

Progress Report  
Cover memo

Department of Physics Year of appraisal 2012

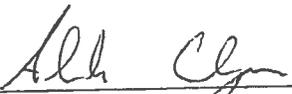
To: Vice-Provost, Teaching and Learning

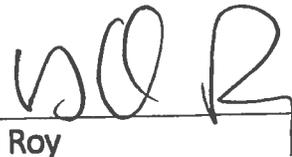
Date: June 19<sup>th</sup>, 2017

In accordance with the Concordia University Academic Program Appraisals Manual, 5th edition revised, the **Department of Physics** and the **Faculty of Arts and Science** enclose the finalized Progress Report detailing the activities originating as a result of the Faculty Dean's Implementation Plan, dated **February 16, 2015**.

The Department Chair also confirms that this Progress Report has been presented to the Departmental Assembly (or its equivalent) prior to its submission for signature to the Faculty Dean.

Signed,

  
\_\_\_\_\_  
**Alexandre Champagne**  
Department Chair

  
\_\_\_\_\_  
**André Roy**  
Faculty Dean

# Progress Report

## Update on the recommendations

Note: the recommendations from the original Implementation Plan are presented first, along with the implementation schedule and responsibility. The Department is invited to respond to each recommendation by:

- Indicating the status of the recommendation (completed, delayed, or abandoned)
- Providing a short update and rationale (if the recommendation has been delayed or abandoned)
- Including a new timeline for completion if relevant

### Undergraduate education

The Department needs to invest attention into both curriculum development and how its courses are delivered.

**Recommendation 1:** The department already has initiated an in-depth curriculum mapping and review exercise and as a result of this has modified its core, Major and Specialization programs and added Honours options (with concentrations in Physics and Biophysics). **In the Autumn of 2016, the Department will assess the success of the revamped Major, Specialization and Honours options in terms of student enrolment and retention. At the same time the viability of the Professional Experience Option and the Co-op program will be evaluated.**

*Implementation schedule:* Assessment scheduled for the Fall 2016.

*Responsibility:* Department of Physics

#### Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

#### Update or rationale on the status of this recommendation

All of our programs' enrollments and retention have been continuously monitored since Fall 2012, including in Fall 2016. We have seen a very good improvement both in the recruitment and retention numbers of all programs. The improvement in the specific case of the Major and Specializations are excellent in terms of recruitment, and good in terms of retention. The improvements for the Co-op and Professional Experience enrollments are modest (moved from 1 to 5 students over the last 2 years), but they are steady. We still firmly believe that the program is on a good track, and based on our improvements in terms of job placements we expected to double our Co-op numbers over the next 2 years. We are continuously working on improving our student retention, and another wave of initiatives is planned for 17-18 (new series of BSc seminars, including career development talks). Overall, the recent growth of our programs is in our opinion: quite spectacular! To give some quantitative measures:

Enrollment in BSc Programs - CU\_SR\_STUDENT\_BY\_DEPT - 2014-15 (83), 2015-16 (95), 2016-17 (**149**)

Retention – BSc grads at June convocation CU\_SR\_GRADUATES\_BY\_DEPT- 2014-15 (4), 2015-16 (3), 2016-17 (**11**)

**Recommendation 2:** As suggested by the external examiners, the Department should expand its outreach to students outside of physics by offering liberal science courses to non-physics students. The promotion of these courses can be linked to the development of online courses within the department as proposed by the University Appraisal Committee. **By the Autumn of 2015, the Department will present to the Dean a plan for adding online and liberal science courses to its course offerings.** This will fit the Faculty's priorities for increasing the range of educational experiences available for students in the Faculty of Arts and Science.

*Implementation schedule:* Plan to be presented to the Faculty Dean by the Fall 2015.

