



FINAL ASSESSMENT REPORT ON THE 2013-2014 PROGRAM REVIEWS

Under UOIT's Quality Assurance Framework, all degree programs are subject to a comprehensive review every eight years to ensure that they continue to meet provincial quality assurance requirements and to support their ongoing rigour and coherence. Program reviews involve several stages, including:

1. A comprehensive and analytical self-study brief developed by members of the program under review.
2. A site visit by academic experts who are external to and arm's length from the program who prepare a report and recommendations on ways that it may be improved based on a review of the program's self-study and supporting material, and a two day site visit involving discussions with faculty, staff and students and a tour of the facilities.
3. Development of a plan for improvement by the program and proposed timelines for implementation.

On the completion of the program, the self-study brief together with the reviewers' report and the assessment team's response are reviewed by the appropriate standing committee of Academic Council, and are subsequently reported to Academic Council, the Board of Governors and the Quality Council.

In 2013-14, program reviews were conducted for the following degree programs:

- Bachelor of Information Technology
- Bachelor of Science in Physics
- Bachelor of Health Sciences
- Master of Science And Doctor of Philosophy in Computer Science

This is the first program review for these programs and the internal assessment teams are to be commended for undertaking this assignment in addition to an already challenging workload and within very tight deadlines. The following pages provide a summary of the outcomes and action plans resulting from the reviews, identifying the strengths of the programs as well as the opportunities for program improvement and enhancement. A report from each program outlining the progress that has been made implementing the recommendations will also be put forward in eighteen months' time.

Included in this report is also the 18 month follow-up report on the following program reviews:

- Bachelor of Allied Health Sciences
- Bachelor of Engineering in Electrical Engineering and Electrical Engineering and Management
- Bachelor of Engineering in Software Engineering and Software Engineering and Management

Looking forward to 2014-15, the following programs will be subject to review under the Quality Assurance Framework:

- Bachelor of Health Science in Medical Laboratory Science
- Bachelor of Science in Health Physics and Radiation Science
- Bachelor of Arts in Legal Studies
- Master of Health Sciences
- Master of Information Technology Security
- Master of Science and Doctor of Philosophy in Material Science
- Master of Science and Doctor of Philosophy in Modelling and Computational Science

BACHELOR OF INFORMATION TECHNOLOGY

Dean: Steve Rose (Acting)

External Reviewers: Dr. Kevin Stanley (University of Saskatchewan) and Dr. Amr Youssef (Concordia University)

Site Visit: September 25-26, 2014

This final report of the Bachelor of Information Technology Program Review Committee is the culmination of a process that began in 2013 and involved extensive meetings with stakeholders, the collection of large amounts of information, a site visit with two external academic reviewers, and a site visit with three industry partners.

The academic reviewers, Professor Kevin Stanley of the University of Saskatchewan's Department of Computer Science and Professor Amr Youssef of Concordia University's Concordia Institute for Information Systems Engineering decided between themselves that they would each write a report on one of the majors in the BIT program. Professor Stanley reported on the Game Development and Entrepreneurship Program (GDE) and Professor Youssef reported on the Networking and Information Technology Security Program (NITS).

This report summarizes the recommendations of the reviewers and the faculty's response to the recommendations. The responses from the GDE and the NITS faculty are provided separately so that each group can address the issues that are specifically relevant to it. In addition, the GDE faculty has included recommendations provided by the representatives of industry who visited the campus as part of the program review.

Summary of Recommendations and Responses

Part I: Networking and Information Technology Security

- A. The idea of establishing the Hacker Research Lab is an innovative one. However, the current lab seems to be outdated and not utilized. The faculty may also consider establishing an additional lab space for the NITS students so that they can meet freely in there to share their knowledge, exchange research ideas and participate in IT security competitions.** The Faculty of Business and Information Technology (FBIT) will review the existing capabilities and usage of the Hacker Research Lab (HRL). The use of the HRL is being integrated into the design and roll out of the IT Skills Workshop. We will also explore the use of this space as a designated drop in center for peer tutoring and supports for programming, math, and other core Networking and IT Security topics to support retention initiatives, share their knowledge, and develop research ideas.
- B. The math requirement seems to be a concern for the interviewed faculty members who have commented that students entering the program need strong math skills and that many students do not have the required academic background and maturity level, and therefore struggle. Based on my discussion with the faculty members and the academic advisor in this program, there are different approaches that can be utilized to handle this situation:**
 - i. Not accepting students who have taken only data management math courses in high school.**
 - ii. If the above suggestion cannot be deployed, for example because of financial constraints and the pressure to accept a specific number of students in the program, then these**

- students have to be very carefully monitored in their first two years in order to succeed in their math courses and in the later courses that rely on math skills. The program may consider the utilization of peer tutoring programs that are geared towards these students.**
- iii. Administer an entry exam that allows the faculty to place each student in a suitable section of the introductory math courses where emphasis is placed on specific areas of weakness that they illustrate to help them develop the requisite skills to achieve success in the math and math dependent courses during their program.**
 - iv. Consider the possibility of asking students who obtain a “D” grade or less (for example) in a core course that is a prerequisite to other courses to repeat this course. The amplification of “out of sequence” problem need to be considered before considering this approach.**

The suggestions of the reviewer characterize well the issues the BIT faces with the math skills of its students. FBIT recognizes that it would be preferable to not accept students who have only taken data management as their math requirement in high school and only take students who have done well in calculus. However, the Faculty believes that the students being admitted to the NITS Program have the ability to succeed at math, given the proper supports. We have taken steps and are developing additional ones to address this issue:

- FBIT has an early alert system that works with instructors in the first year math courses to monitor student progress.
 - UOIT and the Faculty have developed a peer tutoring program so students can obtain additional support.
 - UOIT has developed an online math resource (NOOL) that provides tutorials for both pre-calculus and calculus related topics.
 - It is the current practice in FBIT for Academic Advisors to suggest that students repeat courses they receive a D in. Students are told that a D does not reflect a good understanding of the material and that it is best to establish a strong foundation for core concepts before proceeding in the program.
 - The Faculty is currently exploring options for a math assessment exam to be administered at the start of the program. The results would help to identify student weaknesses and help direct them to appropriate resources for support.
- C. The faculty may consider the alignment of the security related curriculum with professional security certifications such as CISSP, Security+, CompTIA Advanced Security Practitioner (CASP) certification and CEH certifications.**
- The Faculty will review the current course offerings and the learning modules in the IT Skills Workshop to ensure maximum possible coverage of the requirements for these certifications. In addition to those listed above, we will also explore linkage to the requirements for the Systems Security Certified Practitioner (SCCP) from ISC² (which is more appropriate than the Certified Information Systems Security Professional (CISSP) for undergraduate students with no industrial experience) and the Canadian Information Processing Society (CIPS).
- D. The NITS group should consult very closely with the Gaming group in order to avoid the problems that happened in the initial deployment of the GDW workshop in the GDE program. To handle the problem associated with free rider students, instructors may consider the use of peer evaluation and asking students to submit self-reports.**

The Faculty will continue to work with the GDE faculty to benefit from its experience. We will monitor the effect of the IT Skills Workshop on individual skill development to ensure that each student meets the course's learning outcomes and that "free riding" is minimized. Tools such as individual reflections, self and peer evaluations will be used.

