

# Physics Program Review

Faculty of Science

## Dean's Summary

---

Submitted by:

Ora Steyn, Dean of the Faculty of Science

---

Accepted by:

Senate in September 2011

Academic Planning and Priorities Committee in June 2011

---

The purpose of the Program and Unit Review focused on the following areas:

1. Student Success ( vision for ideal graduate, student culture, engagement and success, personal growth and advising)
2. Program goals and outcomes for both streams (vision for future goals, program mix, future graduate credentials, key competencies, quality, breadth and mix of lecture and lab courses, methodologies, options for students , environmental sustainability, needs of minority groups and the community)
3. Program viability and growth opportunities ( vision for the future, entrance requirements, class sizes)
4. Research, Scholarly Activity, Community Involvement/Service (vision for research, student involvement, integration of research and teaching, plans for community involvement)

In accordance with Policy 210.15 Academic and Program Unit Reviews, the previous Dean of Science provided the Physics Department with a scope letter dated January 21, 2010. The Department delivered their finalized self study to the Dean of Science in January, 2011. On March 16<sup>th</sup> and 17<sup>th</sup> 2011, the site visit took place.

The reviewers met with faculty, staff, administrators, and students. The committee was provided with the Department's Self Study, the university's Strategic Plan, curriculum vitae of faculty and staff and material from Institutional Research. The review team provided their final report on March 31, 2011. The Physics Department asked to postpone their response till after the end of the semester and provided the dean with their response on May 9, 2011.

From the external reviewers' report:

"The reviewing committee is extremely impressed by the overall **quality of instruction** provided by the Physics faculty. The committee notes that the department has an excellent track record for placing their undergraduate students in graduate physics programs across the country. This speaks to the strong theoretical Physics education that the department offers. There is a clear consensus among the faculty that quality teaching is not only an essential ingredient to students' success, but is also a key to departmental success.

During the site visit, the reviewing committee met with approximately 12 students. They unanimously stated that the strength of the Physics Department resided in the exceptional quality of the instruction provided, the excellent rapport that existed between the students and the faculty, and the small class-size that enabled one-on-one interaction between students and faculty. Students indicated that all these factors played a preeminent role in their decision to study Physics at UFV."

Following are comments on the external review recommendations, the departmental response and the plan for implementation of the recommendations. It should be noted that the implementation of some of the recommendations will be dependent on the availability of funding.

**Recommendation 1:** Given the high proportion of Physics courses taught by sessional instructors (~50%), it is recommended that at least one additional full-time lecturing faculty member be hired.

**Action:** The Physics Department has had a vacancy for a number of years. They are in the process of hiring a new faculty member at the moment. The plan is to have the new faculty member in place for Fall 2011. The department indicated that they may request another hire in about a year's time when one of the faculty will have to take on the task of Department Head.

**Recommendation 2:** With a view of strengthening the curriculum in Experimental Physics, the following actions are recommended:

Laboratory course PHYS 232 – Experimental Methods in Physics should be a required course for all students completing a Major or an Honors degree program in Physics at UFV.

**Action:** The Physics department indicated that the course in question is new and that they would like to offer the course before making it mandatory. The Dean is supportive but would like to urge the department to ensure this change be made as soon as possible as there will likely have to be a warning period for students before it can be implemented.

PHYS 382 – Modern Physics Laboratory I and PHYS 383 – Modern Physics Laboratory II  
Purchase of new equipment for all upper-level laboratory courses.

**Action:** The Department will have to supply the Dean with a list of needed equipment and a budget once the inventory and testing of current equipment is complete. This will be taken into account for future budget planning.

The Physics Department should identify a “champion” for these courses who will take a leadership role in overseeing their future development.

**Action:** The Department has identified one of the faculty members as the champion for these courses. There is a request for two course releases for the faculty member to do an inventory of the labs, test the equipment, effect repairs, identify shortages in equipment, reflect on improvements and get the two new lab courses. A further recommendation is for a lab monitor student position for these courses. The Dean is supportive of these recommendations and would like to request a plan for the implementation of these courses with a clear timeline and budget.

A 5-year capital acquisition plan should be developed to revamp and modernize all equipment necessary for upper-level laboratory courses.

**Action:** The 5 – year capital acquisition plan will be developed once it what equipment will be needed has been established.

The department should consider making any two of PHYS 342, 372, 382 required courses for all students completing a Major degree program at UFV. (Currently this is a requirement for Honors students only).

**Action:** The department indicated that they will not consider this requirement until they have dedicated space and equipment to offer the courses on a regular basis. Please previous action item.

The department, with the help of the institution, should identify a dedicated space for the delivery of PHYS 382 and 383. University level equipment and lab facilities are costly but necessary for the UFV Physics program to move forward.

**Action:** The Dean will work with the department to assess space and equipment requirements and provide an implementation plan to the VP Academic and Provost. Students currently use part of the room for experiments lasting more than one week, but it is essentially not working as other students have access to the equipment.

**Recommendation 3:** The Physics Department should review either its second-year course requirements or its prerequisite structure for PHYS 351, 352, and 311 to ensure that students entering these third year courses have a consistent level of familiarity with the required prerequisite material. Currently PHYS 221 and 222 are the only required courses for the Major and Honors degree programs, yet PHYS 351, 352, and 311 require PHYS 231 and 252 as pre-requisites.