*Responsibility:* Department of Physics

#### Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

### Update or rationale on the status of this recommendation

We have communicated this plan via several communications, rather than in a single document. The communications were addressed to Associate Deans P. Joyce (via curriculum proposals), and Associate Dean M. D'Amico (via detailed course-section requests and rationale), and to Vice-Provost C. Bolton (via online course development discussions). The reason for this multi-prong approach (rather than a single document) is simply that it was an extremely challenging task to add more liberal science courses in the context of our unit's rapid program expansion. We had dire needs for program course sections, and the FAS faced budget cuts which severely limited the number of course sections we were allocated. By working with multiple offices, and maximizing the resources they could offer, we managed to deliver on this recommendation as follows: (i) We created 2 new liberal science courses for all Science and ENCS students in multidisciplinary biomedical Physics (PHYS 443/663 and 445/665 – this later one is now an approved elective in the Dept. of ECE). We are now offering 1 of these courses every year (alternating). (ii) We developed an online course accessible to all Concordia students called PHYS 284 Introduction to Astronomy. It is now offered yearly, and the enrollment for 17-18 is expected to be 800. (iii) We are currently developing a second general-audience online course called PHYS 273 (Energy and Environment), which will be offered for the first time in Winter 2018. We will continue to develop our course offering in the future.

**Recommendation 3:** The Department will continue to encourage its faculty members to work with the Centre for Teaching and Learning (CTL) to improve the quality of their course delivery. In addition, the Department should look to the common course outline template available from CTL and explore what is in place in other departments to optimize the development of a common course outline. The Faculty supports the Department Appraisal Committee recommendation to encourage presentations within the department to promote teaching methods and improvement. This can be implemented immediately with the assistance of CTL.

**Implementation schedule:** Ongoing/immediately [as of February 2015].

**Responsibility:** Department of Physics/assistance from CTL

### Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

### Update or rationale on the status of this recommendation

We have encouraged our faculty at Departmental meetings, as well as by circulating CTL emails, to attend the various activities organized by CTL. We also have recently (Winter 17) increased the amount of time dedicated to teaching method discussions at the Departmental meetings. We agree that more must be done on this point. The development of common course outline is extremely challenging in the context of our unit. We nevertheless are planning the following steps to more exhaustively comply with this recommendation:

### New timeline for completion of this recommendation

Fall 2017: We plan a joint meeting with the teachers of all multiple-section courses to develop a common set of practices for Homework delivery to large enrollment courses. We have initiated the discussion and are exploring the possibility to have a more uniform set of homework which merges both online and on-paper components. The best practice document from the Provost office concerning multiple-section courses will guide these discussions.

Fall 2017: We will invite a CTL staff to a Departmental meeting to talk directly to all our faculty members about the CTL training, resources and activities.

We will have fully complied with this recommendation by the end of Fall 2017.

## Graduate education

Graduate education happens both in the classroom and through mentoring by supervisors and advisory committees in a research environment.

**Recommendation 4:** In terms of classroom teaching, the Department already is broadening the course options for both PhD and MSc students by modifying degree requirements to include a larger selection of courses. In this context, the Department should continue to explore the feasibility of inter-departmental collaborations in course

offerings. By the end of 2015, the Department should have approached the appropriate departments and initiated discussions to explore available possibilities.

*Implementation schedule:* Discussions initiated by the end of 2015

*Responsibility:* Department of Physics

Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

Update or rationale on the status of this recommendation

*We are continuously monitoring the course offering in other units and evaluating its usefulness for our graduate students. Indeed our graduate students regularly register for courses in the Depts. of MAST, CHEM, and ECE for instance. We also have created courses which can more readily be used by graduate students in other programs in health sciences (PHYS 663, 665), and are developing in collaboration with 4 other Depts. a joint program in Nanoscience and Nanotechnology with common courses. For instance the course NANO 610 will be a six-credit course addressed to a broad range of students working in material science. We also increased the number of graduate courses by cross-listing more BSc level courses via curriculum changes (e.g. PHYS 637, PHYS 660).*

**Recommendation 5:** The Faculty supports the External Evaluators' recommendation that graduate students be encouraged to take advantage of all available opportunities for soft skills development at the graduate level. **The Department should consult with their students to see what skills they need and consult with the School of Graduate Studies to try to implement opportunities in these areas.** This should be initiated immediately.

*Implementation schedule:* To be initiated immediately [as of February 2015].