- E. During the interview with students, some of them showed concerns about few instructors who lower the bar in their classes which lead to some very weak students being able to pass these classes. Students claimed that they were able to see this when they interact with their peers inside and outside the classroom. The faculty should make the necessary arrangements to ensure some consistency among faculty members who teach different classes. Also this issue should be addressed frankly with faculty members, especially newly hired ones who might be under the pressure of trying to avoid any potential problems with students before obtaining their tenure, etc.**

The Faculty will continue to monitor course evaluations and student feedback. The current practice is for each sessional instructor to have a core faculty member as a mentor to ensure continuity of course learning outcomes and standards. Grades from courses taught by sessional instructors will be reviewed by the area coordinator to identify any problems.

The integration of courses through the IT Skills Workshop will also support improved flow of topics, consistent standards, and interactions between faculty members

- F. According to the statistics obtained from recently graduated students, there is a significant amount of dissatisfaction with the capstone project. The largest number of students were neither satisfied nor dissatisfied. Many of the alumni also did not think that it provided useful skills and abilities. The faculty members of the NITS program should collectively address this issue and study approaches to improve the usefulness of the Capstone project. Students' representatives should be encouraged to participate in these discussions/meetings.**

The Capstone is an integral part of the BIT Program. The course gives students hands on working experience and is consistent with the Faculty's recognition of the importance of experiential learning. The faculty will review the specific issues around the design and implementation of the Capstone, particularly with respect that students get appropriate and relevant experience. The review will include an investigation of the selected and designed projects, the monitoring of student groups during the course, and the standards of evaluation. Participation from students, alumni, faculty, and industry partners will be included.

- G. UOIT advertises itself as Ontario's only laptop-based university and indeed, UOIT uses the latest technology to enhance learning and give students a competitive edge in tomorrow's workplace. On the other hand, some faculty members discussed the option to move to other cloud-based technologies. Also students in the program were concerned about the high tuition fees associated with laptops. Moving to a BYOD (Bring Your Own Device) model have many challenges such as the need to deal with (non)compatibility problems in classes and computer hardware and software problems during exams. These issues need to be better clarified to students and the students views should be discussed with faculty members of the program. Other options to reduce the cost of software, such as using Linux based machines and free open source software can also be considered.**

UOIT takes great pride at being a technology leader. The university is currently reviewing the TELE program. The Faculty has recommended moving to a virtualized environment with a

BYOD hardware model. There is support to test the potential constraints of this model in the next year (2015) for a roll-out of a new TELE model in 2016.

- H. Faculty members need to be more aware of the key performance indicators used to measure the quality of the outcome measures of student performance and achievement for the program. They should also be involved in the measurements and analysis of these quality indicators.**

The Faculty will establish a Program Advisory Committee to develop a set of key performance indicators they would like to monitor. We will work with the institutional research office to determine the availability of such data and begin the process of obtaining annual reports of such values.

- I. This relative low retention and graduation rates require immediate investigation by the program coordinator, academic advisors, and the faculty. The faculty should also provide a formal course-path planning for out of sequence students and encourage “weak” students to benefit from the peer tutoring option.**

The Faculty is very concerned about retention in the BIT program. Part of the problem is likely due to the calibre of some of the students. Given that some of the students who are admitted are weak, loss of students is expected. However, the steady decline over time is a significant concern. The Faculty is already addressing retention:

- The Faculty provides peer tutoring as well as other supports to assist students in their academic progress. Some courses are available in the spring/summer to help students recover if they have a poor initial semester.
- The Faculty is integrating the IT Skills Workshop into 2nd and 3rd year to improve retention of students after 1st year. We will monitor the success of this initiative over the next three years to determine if the integration of curriculum and group-based learning support retention as in this program in particular, retention issues are not restricted to 1st year.
- UOIT is also exploring retention programming to support incoming students who may need improvement in their academic before they can successfully complete the program.
- Although the retention rate is not high, not all students are leaving the institution. Many students transfer to other programs such as software engineering or computer science when they determine that the BIT program is not the best fit for them. The Academic Advisors work with the students to ensure they are in a program that will help them meet their career objectives.

To gain an understanding of the cause of the retention problem the faculty will examine in more detail the students who have left the program. This analysis will provide a useful base for further developing and refining programs to improve retention.

- J. Based on my discussions with the program faculty members, math courses should be reviewed. These courses were originally designed by engineers (e.g., calculus may not be needed that much in IT courses). Another example is the signal analysis course. It should also be noted that course delivery by part timers may lead to inconsistency in the course delivery and expectation. The faculty may also need to review the general requirements for the business courses (e.g., the marketing course(s)).**

The Faculty will initiate a complete review of the math requirements for all courses in the program to ensure adequate coverage of the appropriate materials in the core math

courses. This will include the sequencing of material and the depth of coverage. Application problems are being developed for discrete math to better demonstrate to students the linkage to Networking and IT security applications to support motivation of the topics.

The Faculty will also initiate a complete review of the business curriculum integrated into the program. The review will use the requirements identified in the review of potential professional accreditations as a basis of determining the management skills needed by graduates. A proposal is already in place to remove the marketing course from the curriculum.

- K. The current curriculum focuses too much on a single vendor. Students showed their interest in being exposed to multi-vendors technologies throughout their study. The technical (depth versus breadth argument) and financial implications of this suggestion need to be discussed by the NITS group.**

The Faculty has begun discussions and the negotiation of partnership agreements with other vendors (e.g. Juniper Networks). Although the lab has only one vendor's equipment, the courses teach theory and concepts applicable to any vendor. Simulated environments for other equipment types will be explored to diversify the experience of students while respecting physical space and budgetary constraints.

