

Merging Organic and General Chemistry in a Four Semester Chemistry Curriculum.

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Highlights

- Chemistry curricula must usually serve many majors and cannot afford switching the order of topics. They must create separate tracks depending on careers. The first semester is commonly seen as a "weed out" course.
- At UMR all students are graduating in health sciences: possible careers are pre-med, nursing or a wide variety
 of health professions that require different levels of chemistry.
- Our curriculum prevents tracks and allows students change plans without having to take additional courses.
- We remove the pedagogically artificial barrier between the organic and general chemistry courses and introduce organic structures and spectroscopy since the very beginning while introducing some fundamental aspects of chemical structure and reactivity. Quantitative aspects are progressively increased throughout.
- The first two semesters combined, CHEM1 and CHEM2, may be seen as to what elsewhere is "General Chemistry 1" and "Organic Chemistry 1", but not in that order and not with the exact same content.

Sequence of courses and topics

The old sequence is a challenge for health-science students

Nationwide the "pre-med" 4-semester chemistry sequence is a challenge

These courses serve too many majors and its sequence cannot be changed

First year

GENERAL CHEMISTRY 1

GENERAL CHEMISTRY 2

ORGANIC CHEMISTRY 3

ORGANIC CHEMISTRY 4

ORGANIC CHEMISTRY 60B 1)

ORGANIC CHEMISTRY 60B 2)

Chemistry major...

You and the alth professions.

But those are not accepted for pre-med as they sacrifice too much content.

Second year

ORGANIC CHEMISTRY 60B 1)

ORGANIC CHEMISTRY 60B 2)

Taught for chemistry majors

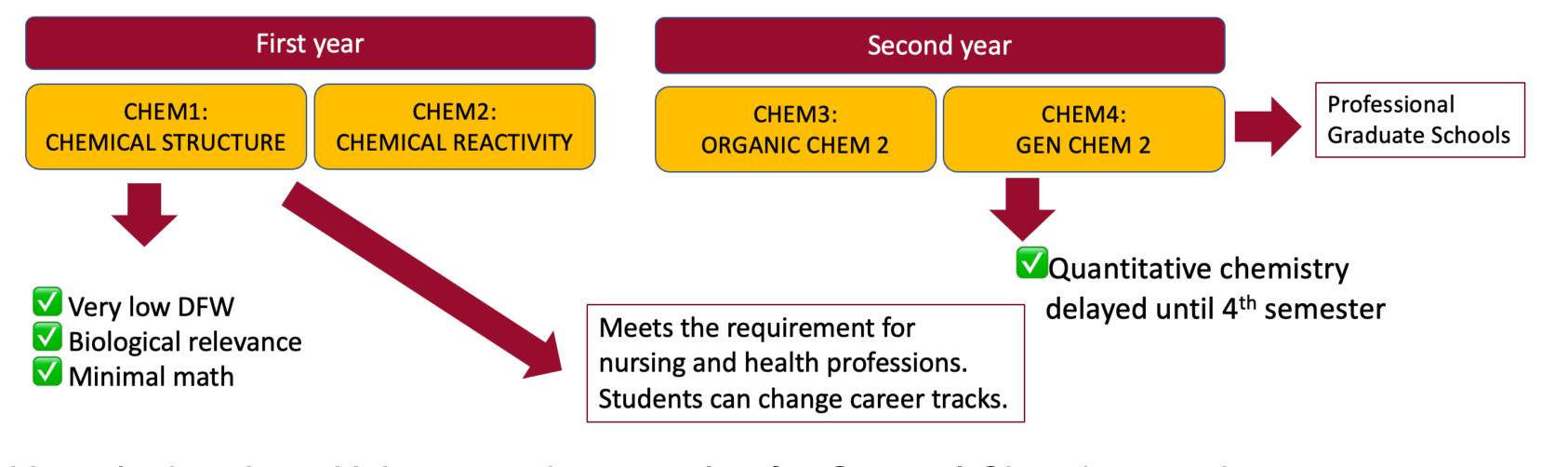
EIGHERAL ORGANIC

BIOCHEMISTRY (60B 2)

