration of the robustness and stability of the model.
- Provide algorithms in words, figures, or flow charts (as a step by step algorithmic approach) for all computer codes developed. Do not submit pages of code.
- A short discussion of the contributions of each team member.
- References

Summary Sheet

The summary is a very important part of your paper. To write a good summary, imagine that a reader may choose whether to read the body of the paper based on your summary. *Thus, a summary should clearly describe your approach to the problem and, most prominently, what your most important conclusions were.* Your concise presentation of the summary should inspire a reader to learn the details of your work. Summaries are not mere restatements of the problem or a cut-and-paste repeat of the introduction.