- L. The faculty may also consider the addition of data-center related courses, and cloud related courses.**

Courses on these topics have recently been approved by FBIT's Faculty Council and they will be integrated into the NITS curriculum.

Plan of Action

Table 1 presents a time-line of the actions we plan to take to address the recommendations from the external report.

Table 1: Timeline for addressing the recommendations of the external reviewers

Proposed Action	Timeline	Person/Area Responsible
Identify math assessment tool	July 2015 – September 2016	J. Friedlan & Ying Zhu
Review math requirements and	May 2015 – February 2016	S. Heydari & Ying Zhu
Review and redesign the	July 2015 – September 2016	J Percival
Establish a Program Advisory Committee to develop a set of key performance indicators they would	September 2015 – September 2016	M. Vargas Martin and K. El-Khatib
Investigate causes of low retention and develop strategies to improve retention	April 2016 – August 2017	J. Percival, B. Douglas & J. Lowe
Review <i>the existing capabilities of the Hacker Research Lab (HRL). Integrate</i>	June 2015 – July 2016	J. Percival & K. El-Khatib
Assess the design and implementation of the Capstone.	July 2015 – September 2017	K. El-Khatib
Curriculum evaluation for security certifications	July 2015 – September 2017	K. El-Khatib

Part II: Game Development and Entrepreneurship

Academic Reviewers Recommendations

- A. Re-evaluate the Game Development Workshop (GDW) structure and de-couple grading from other courses in the program. Make the workshop a stand-alone project course with its own grade, or allow individual professors to mark components of a larger project for their own course.**

The integrative GDW is a key component of our program and while it does couple the courses together which creates challenges with integration, we believe it is a necessary part of the curriculum. However, we will re-evaluate its implementation, how tightly it should be integrated with the courses, and how to better create an idea-centric academic discourse while still maintaining the project management and game development skill development.

- B. Manage student expectations by clearly expressing requirements of the GDW, managing capstone expectations, and clarifying career outcomes. Students should have a better understanding of the job market and their place within it.**

As part of the re-evaluation of the GDW, we will create formal processes to ensure that the coordinator(s) express the requirements to the students more effectively to mitigate student expectations. Capstone needs to be re-evaluated as part of the curriculum review process. We will investigate the creation of modules for the GDW that include overviews of the job market to ensure students understand where their skillsets will be appropriate.

- C. In interactions with Business (B.Comm) faculty and students there seems to be little engagement from the Business professors and no integration with the B.Comm.**

As part of the curriculum review, we will talk with the business professors to determine how to best integrate them (and their courses) more effectively. We will re-evaluate the entrepreneurship and business courses for appropriateness and overlap.

External Industry Reviewers (Matt Robinson, Julian Spillane, Daniel Posner) Recommendations

Three external members from the Games Industry evaluated our program and met with faculty and students as part of the BIT review process. Their recommendations were succinct but mimic some of the Academic Reviewer comments as well.

- A. Less focus on the low level technical & more focus on the higher level gameplay elements.**

As part of the curriculum review, we will re-evaluate the balance between low-level technical knowledge, fundamental knowledge, and high-level design knowledge.

- B. Remove “engine design” and replace with “gameplay design” or similar**

We believe that while students do not necessarily need to develop game engines in today’s market, they still require the fundamental technical skills to extend engines, which would not be possible without understanding how they are designed and implemented. We will re-evaluate the balance however between the technical and the design aspects of the curriculum.

- C. Should use Unity or Unreal engines more effectively.**

We are in agreement here and will create a plan to integrate more modern game engines in the curriculum without sacrificing the fundamental knowledge associated with developing one yourself. This should increase student engagement and enhance retention.

- D. Business profs unengaged, students don’t see the connection effectively**

We agree with this and will meet with the business professors and create a plan to engage them more effectively.

E. GDW is good, mimics industry practice, but needs more structure and better coordination

During the GDW Re-evaluation we will put in place formal processes to ensure that the structure is upheld and students have better knowledge of timelines and requirements.

F. Should use pre-defined asset packages so students don't have to develop own assets.

As part of the curriculum review, we will take this under advisement and identify key asset packages that the faculty should procure.

Plan of Action

Table 1 presents a timeline of the actions we plan to take to address the recommendations from the external report.

Table 1: Timeline for addressing the recommendations of the external reviewers

Proposed Action	Timeline	Person/Area Responsible
GDW Re-Evaluation (make more effective and more clear)	July 1, 2015	Dr. Pejman Mirza-Babaei
Curriculum Evaluation (e.g. effectively integrate Unity/Unreal, role of business courses, industry skills vs academic, ability to hold Minor programs)	August 1, 2015	Dr. Bill Kapralos & Dr. Andrew Hogue
Business Engagement (engage business professors, involve in GDW)	August 1, 2015	Dr. Wei Shi
Administrative Evaluation (graduate tracking, quality indicators, evaluation of GDW criteria, plan for faculty research leave)	August 1, 2015	Dr. Bill Kapralos & Dr. Andrew Hogue

BACHELOR OF SCIENCE IN PHYSICS

Dean: Dr. Greg Crawford

External Reviewers: Dr. Mark Gallagher (Lakehead University) and Dr. Mohammed Azzouz (Laurentian University)

Site Visit: October 2-3, 2014

The UOIT Physics B.Sc. program was developed in collaboration with leading representatives from both academia and industry. Graduate obtain a solid foundation in the theory and application of the principles of physics, as well as in the cognitive capabilities and skills relating to physics. It graduated its first class of students in 2007.

The program began its regular program review in the fall of 2013. A self-study document was drafted in February 2014 and was vetted through Faculty Council in March.

An external review was conducted during October 2-3, 2014. The reviewers were asked to provide feedback in two key areas: the assessment of resources, including teaching staff, support staff and laboratory facilities; the assessment of the curriculum. The reviewers' report was received in November and was subsequently discussed among the Dean and Physics faculty. The following report summarizes the key recommendations of the reviewers, as well as my responses (in consultation with, and with the assistance of, the Physics faculty).

Summary of Recommendations and Responses

A. The University should do all it can to provide Physics with additional undergraduate laboratory space. The current lab space is at capacity and with ever-increasing enrollments in first year the problem is at an acute stage.

