

8888 University Drive, Burnaby, BC  
Canada V5A 1S6TEL: 778.782.3925  
FAX: 778.782.5876vpacad@sfu.ca  
www.sfu.ca/vpacademic**MEMORANDUM**

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<b>ATTENTION</b>	Senate	<b>DATE</b>	February 12, 2014
<b>FROM</b>	Jon Driver, Vice-President, Academic and Provost, and Chair, SCUP	<b>PAGES</b>	1/1
<b>RE:</b>	Faculty of Applied Sciences: External Review Update for the School of Engineering Science (SCUP 14-04)		

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At its February 5, 2014 meeting, SCUP reviewed the External Review Update Report for the School of Engineering Science within the Faculty of Applied Sciences. The report is attached for the information of Senate.

c: G. Myers

A handwritten signature in black ink, appearing to be "Jon Driver", written in a cursive style.



OFFICE OF THE VICE-PRESIDENT, ACADEMIC AND PROVOST

8888 University Drive, Burnaby, BC  
Canada V5A 1S6TEL: 778.782.4636  
FAX: 778.782.5876avpcio@sfu.ca  
www.sfu.ca/vpacademic**MEMORANDUM**

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**ATTENTION** Jon Driver, Chair, SCUP  
**FROM** Gord Myers, Associate Vice-President,  
Academic  
**CC** K. Gupta and N. Rajapakse  
**RE:** External Review Update for the School of Engineering Science

**DATE** December 16, 2013  
**PAGES** 1/1

A handwritten signature in black ink, appearing to read 'Gord Myers', written over a horizontal line.

The External Review of the School of Engineering Science was undertaken in April 2010. According to the procedures established by SCUP, the Unit is required to submit an update describing its progress in implementing the Action Plan, which was derived from the External Review report, in the fourth year following the start of the External Review process. Please find attached this update, together with a copy of the Action Plan approved by Senate.

Based on this midterm report, my assessment is that the School of Engineering Science has made substantial progress toward implementing the Action Plan, within the constraints imposed by its budget.

Applied Sciences Building 9801  
8888 University Drive  
Burnaby, BC V5A 1S6

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**MEMORANDUM**

**ATTENTION** Glynn Nicholls, Director, **DATE** December 16, 2013  
Academic Planning and Budgeting  
**FROM** Kamal Gupta, Director, **PAGES** 2 *Kap* *W* *Gpta*  
Engineering Science  
**RE:** External Review update for the School of Engineering Science  
**CC:** Nimal Rajapakse, Dean, Faculty of Applied Sciences

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School of Engineering Science has taken following steps as per the Action Plan approved by Senate on December 6, 2010 following the External Review in April 2010. Please note that the School of Mechatronics Systems Engineering (MSE) is now a separate school (effective April 1, 2013). Responses to the MSE specific items (13-16) were provided by Dr. Farid Golnarghi, the current director of MSE. The numbers below correspond to the numbers in the Action Plan.

1. The School has steadily increased the TA Budget over past 3 years. While it was adequate this year, the School will need an increase in its base funding (estimated at about \$100K) to support this level of TA Budget on a consistent basis.
2. Our undergraduate curriculum has been significantly revised including the biomedical option and is operation effective Fall 2013. The School has made initial steps and invested in some new lab equipment – hardware boards, control systems, etc. While this has improved the situation, there is still an acute need for additional significant investment in the lab equipment – estimated at about \$500K - to bring our labs to national standards. Concomitantly, there is an acute need for one additional lab/computer staff member to support the labs and computers.
3. Biomed option has been revised and indeed students can opt out more easily, particularly into the Systems option.
4. We have been offering multiple offerings for a subset of 200 and 300 level courses for last few years. However with the revised curriculum, space constraints, and teaching bandwidth for a balanced undergraduate and graduate course offerings, we need to re-evaluate this and we are currently undergoing this process.
5. In the revised curriculum, one four-month and one eight-month co-op term (instead of three four-month co-ops in the old curriculum) is integrated into the program.
6. There has been a reorganization of the Engineering Science co-op office and it is now integrated under the central co-op as a sub unit.
7. Recruitment is now done under the umbrella of the Faculty of Applied Sciences and entrance standards in Engineering Science are on a clear and consistent upward trajectory.