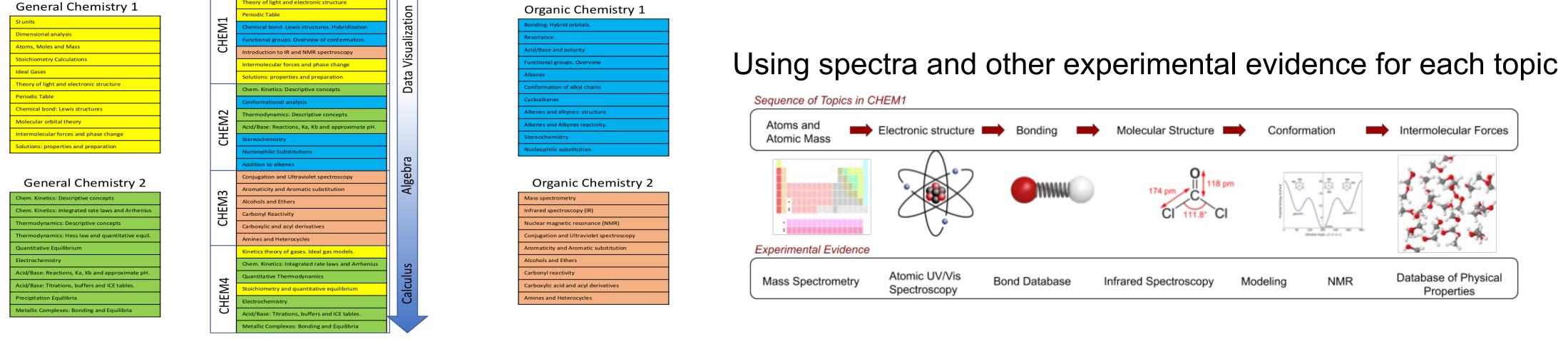
Taught for chemistry majors

Chemistry (60B 2)

The new sequence allows students to change tracks: quantitative skills are progressively added, organic structure and spectroscopy are seamlessly introduced since the first semester.

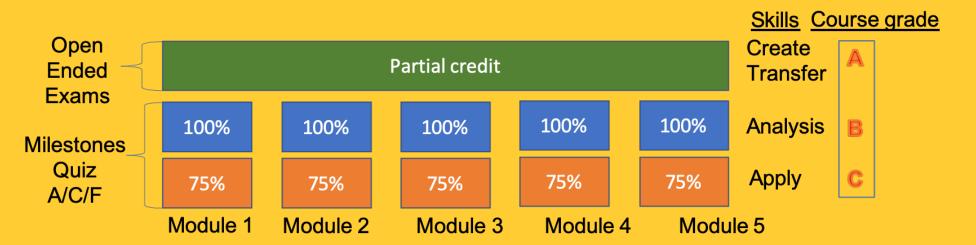


Mixing up topics without losing rigor: Using organic examples for General Chemistry topics



Assessment & Feedback Aligning content, class activities, practice, and exams. What to teach: Content Curriculum Design How to assess it: Ouestions and Artifacts Homework practice Cumulative Specs gradin A / C / F scale

Milestones Assessment: A cumulative and specifications grading assessment for low-cognitive skills



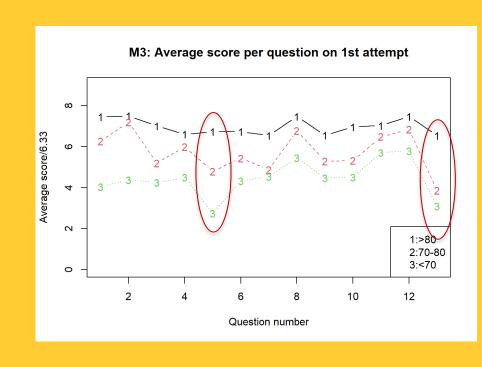
- → The question pool is available ahead of time. Students can practice as much as they want as questions change for each attempt.
- → The question pool is also assigned as homework so that students can connect practice with assessment
- → Students can only obtain 100% (if score is > 80%), 80% (if score is between 70 and 80) or 0% (if score is < 70%)
- → It can be thought as "proctored homework" and they have several attempts to get the highest grade.

Quick feedback: The case of fall 2021

→ Are milestone scores comparable among years?
When comparing Fall19 and Fall21 we saw a decline in performance that were able to correct.



→ Identifying questions with high discriminatory index



The questions circled show very different scores between passing and failing students

→ Are they watching the videos? Does it correlate with performance?

During fall 2021 we saw a disengagement that was corrected.

