

Curriculum Mapping Project, Chemistry Undergraduate Program

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Introduction

As part of a recently undertaken expansion of the University of Ottawa's Department of Chemistry, a rigorous self-examination of the undergraduate program has been in progress. This wide-spectrum project has been termed "Curriculum Mapping Project". Previous research shows that such undertakings lead to increased quality of chemistry education in undergraduate programs. This specific project investigated the analytical and inorganic streams of the chemistry program, and the specific questions sought to be answered were the following:

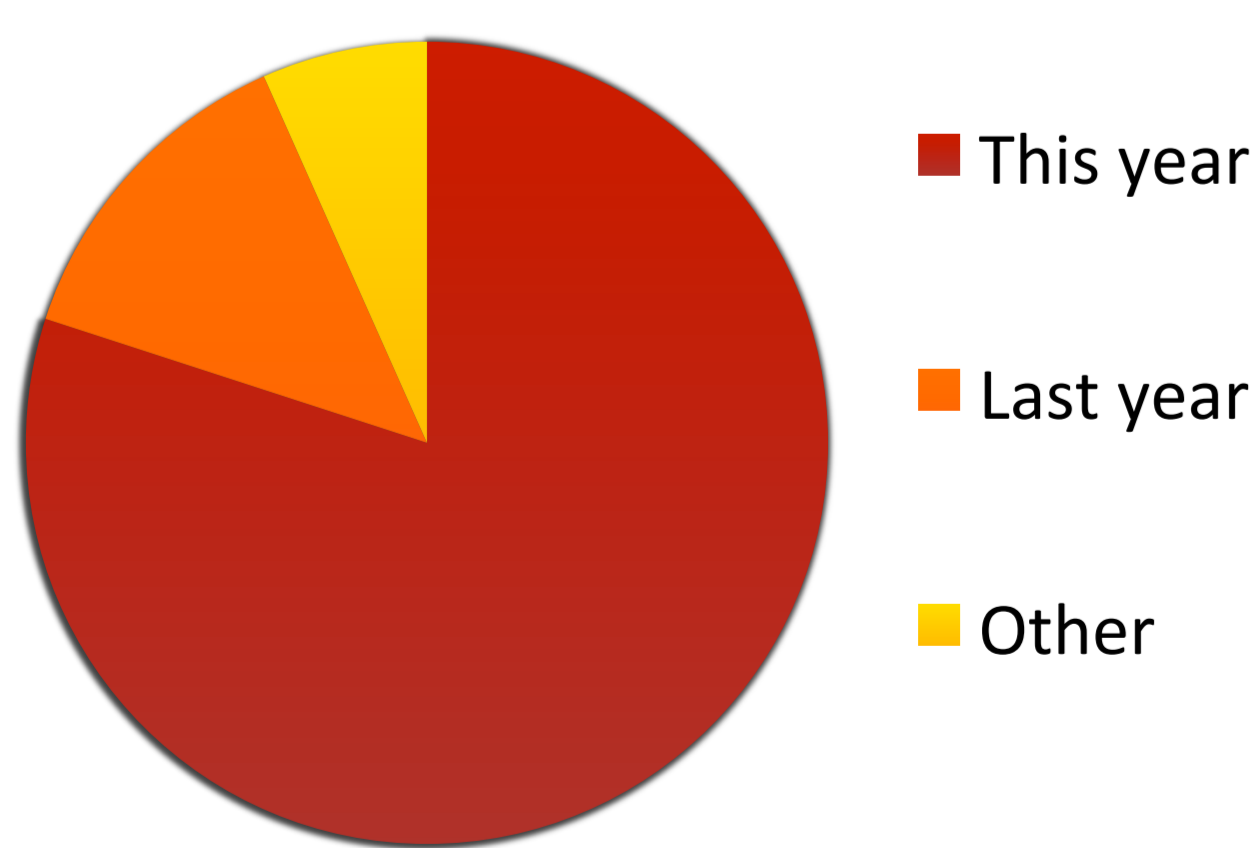
- 1) Does the current course sequence in the undergraduate chemistry program contain conceptual overlap, and if so, does this redundancy benefit, or setback, the students?
 - 2) Can any specific components of the program, such as important concepts or skills, be identified as missing, and incorporated into the program?
- Adherence to recommendations made by previous external evaluation of the chemistry undergraduate program were also to be verified by means of this project. It was expected that not many further changes would have to be made, due to the quality of the university's undergraduate chemistry program. Lastly, an analysis of teaching methods, as well as their learning objectives and required resources, was done.

