

Final Assessment Report

Geography and Aviation (BES)

Science and Aviation (BSc)

September 2015

Introduction

In accordance with Waterloo's Institutional Quality Assurance Process (IQAP), this final assessment report provides a summary and synthesis of (i) the external review of Waterloo's aviation program, (ii) the program response to the external review, and (iii) an implementation plan for improvements that list specific actions, timelines, required resources and responsibility.

The Bachelor of Environmental Studies (BES) and Bachelor of Science (BSc) programs commenced at the University of Waterloo in September 2007. The BES Geography and Aviation (Honours) is located in the Department of Geography and Environmental Management (GEM) within the Faculty of Environment. In the BSc program, students have a further choice of specializing in either Earth Sciences or Physics or remaining in the broadly based unspecialized program. In the Faculty of Science, Aviation Plans are administered from the Dean's Office as an interdisciplinary program that requires core science courses from Earth and Environmental Sciences, Physics and Astronomy, Chemistry and Biology. Students in the BES and BSc programs automatically receive a Geomatics Option.

The aviation component of both programs provides advanced flight training leading to a Commercial Pilot Licence. Through a partnership with the Waterloo-Wellington Flight Centre (WWFC), (founded in 1932), students receive at least 200 hours of flight experience at one of Canada's largest and most experienced flight training centres. With a location at the Waterloo Regional International Airport, this affords students experience in controlled airspace (Toronto) as well as short access to training areas. The WWFC instructs and prepares students to be examined by Transport Canada, the civil aviation authority responsible for pilot licences in Canada. WWFC flight training programs are regulated under Transport Canada and registered as a private career college (ID # 105919) under the Private Career Colleges Act, 2005 with the Ministry of Training, Colleges & Universities in Ontario.

This is the first review of Waterloo's aviation program.

Self-Study Process and Site Visit

The self-study was prepared by the Director of the program, assisted by the Associate Director of Aviation as well as individuals in the Science Undergraduate Office and the Geography Department. The report was submitted to the Office of the Associate Vice President, Academic on July 29, 2014. The self-study closely followed the standard template based on Waterloo's IQAP and also included informal exit discussions with members of the first and second classes as well as surveys of current students and alumni. Program mapping of Undergraduate Degree Learning Expectations was done with the WWFC Aviation courses, involving flight staff and administration. The Center for Teaching Excellence coordinated the mapping. The Undergraduate Degree Learning Expectations of academic programs involved (Geography, Earth Sciences, Physics and Honours Science) were established separately from this program review.

The site visit was conducted on November 6-7, 2014. The external members of the review team were Dr. Susanne Kearns, Associate Professor in the DAN Program in Management and Organizational Studies, University of Western Ontario (London, Ontario) and Dr. Leon Cygman, Associate Professor in the Aviation, General Management, Human Resources Department of Mount Royal University (Calgary, Alberta). The internal member was Dr. Duane Cronin, Professor, Department of Mechanical and Mechatronics Engineering. During the site visit, the review team met with administrators, faculty, staff and aviation students from both Faculties and the Associate Vice-President, Academic. The review team also travelled to the Waterloo Wellington Flight Centre to meet with administrators and flight instructors.

The external reviewers' report was received on November 20, 2014 and the program's response and implementation strategy, with timelines, responsibilities and resource needs assessment, were received on June 18, 2015. Endorsement of the plan was received on June 19, 2015 from the Dean of Environment and on September 5, 2015 from the Dean of Science.

This final assessment report is based on information extracted, verbatim in many cases, from the self-study, the reviewers' report and the program response.

About the program

The Aviation program is an interdisciplinary undergraduate program offered as a regular (i.e. non-co-operative) 4-year degree program. Aviation students complete an academic 1A term (September to December) in their first term on campus. Students grades are reviewed by the Director in late December to determine eligibility to begin flight training in the first week of January, 1B. A successful student would have a minimum Geography major average of 70% and an minimum overall average of 65%. In Science, a successful student would have a minimum faculty average of 65% and a minimum overall average of 65%. As the flight training has transfer credits, aviation students will normally have a course load of four academic lecture units. The aviation programs have had four graduating classes to date of 55 students. About 80% of students who enroll in the aviation program graduate with a UW degree but the retention rate is only about 30-40% (within the aviation component). For an aviation program, this retention rate is fairly typical, likely the result of high financial costs combined with the academic workload and the rigors of flight training.