8. We have thoroughly revamped the funding model for PhD and MASc students. With a combination of our (increased) Teaching Assistant (TA) budget and Graduate Fellowships (GF), the School is able to guarantee a minimum level of funding and the Senior Supervisor is also required to provide a minimum level of funding, thereby guaranteeing a minimum level of funds for graduate students. The funding process has been made transparent via published policies made available to graduate students.
9. Effective Fall 2013 we have significantly revised the M. Eng. Program and it is now open to international students. We are in the process of increasing the graduate course offerings providing students with a wider choice. Please see item 11 also.
10. We have revised the format of our annual progress report. Four possible outcomes can be selected instead of two as in the past. This encourages the supervisors and the committee to provide more specific suggestions to the students. This report must be submitted each year in order to be qualified for Graduate Fellowship (GF). We have also revised our TA and GF allocation policies to give higher priority to PhD students within 4 years and MASc students within 2 years of their program. This will encourage students to finish their programs earlier.
11. In the past, the number of graduate courses we could offer was limited by our teaching bandwidth. However, we are in the process of reducing some of the double offerings of our undergraduate courses, which will free up more bandwidth for graduate course offering. A re-evaluation of our graduate courses is currently being conducted, and more changes will be introduced in the near future.
12. Student Advising Model has been thoroughly revamped. Routine student advising is now provided by FAS advisors. These advisors have been provided training on the Engineering Science Curriculum. Questions of more complex nature are referred to the undergraduate curriculum committee (UCC) Chair in the School.
13. At this stage School of Mechatronic Systems Engineering has 15 full time faculty members (inclusive of two lecturers) catering to 628 graduate and undergraduate students. This creates an approximate 30:1 student (head count)/faculty ratio, which by national standards is well below average. To meet it full demand in respect to teaching of its undergraduate and graduate courses, 2-3 more faculty members are still required.
14. While space remains to be a critical issue, as the Surrey campus is not an engineering building, through the generosity of SFU Administration, MSE has received additional 3200 sq ft of space, bringing its square footage to close to 30,000.
15. The TA budget continues to be serious issues, which has been reduced last year. MSE students are suffering, from lack of resources in this area due to budgetary pressures, which have impacted their quality of learning.
16. This issue has been addressed by the Faculty of Applied Science providing more resources in this area.
17. There has been one new hire, the BC Leadership Chair in Multimodal Technology for Healthcare Innovations, held jointly between Engineering Science and Computing Science. In addition, efforts are being made to utilize synergies with MSE and BPK.
18. There have been one time allocations of capital budget for the lab equipment needs and that has certainly helped. To ensure quality programming, however, we are still under resourced in terms of lab staff and faculty complement.



8888 University Drive, Burnaby, BC  
Canada V5A 1S6

TEL: 778.782.6702  
FAX: 778.782.5876

gnicholl@sfu.ca  
www.sfu.ca/vpacademic

**MEMORANDUM**

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<b>ATTENTION</b>	Kamal Gupta, Director, School of Engineering Science	<b>DATE</b>	November 7, 2013
<b>FROM</b>	Glynn Nicholls, Director, Academic Planning and Budgeting	<b>PAGES</b>	8
<b>CC</b>	Nimal Rajapakse, Dean, Faculty of Applied Sciences		
<b>RE:</b>	External Review Update for the School of Engineering Science		

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In 2004 the Senate Committee on University Priorities endorsed procedures for reviewing a unit's progress in implementing the recommendations approved by Senate as a consequence of the previous external review (which takes place normally once every seven years). The last review of the School occurred in April 2010. This is to advise you that the External Review Update for the School of Engineering Science is due at this time.

Please provide a **one to two page** progress report by Monday, December 16, 2013 on the actions that your School has taken in accordance with the Action Plan (copy attached), which was approved by Senate on December 6, 2010.

Please contact me at 26702, [gnicholl@sfu.ca](mailto:gnicholl@sfu.ca) or Bal Basi at 27676, [bbasi@sfu.ca](mailto:bbasi@sfu.ca) if you have any questions or concerns regarding the external review update process.

Thank you.

Attach.