Methodology

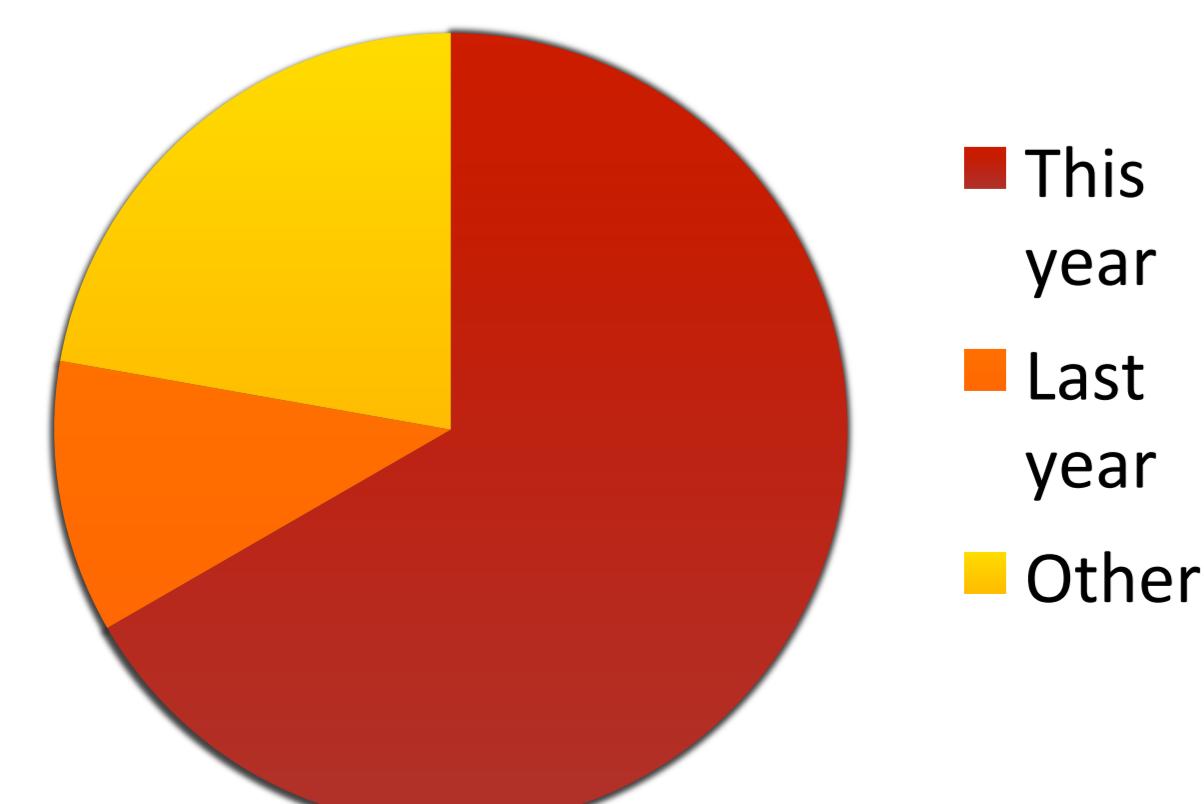
1. Assembly of a database containing all information pertaining to this select list of courses. This demanded the use of various resources, from professors and staff members within the Department, to students currently in the undergraduate chemistry program, as well as the university's website and online databases.
2. Construction of the concept map.
3. Structured interviews were conducted with a number of professors in the Department of Chemistry. These were done in order to obtain relevant information as to the pedagogical aspects of these courses, as well as the professors' opinions on the usefulness of the conceptual overlaps between courses.
4. All information gathered throughout the project was integrated, and the courses were assessed based on the Canadian Society of Chemistry guidelines.
5. Recommendations were then made based off of these results.