The program is administered by a Director and assisted by an Associate Director and an Undergraduate Program Advisor. The Director reports to the Chair of the Geography and Environmental Management Department and the Associate Deans (Undergraduate Studies) in the Faculty of Environment and Faculty of Science. Curriculum matters approved by the Faculty of Environment Undergraduate Committee and the Faculty of Science Undergraduate Studies Committee receive further discussion at their respective Faculty Councils. Faculty in Geography and Science teach core courses in the aviation program. The Aviation program does not have separate full time faculty, although there is a sessional instructor hired to teach a human factors course and another; new Adjunct Professor available to provide guest lectures in aviation. Retired Canadian astronaut, Chris Hadfield, is also connected to the program via his adjunct professorial appointment at the University of Waterloo, and he is expected to participate in instruction in the future.

Strengths (as reported in the self-study)

- The program attracts dedicated, high quality students.
- The program is administered by dedicated individuals at Waterloo
- The program has 5.0 credit relief for student flight training, which is a notable achievement within a Canadian university
- The aviation partnership is with a top-ranking aviation school that is thoroughly engaged with the program
- Undergraduate students have access to research courses as electives in AVIA 474 and 475 to explore specific topics in Aviation.
- The WWFC fleet consists of 22 aircraft and is one of the largest instructional fleets in Canada
- Averaging over seven years, females represent 20% (Geography) and 17% (Science) of the students, which is substantially above aviation industry average of about 8%.
- Alumni survey data indicate that 24 students, (92% of respondents) are working in an area closely related to aviation (n=20) or somewhat related (n=4) to their degree. Two alumni are not working in an area related to the degree.

Challenges/Weaknesses (as indicated in the self-study)

- Currently lacking is a core team for aviation-related research to stimulate undergraduate and future graduate topics in aviation research
- The program is not available in the co-operative system of study due to logistical reasons (ongoing and consistent flight training would be interrupted.)
- Access to the program is controlled in part by financial factors - the cost for the aviation portion of the program is substantial - \$58,000.00 to \$63,000 over a period of three calendar years in addition to academic tuition costs. The flight portion is not covered under the Ontario Student Awards Program (OSAP). This largely explains the seven year average of 11.5% and 7.1% in converting 'total' applicants to actual registrants in Geography and Science, respectively.
- Although over 80% of students in the first 4 graduating cohorts, classes 2007-2010 who started with Aviation plans obtained Waterloo degrees, less than 40% received a Waterloo Science and Aviation or Geography and Aviation degree.

- Challenges remain for students travelling to and from the Waterloo Wellington Flight Centre.

External Reviewers' Assessment

The reviewers noted Waterloo has shown leadership along a much needed path to produce academically trained pilots with a BSc or a BES. Despite the growing need for aviation professionals, there are only a small number of universities in Canada that offer degrees associated with aviation besides Waterloo – University of Western Ontario, University of Windsor, Mount Allison University, Mount Royal University, University of the Fraser Valley and Trinity Western University. The reviewers saw the program as being innovative and consistent with the institution's mission and academic plans. They noted further that program objectives were appropriate and well aligned with the institution's mission. Admission requirements for aviation students were noted to be the same as for non-aviation students in their respective Faculties, thus facilitating completion of another academic program at Waterloo that is not associated with aviation.

The external reviewers were very impressed with the passion and drive exhibited by the Program Director. The program was considered to be appropriately resourced with highly competent professors and qualified flight instructors in their respective disciplines. It was noted, however, that Waterloo lacked *academic* staff with an area of specialization in aviation. As the program evolves to add more aviation theory, there may be a need for aviation-specific labs on the Waterloo campus.

