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Open letter to high-school principals and guidance counsellors concerning physics courses

It has come to our attention recently that a number of high schools are recommending that their students not take upper-year physics because of concerns it may bring down their averages, hurting their chances for entry into university. In some cases, this has so reduced the number of students taking those courses that schools have even cancelled them, reducing even further the number of students who take physics. However, physics is required for many university professional programs as well as for science programs, which means that such students in these programs are exposed to a university physics course with no prior experience in the subject. Recent evidence shows that these students are largely unprepared for the subject and are failing or dropping out at a rate up to four times as great as for those who have taken high-school physics. Even when a university does provide a make-up course for students without previous physics training, this can prolong by a year the student's university career, at great expense. **Our strong recommendation is to advise a student who is likely to take a university physics course, for whatever reason, to take the high-school physics courses.**

Programs requiring a physics background

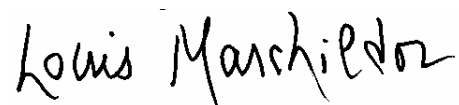
A physics background is required by many disciplines and professional programs, because it provides knowledge essential for the discipline while developing strong numerical and analytical skills. Such programs include the following:

1. Medicine, where knowledge of basic electricity, mechanics and optics is required to understand the functioning of the human body. Reflecting this, the MCAT (Medical College Admission Test), required for entrance to most medical schools in Canada, has a high physics content.
2. Optometry, for the same reasons as for medicine.
3. Architecture, for which a good understanding of physics of structures is clearly crucial.
4. Engineering of all types.
5. Chemistry. Accreditation by the Canadian Society for Chemistry requires a university physics course.

6. Forensic Science. Accreditation by the American Association of Forensic Scientists requires a full-year university physics course.
7. Other sciences, in addition to physics.

Evidence that high-school physics is essential

Many university programs, including some in the life sciences, require high-school physics (SPH4U in Ontario) as one of the entrance requirements. However, a number of programs which require a physics course at the university level do not require high-school physics as an entrance requirement, as the high-school material is repeated at university although at a much accelerated pace. Our statistics, derived from a range of universities of different sizes, indicate that the group without high-school physics is severely disadvantaged at the university level. **The drop-out and failure rate of these students from their university physics course is typically in the range of 20%, compared to about 5% for those students in a similar course that does require high-school physics.** Dropping out or failing a course is a major setback for a university student, as it means an extra year of study or retaking the course over a summer which is a major commitment in time and cost. Moreover, students who have high-school physics perform substantially better than their peers in the same course who have not had high-school physics. Of course, some capable and highly motivated students without high-school physics perform well in university physics courses, but these are the exception to the rule.



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