

**Graduate Programs in Aerospace Engineering**  
**Faculty of Engineering and Architectural Science**  
**FINAL ASSESSMENT REPORT (FAR)**  
**Approved by Senate January 31, 2017**

## **EXECUTIVE SUMMARY**

In the area of graduate studies, the program is comparable to equivalent programs in terms of enrollment. The program has been able to maintain student support in spite of changes in overall research funding. However, action is needed to encourage enrollment from domestic sources and to maintain the present level of funding. It was also recognized that a significant effort will need to be made by the department and faculty to maintain current levels of application. It was also determined that the new Professional Master's Diploma (PMDip) program in Aerospace Design management has significantly enhanced graduate student numbers. Nevertheless, the program is new and will require efforts to maintain enrollment.

The research program spans all traditional disciplines in Aerospace Engineering and has added the newer fields of avionics, flight automation, and advanced materials. The program has recently achieved a measure of success when it obtained three Canada Research Chairs (CRCs). Publication rates in scholarly journals and conferences have been consistent. Research funding has been cyclic, following trends in economic growth and government sponsored funding. A recommendation is made to enhance grant application success through sharing of writing techniques and mentoring. One trend observed in Aerospace research is the movement away from government sponsored funding programs towards grants based on collaborative relationships. A key recommendation is to formulate a collaborative grant application strategy based on small groups of researchers dedicated to a single project or facility. Such groups should seek out industrial collaborators to allow application for industrially focused programs.

The Departmental Strategic Planning Committee was tasked to consider future trends in aerospace education and research, and how the department can best position itself to take advantage. One of the concerns addressed was the increase in the number of programs offering Aerospace education. The committee recommended the department pursue the creation of a Bachelor of Technology program with Centennial College, and maintaining the PMDip program. They also recommended involvement with the Downsview Aerospace hub to encourage collaboration with academic and industrial partners. The committee also recommended that the department pursue a cabin interiors research program to take advantage of recent trends within local manufacturers. With the cabin interiors initiative as a driving force, it is recommended that an 'Aerospace zone' be established using the Ryerson model. An Aerospace zone can be the driving force to make Ryerson Aerospace a key player in local Aerospace R&D.

## **PEER REVIEW**

The Peer Review Team (PRT) for the Periodic Review of the Graduate Programs in Aerospace Engineering (Aerospace) consisted of Dr. Chris Damaren (University of Toronto), Dr. Il-Yong Kim (Queen's University) and Dr. Lawrence Kolasa (Ryerson University). The PRT site visit was conducted on April 12 and 13, 2016. The PRT report was communicated to the Associate Dean, YSGS on May 3, 2016, and the response to the report from Aerospace was communicated on October 18, 2016. (Note: the delay in the program-level response was in part owing to the fact that the Aerospace Graduate Program Council did not meet until the Fall term.)

The PRT cited several strengths of Aerospace in their report, citing the high level of dedication of the faculty to the training of graduate students. The PRT highlighted strong connections with the program and the aerospace industry, and referenced RIADI as a successful vehicle for these connections.

As mandated by Ryerson Senate Policy 126, what follows is the YSGS-level response to both the PRT report, and the response to the report by Aerospace Engineering. Summarized below are program strengths, weaknesses, and opportunities that were noted by the PRT. Also outlined are the PRT recommendations and YSGS and Aerospace Program responses, divided into two broad categories: academic and administrative/financial as well as the implementation plan.

## **STRENGTHS, WEAKNESSES AND OPPORTUNITIES**

### **Strengths**

An obvious strength of the department is its current dedicated academic staff consisting of 17 faculty members. They are clearly dedicated to the training of graduate students via their flourishing research programs. Overall, faculty members are productive in terms of journal papers, HQP training, and industrial research projects.

A major strength of the department's graduate program is the connection with aerospace industry. The RIADI program is a great success and ensures that the department maintains close ties with the local aerospace industry. The creation of the PMDip reveals that the department is nimble and able to respond to the needs of industry in terms of the skills required of graduate students.

There is currently a high degree of mobility between the various graduate programs. It is typical for MEng students to transfer into the research stream degrees, namely the MASc. The current average time to completion for the PhD (4.1 years) which is excellent.

The Ryerson Library is doing a good job of supporting research in aerospace engineering. Many of the key resources that are required are available to faculty and students while those that are not can be accessed by a vigorous interlibrary loans program.

### **Weaknesses**

The Peer Review Committee heard many times that the University's quota policy on domestic graduate students was hindering the growth of the department's graduate programs. This policy requires the department to admit a prescribed number of domestic students before they can begin to admit international students. The Peer Review Committee understands that the quota for domestic students is implemented for valid reasons. It is clear, however, that the downside of the rule is significant. Recruiting strong PhD students is essential for high-quality research, and the current system often keeps professors from admitting promising international students who would make excellent research contribution.