The Faculty, Dean and senior administration are aware of these issues. Given the space shortage on campus, the long-term solution is additional building space. The institution is actively pursuing some building expansion opportunities. In terms of the short term, we are evaluating a variety of solutions, including opening the labs on weekends, modifying laboratory setups, and investing in additional equipment and storage capacity.

In terms of the "ever-increasing enrollments in first year", we also note that this year (2014-15) marked the first year where the number of incoming Science majors dropped (to 336, from a high of 368 in 2013-14). On the other hand, the required number of sections of PHY 1010 (a core first-year science course for many Science and Engineering students) and the number of students completing that course increased from Fall 2013 (40 sections, 882 completing) to Fall 2014 (42 sections, 900 completing). In PHY 1030 (taken only by certain Science students), on the other hand, the number of students completing dropped from 97 to 86 from 2013 to 2014. We will continue to watch closely the complex influences of reduced numbers of graduating Canadian school students, the growth of the GTA, increased competition among post-secondary institutions in the GTA, and the relative popularity of relevant majors in order to understand better the evolving pressures on undergraduate laboratory space.

B. The Faculty of Science should hire a Technician to provide more specialized scientific IT support, i.e. Linux, etc.

The Faculty recently hired a technician to oversee the laboratory needs of the Computing Science program (including the installation of Linux/Windows dual-boot operating systems). We

have been able to expand his role to include providing some support for other Science programs. At this point we feel we have been able to deal with the issue to a satisfactory degree, given the resources available.

C. The Career Centre should investigate whether or not it is feasible for a staff member to be assigned exclusively to Science co-op placements.

This is obviously a much larger issue. While we have had discussions with the Career Centre regarding the level of support for the development of co-op placements, resources in that department are limited. (For the current fiscal year, they have been able to hire an extra staff person to support this activity, albeit the support covers both Engineering and Science.) While it is unclear whether additional resources can be found in the near future to undertake this recommendation, the dean recently created (December 2014) an *ad hoc* committee of Science faculty members to review the status of the co-op programs in Science, provide an assessment, and make recommendations for improvements.

D. To strengthen the physics cohort in first-year, the program might consider creating special lab and tutorial sections for physics majors.

The Physics faculty currently reviewing and revising the program map and the associated course offerings. As an element of that effort, the faculty are evaluating the value and feasibility of implementing this recommendation. As mentioned above, however, available space is a significant limiting factor.

E. The program should investigate ways to expand offerings, i.e. more senior electives. While we understand that Physics is participating in a pilot project with Trent University to offer elective courses through videoconference we believe a better alternative may be to offer some courses on a rotating (biennial) basis. Course rotation would also have the added benefit of increasing course enrolments.

As mentioned previously, the Physics Faculty is reviewing the program map and course offerings. Course rotation has already been proposed and new electives are being examined by the curriculum committee of the Faculty of Science. Videoconferencing does represent a possible alternative, but as the reviewers point out this methodology needs to be evaluated carefully. (In Winter 2015, both Trent and UOIT offered a physics course to both universities through videoconferencing.)

F. Consider the introduction of a senior laboratory course in third or fourth year. This would clearly depend on the success of Recommendations 1 and 5.

A draft proposal is in development and may be incorporated into curricular revisions. However, as the reviewers also note, its implementation may well be predicated on space availability (as well as funding).

G. Develop a formal mechanism to provide teaching relief to faculty members (including teaching faculty) that are active in research and/or student supervision.

The Dean notes that teaching is a component of faculty workload and that the faculty collective agreements cover these issues.

H. In future hires the Physics program should look to correct the theory/experiment imbalance, and make the appointment of a female faculty member a priority.

The Dean and the Physics faculty members agree. At this point, no new hire in Physics is planned, but these ideas will be brought forward when the next opportunity arises (e.g., a CRC Chair; a retirement).

I. The Faculty of Science should be encouraged to discuss whether or not it would benefit from the introduction of a departmental structure.

The issue does arise from time to time. The Faculty as a whole has preferred a non-departmental structure. There is a perception the absence of departments promotes a freer interdisciplinary environment, which is a point of pride for the Faculty. While we appreciate the perspective of the external examiners, there is no intention to revisit the issue in the near future.

J. Given the focus on materials science and technology, the physics Program should add a course in solid state/condensed matter physics. One of the statistical mechanics courses can be turned into this new course.

Such a change has been submitted to the Curriculum Committee and the new course is expected be implemented in 2016-17 academic year.

Plan of Action

Table 1 presents a timeline of the actions we plan to take to address the recommendations from the external report.

Table 1: Timeline for addressing the recommendations of the external reviewers

Proposed Action	Timeline	Person/Area Responsible
Co-op programs review	Ongoing; expected completion date, with recommendations: Dec. 2015	Dean
Curriculum review (e.g., course rotation, 1 st year physics majors, senior electives, senior lab course) and prioritization	Ongoing; expected completion date, with recommendations: Dec. 2015	Physics UPD and faculty
Implementation of key curricular changes	Fall 2016 through Fall 2017	Physics UPD and faculty
New condensed matter/solid state course	In development; expected first offering: Winter 2017	Physics UPD and faculty

BACHELOR OF HEALTH SCIENCES

Dean: Dr. Otto Sanchez (Interim)

External Reviewers: Dr. Delsworth Harnish (McMaster University) and Dr. John Hay (Brock University)

Site Visit: September 23-24, 2014

The Bachelor of Health Sciences (BHSc) program accepted its first cohort of students in 2005, when UOIT was still a very new university without a complete faculty complement. Each program was developed by a team of UOIT deans, faculty members, academic specialists from other Ontario universities and consultants expert in the field. The curriculum plan for the BHSc has been refined as the university matured and has undertaken several revisions in response to student and faculty feedback as well as developments within health care sectors. The original BHSc proposed during the founding years of the university was intended to prepare a “health generalist” with an additional “focus”. Students followed a common core curriculum for two years and then chose a specialization for the third and fourth years. This history serves as a starting point to consider the evolution of offerings; from the discontinuation of a specialization, to the development of a Major in Kinesiology with three of its own specializations, and most recently the development of two new specializations in Public Health and Human Health Sciences for the 2013 cohort. Given that faculty and staff already reviewed the program in light of feedback and lessons learned during the initial years of delivery, and have implemented considerable program change that is just beginning to roll out, the challenge of this Undergraduate Program Review has really been to determine which materials to ask our reviewers to assess as a review of the program being phased out is not necessary, and, in contrast, a review of the new programming is premature.