Results

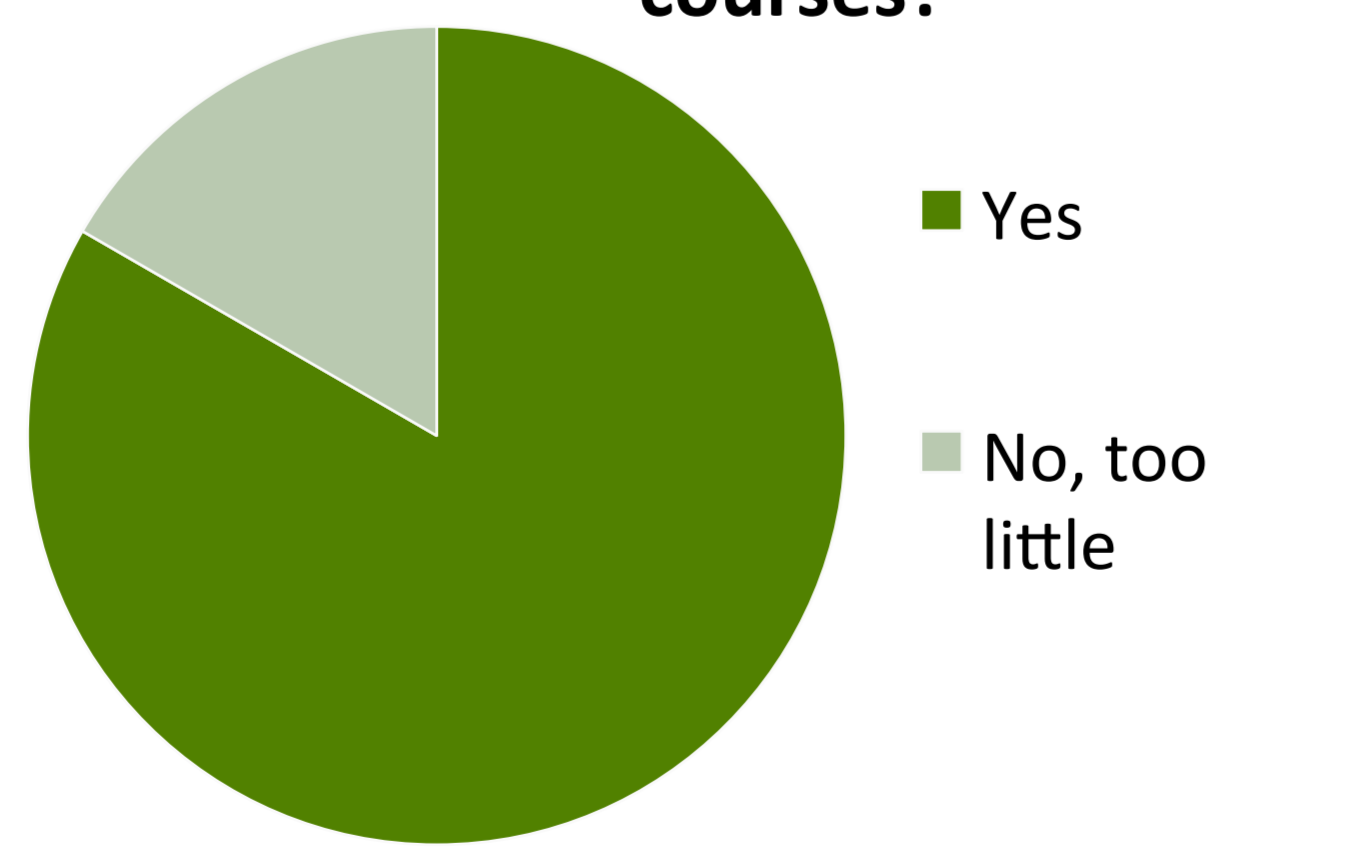
(A) English courses, last offered



(B) French courses, last offered



(C) Appropriate amount of conceptual overlap between courses?