## EXTERNAL REVIEW – ACTION PLAN

<b>Section 1 – To be completed by the Responsible Unit Person e.g. Chair or Director</b>				
<b>Unit under review</b> School of Engineering Science	<b>Date of Review Site visit</b> April 7-9, 2010	<b>Responsible Unit person,</b> Mehrdad Saif	<b>Faculty Dean</b> Nimal Rajapakse	
<i>Note: It is <u>not</u> expected that every recommendation made by the Review Team needs to be included here. The major thrusts of the Report should be identified and some consolidation of the recommendations may be possible while other recommendations of lesser importance may be excluded.</i>				
External Review Recommendation	Unit's response notes/Comments (if any)	Action to be taken	Resource Implications (if any)	Expected completion date
1. Undergrad. Education  Substantially increase the TA budget.	The School has been struggling with shrinking and historically low TA budget.	While managing our resources in best possible way, we will continue making our case for increased TA funding.	Directly related to resources made available to the School.	Unknown.
2. Undergrad. Education  Improve the quality of the lab equipment maintenance, better supervision of students using equipment, more scheduled lab sessions in combination with open labs.	We fully agree with this recommendation as stated in Sections 4.3.3 and 4.9.4 of the Self Study Report.	In 2009, two new committees, Curriculum Reform Committee (CRC) as well as Biomedical Option Curriculum Committee (BOCC) were struck. CRC will review and make recommendations for a major curriculum revision and reform of all engineering options. However, since biomedical option is the newest option and has its own challenges, different from other established options, BOCC was created to work in parallel and in collaboration with CRC to consider issues relevant to the biomedical option. The hope is that these two committees will make recommendations to our Undergraduate Curriculum Committee (UCC) that would result in curriculum Innovation and	For scheduled labs more TA and faculty instruction time is required. Lab equipment renewal is a problem due to lack of base budget funding. One-time funding such as supplemental funding due to over-enrollment has been used to address urgent issues.	<u>Plan of action for curriculum changes:</u>  Committee Recommendations: May 2011  Implementation: September 2011  Completion: December 2012

		<p>wholesale revision of our programs. It is hoped that CRC and BOCC recommendations will address many of the issues raised by the external reviewers in their report.</p> <p>Specifically, to address the issue raised by the reviewers, ENSC 220 (Electric Circuits I) is the first ENSC course in our Burnaby campus, which now includes scheduled labs. Also ENSC 215 (Microcontroller Interfacing and Assembly-language Programming) now has scheduled labs. We are also considering scheduled labs for ENSC 225 (Microelectronics I) as well. For higher level courses, a combination of scheduled and open labs is under consideration by UCC and CRC as per External Review Committee's recommendation.</p>		
<p><b>3 Undergrad. Education</b> Revise the biomed option to make it more flexible for students to opt out.</p>	<p>Being considered. See previous reply.</p>	<p>The Biomedical Option Curriculum Committee (BOCC) is working on this and will report its recommendations to Curriculum Reform Committee (CRC) for further discussion. The final recommendations will be considered by UCC.</p>	<p>Not known.</p>	<p>Recommendations: May 2011 Implementation: September 2011 Completion: December 2012</p>
<p><b>4. Undergrad. Education</b> Implement smaller class sizes to reduce poor attendance- more projects courses.</p>	<p>We agree with the first recommendation as stated in Sections 4.9.5 and 9.5. Also, many ENSC courses have lab/project components already.</p>	<p>Class sizes will be reduced starting Fall 2010 by offering multiple sections of high enrolment courses.</p>	<p>Increased faculty teaching load which has been approved.</p>	<p>Immediately (Fall 2010).</p>