**Action:** The Physics Department has provided the Dean with the following changes to their curriculum:

Existing (typical) Fall semester:

- PHYS 221 (lecture + lab)
- PHYS 231 or 252 (alternating years)

New Fall semester:

- PHYS 221 (lecture + lab)
- PHYS 231

Existing Winter semester:

- PHYS 381 **strongly encouraged**
- PHYS 222
- PHYS 232

New Winter semester:

- PHYS 381 **strongly encouraged**
- PHYS 2xx (Waves)
- PHYS 232

The Dean will request a timeline from the Department for the changes to take effect. The department explained that PHYS 381 has two second year prerequisites, but is beneficial for students to take in their second year as it prepares them well for further upper level courses. Changing this course to a second year course will likely alleviate confusion. There is a precedent for courses at a certain level having prerequisites at the same level.

**Recommendation 4:** With a view to strengthen the Co-op option, the following actions are recommended:

The Physics Department should identify a faculty member who will take a leadership role in promoting the Co-op option among the students, liaise and collaborate with the Co-op office, help identify possible employers and Co-op placements, and build ties with local industries. The faculty member assigned to this role should receive the equivalent of one course release. The innovative approach taken by the UFV Science Advising Center, incorporating both staff and rotating faculty, might be worth adopting for the Co-op office.

**Action:** The Dean is supportive of this recommendation and will work with the department to develop a model and budget for implementation.

**Recommendation 5:** The Physics Department has identified 4 possible areas in which it might expand its programming: Medical Physics, Minor in Electronics, expansion of the Engineering Transfer program, and finally a Diploma in Engineering Physics. In view of its small size, it is unlikely that the department will expand in all those areas over the next 5 years. However for each new direction, the committee makes the following recommendations/comments:

#### Medical Physics

The Physics Department at UFV is uniquely positioned to implement this program due to its proximity to the new Cancer Agency in Abbotsford.

- The department could consider initially the development and offering of at least one of the third year courses required for this new program. The poor enrolment observed in PHYS 275 is perhaps due to the nature of the course content or the credit value (1), rather than a lack of interest in the Medical Physics program itself. The offering of a third year course could provide a better measure of the actual interest in the program.
- It is not clear whether the new program should be a minor, a concentration, or a certificate. The department should carefully analyze the benefits and the shortcomings of each model.
- In view of the department's commitment to quality instruction, it might consider involving a faculty member in the delivery of the third year courses in Medical Physics. (The committee recommends that the department examines the model used by Dr. Jirasek at UVic for the delivery of their newly developed Medical Physics program including their interactions with the BC Cancer Agency and their use of video conferencing facilities to enable a single course to be delivered to several institutions at once).

**Action:** The Physics Department intends to investigate all the options as to the delivery of Medical Physics courses and a possible minor, certificate or concentration. The possible involvement of a faculty member and cooperation with the BC Cancer Agency will be investigated as well. Due to the specialized nature of these offerings I would strongly advise the group to look at cooperation with a similar program at University of Victoria.

#### Engineering Transfer Program

In view of the high demand and interest for the study of Engineering at UFV, the articulation of existing second-year courses and the development of new second-year Engineering courses should be continued.

**Action:** The Dean is fully supportive of proceeding with a second year Engineering Transfer Program. The department intends to pursue discussion with the receiving institutions.

#### Minor in Electronics

The committee urges the Physics Department to create the last course needed to complete the needed suite of 5 courses to create this Minor. The incremental cost to offer this new program is small, and it

could be of interest to students in a number of disciplines, in particular students majoring in Computer Science and Chemistry. Abbotsford is also home to a burgeoning industry in avionics and the department may want to consult with local companies to refine the content of the Minor.

**Action:** The department indicated that the required course could be developed easily. The Dean would request that the department consult with the Electronics department in the Faculty of Trades as to possible collaboration. As the minor would benefit more students than a concentration, working on the implementation of such a minor is recommended.

### Diploma in Engineering Physics

It is recommended that the Physics Department conducts an in-depth analysis of the market demand for future graduates of this program. Consultation with ASTTBC (Applied Science Technologists and Technicians of BC) and potential employers is also recommended.

As the discipline of Engineering Physics is not recognized by ASTTBC, the department should consult with the Association to determine the type of professional credentials that could be achieved by future graduates.

**Action:** This project will clearly need much investigation and discussion. The department is well aware of the commitment needed to proceed, and see this as a long term project. A full feasibility study will be needed.

Other items worth mentioning from the external review are:

- Approximately half of all graduates of the program enter graduate schools, which is an indication of the quality of the program.
- Community outreach was mentioned by the group as something the department is involved in through the engineering transfer program, and that the department could expand. The hope is to do so through the co-op program.
- Lack of undergraduate research opportunities for students. This may be alleviated by the implementation of the recommendation on space and equipment, and the hiring of new faculty. The Dean will work with the department to explore possible collaboration with industry in the valley to generate research opportunities.

### **Conclusion**

Congratulations to the Physics Department for a very favorable review. The recommendations have all been considered and there is a willingness to move forward to implementation. I look forward to the opportunities that it will bring for students.