(D) Lecture format

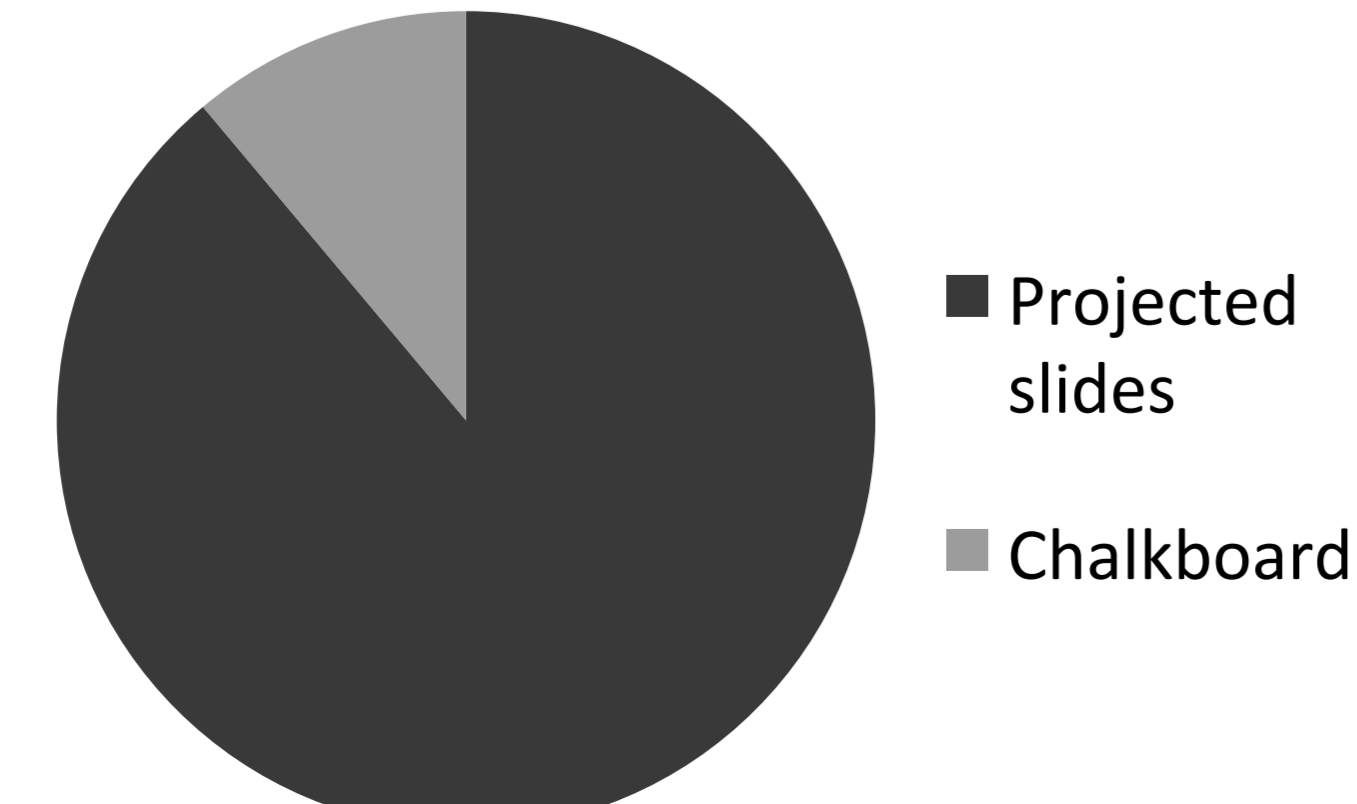