With respect to curriculum, the reviewers noted the Science and Geography curricula reflect the current state of those respective disciplines. However, input from current students suggested students may not be developing sufficient communications skills that are regarded as vital to becoming a successful pilot. The reviewers commented further on two aspects of the aviation portion of the curriculum: (1) the flight training component taught by the WWFC and (2) the academic aviation core taught at the university. With regards to the WWFC, they commented that most components of the program meet or exceed flight training standards, noting further that in the future, the program could incorporate some more training in glass cockpit avionics and crew coordination training. The second point is considered below in the reviewers' recommendations.

The reviewers were very favourably impressed with the program's students, who excelled in both their academic and flight training. Students were clearly receiving education-related job placement. Several graduates have been accepted by the military, which is a huge testament to the quality of the pilots produced by the program.

The reviewers provided a series of recommendations for improvement of the aviation program, and categorized them into short-term (0-3 years) and long-term (3-5+ years) opportunities:

Program Response and Implementation Plan

The following is the response and implementation plan provided by the Director and Associate Director of Aviation on behalf of the Science and Aviation plan and Geography and Aviation plan

based on the external reviewers' recommendations. Below Aviation indicates how they will respond to the various issues identified.

1. Reviewer Comments: *Is the degree nomenclature appropriate?*

The degree name could be misleading. "Bachelor of Science and Aviation" or "Bachelor of Geography and Aviation" could lead a recruiter to the mistaken opinion that the graduate has more theoretical background in Aviation. In fact, the graduates have no more background in Aviation than a graduate of an airport-based flight school. Something like "Bachelor of Science (Professional Pilot)" may be more appropriate unless the academic curriculum is enhanced with core aviation courses.

Response: We disagree. The degree names stated by the reviewer are incorrect. The actual name of the degrees are Bachelor of Science (Science and Aviation) and Bachelor of Environmental Studies (Geography and Aviation). We believe that the current degree nomenclature is appropriate for distinguishing Aviation as a separate/individual degree program at Waterloo. It is in line with the intention of identifying Aviation as an academic discipline in its own right, rather than solely as an add-on/option to existing traditional degree programs. This also encourages more growth, expansion, and resources.

2. Reviewer Comments: *Car Share or Bus Service*

Transportation and parking seem to be a major ongoing problem for flight students. It was recognized that both the Director of Aviation and the General Manager of WWFC have invested time and energy into finding a resolution.

Response: The reviewers are correct that since the program began, we have conducted an extensive search for transportation options. Students have developed creative ways to manage their transportation needs such as: carpooling with students with flights at the same time; sharing rides with other students across various years; and, most recently, using the Student Care Share program. Recently parking fees have become enforced by the Airport, leading to an additional expense.

Work plan: The most practical solution for students without a car is public transportation because they can obtain student-rate bus passes. The new Fairway Road N. bridge across the Grand River, the 2017 Ion rail link to Fairway Mall, and growth of public transportation in the Breslau area are expected to improve travel options by 2017-18.

Responsibility: The Director in conjunction with the Associate Director.

3. Reviewer Comments: *Internship Opportunities*

The program is encouraged to continue identifying relationships with industry and leveraging the co-op and internship resources on the University of Waterloo campus for 3rd and/or 4th year aviation students.

Response: We agree. There are no traditional co-op opportunities in aviation because flight training occurs in all terms until 4th year. An opportunity for experiential learning in the spirit of

Waterloo is welcomed. We continue to investigate 3 to 6 week opportunities for paid internships with airlines, flight operations, and aviation-related companies. We envisage this as a 4th year elective course for students.

Work plan: For fourth year 'internships' to be accommodated, students would need to have all their flight training complete by 4A. The goal is that limited availability of such internships be created by the 4B Winter 2017 term. The plan is to initially limit this opportunity to 6 positions, based on academic merit and course completion. Students who complete a Flight Instructor Rating in 4B as a flight option may be unavailable to pursue an internship experience. A reflection piece will be required from the student after the placement. Consultation with CTE and Faculty teaching fellows will occur in creating guidelines for these reflections.

Responsibility: Director and Associate Director for securing intern positions in Industry. Undergraduate Advisor for Geography and Aviation to co-ordinate placements and monitor. This is considered an incremental work load for the staff advisor.