*Responsibility:* Department of Physics/consultation with School of Graduate Studies

Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

Update or rationale on the status of this recommendation

*We have addressed this recommendation but have not fully completed the consultation of our graduate students. We regularly inform each graduate student of the Grad Pro Skill Program offered by the Graduate School, via their yearly evaluation. We regularly consult our graduate students about their needs, for instance via the presence of the physics graduate student association at our Departmental meetings.*

New timeline for completion of this recommendation

*To complete the work on this recommendation we propose to send to each graduate student a brief Google Survey asking them to precise their needs regarding the development of their soft skills. After compiling these results, we will organize an information session for our graduate students with the help of the Grad Pro Skill Team to orient our students towards the services they need. Most importantly, we will establish a schedule (e.g. bi-annual) for this type of information session to be repeated regularly.*

*The survey will be completed in Fall 2017. The information session will take place in Winter 2018.*

**Recommendation 6:** In terms of research mentorship, the Faculty supports the recommendation of the University Appraisal Committee that **the Department develop a common set of guidelines for graduate supervision and ensure that all students and research supervisors are aware of these guidelines and their responsibilities.** Discussions should begin immediately and the School of Graduate Studies consulted as needed.

*Implementation schedule:* To be initiated immediately [as of February 2015].

*Responsibility:* Department of Physics/consultation with School of Graduate Studies

Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

**Update or rationale on the status of this recommendation**

Many GPC discussions, and procedure improvements have already taken place. The Graduate Program Director is currently drafting an updated version of our graduate supervision guidelines. This updated set of guidelines will be discussed in Fall 2017 by the GPC. This new set of guidelines will be based on the recently updated guidelines for graduate supervision from SGS.

As part of this new set of guidelines, we envision that a summary of the guidelines and responsibilities (to be approved) would have to be signed by both parties at the beginning of the student’s degree to clearly inform and remind both the students and supervisors of the guidelines.

**New timeline for completion of this recommendation**

Fall 2017

**Recommendation 7:** As proposed by the External Evaluators, the Faculty recommends that **the role of the supervisory committee be formalized and that regular meetings are scheduled to provide guidance to students.** This can be implemented immediately and the School of Graduate Studies consulted as needed.

**Implementation schedule:** To be initiated immediately [as of February 2015].

**Responsibility:** Department of Physics/consultation with School of Graduate Studies

**Progress on this recommendation (please underline one)**

Completed                      Delayed                      Ongoing                      Cancelled

**Update or rationale on the status of this recommendation**

This is completed. We have yearly and formal supervisory committee meetings.

**Recommendation 8:** To encourage graduate student enrolment and to benefit current students **the Department must promote existing funding opportunities and work with the School of Graduate Studies to improve funding packages for graduate students.** This should be initiated immediately.

**Implementation schedule:** To be initiated immediately [as of February 2015].

**Responsibility:** Department of Physics/consultation with School of Graduate Studies

**Progress on this recommendation (please underline one)**

Completed                      Delayed                      Ongoing                      Cancelled

**Update or rationale on the status of this recommendation**

Our GPD is communicating to all members any student funding opportunity he is made aware of. Moreover, the Department has improved (with help from the FAS and online courses) its TA budget to support graduate students. The number of FAS graduate awards in our unit has increased. The overall packages for graduate students have improved both in monetary value, and in how clearly they are communicated to the students. There is still some room for improvement at the level of RA support, but this is limited by research grants. We will continue to review, and when possible increase, the minimum RA support to be allocated to each student. Overall, our graduate students now receive competitive funding packages. Almost all packages significantly exceed \$20,000 per year.

**Recommendation 9:** As suggested by the External Evaluators, **the Department should increase the number of regularly scheduled colloquia, seminars and journal clubs to develop the intellectually community within the graduate population.** This could be implemented for the 2015-16 academic year.

**Implementation schedule:** Implement for the 2015-16 academic year

**Responsibility:** Department of Physics

**Progress on this recommendation (please underline one)**

Completed                      Delayed                      Ongoing                      Cancelled

**Update or rationale on the status of this recommendation**

For the last 2 years, we have had excellent series of research seminars. Each year, we have 24 high caliber external

speakers (once per week during Fall and Winter), plus a series of internal PhD and MSc thesis seminars (occasional). In May 2017, members of the Dept. of Physics helped organize the first (to be annual) PERFORM Methodological Workshop (Longitudinal Analysis with Neuroimaging Data), attracting around 120 participants from many Québec Universities to the Loyola campus.