The External Reviewer’s report of the BHSc program at UOIT has now been reviewed by the BHSc program committee and the comments and recommendations given thoughtful consideration. The reviewers were pleased to visit UOIT on September 23, 2014 and mentioned that the organization of the site visit and helpfulness of the staff, faculty and students were exemplary. The BHSc program committee have discussed the contents of the external reviewer’s report and are positive about its comments and of the site visit in general.

Summarized below are the program committee’s response to the report and specific recommendations.

- The BHSc. Program committee members agree with the reviewer’s stance that since the university has not yet developed an effective mechanism for institutional analysis, perspectives and commentary on student outcomes and student satisfaction with their degree BHSc is not possible.
- The BHSc program committee members agree with the reviewer’s comments concerning their difficulty in determining direct assessed linkages between the Faculty’s mission and the BHSc program, given the considerable evolution of the BHSc program since its inception in 2005, with new programming still in its infancy. The reviewer’s commented that the new Faculty strategic plan directly targets elements of the BHSc program with distinct goals and particularly relevant short term aims. The reviewer’s cautioned that focus on particular elements is essential at this time “because it is not feasible to do all of this in the context of already high faculty workloads”.
- The BHSc program committee acknowledges the reviewer’s recommendation surrounding continued efforts to meet the challenges of providing students with an appropriate opportunity to demonstrate degree level expectations in the context of a capstone research experience in their final year. As indicated, the faculty are collaborating on changes to the capstone research applications courses.

- The BHSc program committee does appreciate the need for more advanced courses in key areas throughout the program, but, as acknowledged in this report, has been constrained in the context of already high teaching load for faculty, a high service load for faculty and a very high 'required course to elective course' ratio. Student dissatisfaction with the lack of choice for electives has always been a concern, but is now exacerbated by the demands of meeting the requirements of the new specializations.

Summary of Recommendations and Responses

- A. "It is imperative that UOIT develop a comprehensive strategy for institutional analysis that would inform decision making. Ideally this should be transparent, make use of existing data, and not add to current faculty or staff responsibilities. It's also imperative that the faculty of health sciences take responsibility for gathering data on graduates and graduate success."**
- Comments on the recommendation: The faculty are in full agreement with the need to gather outcomes data and have so far, developed exit survey tools for both the Masters of Health Sciences program and the Bachelor of Allied Health Sciences program. There is no current tool for the BHSc program and the faculty would want to play an import role in informing the questions to be included in such a survey. Currently the faculty are not aware of any initiatives under development with institutional research in the Registrar's Office or with Alumni relations.
- B. "It would be useful to implement an institutional leadership development strategy. This would benefit from external input and the Faculty might also consider extraordinary programs such as those offered by the Academic Impressions"**
- Comments on the recommendation: The faculty are in agreement that career development should be a top priority and recognize this is outlined in our institution's strategic plan as "Be distinguished as a healthy 21st century workplace." Support for leadership development would be appreciated at the faculty and/or university levels. However, it is important to recognize that faculty currently view tenure and promotion policies as focused predominantly on research excellence, and not equally supportive of other academic citizenship strengths, such as leadership
- C. "The faculty should consider a moratorium on major program changes for several years and, given the existence of physical and human barriers to on-campus growth, consider if they and students would be better served by providing fewer programs, each in greater depth."**
- Comments on the recommendation: While the faculty agrees that a period of stability would provide a space for reflection upon our BHSc program, and that the previous 10 years has witnessed rapid growth, development and evolution of the program, there is a need in the Kinesiology Major to complete some curricular adjustments. Based on feedback received through a strategic review of the Kinesiology Major undertaken in 2013, Dr. Ellen Vogel, Dean, Faculty of Health Science requested an external curriculum review to be completed with a focus on quality assurance and curricular alignment. The curricular review is now near completion with the goal to provide recommendations that would assist in the further curricular development of a quality kinesiology specialization within the current fiscal realities at UOIT.
- D. "The university needs to deal strongly with the issue of student access to courses outside of FHSc and external student access to FHSc courses. Students feel that they are restricted with respect to choice and notification, if it comes, comes too late. This is creating a very negative climate."**

Comments on the recommendation: Our committee is aware that UOIT is managing with considerable space constraints that limit enrolment in specific courses. Courses that have a laboratory component are most affected, with space generally so limited there is not room to enrol students within the home Faculty! These space constraints are top priority for the university, and several initiatives have been successful. That being said, our advising team has suggested that a block reserve of seats in courses offered by other Faculties specifically for BHSc students may be possible, and discussions surrounding this proposal should be initiated.

E. “There is a need to deal with strong concerns regarding academic integrity issues surrounding online courses”

Comments on the recommendation: The BHSc program committee were a bit perplexed by this recommendation as the undergraduate program review for the BAHSc, a completely online program, did not raise this issue at all. Two considerations may be that this issue is being raised by students that have not had the opportunity to be part of our new curriculum, which clearly embeds academic integrity modules into the courses, or they are raising concerns with online courses delivered by sessional instructors that have not worked with TLC at UOIT to build appropriate assessments. One suggestion is to mandate online assessment training modules for instructors of online courses that are not familiar or experienced with this mode of delivery.

F. “A systematic evaluation of courses, faculty and TA’s by students (and TA’s) using effective tools, and a common structure to communicate results is required for both on-site and online courses.”

Comments on the recommendation: The current course evaluation structure was presented to the review team and their comments are as follows “A systematic evaluation of courses and instructors that provides data meaningful in the provision of formative feedback and evaluation of performance is required. This should be hand in hand with a consistent process for the review of the evaluations including responses where necessary. This is necessary to demonstrate accountability to educational excellence....and can provide evidence of the attainment of the same for young faculty seeking tenure and promotion.”

The program committee acknowledges that course evaluation practices should be reconsidered at the institution and would be committed to adopting and implementing other more meaningful evaluation systems. During review, faculty have always been encouraged to ask for feedback within their classrooms as a means to gather formative information, but course evaluations are administered through the Office of the Provost.

Plan of Action

Table 1 presents a timeline of the actions we plan to take to address the recommendations from the external report.