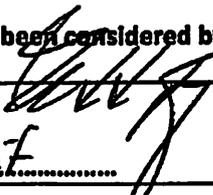
<p><b>5. Undergrad. Education</b> Offer more 8-month co-op terms to allow students to gain deeper experience.</p>	<p><u>Positive aspects:</u> Deeper experience to students; Less work for coop staff; Attractive to employers. <u>Negative aspects:</u> Students may find it harder to get back to studies after being away from SFU for a long period of time. Multiple offering of courses is needed to implement this recommendation.</p>	<p>CRC will consider replacing the current three 4-month coop terms, with one 8-month and one 4-month coop terms. This requires careful scheduling of course offerings as well.</p>	<p>Positive impact on resource requirement, as each student will require two coop placements in the course of their education, rather than three.</p>	<p>Plan of action: Jan 2011  Start of Implementation: Fall 2011 Completion: Fall 2012.</p>
<p><b>6. Undergrad. Education</b> Increase co-op staff to help support the large influx of students.</p>	<p>We are currently adequately staffed. MSE may, however, need a full time PA (currently half time) in future.</p>	<p>We will monitor the workload of the co-op office.</p>	<p>Requires additional financial resources to implement.</p>	<p>Ongoing.</p>
<p><b>7. Undergrad. Education</b> With lower entrance standards care must be taken to grow the program in relevant areas.</p>	<p>Entrance standards are consistent or remain higher than many other engineering Schools. They are also in line or higher than University graduation requirements.</p>	<p>Given the demand for our programs, the School has raised its entrance requirements this year and will re-evaluate its admission policy once again after we have a clear picture of freshman enrollment levels this fall.</p>	<p>None.</p>	<p>January 2011</p>
<p><b>8. Graduate Education</b> 1) Provide adequate funding for doctoral students; and 2) Funding mechanism should be transparent to students.</p>	<p>1) ENSC is a research intensive unit and this is a very important and complex issue that requires creative solutions. 2) We already have published on our web site ENSC criteria</p>	<p>This is a complex issue that requires meaningful discussion and dialogue between faculty supervisors, School, FAS Dean and Dean of Graduate Studies to arrive at a reasonable solution. The graduate program committee will initiate discussions and various possibilities such as considering allocating all our available Graduate Fellowships to doctoral students in</p>	<p>Some commitment and support from the University for doctoral students.</p>	<p>Fall 2011  Ongoing.</p>

	based on which we adjudicate Graduate Fellowship applicants. In line with TSSU guidelines there is also a transparent process for TA application and allocation.	<p>their second to the fifth year. We expect our Graduate Program Committee to have some recommendations after considering this issue in depth with all involved.</p> <p>We will update or revise the ENSC graduate fellowship adjudication criteria on the web as necessary.</p>		
<b>9. Graduate Education</b> Advertise the MEng program more widely, locally, nationally, and internationally; review the quality of the program; and review the fee structure of the program.	Student demand for M.Eng. programs vary widely between regions and disciplines.	<p>We will revise our web site.</p> <p>We will create student handbook that includes the pre-requisite structure of graduate courses.</p> <p>We will disseminate our graduate program brochure to the local industry.</p> <p>We will also re-visit the MEng's mandate and consider opening the program to international students/partner institutions.</p>	None anticipated.	Summer 2011
<b>10. Graduate Education</b> Reduce the graduation time for MASc students. Short annual progress reports should be submitted by graduate students to their supervisors in order to help keep them on track.	Annual reports are already being done. However, we will re-visit and revise some of our current measures and will perhaps introduce new measures to address this issue.	We will track and follow up on students who have exceeded a specified time limit in the program. We will revise our annual progress report, and seek justification from the student and the supervisor on the degree completion time. We will strictly enforce the rule that students missing the annual progress report will be not eligible for graduate fellowships, scholarships, or other benefits.	Increase workload for our already over loaded graduate secretary.	Spring 2011
<b>11. Graduate Education</b> Increase grad level	This will naturally happen with increase in MSE faculty.	Grad course offering is on the rise already. We will explore the possibility of offering more	None anticipated.	Ongoing.

courses.		cross-listed senior-undergraduate/graduate courses.		
<b>12. Student Experiences</b> Provide mentorship/counseling resources to students.	Fully agree.	Currently three full-time lecturers are providing academic advising to undergraduate students and some mentoring and counseling when students are in difficult academic situations. The plan is for all five lecturers to engage in such activities. For MSE, due to the relatively smaller number of students and faculty this duty will be handled by the Systems One advisor (to be hired) in the first year, and in the later years, by individual faculty members.	Increased faculty (lecturer) workload.	Fall 2010 or Spring 2011
<b>13. MSE Program</b> Hire the remaining 5 faculty positions as soon as possible, some at a more senior level, i.e., Associate or Full Professors.	We are hiring them based on our position approval plans.	Two faculty members have been hired. One already is on board, and the other will join in January 2011. The remaining 3 (or 2 based on the budget) will be hired in 2011 or later after BOG approves these positions.	Funding already in place. One position may be lost due to budget cuts over the past two years.	By January 2011
<b>14. MSE Program</b> Resolve the space problem.	Very urgent issue.	The School will continue working with the University on this very important and urgent issue. The MSE program has serious and urgent need for additional and proper space for the program.	A new building is required to meet the needs of Mechatronics as well as other programs in Surrey.	Ongoing.
<b>15. MSE Program</b> Increase TA budget.	This is an issue for all of ENSC and as such was addressed before.	Unfortunately, the budget of Mechatronics program was not protected from cuts although the program is still under development. As a result, limited funding is available for TAs. The program is due for its first accreditation visit in February 2011 and there are serious resource issues with respect to the number of technical staff, TA and equipment budget and space.	Restoration of cuts to the Mechatronics budget over the past 3 years.	Unknown.
<b>16. MSE Program</b> Have an	Being addressed through Systems One staff	A Faculty-wide re-organization of student affairs is in progress and a new hire for Systems One	Supported from Systems One budget	December 2010

