FINAL ASSESSMENT REPORT

Institutional Quality Assurance Program (IQAP) Review

Astrobiology

Date of Review: February 4th and 5th 2020

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response and assessments of the collaborative specialization (M.Sc. and Ph.D) in Astrobiology. This report identifies the significant strengths of the program, together with opportunities for program improvement and enhancement, and it sets out and prioritizes the recommendations that have been selected for implementation.

The report includes an Implementation Plan that identifies who will be responsible for approving the recommendations set out in the Final Assessment Report; who will be responsible for providing any resources entailed by those recommendations; any changes in organization, policy or governance that will be necessary to meet the recommendations and who will be responsible for acting on those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

Executive Summary of the Review

In accordance with the Institutional Quality Assurance Process (IQAP), Astrobiology submitted a self-study in January 2020 to the Vice-Provost and Dean of Graduate Studies to initiate the cyclical program review of its collaborative specialization. The approved self-study presented program descriptions, learning outcomes, and analyses of data provided by the Office of Institutional Research and Analysis. Appendices to the self-study contained all course outlines associated with the program and the CVs for each full-time member in the department.

Two arm's length external reviewers and one internal reviewer were endorsed by the Dean, Faculty of Science, and selected by the Vice-Provost and Dean of Graduate Studies. The review team reviewed the self-study documentation and then conducted a site visit to McMaster University on February 4th and 5th, 2020. The visit included interviews with the Provost and Vice-President (Academic); Vice-Provost and Dean of Graduate Studies, Associate Dean, Grad Studies and Research, Director and meetings with groups of current students, faculty and support staff.

The Director and the Dean of the Faculty of Science submitted responses to the Reviewers' Report (April 2020 and September 2020). Specific recommendations were discussed, and clarifications and corrections were presented. Follow-up actions and timelines were included.

Strengths

- The students have considerable success with obtaining positions in Ph.D. programs, industry, and at NASA.
- This is a well-functioning program that attracts excellent students and results in excellent and highly-visible science.
- The students form a collaborative community, as evidenced by their initiation of a joint research project.
- The report gives a very positive review of the curriculum and notes that it provides a very well-rounded experience to the students.

Areas for Enhancement or Improvement

- Consider how to further encourage cross-laboratory research opportunities for students
- Consider whether a small financial incentive can be provided to encourage additional faculty to take students on the program.
- The report suggests several areas for potential faculty hires that would benefit the Astrobiology program.

Summary of the Reviewers' Recommendations with the Department's and Dean's Responses

Recommendation	Proposed Follow-Up	Responsibility for Leading Follow-Up	Timeline for Addressing Recommendation
1. Consider a formal, but optional, requirement for a cross-laboratory and/or collective research project and a mechanism for forming collaborations and identifying student opportunities. Consider allowing students to fulfil the additional course in a discipline outside their core area of expertise requirement with a collaboration in a lab outside their discipline.	It will be necessary to make changes in the graduate calendar that describe the requirement for the course outside the discipline. This report suggests allowing the cross-laboratory research project as a means of fulfilling this requirement. The suggestion is reasonable, but it now needs careful consideration by the faculty concerned.	The current OI Director will circulate a draft of the proposed calendar changes and will convene a meeting of faculty to agree a final version of these changes.	The meeting is scheduled for May 6th 2020

2. Consider ways in which organizational administrative tasks remain outside the responsibilities of graduate students.	We find this comment puzzling as there are relatively few admin jobs done by students. The scheduling of the Journal Club has been organized by students; however, this is also the case for other journal clubs in different research areas. Students have also helped with social media and talking with new student applicants. Two of the students are part of the Faculty of Science Student Ambassadors Program. These activities are encouraged by the Faculty and seem appropriate.	The OI Director has already discussed this point informally with several students to understand how they feel. There was recognition that being involved with organizing the Journal Club seemed appropriate. The other activities are all voluntary. The OI director will make sure that students feel recognized for doing these things and will try to ensure that jobs are spread among the students and do not always fall to the same people.	Discussions already held, and further discussion with students when responsibilities are assigned for 2020-21 academic year.
3. Work to enable international student collaboration and exchange, as the international astrobiology community has extensive opportunities for McMaster students available.	A agreement of collaboration with Heidelberg was made several years ago and we have not yet made use of this opportunity for student exchanges. The OI also has many connections with other institutions (e.g. collaborators on previous grant proposals) who could in principle take McMaster students. In practice, considerable travel and accommodation costs would be required if students were to make visits for sufficient time to make useful research progress. OI currently runs travel	The current travel grant system is on hold until the COVID situation is resolved. This will be announced by the current or incoming OI Director as soon as travel becomes possible. Supporting research visits for students seems like a beneficial use of OI funds, but this needs to be negotiated by the incoming OI Director and the Faculty of Science at the time of the appointment of the new Director.	Summer /Fall 2020