### Recruitment and retention

Although both undergraduate and graduate enrolments have shown a general increase over the last few years, additional efforts should be made to increase registration and to optimize retention. The development by the Physics Department of a new program of awards for undergraduate students in Physics, the presentation of these awards and the publicization of the awards ceremony represents a strong commitment by the Department in this regard.

**Recommendation 10:** The Faculty appreciates the increasing enrolment levels at both the undergraduate and graduate levels in the last few years, but **efforts must continue to make the community aware of the quality and uniqueness of programs in the Department of Physics. Regular contact with the Faculty Communications Officer by the Physics Departmental Chair, Undergraduate Program Director, Graduate Program Director or Communications Officer (as appropriate) must be maintained to ensure the Department’s public presence and participation in Faculty activities. Similarly, the newly developed Physics Department website must be kept current to publicize physics and the Department. In addition, the Physics Department newsletter and other information should continue to be sent to students regularly through email.** In terms of further promoting the Department, faculty members are visiting CEGEPs and collaborations have been initiated between certain CEGEPs and the Department. A departmental brochure is available and faculty are presenting their research regularly at scientific meetings where they can promote both their programs and research. **These initiatives should be encouraged and continued.**

*Implementation schedule: Unspecified*

*Responsibility: Department/UGPD/GPD/FAS Communications Officer*

#### Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

#### Update or rationale on the status of this recommendation

*By its nature, this task must be perpetually renewed, and we are continuously working on it. The visibility and profile of our Department has steadily and significantly improved at Concordia, in Montreal, and globally in Canada and abroad. We regularly have news on the Concordia webpage, and have members joining research networks or presenting at major conferences. We are presently (Summer 2017) refreshing again the content of our webpage, and adding content for our students and prospectives. We regularly visit or host CEGEP students to promote our department. We participate fully in all internal promotional activities (Open House, Science Odyssey, recruitment service events). We are also increasingly sending students to undergraduate physics conferences across Canada.*

**Recommendation 11:** To ensure the smooth progression of students through their programs the Department has mandated that all undergraduate students see an academic advisor each year and has worked toward a defined course sequence for students that is available on the departmental website. **In the summer of 2015 the academic advisors will report to the department what effects these changes have had on student retention and success and explore how these practices can be improved. The academic advisors should consult with Student Academic Services and the School of Graduate Studies to explore best practices for academic advising at both the undergraduate and graduate levels.**

*Implementation schedule: Report due in the Summer of 2015*

*Responsibility: Academic advisors/consultation with Student Academic Services and School of Graduate Studies*

#### Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

#### Update or rationale on the status of this recommendation

*Our academic advisor (Zazubovits) has regularly discussed and presented to the whole department the impact of*

improved student advising on student enrollment and retention. Dr. Zazubovits, and starting now Dr. L. Kalman, are extremely dedicated advisors and address student requests promptly. The department is constantly trying to improve its advising, for instance by clarifying and updating the proposed course sequence online. In Fall 2017, Dr. Kalman will bring renewed energy and ideas to further improve our advising. The retention and graduation rates are improving, but this is a long term endeavor. A clear signal of the ongoing progress: program enrollments and number of graduates are by far record numbers in 2016-17.

**Recommendation 12:** In terms of retention and student advancement, the Department has initiated a regular series of meetings with students to explore research topics as well as to discuss career options and to hear from successful alumni. To enhance the student experience, **the Department is encouraged to begin immediately to expand the number of available research opportunities for undergraduate students and to advise undergraduate students about the possibilities for scholarship support.** In addition, **the Department should continue to work with the physics students to develop a Physics Club and, as recommended by the External Evaluators, establish a Physics Help Centre.** Discussions should begin immediately with the Deputy Provost about this recommendation.