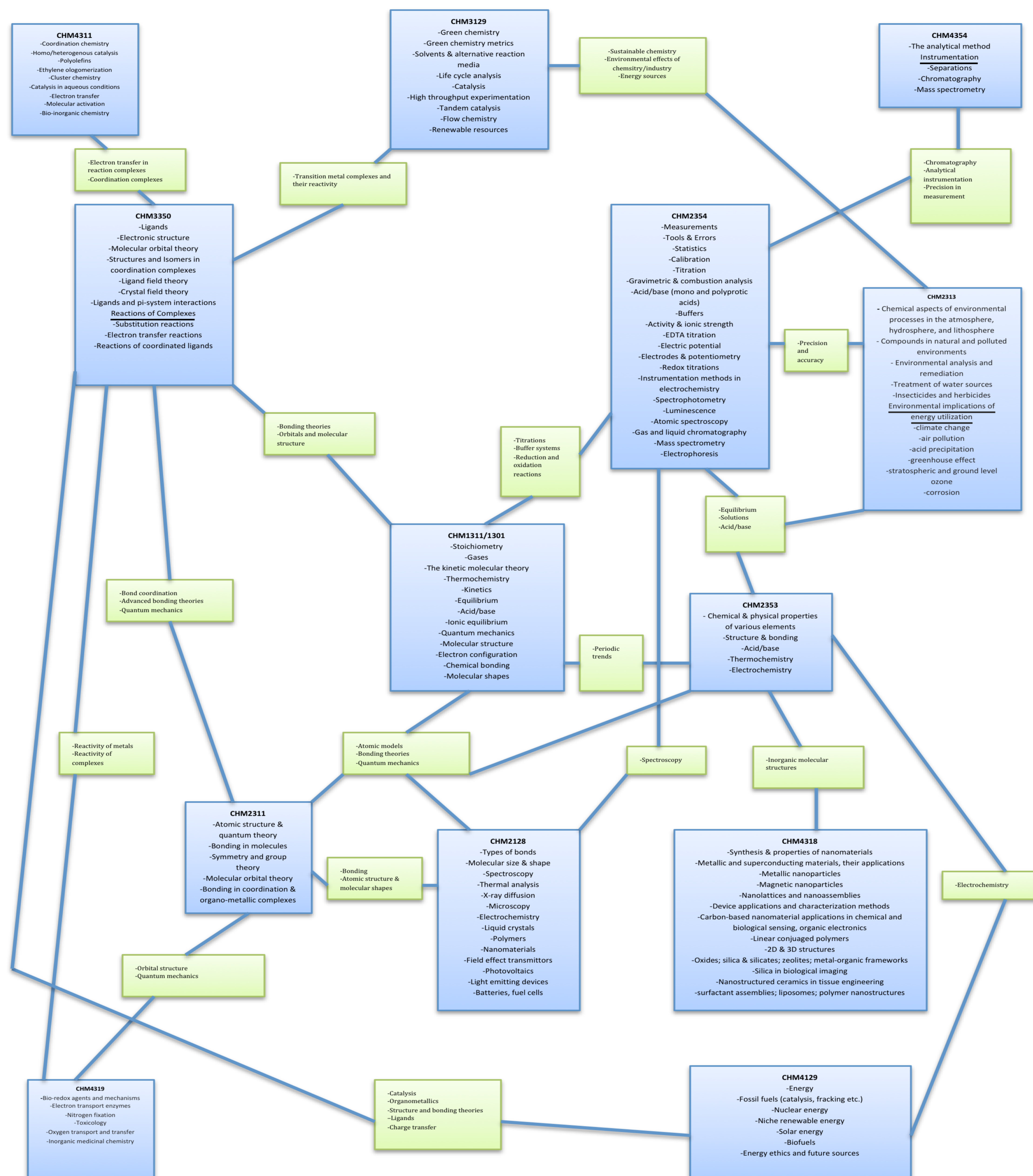