	grants for students to attend conferences, but greater resources would be required for longer research visits.		
4. Encourage home departments to hire in Exoplanet Detection and Planetary Geosciences.	We agree that faculty hire in Origins-related subjects would be very beneficial for the Astrobiology program and the OI in general. The two subject areas mentioned in the report would be possible areas of recruitment; however, other areas are equally possible (e.g. Extremophiles, Microbial Ecosystems, In Vitro Evolution, and Prebiotic Chemistry). There has been no recent discussion of faculty hiring priorities by the OI faculty as a group because there is no current means by which Institutes can recommend areas for faculty hiring. The suggestion of "encouraging home departments" to recruit in Origins areas is very unlikely to work. The system needs to be changed in order to allow hiring proposals that are led by the institutes.	It would be appropriate for the incoming director to initiate a discussion of faculty hiring priorities among OI members in order to come to a consensus on what topics are most supported. The incoming director should try to negotiate changes in the faculty hiring procedure so that a topic supported by a consensus of OI members could be put forward to the committee on faculty hiring. A possible way forward that would benefit the graduate program and the OI tremendously is to recruit a "Chair of Astrobiology" at a senior level, who would assume responsibility for the graduate program and become the OI Director. We note, however, that a new director is already required to be appointed in July 2020.	Summer/ Fall 2020
5. As part of the recruitment process (through the website and via initial emails), encourage prospective	The OI Director is currently responding to students as they make inquiries, as are the directors of the departmental graduate	The current and incoming Directors will work with the team for development of the new web site.	Spring/Summer 2020

students to apply for NSERC fellowships.	programs. An update of the OI website is definitely overdue. There is a current team from Faculty of Science working on this. We agree that the information on the current website regarding student recruitment and student fellowships needs improvement.		

Faculty Response:

The Dean noted they were pleased to see that the reviewers had recognized the successful operations of the graduate program in Astrobiology. The success of this interdisciplinary program is evident from the high-quality training of students from several participating departments and creating a collaborative research atmosphere at McMaster. The report highlights that the program provides a framework for astrobiological training in Canada, on par with the best programs at other institutions in the world. It also notes that students have taken the initiative of collaborating with available faculty.

The recommendations of the review team have been reviewed by the program leadership. The response report contains follow up actions and timelines and the Dean was satisfied with the proposed plan. One of these involves allowing students to take additional courses outside of their core areas of expertise. This matter will be addressed through curriculum changes. The Director of the Origins Institute (OI) will be meeting with all stakeholders to develop a plan for approval by the Faculty of Science Graduate Curriculum, Policy, and Study Committee.

The issue of administrative load on students is being resolved through discussions. The Dean had not heard any concerns in the past and feel that the proposed solution is reasonable. Two of the recommendations, i.e., international student collaborations and faculty hiring, will require a careful review of options, opportunities and taking a balanced approach. Research-related travel of students in Science units is typically supported by two sources of funding: supervisor's research grants and graduate scholarship fund. Astrobiology students are eligible to receive financial support through both these sources. Additional opportunities, such as MITACS training, McMaster SGS Grant in Aid, and Michael Smith Foreign Study Supplements, are also available.

The Faculty of Science has an established and collaborative process for the proposal, review and recommendation of faculty hires. Specifically, there is a central Faculty Academic Appointments Committee with representation from each Department that receives and reviews applications for faculty appointments on a yearly basis. The criteria considered include both potential alignment with Departmental and interdisciplinary graduate programs (including Astrobiology) and with the mandates of the Faculty's Institutes and Centres (including the Origins Institute). It is incumbent on the members

of the Astrobiology program to articulate their aspirations for faculty positions and to advocate for those to be considered in the Departmental submissions, where hires are made. The proposed consideration of a chair in astrobiology funded through philanthropic sources is an excellent one that should also be proposed as part of the requests for funding priorities circulated widely in the Faculty.

The Faculty of Science is committed to providing the Astrobiology program adequate support to continue to train students and enhance their research and training mission.

QAC Decision

That the Quality Assurance Committee recommend that the Astrobiology graduate program should follow the regular course of action with an 18-month progress report and a subsequent full external cyclical review to be conducted no later than 8 years after the start of the last review. At the time of the progress report, the program should provide greater clarity on the way courses are organized and managed by faculty.