4. Reviewer Comments: *Creating 2 new 0.5 courses on aviation topics (a total of 1.0 credits)*

Suggestions include a 1st year class to introduce students to aviation - a survey course exploring aspects of the 'aviation core' topics suggested by Aviation Accreditation Board International (AABI) and a 4th year course that is run by a course manager but with lectures presented by different professors each week from across Waterloo campus (whose work relate to aviation such as robotics, systems design engineering, computer science, etc.).

Response: We agree. Adding more aviation-focused academic courses to the plan would be popular with students; however, more staffing resources are required.

Work Plan: In the short term, 2 years, aviation-focused courses can be mounted to replace electives. Over the next 3 to 4 years, academic plans will be updated to include the new aviation courses as core courses.

We are currently developing an Unmanned Aerial Systems (UAS) course AVIA 374, with the first offering in January 2016 (starting as a team-taught course). This course will be open to all students in the university with interests in: applications, aerial survey data collection, analysis, regulations and flight control, geomatics, and robotics. The Associate Director of Aviation will run this course. The Geography and Environmental Management (GEM) department Chair has consented, but this will mean an unfilled course teaching assignment in Geography. A solution could be to replace the vacant geomatics faculty line in 2016.

Responsibility: The Director and Associate Director will be responsible for the academic components of AVIA 374. The Chair of GEM and the Director of Aviation will be responsible for addressing teaching resources in Aviation in the

short term (2016) and in Geomatics for the AVIA 374 UAS course. In the long term (2 to 3 years), the Director will address the teaching resources in Aviation with the Deans in the Faculty of Environment and Faculty of Science, in conjunction with the Associate Dean of Science.

5. Reviewer Comments: *Add a significant culminating upper year experience in aviation. For example, a capstone course, internship, or special project related to aviation that is a required part of the degree.*

Response: We are considering this suggestion. The opportunity for an internship is being considered for 2017 as an elective. A special research project course is already available (AVIA 475: Independent Studies of Selected Topics). Flexibility is required in year 4 to meet various degree requirements. A capstone course for all Aviation students in Science and Geography would be difficult to add into the program. Students are working to complete academic specializations, or minors in year four. These credentials, among others, can include Physics, Earth Sciences, Biology, Chemistry and Geomatics.

Work plan: The potential of introducing a 4th year AVIA elective will be explored in the next 10 months. There will be implications for staffing and resources to this recommendation as well.

Responsibility: Director and Associate Director. Staffing and resources: Deans.

6. Reviewer Comments: *We also recommend incorporating some mandatory flight training in 4th year to avoid flight skills becoming 'rusty' during that time (not necessarily more flight hours, but a redistribution of training so that it extends into 4th year).*

Response: We understand this suggestion; however, but raise the following points. Some students already obtain flight training in fourth year because they complete extra credentials in aviation (e.g., 30% of students pursue an Instructor Rating or Float Rating). The Waterloo Aviation program already has flight training in 8 terms (1B to 3C; including 3 Spring terms). Students on campus during a Spring term may work part time (80% of year 3 students), or take extra courses in order to graduate early or reduce their load in other terms (20% of year 3, 40% of year 2, and 30% of year 1 students).

We have already discussed the incorporation of the new two-person crew ALSIM flight simulator as an additional training option.

Work Plan: Implementation in late 2016 of ALSIM flight simulator training in year 4.

Responsibility: Director and Associate Director in conjunction with WWFC

7. Reviewer Comments: *Incorporate crew-coordination training into flight curriculum.* Not necessarily additional hours of training, but a restructuring of a few existing flight lessons to target crew-coordination skills through Line-Oriented Flight Training (LOFT) and/or scenario-based simulator flights.

Response: We agree. This idea is already being considered with WWFC, using the new ALSIM simulator in year 4. This is further discussed under item 16 below (the writing portion of the Airline Transport Pilot Licence).

Work Plan: Implementation late 2016.

Responsibility: Director in conjunction with WWFC

8. Reviewer Comments: *Incorporate more student involvement in flight training.* Consider training students in elementary maintenance. Involve students in regular safety meetings.

Response: We believe there is limited potential for this suggestion. Basic maintenance information is possible, but WWFC considers that, only the Aircraft Maintenance Engineer has responsibility to work on any aircraft.