The lack of a systematic approach for funding graduate students seems somewhat problematic. There is little consistency from one student to the next in terms of the total funding package provided. Also, the sources of the funding seemed to be somewhat patchwork in nature.

A major issue at the moment is a lack of space for research and suitable study spaces for graduate students.

The proportion of faculty members holding an NSERC Discovery Grant is not as high as it should be for a research intensive department. The Discovery Grant is an essential funding source; if a faculty member does not secure the grant for multiple years, it would be hard to do any research. There should be more active assistance and support in the department level to help professors to succeed in the Discovery Grant competition. Multiple faculty members in the aerospace program feel aerospace engineering proposals suffer from disadvantages in the Discovery Grant review process.

### **Opportunities**

The DAIR initiative which would see the creation of an aerospace research hub at Downsview Park represents an excellent opportunity for the department to increase its already excellent ties with local industry.

The next accreditation visit from the Canadian Engineering Accreditation Board (CEAB) represents an excellent opportunity for the department to lobby for an increase in the number of faculty members.

## **SUMMARY OF THE PEER REVIEWER TEAM (PRT) RECOMMENDATIONS**

### **Academic Recommendations**

- The department should implement a formal procedure whereby all M.A.Sc. students are evaluated for direct transfer to the Ph.D. program and the most promising ones offered admission.
- Faculty should try to incorporate some material into the beginning stages of their courses to support student skills in mathematics and computer programming.

### **Administrative and Financial Recommendations**

- The faculty should be encouraged to pursue a collaborative approach to obtaining large research grants.
- The department should more actively support faculty members' Discovery Grant applications.
- The department should work with FEAS and its Dean to develop a Faculty-wide recruitment campaign for

graduate students. The individual and departmental efforts to help recruit students are laudable, but it must be recognized that greater resources are necessary.

- The department should more aggressively attract scholarship students. Better financial support would help, but better research environment (including lab space) would be also important. The department should develop effective marketing and promotion strategies, and the first target should current undergraduate students at Ryerson.
- If students are to be wooed to Ryerson University to the Aerospace program, then the experience of current students must be a priority as they are one of the best “sales persons” for the program. In that vein, if a significant fraction of these students do not even have a desk (let alone an office), then this is a shame. The Dean and Provost should work tirelessly to address these modest space concerns.
- The department should be proactive in attempts to increase the size of its female faculty complement.
- The University should loosen its quota policy on domestic enrollments so that a department like Aerospace Engineering can fully reach its potential in graduate student training. This will ensure that opportunities to admit high quality international students are not missed. Instead of mechanically implementing the domestic quota rule, a more flexible and effective approach should be developed.

## YSGS AND AEROSPACE RESPONSES WITH IMPLEMENTATION PLAN

### Academic Recommendations

| <b>PRT Recommendation</b>   | <b>Aerospace Response</b>  | <b>Aerospace Implementation Plan and Lead</b>   | <b>YSGS Response</b>  |
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| The department should implement a formal procedure whereby all M.A.Sc. students are evaluated for direct transfer to the Ph.D. program and the most promising ones offered admission. | The Aerospace Program agrees that our M.A.Sc. students are an important source of potential Ph.D. students and will consider this recommendation carefully. However, any transfer procedure that we might develop should not seriously diminish the integrity or vitality of our M.A.Sc. program, and must function within YSGS guidelines. Currently these options are left to the individual students and their supervisors to explore and push forward on a case-by-case basis. | The Aerospace Graduate Program Council will be asked to discuss these issues and make a recommendation by the Fall 2017.  | YSGS supports the program response. Our preference is that direct transfers be considered on a case-by-case basis rather than via a formal policy or procedure. Further, consideration should be given as to how transfers affect targets.  |
| Faculty should try to incorporate some material into the beginning stages of their courses to support student skills in mathematics and computer programming.                         | The Aerospace Program agrees that mathematical and computer programming skills are important. We will discuss these recommendations with our faculty and our Graduate Program Council. We will also investigate the possibility of creating some mathematical programming workshops to help introduce  | The Aerospace Graduate Program Council will be asked to discuss these issues with the Chair of the Aerospace Department and make a recommendation by the Fall 2017. | We suggest that Aerospace review its offerings through the lens of the adequacy of its mathematics and computer science training. As referenced in the program response, the Aerospace Department Council and the Aerospace GPC can provide valuable feedback on this initiative.<br><br>One approach to this matter is |