Fig. 1. A based off 15 courses, B based off 9 courses, all offered by the Dep. of Chemistry. C and D based on the opinions of 6 professors, instructing 7 courses.



Student performance vs. student rating

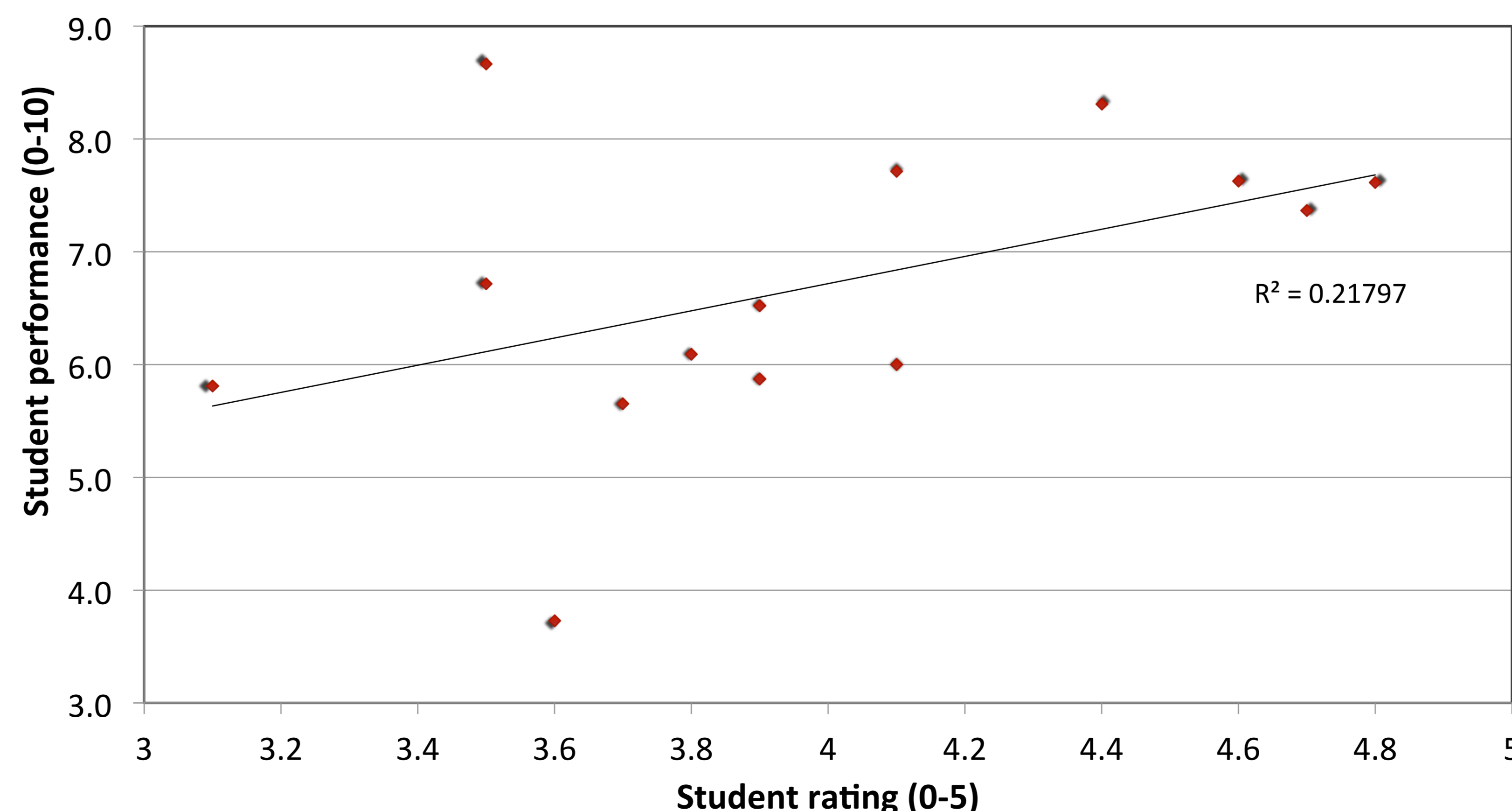


Fig. 2. Correlation between student overall appreciation of courses, and grade performance for those courses. Averages taken across all sections of a course for a given academic year.