WWFC has an active Safety Management Systems (SMS) and a flight officer responsible for WWFC activities. SMS help companies identify safety risks before they become bigger problems. Transport Canada regulations require the aviation industry to put safety management systems in place as an extra layer of protection to help save lives.

Work Plan: Encourage student participation in safety meetings. Appoint a student safety representative responsible for reporting to aviation students in Fall 2015.

Responsibility: WWFC, Director and Associate Director

9. Reviewer Comments: *Explore a specialization in Unmanned Aerial Vehicles/Systems (UAVs/UASs).* With the aviation program located within Geography and Science it seems logical for the aviation program to explore opportunities within the UAV/UAS sector. This is a segment of the aviation industry that is growing rapidly yet there is little academic guidance to support best practice. With an academic specialization in UAV/UASs Waterloo graduates would be likely to see a more direct link between the academic courses they complete at the University and how that knowledge can help them contribute to industry (and find employment).

Response: We agree and have been exploring the UAV/UAS opportunity. As indicated in item #4 above, we will offer a new UAS course as AVIA 374 in Winter 2016. The WWFC has launched a new flight course in UAV <http://www.wwfc.ca/courses-and-rates/uav-training/>. We are reviewing training courses (in Canada and in the USA).

Work plan: After the initial offering of AVIA 374 in Winter 2016, we will assess interest and student feedback on further UAS courses. Our current plan is to offer a new UAV/UAS Option. This Option would be open to all Waterloo students. It would combine UAV/UAS, theory, applications and flight training courses taught at Waterloo with flight training taught at WWFC. This would be the first of its kind in Canada – i.e., a University UAV/UAS flight combined Option. Flight training would use the existing AVIA course framework AVIA 101, 102, 203 (Professional Flight Training I – III). These three courses would provide students with a Private Pilot’s Licence and a Night Rating. This qualifies them to fly a small plane day or night. It also assures that skilled pilots are also in control of UAVs, a growth industry globally. It is important that professional UAS operators in the same airspace with airplanes should be well-trained pilots.

The initial UAS course, modeled after AVIA 374, can be offered in Fall 2017 and focus on 4 modules: (a) robotics, (b) remote sensing and image interpretation, (c) GIS and data management, and (d) flight and operations.

Responsibility: Director and Associate Director and support from GEM and Geomatics

10. Reviewer Comments: *Collaboration with Western’s and Windsor’s aviation program.* With a similar structure and the close geographic proximity it seems logical for Waterloo, Western, and Windsor to collaborate. Possibilities include notifying each other of guest speakers, tours, shared student chapters (99’s, Women in Aviation, IAAE, etc.), student social events (such as ski trips), etc. Also, sharing faculty resources by allowing Waterloo students to complete other University aviation courses and vice versa is an opportunity worth exploring.

Response: We agree but as a lower priority goal. Collaboration between university programs would be appropriate, especially Western because of its proximity. Opportunities could include invitations to lectures with guest speakers and collaborative research opportunities related to the aviation industry. Social events can be organized by students such as ‘fly-ins’. Meetings could be arranged at the home airport of one institution, with student pilots from the other flight programs, arriving by plane.

It should be noted that students already can take courses elsewhere on a Letter of Permission. Developing additional Waterloo AVIA courses with Waterloo faculty will be a higher priority than arranging inter-institutional collaborations.

Work plan: Encourage links with Windsor and especially Western because of its proximity to promote Aviation as a discipline and provide connections

for aviation students.

Continue to review AVIA courses and industry and institutional trends for new course opportunities. Waterloo has an opportunity to take a leadership role in UAS systems for airborne remote sensing. Build on existing resources at Waterloo in Aviation and Geomatics by creating new directions in teaching and research. This would require reallocation of existing Geomatics teaching resources to cover AVIA 374 on a regular basis.

Responsibility: Deans, Department Chair of Geography and Environmental Management, under which Geography and Aviation and Geomatics are housed, and the Director of Aviation

11. Reviewer Comments: *Join the University Aviation Association (UAA), Aviation Accreditation Board International (AABI), and Women in Aviation.*

Response: We agree. Resources for membership fees and travel resources are required. We would need to work toward an AABI accreditation with curriculum revision and additional staff/faculty resources. Only two Canadian institutions are accredited: Mount Royal University and Seneca College Flight Training Program.

