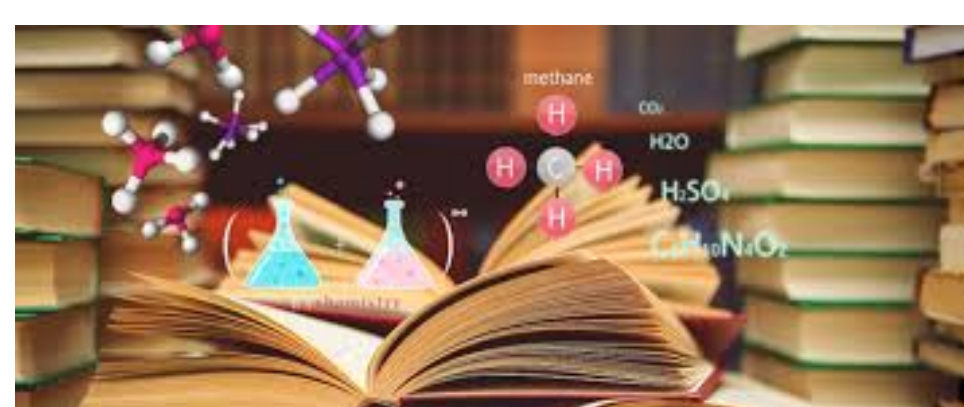




uOttawa



A map towards success in Chemistry

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Results

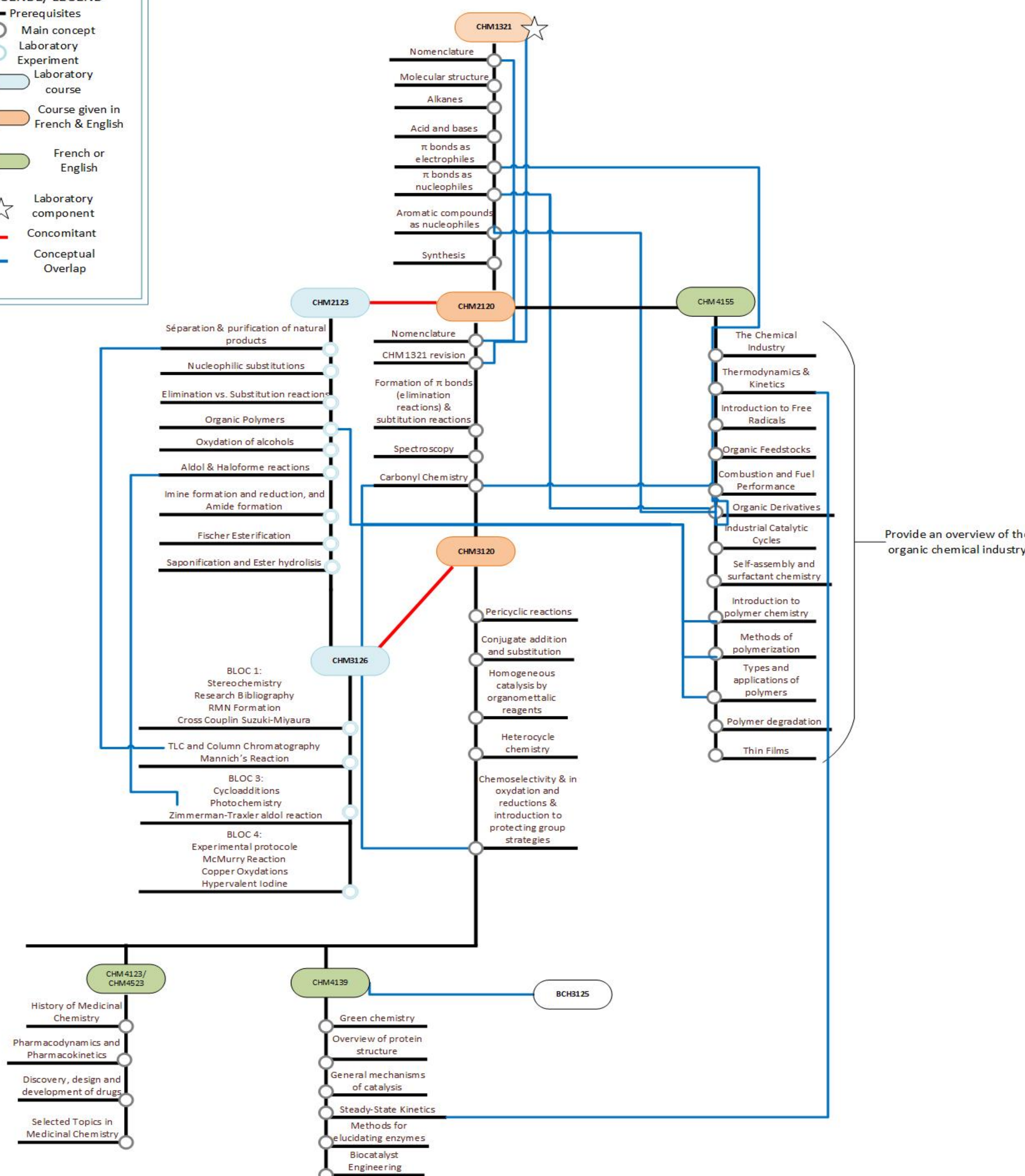
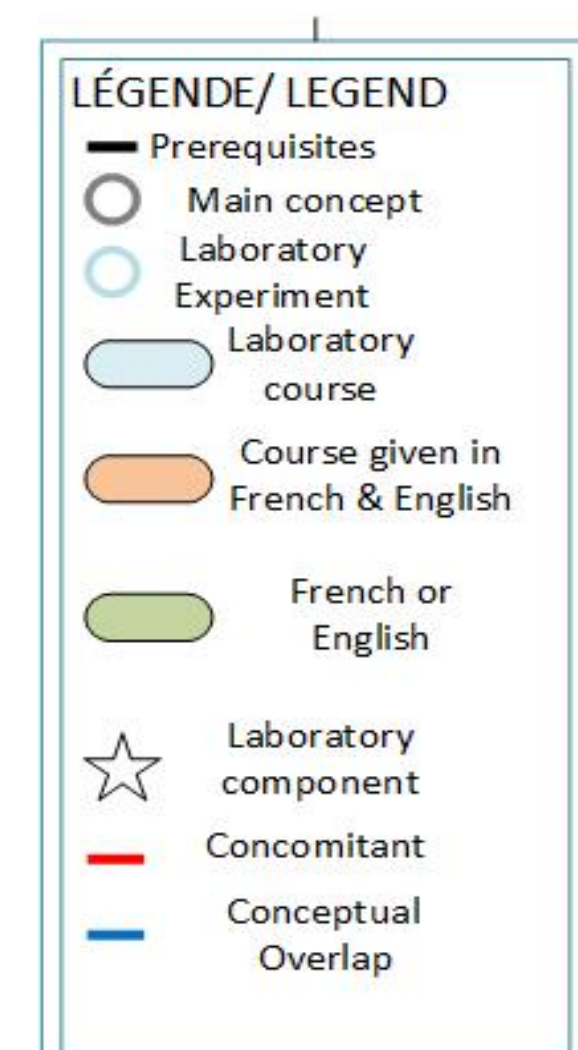


Figure 1- Curriculum Map of all the concepts taught in the Organic/Bio-Organic courses offered by the Faculty of Science at the University of Ottawa. The concept map above represents the English Stream of all the courses. A similar map can be made with all of the French courses offered.