Table 1: Timeline for addressing the recommendations of the external reviewers

Proposed Action	Timeline
Work closely with HR (collective agreement) over hiring and retention and review of sessional instructors	A review of the collective agreement for sessional instructors is currently in progress and feedback in this process has been given. Summer 2015

Develop and deliver more electives	Current budgeting within the Faculty of Health Sciences has made allowances for development of electives, while balancing the need to deliver required courses in our new specializations. Support for development of online electives has seen the development of 10 new online electives over the past 2 years. Ongoing
Online assessments training modules	The Dean and Associate Dean will work with TLC to determine how modules can be best deployed to sessionals hired to teach online. Faculty already develop online courses in association with the TLC. Summer 2015
Linking Institutional research with alumni relations– exit survey done for MSc, BHSc, BAHSc	The Dean will explore this feasibility of this approach with the Registrar’s and Alumni Office. Summer 2015
Follow graduates and make a “wall” of our successful grads	This idea will help with student program identity and career planning as well as providing information on our graduates. Ongoing

MASTER OF SCIENCE AND DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE

Dean: Dr. Pamela Ritchie (Principal Dean); program jointly offered with Faculty of Science and Faculty of Engineering and Applied Science

External Reviewers: Dr. Mourad Debbabi (Concordia University), Dr. Ali Miri (Ryerson University), and Dr. Bradford Nickerson (University of New Brunswick)

Site Visit: January 27-28, 2014

The MSc and PhD in Computer Science received OCGS approval on June 29, 2009 and enrolled its first students in September of 2009. Both the MSc and PhD have four fields; Digital Media, Information Systems, Networks and Information Technology, and Security Software Design. The programs have a strong research focus and consist of courses and a thesis.

The program is designed so that graduates not only have strong technical expertise in their particular field, but also the ability to work effectively in interdisciplinary teams and be able to tackle problems that require both technical and non-technical solutions.

This is the first program review for the MSc and PhD in Computer Science. The programs were critically examined throughout the process of creating the self-study document which was presented in December 2013. An external review was conducted in January, 2014. The reviewers' report was received in March 2014 and was subsequently discussed among the Dean, the faculty, and members of the other participating Faculties.

Summary of Recommendations and Responses

In this section the recommendations by the external review team report are shown in italics with action items noted. These items draw on comments and suggested points raised during discussion at a meeting of CS graduate faculty on 26th May, 2014. As a result of the review and subsequent discussion, the following committee structure is proposed:

- (1) A committee of all CS graduate faculty members to be referred to as the CS Graduate Council. This committee should also include two students, one MSc student and one PhD student drawn from different Faculties.
- (2) A CS Graduate Curriculum Committee consisting of six CS faculty members drawn equally from the participating Faculties.
- (3) A CS Graduate Management Committee consisting of one faculty member from each participating Faculty and including the CS Graduate Program Director.

The graduate program in Computer Science at UOIT is by design multi-faculty. Thus it is important to recognise that structuring the program as if it were an isolated faculty may impede it in realising its full potential.

Enhancing the leadership

- a) *Appointing a Graduate Program Director who is an active member, supervising graduate students enrolled in the computer science graduate programs.*
 - This appointment is made by the deans of the participating Faculties. However, the following comments were made:
 - While it was felt that someone who is active in the program might best understand the challenges of the program, faculty, and students, it was noted that the graduate program committee draws on advice from all participating Faculties.

- There is a significant learning curve from supervisor to GPD and documentation on policies and procedures would be helpful.
 - Building cohesion between the participating faculties is important.
- b) *Appointing a Graduate Program Assistant (Co-ordinator) whose sole responsibility is the Computer Science programs. It is important to have stability in this position especially since the current staff assigned to this position is highly appreciated by the students enrolled in these programs.*
- The current Graduate Program Co-ordinator (GPC) is responsible for MBA, MITS, and CS graduate programs. While continuity in this position is important, expanding the GPC for CS to a full-time position is not feasible at this time.
- c) *Establishing an admission committee with membership from the three faculties (e.g. 1 professor per faculty) to oversee the admissions of new students in both programs.*
- Currently, the admission decision depends on the willingness of a faculty member (or members) to agree to supervise the applicant and to provide appropriate funding. The role of the GPD/GGPC consists of confirming that the applicant meets the minimum admission requirements and that an appropriate funding commitment is in place. It was agreed that while standard admissions require little or no committee involvement and should be handled by the GPD. Non-standard admissions should be handled by the Curriculum Committee which would also address the admissions procedures in general including making them more applicant-friendly. An ad hoc Scholarship Committee of one faculty member from each participating Faculty should be struck once scholarship announcements are made to avoid conflicts of interest.
- d) *Establishing an active curriculum committee with membership from the three faculties (e.g. two professors per faculty) that will oversee curriculum matters of the programs in question. The committee should have regular meetings (with minutes) to formally prepare curriculum changes, additions and removals to appear in the graduate calendar for approval by the Faculty councils and the Graduate Studies Office.*
- The Curriculum Committee should review new courses, program changes, etc. Changes would go to the CS management committee who would then refer them to the CS Graduate Council. The Curriculum Committee should also propose terms of reference for each of these committees.
- e) *Among the responsibilities of the Graduate Program Director is to report to the Deans of the three involved faculties as well as the Graduate Studies Office, program changes, identified issues, and requests for needed resources.*
- Minutes of each meeting of the CS Graduate Faculty should be sent to the participating deans. The CS Graduate Committee should also provide an annual report to the deans.

Enhancing the ownership

- a) *We recommend formally instating the three Deans, the Graduate Program Director, the Graduate Program Coordinator as well as the admission and curriculum committees as the overseeing body underlying these two programs.*
- This is somewhat excessive, and the changes proposed above would address this concern.

Enhancing Cohesion

- a) *Organization of meetings (e.g. one per term) including all the faculty members that participate in the computer science programs. During these meetings, it would be beneficial to discuss program related matters such as achievements, weaknesses, lessons learned, and potential future directions. Feedback should be encouraged and collected.*
- This has already been implemented. It was noted that the fall meeting should be scheduled in early October to provide time for proposed changes to flow through the faculty and university systems.
- b) *Establishment of a Computer Science Seminar Series (e.g. monthly or bi-weekly) with participation of the involved professors and graduate students.*
- There is currently a seminar series in place organized by the Faculty of Science. There is a proposal to increase involvement of FBIT and FEAS in the series by rotating hosting duties, etc. The minutes of the CS Graduate Faculty meeting of 26th May indicate that two faculty members have agreed to coordinate the series and Faculties are looking at a common period which will be held free for seminars and other functions.
- c) *Organization of team building exercises such as social events with participation of program faculty members, staff and graduate students.*
- It was agreed that these are a high priority and a number of possibilities have already been implemented and/or explored.