**Implementation schedule:** Immediately [as of February 2015]

**Responsibility:** Department of Physics and Deputy Provost

**Progress on this recommendation (please underline one)**

Completed

Delayed

Ongoing

Cancelled

**Update or rationale on the status of this recommendation**

*We have significantly increased the number of BSc students working, and volunteering, in our research laboratories. We communicate via email several Summer research opportunities to all BSc students. We have put renewed emphasis on the annual Canadian Association of Physics guest lecture we host. This BSc level seminar by an external researcher is used to broadly advertise research for undergraduates (via an introduction by our Chair, and the talk itself). There were roughly 50 Physics BSc students at this event in March 2017. Working with our undergraduate student association (CUBCAPS), we are planning more undergraduate research and career seminars for 2017-18. The CUBCAPS is very active, and additionally many of our physics students are members of the Space Concordia Club (including the president of the club). Given these two active organizations, we did not see a clear need for an additional Physics Club, but we will discuss this again with our BSc students in Fall 17. Regarding a Physics Help Center, we have significantly increased the number of tutorial sessions offered to our BSc students – including for our service CEGEP courses. Recently, we have offered very extensive tutorials for what we judge to be a gateway course for retention (PHYS 367), and are targeting one more gateway course this year (PHYS 236). More tutorials will be offered as soon as we secure more TA funds.*

**The direction of the Department**

The changes that the Department already has made in their undergraduate programs strengthens both the Physics and Biophysics programs and highlights the direction of the Department. In addition, after this appraisal process was begun the Physics Department made two faculty hires in the area of Medical Physics Imaging. These two hires fall in the general area of Biophysics and more specifically in the area of Biomedical Physics. This also is an indication of the direction that the Department hopes to follow.

**Recommendation 13:** As recommended by both the External Evaluators and the University Appraisal Committee, **the Department should develop a detailed rationale to support their requirements for future development and hiring.** This plan should focus on not only research and teaching objectives, but also space needs in terms of research space, and teaching (laboratory space) and common space (e.g., for graduate students or a Physics Club). In addition, this plan should consider both the facilities and equipment needs in terms of research and undergraduate teaching. These issues will become even more pressing if enrolments continue to increase. Once the rationale has been developed the Department should bring it to the Faculty for discussion.

**Implementation schedule:** Unspecified

**Responsibility:** Department of Physics

Progress on this recommendation (please underline one)

Completed

Delayed

Ongoing

Cancelled

Update or rationale on the status of this recommendation

*The Department has complied with this recommendation as follows. A detailed hiring vision has been developed and explained (e.g. during a departmental visit by the VP Research, Dean, Assoc. Dean Research, and PERFORM Director in February 2016, in the presence of all our faculty members). Specifically, four faculty hiring proposals have been developed in our two research clusters “nano” and “biomed”: a long-standing priority for a theoretical physicist in nanomaterials (nano), a joint experimental physics-chemistry position in nanomaterials (nano), a joint physics-biology position in biophysics of human health (biomed), and previously a strategic position in medical imaging called MR physicist (biomed). Of these four positions two have been awarded recently, but not yet filled. Very recently, we also developed a proposal in wearable device physics (nano). **We are extremely hopeful that our top priority for a theoretical physicist hire can be granted in 2017. This would be a huge breakthrough for the future of our unit.** Following this, we aim to renew our hiring plan in Fall 2017 during departmental discussions.*

*At the request of the Assoc. Dean Planning and Facilities, we submitted in August 2016 a detailed space plan including all of the items mentioned above. All researchers whose space would be in any way affected by the plan were consulted. The plan was not to provide more space to any current researcher, but rather to cluster labs together and create new labs for future recruits. We did not get any feedback from the Assoc. Dean regarding this space plan after it was submitted. Regarding our teaching laboratory capacity, we have been aggressively planning the renewal of our teaching equipment and secure about \$200,000 in equipment purchases over the last 2 years (from the FAS). We have also improved our teaching lab space usage, and are managing well our increasing enrollments. On the research front, the leadership comes from our active researchers. We have seen excellent research infrastructure development. A new laboratory was built for Gauthier and Grova. Gauthier secured a CFI grant, and other researchers have also attracted recent equipment grants (CFI, RTI).*

**Further comments on the appraisal process**

The Department and Faculty Dean are invited to share any additional comments on the appraisal process or this Progress Report.

Comment from the Department of Physics:

*Recommendation #3 of the external Referee report calls for a faculty hire in theoretical Physics. This hiring request has been our top (and only) regular hiring request for several years. We have only 1.5 FTE theorist out of 10 FTE faculty members in our department. Almost all other Departments of Physics in Canada have roughly 50% of their complement as theorists. The lack of theorists in our unit is seriously jeopardizing the quality of several of our core courses, and the competitiveness of our programs. We sincerely hope that our 2017 hiring request for a theorist will be considered as an integral part of this appraisal report implementation, to ensure the sound development of our unit.*