Work Plan: Accreditation of a professional program is important. It will take time, staff, faculty and resources to meet the requirements. This target is considered possible within a 4 to 5-year time line. A shorter 1-year time line is reasonable to obtain university membership in the University Aviation Association (UAA). There are over 500 individual members and 96 college and university institutional members. Western is a member of UAA. Fees are \$550 US per year. UAA provides opportunities for student scholarships and networking. Annual student memberships of \$30 US provides access to student competitions, job postings, networking and UAA educational resources. Similar opportunities exist for Women in Aviation for an annual Institutional membership of \$400.

Responsibility: Director in association with Deans to support Waterloo presence in international and national organizations and support to AABI accreditation.

12. Reviewer Comments: *Create a University of Waterloo Flight Standards Committee for Quality Assurance Purposes and hire or contract a qualified flight standards pilot.*

Response: We disagree. At the present time oversight of flight training is with WWFC. Students are prepared for the various flight credentials. Examinations and licensing of credentials is the responsibility of the Department of Transport, Civil Aviation. Although appropriate for

accreditation by AABI, university resources are more appropriately directed to Waterloo Aviation faculty. Currently the Aviation Director and Associate Director sit on the Conestoga College Program Advisory Committee with members from the Aviation Industry and Airlines. We both utilize WWFC as the flight training school (Conestoga College for 18 years). In the spirit of regional co-operation, this committee serves the needs of both institutions.

Work plan: Re-examine in 3 to 5 years.

Responsibility: Director of Aviation in conjunction with WWFC

13. Reviewer Comments: *Create a tenure-track faculty position (that includes a research component) with an aviation focus.*

Response: We agree. This is one of the key components going forward with the Aviation programs in Science and Environment. The University of Waterloo program is unique and the first in Canada to offer a BES or a BSc degree in Aviation. Graduates from the program have the recognized Waterloo branding. In Geography and Aviation, a Geomatics Specialization with a Commercial Pilot Licence, Multi-Engine Rating and Instrument Flight Rating is possible. In Science and Aviation, a BSc academic credential is possible with an Earth Sciences Specialization, a Physics Specialization, or no specialization plan that is often associated with a Biology or Chemistry Minor. Additional options include: Commercial Pilot Licence, Multi-Engine Rating, and Multi-Instrument Flight Rating. Graduates are ready for placement in many areas in the Aviation Industry, but most importantly, as pilots. In the first four graduating classes (2011 to 2014), Waterloo graduates are working across Canada from Newfoundland Labrador to British Columbia to Inuvik. Our graduates are also working as pilots with:

- the Canadian Military (search and rescue and training for fighter squadrons);
- international airlines such as Cathay Pacific (2nd officers);
- cargo and passenger operation in Canada's north for resource industries and isolated communities;
- Medivac work from Europe; and
- corporate aircraft within North America.

Graduates also train some of our new pilots as flight instructors.

At this time, there are no full-time aviation faculty members at Waterloo. The first seven years of the program and the review, acknowledge success of this new program, as a small but important part of Canadian Aviation. The Aviation flight and ground school instruction components have been delivered by the Waterloo Wellington Flight Centre (WWFC), which has been in operation for over 80 years. The Waterloo Aviation academic component has been given by a sessional who is a Waterloo Alumni and an Air Canada captain. The sessional is respected by students as an experienced frontline pilot. We also have as an adjunct Aviation Professor and former astronaut. We have the nucleus for innovation and research but the program needs to grow with faculty who hold regular appointments to achieve this.

Work plan: Continue to build on the innovation of this unique program at Waterloo. To develop courses and an option with a Waterloo focus on technology

such as Unmanned Aerial Systems (UAS). Incrementally, build a faculty component for teaching and research in Aviation at Waterloo. The first academic appointment by 2016 and a second by end of 2017, prior to the UAS/UAV Option start in Sept 2018.

Responsibility: Director of Aviation in conjunction with Deans and University administration to grow the Aviation program at Waterloo.