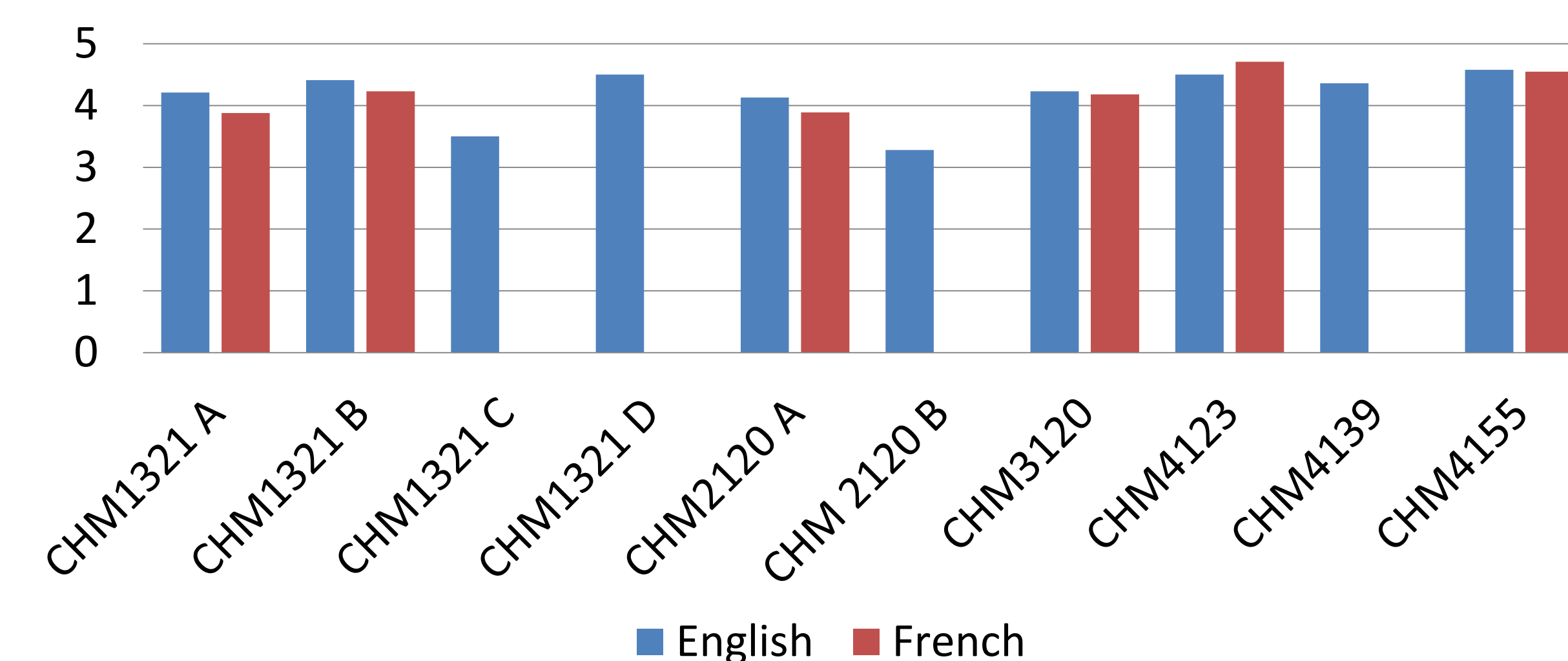


Figure 1- Student satisfaction rates of courses in the Organic/ Bio-Organic Chemistry Stream. Data retrieved from online student S-reports for the most recent offerings of each course. There is a general trend to be observed in this graph. We can see that more advanced courses have a higher overall satisfaction.

Introduction

La chimie est une science fondamentale de la vie. Donc, on veut l'enseigner de la manière plus efficace aux étudiants du premier cycle. Une expansion du Département de Chimie à l'Université d'Ottawa, ainsi qu'un examen propre, nous apporte à faire un plan de tous les concepts enseignés dans le programme du premier cycle de Chimie pour améliorer l'expérience des étudiants. La conception du plan de concepts va relier tous les sujets de la chimie enseignée à l'Université, soit, la chimie organique/bio-organique, la chimie générale/analytique/inorganique et la chimie physique/théorique. La chimie organique/bio-organique agit comme la base de la vie, et elle doit être enseignée non seulement théoriquement mais aussi dans un aspect pratique. En évaluant cette partie des cours offerts par l'Université d'Ottawa, on peut ensuite comprendre avec plus de profondeur une partie du programme de Chimie et apporter des recommandations pour améliorer le programme ainsi que bénéficier les prochains étudiants en chimie.

Le plan conceptuel va ensuite aider à évaluer le programme de Chimie grâce au *Canadian Society for Chemistry Accreditation Criteria*.