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|  | <p>new graduate students to the programming skills that they will need to be successful in our program. We will also investigate other departments and faculties resources to see if our students could benefit from any of their course offerings.</p> |  | <p>to revise admission criteria so students have sufficient background to succeed in the program.</p> |
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### Administrative and Financial Recommendations

| <b>PRT Recommendation</b>   | <b>Aerospace Response</b>  | <b>Aerospace Implementation Plan and Lead</b>  | <b>YSGS Response</b>  |
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| <p>The faculty should be encouraged to pursue a collaborative approach to obtaining large research grants.</p>  | <p>The Aerospace Program agrees that collaborative research should be pursued and we will investigate all possible avenues for collaboration. The program will create an Aerospace Research Council that will be mandated to work with OVPRI and industry to pursue all possible collaborations.</p> | <p>The Chair of Aerospace Graduate Program Council will construct the Aerospace Research Council by the Fall 2017.</p>                           | <p>We support this initiative, and encourage Aerospace to work with FEAS and OVPRI on enhancing its grant success.</p>  |
| <p>The department should more actively support faculty members' Discovery Grant applications.</p>   | <p>The Aerospace Program agrees that more active support of faculty member's Discovery Grant applications is needed and the form of this support will be developed through further discussions within the department and the Graduate Program Council.</p>   | <p>The Aerospace Graduate Program Council will be asked to discuss these issues with the Chair of the Aerospace Department by the Fall 2017.</p> | <p>YSGS supports the program response.</p>  |
| <p>The department should work with FEAS and its Dean to develop a Faculty-wide recruitment campaign for graduate students. The individual and departmental efforts to help recruit students are laudable, but it must be recognized</p> | <p>The Aerospace Program agrees that a Faculty-wide recruitment campaign for graduate students is needed and we will pursue this idea with the Dean, and Associate Deans, of FEAS.</p>   | <p>The Aerospace Graduate Program Council will seek to participate in all recruiting initiatives that are developed by FEAS, Fall 2017.</p>      | <p>YSGS works with Aerospace FEAS to promote its graduate programming. Recruitment efforts are supported at all levels, and are especially effective with the local engagement of faculty through their research and professional networks.</p> |

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| that greater resources are necessary.  |  |  |                                     |
| The department should more aggressively attract scholarship students. Better | The Aerospace Program agrees that we should more aggressively attract students who | The Aerospace Graduate Program Council will discuss these issues and | YSGS supports the program response. |

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| financial support would help, but better research environment (including lab space) would be also important. The department should develop effective marketing and promotion strategies, and the first target should current undergraduate students at Ryerson.   | would arrive with their own externally funded scholarships. We will investigate all possible opportunities to increase the lab space for our students and will pursue marketing and promotion strategies with the Dean, and Associate Deans, of FEAS. We agree that our current undergraduate students are our most obvious targets, but we are also concerned that this pool of potential students is finite. Thus we would prefer to make sure that any strategies that we develop will be capable of attracting scholarship students from both inside and outside our undergraduate program. | participate in all marketing and promotional strategies that are developed by FEAS, Fall 2017.           |   |
| If students are to be wooed to Ryerson University to the Aerospace program, then the experience of current students must be a priority as they are one of the best “sales persons” for the program. In that vein, if a significant fraction of these students do not even have a desk (let alone an office), then this is a shame. The Dean and Provost should work tirelessly to address these | The Aerospace Program agrees that the ideal, and most productive environment would be for every student to have a desk. We recognize that our graduate student space is deficient and will promote and pursue the expansion of this space with the Dean, and Associate Deans, of FEAS.  | The Aerospace Graduate Program Council will seek research space from the department and FEAS, Fall 2017. | We recognize that space is a concern not just in Aerospace but across campus. We encourage Aerospace to work with the Dean and Associate Dean of FEAS to address its space needs. |

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| modest space concerns.  |  |  |  |
| <p>The department should be proactive in attempts to increase the size of its female faculty complement.</p>  | <p>The Aerospace Program agrees that the size of its female faculty complement should be increased. We support the Ryerson values that were stated in the recent Academic Plan: Our Time to Lead. “The university values and respects diversity of knowledge, worldviews and experiences that come from membership in different groups, and the contribution that diversity makes to the learning, teaching, research and work environment.” We will pursue this goal with every hiring opportunity that we are given.</p> | <p>The Department Hiring Committee be tasked to address these concerns with every new hiring opportunity, Fall 2017.</p> | <p>YSGS supports the values of as articulated in Ryerson’s academic plan.</p>  |
| <p>The University should loosen its quota policy on domestic enrollments so that a department like Aerospace Engineering can fully reach its potential in graduate student training. This will ensure that opportunities to admit high quality international students are not missed. Instead of mechanically implementing the domestic quota rule, a more flexible and effective approach should be developed.</p> | <p>The Aerospace Program agrees that reaching our full potential in graduate student training is important. We will pursue all avenues to admit highly qualified students, both domestic and international. We will continue to work with the Deans and Associate Deans of and YSGS to make this happen.</p>   | <p>The Aerospace Graduate Program Council will seek to pursue these concerns with FEAS and the YSGS, Fall 2017.</p>      | <p>As was discussed at the site PRT exit interview, the provides no funding for international students. YSGS recognizes that this puts Aerospace and our other programs at a competitive disadvantage in the graduate education sector. YSGS support to international doctoral students in FEAS via the RISS program. We encourage a broad discussion across the various levels of university governance on strategies for funding high quality international graduate students.</p> |

**Next Periodic Program Review: 2024 - 2025**