Enhancing Quality Assurance

- a) *The Graduate Program Director and Assistant should be given access to program data and student records in order to monitor enrolment, admissions, graduation, etc.*
- GPC already has access. GPD should also have access.
- b) *Procedures to collect feedback from both students and faculty members need to be put in place and acted upon to improve the quality of the two programs. We suggest having one elected student representative per program whose role will be to collect feedback and transmit it to the concerned faculty or Graduate Program Director.*
- One MSc and one PhD from different Faculties will be added to the CS Graduate Council.
- c) *If not already in place, establish an annual report process whereby each faculty member lists all publications, patents, research support, honours and awards related to research, and other research activities (e.g. supervision of post-doctoral fellows, start-up companies) in a standard format. Such a process is common practice among other research intensive computer science graduate programs. Such reports are valuable for compiling annual research reports, obtaining useful objective quality metrics, discovering success stories useful for press releases and future development of the computer science graduate programs.*
- Faculty will determine a standard reporting mechanism. It was noted that the faculty need to work more with Communications and Marketing to elevate the profile of the program.
- d) *Consideration should be given to monitoring research publication quality by taking advantage of tools such as the Web of Science or the SCImago Journal & Country Rank. While not perfect, such tools can provide quantitative evidence about which conferences and journals are considered of higher quality.*

- Annual reviews of faculty members are already conducted by the deans.

Enhancing the Program Structure

- a) *To enhance the structure of the two programs, we recommend directing the curriculum committee to review the programs and to engage in a major revision that will redesign and modernize the program structures to better reflect new developments and research interests in the field of Computer Science.*
- A committee is currently meeting to revise CSCI5010/5020
 - Curriculum committee (when formed) could review program structure and go from there.

Enhancing Program Curricula

- a) *To enhance program curricula, we recommend that the Program Director together with the curriculum committee take a leading role in collecting feedback from students and faculty members about the needed revisions, and reviewing the programs in light of the collected feedback as well as market requirements and recent developments in the area of Computer Science.*
- Preliminary results are available from the faculty-student survey which was part of the report to the reviewers. This could be a regular occurrence, and should be extended to an exit survey for graduating students. However, care should be taken to avoid “survey fatigue.”

Enhancing Funding for International Graduate Students

- a) *We recommend the University explore other funding opportunities to enhance the existing level of funding for international students.*
- This is typically administered through the Office of Graduate Studies.

Other Recommendations

- a) *Implement a three-year rolling plan of which Computer Science graduate courses are to be offered in the next three years. This will give students a better chance at successfully completing their degree requirements in a timely fashion. This also helps faculty better plan their activities and helps staff provide clearer advice to students.*
- A draft plan is currently being developed by the Graduate Program Coordinator in consultation with PBOs and Graduate Faculty.
- b) *Establish, if possible, a graduation scholarship to encourage students to complete the program requirements in due time.*
- Benefit unclear.
- c) *Establish, if possible, some dedicated funds for computer science graduate students. These funds could be used (for example) to help graduate students travel to conferences to present research papers.*
- Pending funding discussion among Deans.
- d) *Revamp and prepare a web site for the Computer Science graduate degree programs that is not part of any one Faculty's web site.*
- GPC to coordinate.

- e) *Remove the Ph.D. requirement to have courses in all three areas computational science, computer systems, and computer applications. Breadth requirements are stipulated by the MSc degree program, and the student is assumed to have breadth already fulfilled when admitted to the PhD program.*
- Further discussion is required.
 - The definitions of fields should be harmonized between the MSc and PhD requirements.
 - This matter should be referred to the Curriculum Committee.
- f) *The two required courses CSCI 5010 and CSCI 5020 need to be reworked to become one course, and to include significant research methods content at the very beginning of the degree program. Consideration should be given to making this "Research Methods" course non-credit, but required, and shortening its length. This would leave room to add one more "content" course in the Master's program to increase the breadth of courses taken by Master's degree students.*
- As noted above, a committee is already in existence to review these two courses.

Plan of Action

Table 1 presents a time-line of the actions we plan to take to address the recommendations from the external report.

Table 1: Timeline for addressing the recommendations of the external reviewers

Proposed Action	Timeline	Person/Area Responsible
Creation of full CS Graduate Council and addition of two students	Mid-February 2015	Jessica Clarke
Devise working procedure to set up <i>ad hoc</i> Scholarship Committee. (To be confirmed by CS Graduate Council.)	Mid-February 2015	Graduate Management Committee
Creation of six member Graduate Curriculum Committee	End February 2015	Jessica Clarke
Creation of specific CS Graduate web site.	March 2015	Jessica Clarke with appropriate assistance and advice
Process in place to send minutes of CS Graduate Council Meetings to participating deans each term.	January 2015	Jessica Clarke
Annual Report to the participating deans in April each year.	April 2015	Graduate Program Director
Find common free time across faculties for seminars and other meetings.	For 2015-16	Jessica Clarke working with scheduling officers in each Faculty
Investigate expansion of social events for program faculty members, staff and graduate students.	Winter 2015, implementation Fall 2015	Winter CS Graduate Council meeting
Investigate closer cooperation with Communications and Marketing.	Winter 2015, Implementation Fall 2015	Winter CS Graduate Council meeting
Report from CS 5010/5020 Committee.	Winter 2015	CS Graduate Council
Curriculum Committee to review Ph.D. requirements and make	Winter 2015	CS Curriculum Committee

recommendations to CS Graduate Council.		
Creation of draft policy and Procedures Manual GPD, GPC and Committees.	September 2015	Jessica Clarke to initiate in consultation with GPD and Graduate Management Committee

18 MONTH FOLLOW-UP REPORTS

As a component of our Quality Assurance processes and our program review policy, all programs that undergo a review must be followed up on 18 months after the completion of the review to gather information on the progress that has been made in implementing the agreed upon plans for improvement. These 18 month follow up reports are from the reviews that took place and were reported to Academic Council in 2012-13. The programs have submitted to the Provost Office a comprehensive chart outlining the achievements they have made in the plans for improvement following the program reviews. A summary of these achievements is provided below.