■ Appropriate lab space ■ Appropriate TA units

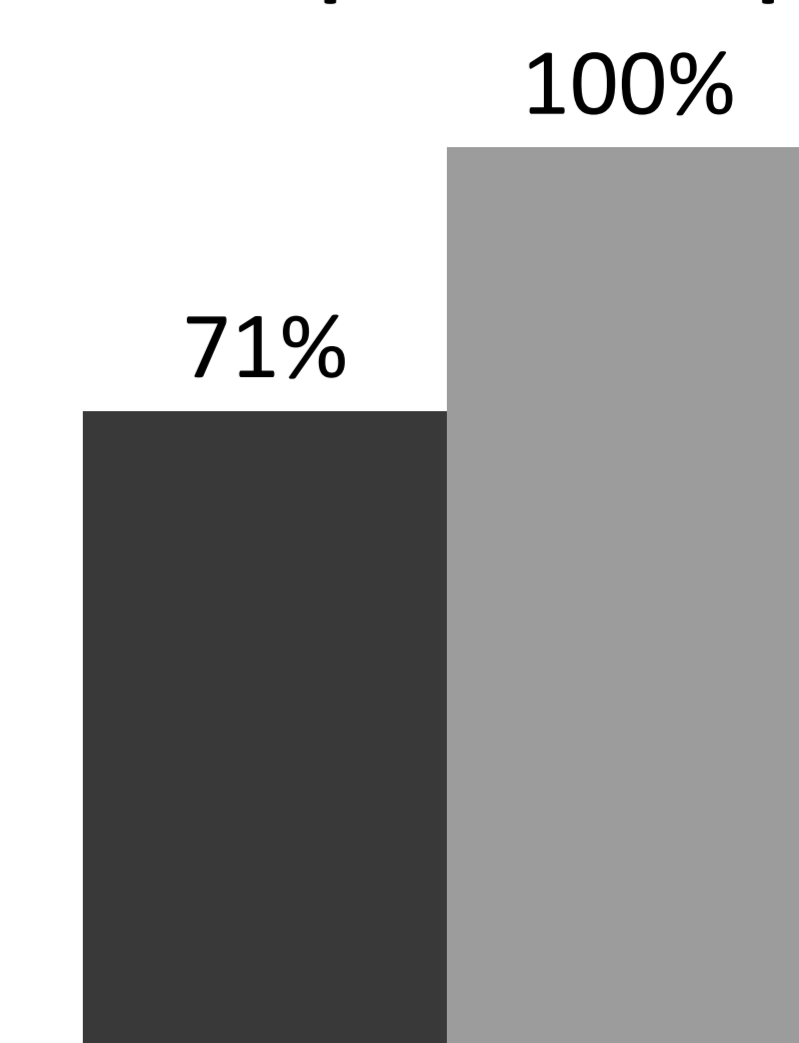


Fig. 3. Data based on the opinions of 6 professors providing information for 7 representative courses.

The department's strengths

1. The Department of Chemistry has a very good overall conceptual overlap between courses; the vast majority of professors consulted believed this overlap was beneficial to students, as during their learning experience, students will neither waste time repeating material, nor have gaps in their understanding.
2. A unanimously positive point is the appropriate number of TA units provided for courses.
3. The vast majority of professors indicated that they conduct lectures by means of projected slides, and other technology, while a minority reported using a chalkboard (by choice, and not due to lack of equipment). This demonstrates that the Department is able to provide learning facilities in accordance with professors' resource requirements.
4. A prevalent learning objective beyond syllabus material is problem-solving, a tool critical to a proper chemistry education.
5. The vast majority of courses offered within these streams have respectable averages and student appreciation scores. The two demonstrate correlation.

Areas for improvement

1. It appears that an improvement could be made with respect to the material taught on chemical structure and bonding. Deficiencies in these concepts seem to lead to a more difficult understanding of upper year material.
2. A recurring, but not overwhelming, point made by various professors is the lack of lab space in the department. This deficiency limits the number of places available for students to register in certain courses, especially some upper level courses, and inevitably limits the hands-on experience students can gain.
3. We can clearly see that English courses are offered much more prevalently than French courses. Perhaps hiring more French-speaking professors would increase the availability of courses for strictly French-speaking students.

Future work

This project is linked to two other UROP projects in the department, which analyze the remaining streams of the undergraduate chemistry program. All three work in coordination toward the completion of the Department of Chemistry's Curriculum Mapping Project.

Acknowledgements

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References

Canadian Society of Chemistry, *CSC Accreditation Guidelines*