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Mathematics in Transition: Life Sciences Course at McMaster University

I will discuss rationale for and implementation of a new course 'Calculus for Life Sciences' that I created in an attempt to address (among other objectives) certain issues that emerge in transition from secondary to tertiary mathematics. Course design has been, in part, based on my previous research in transition, and on insights that I gained from analyzing high school mathematics background surveys that I have been administering to incoming students for over five years. Among the largest challenges that students in transition face are poor algebraic skills, inadequate mathematical reasoning and learning strategies, as well as robustness of their preconceived notions about what a calculus course should be about.

So... what topics from calculus have been kept, and what is out? Do we still do proofs, are there any theorems left in the course? Why are students now studying discrete-time dynamical systems and stability? Relevant applications, presented in appropriate context, replaced related-rates and other artificial problems that populate calculus textbooks. We study allometric models (blood circulation time vs. body mass, scaling of bones), population and growth models, radioactive decay and dissolution of drugs, growth of cancer, to mention a few.

It is too early to provide any kind of answer to the ultimate question—does it work? However, I will share my initial experiences and reactions, as well as my students' reactions and critiques that I will collect during the semester.