Methodology

Build a database of all the courses in the Organic/Bio-Organic Stream offered by the Chemistry Department:

CHM1321, CHM1721, CHM2120, CHM2123, CHM2520, CHM2523, CHM3120, CHM3126, CHM3520, CHM3526, CHM4123, CHM4139, CHM4155, CHM4317, CHM4325, CHM4523, CHM4528, CHM4555

Formulate a questionnaire for professors about each course to investigate conceptual overlap, learning objectives, and student performance.



Create a curriculum map concept-by-concept of all the courses studied in this particular stream. Identify areas of overlap or/and deficiency in the Organic/Bio-Organic Stream.

Based on the professors comments, review the pros of the Chemistry Courses as well as, make any recommendations to improve the program.

Connect student performance reports to the concept map.

After we interviewed some professors that teach or have taught these courses in recent academic years, some trends emerged:

- Some courses find themselves in uncomfortable classrooms, which limits space during exam times.
- Some professors find that there is some inconsistency in the laboratory course with the lecture course. The synchronization between laboratory work/when the material is covered in class could be better.
- Instructors generally agree that a recent update in the CHM1321/1721 and CHM2120/2520 curriculum has had a beneficial impact on student performance in these courses.
- The overlap between CHM2120/2520 and CHM1321/1721 is the most important conceptual bridge in the Organic/ Bio-Organic Stream.
- Some conceptual overlaps between courses (i.e. CHM4139 & BCH3125) are being adapted to benefit the students by having the same professor teach the course.

It is important to emphasize that unlike other chemistry streams that can be taught with a parallel sequence, every course taught in organic chemistry builds onto previous knowledge. Even though there is certain conceptual overlap between some courses, the overlap helps by adding flow and we find ourselves with sequential learning. For example, we learn simple organic reaction mechanisms to apply them later on onto a bigger scale synthesis. This type of learning helps the student succeed because it lets them acquire all of the building blocks in a certain order that enhances the understanding of organic chemistry. Our concept map (figure 1) shows the flow gained by the sequential learning, every course follows each other and builds from the previous course. Also, the building blocks the students gain during the earlier course can also be applied in other fields and not only in organic chemistry. For example, in the biochemistry department, some courses will overlap and connect with the concepts learned in organic chemistry

Pros	Recommendations
Laboratory courses enhance chemistry appreciation by allowing students to see how the theory is applied in the lab.	Timing between concept coverage in the lecture courses and the laboratory courses could be improved. Also, professors and laboratory coordinators could collaborate to make sure there is better synchronisation.
A variety of teaching techniques are being used by all involved instructors. Overall, most of the professors appreciate in-class student participation. Note-taking involves students either making contributions to pre-prepared notes or writing their own notes simultaneously with the professor.	Some classes are given in the UCU auditorium. Numerous negative comments reflected its poor capacity as classroom due to limited space. Mid-term examinations could be given in alternate or additional rooms, offering more space for the students to spread out. Also, teaching techniques such as online homework assignments have been added certain courses. This addition has shown an improvement the class average. Online tools could be a good addition to all of the organic chemistry courses to increase student performance.
In general, there is a satisfactory number of TA (teacher's assistant) units in every class.	To compensate for increased class sizes, decreased Discussion Group size would greatly benefit students, allowing for more meaningful student/TA interaction.
Most courses (83%) are regularly offered in both languages.	Some classes are only offered in French every other year and in English every year, resulting in inflated English sections in alternate years. These fluctuating class sizes can sometimes be detrimental to in-class learning. For example, some courses have in-class demonstrations, and in larger classrooms, it can be challenging to carry them out effectively.
The conceptual overlap found in some courses is good, because it ensures that students review basic concepts.	Some courses should add certain pre-requisites to help the students succeed better in the class. For example, in CHM4155/4555, Physical-Chemistry should be added to the pre-requisite list.

Table 1 – Departmental recommendations for the courses in the Organic / Bio-Organic Stream, as compiled from instructor interviews.

Conclusion

In conclusion, this research will help us build a global curriculum map for all the courses offered by the Chemistry Department. Once all the data of the chemistry courses are compiled, it will be presented to the department with recommendations which will benefit the students' success in the courses and in all of the undergraduate programs offered by the Chemistry Department. This research will continue on, by analysing the students' performance in the courses, and comparing both the course overall evaluations with the students' data performance.

Bibliography

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