14. Reviewer Comments: Add 1.0-2.0 university credits (in addition to the 1.0 courses suggested in short-term opportunities, above) in aviation-related academic topics to target all of the Aviation Accreditation Board International (AABI) 'aviation core' subject areas over 3 to 5 years.

Response: We agree but note resource limitations. To add 1.0 to 2.0 additional aviation units will require curriculum adjustment to potential core course requirements. The 'Science and Aviation' and 'Geography and Aviation' degrees meet the discipline focus of the degrees. With additional faculty and resources, the aviation focus of the degree can be further emphasized and still meet the rigor of the BSc and BES degrees. Some of the existing core courses can be replaced by some of the AABI recommended courses. It is important to build an academic aviation component.

Work plan: Continue to build more focussed, enriched, academic aviation components for students. This will involve curriculum adjustment, additional faculty, and resources. This will further attract opportunities for innovation and research at Waterloo. The building on the core disciplines of Science and Geography, with teaching and research resources in Aviation, exposes students to opportunities in industry beyond flight operations. We continue to review the aviation curriculum for the opportunity to improve our program. We will revisit our status on AABI accreditation in fall 2017.

Responsibility: Director and Associate Director in conjunction with Deans and Associate Deans.

15. Reviewer Comments: Create a non-flight stream allowing students to complete academic courses (with the added aviation credits) to earn an aviation degree without the flying component.

Response: We disagree. At this stage of the program, Waterloo Aviation is currently known for its strength as a BSc or BES degree with flight training program. We are not considering a non-flight option degree. We are considering new UAV/UAS, AVIA courses that would include some non-flying components and flying components that could lead to an Aviation UAS Option. It is expected that within a few years Transport Canada will have regulations in place for 'Beyond Line of Sight operations'. This will likely require an Instrument Flight Rating (IFR) capable, remote pilot. There will be an emerging role for UAV specialists in a wide range of applications that can include: extracting resources and monitoring pipelines, sea and lake ice, whales, hydro

installations, environmental issues/ pollution and disasters. UAV specialists – pilot/crews will be required to manage UAV use and data collection.

Work plan: The first Aviation UAS course will be offered in Winter 2016 (AVIA 374) The course will be open to all Waterloo students. Student interest and feedback will be reviewed in May 2016 to consider course and plan directions. An Aviation Option (3.5 units), coupled with Pilot and UAV training, existing expertise in Geomatics and aerial data, will be developed for consideration for an academic sub-plan. This will be an option that non- aviation students would be eligible to take. A target for the Option would be fall 2018. AVIA 101,102 and 203 are available for this option as part of the core already. Once the additional 4 AVIA courses are in place to service the UAS Option it can be delivered.

Responsibility: Director and Associate Director with WWFC.

16. Reviewer Comments: *Consider adding a ‘Frozen’ ATPL option for flight students.*

Response: We agree. An integrated Airline Transportation Licence (ATPL) allows the captain or pilot to be in command of a multi- crew airplane. The ATPL for aviation students would include a Commercial Pilot Licence (CPL) Instrument Rating (IR) and the ATPL theory subjects complete. The written portion of the licence requirement is considered complete or ‘frozen’. However, the Licence requirements are not complete until the pilot accumulates 1,500 total hours with a minimum of 250 hours as pilot in command. A pilot has 5 years to complete the flight requirements of the ATPL. Upon graduation from our program students will have about 200-205 total hours. Students will finish their in-airplane training as usual in Spring of third year. In year 4, the simulation training would continue, culminating in the written ATPL.

Work plan: WWFC is currently working towards certification of an ‘Integrated Airline Transport Pilot’ (IATP) program in time for the 2016 incoming class with delivery in Winter 2017. This would entail some additional simulation time, but the total amount of flying is essentially unchanged.

Responsibility: WWFC with the help of the Director and Associate Director of Aviation

17. Reviewer Comments: *Build an alumni network*

Response: We agree. This work is ongoing, both at Waterloo and WWFC, to link grads to social media for networking and career advancement.

Work plan: Continue to work with Alumni Affairs and WWFC to track graduates.
Responsibility: Director and Associate Director