advisor/recruiter come more regularly.	position.	will be in place before the end of 2010.	allocation from VPA.	
<b>17. Biomed Program</b> 1) Hire additional faculty members.2) Further utilize the synergies between the BME and the MSE.3) Not enough support staff.	1)No resources available at this time for this. 2) Already done. 3) We have very limited number of staff for all our programs. No program has its own staff.	Biomedical engineering program is a joint program between ENSC and BPK Department. We believe that between ENSC, MSE, and BPK, there are enough faculty members to support this option.	Current resources are adequate compared to our overall priorities.	None.
<b>18. Research Enterprise</b>  The upper administration needs to better recognize that Engineering has special needs due to the laboratory-intensive curriculum, accreditation requirements and industry internships. Thus ENSC should not be treated at par with other Schools.	We fully agree.	We hope the new budget process will address some of these issues.	-	Unknown.

The above action plan has been considered by the Unit under review and has been discussed and agreed to by the Dean.

Unit Leader (signed)  Name ... Mehrez Saif ..... Title... Professor & Director .....	Date Oct 20, 2010
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**Section 2 - Dean's comments and endorsement of the Action Plan :**

This is the first external review of the School of Engineering Science after the completion of DTO expansion. The reviewers have commented positively on School's activities including its highly regarded technical communication program, mandatory co-op program, open-labs and new Mechatronics Systems Engineering program. The general level of research activity is found to be quite commendable when measured in terms of research grants (\$80K per faculty per year) and research results. The school should be congratulated for the positive evaluation by the reviewers. With regard to the recommendations and action plan outlined by the Director, I am in full agreement. My comments on key topics of the review report are given below.

**Undergraduate Curriculum Revision and Student Experience:** The action plan is acceptable and practical. The issues concerning student experience will be addressed during the curriculum review.

**Graduate Student Funding:** Although the reviewers have commented critically on this issue, the School is doing its best to support graduate students. The main problem is relatively low TA support per student compared to other units. According to data the prepared by the Dean of Graduate Studies, the school ranks second at SFU in terms of the total research funding (\$1.47M) directed for graduate student support. I recommend discontinuing the practice of accepting international PhD students without funding. The school should develop a strategy to attract more NSERC scholarship recipients.

**Mechatronics Systems Engineering Program and Space:** This is a very successful program with high student demand. The first accreditation visit will take place in February 2011. The program needs a stable budget to complete its development. The space available in Surrey for Mechatronics is still inadequate although the program recently received some new space.

**Research:** There is room to attract more research funding by pursuing large team grants and collaboration with regional universities. The School has strong ties to industry and should develop a strategy to attract more research funding from industry.

**Budget Issues:** Many comments of the reviewers are related to the school budget (e.g. TA, laboratory equipment, student advising, etc). Although the DTO Program brought additional resources to the School, the increase in undergraduate and graduate enrollment has been very large (approximately 80 undergraduate students per year in the pre-DTO era to nearly 250 students per year in 2010 and nearly 300% increase in graduate enrollment). This is causing substantial pressure on every aspect of the school. To put this issue in proper context, I have looked at data published by Engineers Canada for Canadian engineering programs. Engineering Science at SFU is 40% below the average space allocation for engineering programs in Western Canada and 30% below the Canadian average for \$\$ per FTE undergraduate student.

Faculty Dean



Date

October 20, 2010