BACHELOR OF ALLIED HEALTH SCIENCES

Establishment of a Crosswalk Working Group

The incoming Dean (post Nov. 1, 2015) will establish a Working Group to elucidate “cross-walk” re: the BAHSc program and course learning outcomes, including assignments and assessment rubrics. This work will ensure that program outcomes are aligned with the program outcomes associated with the BHSc program.

Interactive Web-Based Recruitment Strategy

The Dean and FHS Planning & Budget Office (PBO) worked with the Office of the Associate Provost Academic, Registrar’s Office, and others, on the design, implementation and evaluation of an interactive web-based recruitment strategy to increase enrolment in the BAHSc program.

Business Case

The Dean and PBO developed a business case, based on projected increases in BAHSc student enrolments. This was reviewed and approved by the senior leadership team.

Establishment of an External Advisory Board

The incoming Dean (post Nov. 1, 2015) will establish an External Advisory Board for the BAHSc program including representatives from the various Allied Health Professions and program graduates. PBO to include estimated Advisory Board costs, using MLS and Nursing programs as examples, in drafting upcoming budget documents.

Student Online Support

An online orientation specific to BAHSc students was implemented.

Library Resources

The Dean and the Associate Dean Undergraduate set-up a meeting with the UOIT Librarian and pertinent staff to review UPR recommendations and to determine next steps. In collaboration with the Library (K. McFarlan), FHS Guide to Health Sciences resources has been established.

<http://guides.library.uoit.ca/alliedhealth>

Teaching & Learning Centre Resources

The incoming Dean (post Nov. 1, 2015) Dean and the Associate Dean Undergraduate will set-up a meeting with the Director of the Teaching & Learning Centre to review UPR recommendations and determine next steps.

BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING AND ELECTRICAL ENGINEERING AND MANAGEMENT

Awareness Session on Academic Misconduct

Academic Misconduct has been discussed at several department meetings, and the academic integrity website has been reviewed. It has been made clear to students that we have zero tolerance for any form of academic misconduct and faculty members will do whatever is necessary to eliminate or minimize opportunities for academic misconduct. For example, they have been encouraged not to reuse quiz/assignment/test questions; ensure solutions are not available online; and use assignments for practice and not for credit whenever it makes sense.

Program Advisory Board

A Program Advisory Board for both of our programs (EE and SOFE) has been established: it consists of people from the industry. They have been invited to meetings on campus, and they have also been invited to attend events such as Research Day and Capstone Exhibition.

Outreach Report

The Department is very active in participating in student recruiting events such as OUF and Fall & Spring Open House. In addition, the website (<http://www.nextproject.ca>) has been used for outreach activities. We have visited a school in Brampton and offered hands-on activities for high school students, and we have also hosted students from schools in the GTA for hands-on activities. More resources are required.

Results of New Model for Lab Instructors and TAs

To improve the instructional quality and student hands-on learning experience in the engineering laboratories as well as to address student concerns, structural changes were made within the technical services and undergraduate laboratories. In the new structure since 2013-2014 most of the engineering labs are now delivered and instructed by the full time laboratory teaching staff. Overall the quality of the students learning experience has been improved as indicated in their comments in course evaluations.

Results of Comprehensive Review of the EE Program Curriculum

This has resulted in a new and improved state-of-the-art curriculum. All changes have been approved and the new program map (can be found in the 2015/16 calendar) will be implemented one year at a time starting Fall 2015.

Program Options

A new specialization "Smart Grid" has been designed and will be offered starting Fall 2017, just in time for the CEAB accreditation visit.

Implementation Strategies

The new program map will be implemented starting with students moving into 2nd year in Fall 2015, first year is a common year and no changes have been made to it. The new specialization in Smart Grid to students who will be in their 4th year starting Fall 2017.

The new program map is attached with changes highlighted. This has been the result of a comprehensive and collaborative effort with the Department of Electrical, Computer and Software Engineering as well as with FEAS as a whole.

Enrollment is growing and resources and space constraints are very challenging. Most of the core courses in the Electrical Engineering program have a hands-on component conducted in a lab

environment with specialized equipment. The availability of limited equipment as well as space force us to have several lab sections that run late into the night on most days, and scheduling such labs is increasing challenging with the limited space available. Resources are required to increase the number of units of specialized equipment available to students, and keep the labs up to date with state-of-the- art equipment.

BACHELOR OF ENGINEERING IN SOFTWARE ENGINEERING AND SOFTWARE ENGINEERING AND MANAGEMENT

Awareness Session on Linux

Several Linux workshops (led by senior students) have been organized for Software Engineering students at the beginning of the Fall and Winter semesters; students appreciate and enjoy learning about a new operating system.

We have assisted students to establish SEEK (Software and Electrical Engineering Klub), supported by the Student Association, and offers hands-on workshops on a variety of technical topics including Linux. We have asked IT Services to provide a special Linux partition for SOFE students, but it wasn't done last year. We hope that all SOFE students will have access to a special computer image with a Linux partition starting Fall 2015.

Capstone Handbook

The Capstone Handbook has been revised to enhance the learning experience of students by reducing the number of progress reports, and improving the student/advisor/coordinator interaction. The revised Capstone Handbook has been implemented as of Fall 2013.

Results of New Model for Lab Instructors and TAs

To improve the instructional quality and student hands-on learning experience in the engineering laboratories as well as to address student concerns, structural changes were made within the technical services and undergraduate laboratories. In the new structure since 2013-2014 most of the engineering labs are now delivered and instructed by the full time laboratory teaching staff. Three of the labs are for SOFE students and overall the quality of the students learning experience has been improved as indicated in their comments in course evaluations.

Results of Comprehensive Review of the SE Program Curriculum

This has resulted in a new and improved state-of-the-art curriculum. All changes have been approved and the new program map (can be found in the 2015/16 calendar) will be implemented one year at a time starting Fall 2015.

Implementation Strategies

The new program map will be implemented starting with students moving into 2nd year in Fall 2015, first year is a common year and no changes have been made to it.

The new program map is attached with changes highlighted. This has been the result of a comprehensive and collaborative effort with the Department of Electrical, Computer and Software Engineering as well as with FEAS as a whole.

Enrollment in Software Engineering is growing and resources and space are very challenging. We have five tenure-track/tenured faculty members supporting this program, and we collaborate with Computer Science by sharing eight courses (taught 50/50 by SOFE and CS).