To: Dr. Erika Paterson, ENGL 301 99A Instructor
From: Aleem Tariq, ENGL 301 99A Student
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Subject: Proposal for the necessity of students in the Life Sciences pursuing additional computational background

Introduction

The University of British Columbia (UBC), is a world-renowned University that plays a significant role in cultivating the next generation of academics, employees and employers that are prepared to face the rapid pace of change seen in the professional world. With regards to the Life Sciences, UBC is in the lead in Canada among Life Science research, as the Life Sciences Institute (LSI) is the largest life sciences institute in Canada, and among the best by any metric.

Therefore, it should stand to reason that the Life Sciences should sufficiently prepare the next generation of students for what is expected in the working world of research and industry related to the field. Both the scale and scope of applications of Computer Science is rapidly increasing, and having a background in Computing confers to one the ability to not only readily manipulate data, but find patterns and pose novel questions.

Given the nature and complexity of the fields in the Life Sciences, and the growth of the tools we have to address such things, a large-scale revolution both occurring at present and will continue. 'Big-data' is an emerging topic in sub-fields ranging from Neuroscience to Genomics to Microbiology. Having the skillset needed to work with these datasets in increasingly challenging ways is the current trend in cutting-edge research.

Statement of Problem

The Life Sciences, in general, provide insufficient preparation for the changes that I suspect to see emerging in both academia and industry. I am a former UBC major in Biology, and did not need to complete any computing pre-requisites for my degree at the time. However, I noticed that research papers covered in upper-level classes involved significant use of data analysis and computational techniques that I was unfamiliar with; techniques that were vital to exploring the subject of the research paper. Furthermore, in the context of my own research projects, I was severely limited in not only the sorts of novel questions I could propose when exploring hypotheses, but also the techniques I would use to do so, which were largely qualitative.

Proposed Solution

A possible solution is to, given the opinions of professors and foreign students, make a strong case towards undergraduates entering the field, that they should obtain a computing background beyond the pre-requisites offered by the degree. Recently, UBC Biology has made CPSC 103, a course that features some basics of Python programming, a required pre-requisite. Clearly, UBC

Biology has already come to a consensus that such a class needs to be added to the pre-requisite list, based on discussions on necessary skills for undergraduates.

Scope

To assess the necessity of recommending that students in the Biology Department, and by extension, the Life Sciences, I plan to pursue the following questions:

1. What are some computational and analytical skillsets that are required in research?
2. What are the perspectives of professors on the role of computing in their research, and what changes do they anticipate with respect this topic in their field?
3. What are the perspectives of former and current students, and what are their experiences with both computing and its role in their research/course projects?
4. What are the specific changes occurring in the Life Sciences, and how does this reflect on the skills that will be demanded from future graduate students and employees?

Methods

My proposed primary data sources will include surveys and interviews of current UBC professors that are conducting research, as well as surveys of current and former UBC undergraduate students in the Life Sciences. These surveys and interview will be used to address the questions posed in my scope.

My Qualifications

I am a Bachelor of Biology graduate from the University of British Columbia. I have taken a large number of upper-level classes that were intended towards students interested in pursuing graduate-research.

Intended Audience

This formal report is intended for undergraduates both currently in the Life Sciences and intending to pursue the Life Sciences at UBC, as well as the departmental heads of the fields within the UBC Life Sciences. The recommendations I put forward, however, would hopefully be acted upon at the level of pre-requisites, and perhaps inform considerations regarding the creation of new classes.

Conclusion

There is no doubt that obtaining a skillset in Computing is a significant return on investment for a student in the Life Sciences. Such a student will not only be able to more proficiently work with

data, but also understand cutting-edge research in the field, as well as approach existing problem domains in novel ways. All of which will be in demand in the near future.