ONDERWIJSONTWIKKELING EN KWALITEITSZORG
FACULTEIT WETENSCHAPPEN
CELESTIJNENLAAN 200I BUS 2105
3001 HEVERLEE, BELGIË

REPORT SELF-EVALUATION IN CO-CREATION

2018-2019

Report on the self-evaluation in co-creation with the external perspective

1 General information

(P)OC: Fysica (Leuven) & WIF (Kortrijk)

Programmes: Bachelor Fysica (Leuven); Bachelor Fysica (Kortrijk); Master Physics (Leuven); Master Fysica (Leuven)

Resources:

- Thema's en vragen voor panelgesprek / *Themes and questions for panel discussion*
- Blauwdruk en leerresultaten Bachelor Fysica (Leuven, Kortrijk)
- Blauwdruk en leerresultaten Master in de Fysica & Master of Physics / *Blueprint and learning outcomes Master in de Fysica & Master of Physics*
- Relevante web-links
- Uittreksels uit het opleidingsplan / *Excerpts of the curriculum plan*

Date: February 6, 2019

Location: Heverlee, Campus Arenberg III, 200 D, 05.32

Present:

- Patrick De Causmaecker – Programme director POC WIF KULAK
- Dries Doornaert - alumnus KULAK and representative workfield, BARCO
- Bert Janssen – extern ZAP – University of Granada, Spain
- Ewald Janssens – secretary POC Fysica
- Vicky Philipsen – alumna and representative work field, IMEC, Leuven
- Alejandro Silhanek – extern ZAP - Université de Liège
- Eef Temmerman – member POC WIF KULAK
- Margriet Van Bael – Programme director POC Fysica
- Koen Van Den Abeele – ZAP member POC Fysica & POC WIF KULAK
- Joris Van de Vondel – ZAP member POC Fysica
- Griet Van Roosmalen (repl. Inge Serdons) – Educational Development & Quality Care – Faculty of Science
- Lynn Verschueren – ABAP, ESAT - IMEC, Leuven

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2 Report

Question 1: Other disciplines in the bachelor programme: *Should bachelor physics students be exposed to other (scientific) disciplines besides physics? If yes, which ones? To what extent should students be able to choose these other disciplines? Is it important that the students can therefore adjust their own study programme at the level of individual courses? To what extent is a further optimisation of such broadening in the bachelor programme required and which opportunities do you see therefore, starting from the current programme?*

Current situation: In the bachelor physics, students are exposed to other disciplines through the following courses or course packages:

- Chemistry & programming (12 sp)
- General courses (philosophy, science communication, religion) (9 sp)
- Minor Leuven (30 sp): mathematics, bio-chemical sciences, astronomy & IT, or business & innovation
- Minor Kortrijk (33 sp): mathematics, informatics, or economy & technology (with possibility to adjust with facultative choices, including study visit abroad or project internship)

Summary of the discussion:

- The general opinion of the panel members was that ***exposure to other disciplines*** is good and that the selection of other disciplines in the Ba curriculum is well chosen. Some panel members bring up the condition that the 'other disciplines' should not be too distant, in particular questioning if it is useful to have optional courses on economy. There was, however, no consensus on this point as other panel members (from industry) consider a course on business and innovation relevant for the student's professional career.
- The consensus of the panel members about the ***weight*** (in study points) ***of other disciplines*** in the bachelor program was that the current situation is well balanced. The panel members would not increase the weight of other disciplines. Teaching the fundaments of physics (and the mathematics required therefor) is most important. Making links with other fields is useful, but should not be extensive.
- The current curriculum contains a significant amount of flexibility, in particular through the minor. The panel was asked the question if particular ***domains of physics/mathematics are not sufficiently covered*** by the compulsory curriculum. Possible shortcomings are in the sub-disciplines of optics, atomic physics, and in particular statistics, although items of those disciplines are covered in other courses.
- The planned implementation of a ***learning line on sustainability*** was also discussed. While most panel members considered this topic important, there were concerns with respect to an associated reduction of the physics/mathematics content in the bachelor programme. If sustainability would be introduced as a standalone compulsory course, one advised that it replaces one of the general courses (science communication, religion?, philosophy). As alternative a reduction of the minor was proposed. Some panel members were of the opinion that students should be able to reflect on sustainability by themselves, i.e. without the need to explicitly include it into the curriculum.

Bachelor Fysica (Leuven); Bachelor Fysica (Kortrijk); Master Physics (Leuven); Master Fysica (Leuven)

Question 2: Personal development and work field oriented skills*: Which work field oriented competences are important in the profile of a freshly graduated physicist? How important is it that already during the Physics Bachelor and Master education, students are trained in these work field oriented skills and attention is given to personal development? How important is it that explicit links are made with the work field during the Physics Bachelor and Master education*

Current situation: The skills that are explicitly mentioned in the learning outcomes are communication, team skills, society, critical judgement, and life-long learning. The development of those skills is stimulated through both activities within the curriculum and through extra-curricular activities.

- within curriculum:
  - Embedding in several courses (compulsory)
  - Specific courses on science communication, historical and social aspects of physics, science and sustainability,... (compulsory)
  - Course offered by LCIE entrepreneurship academy, AFC/AFD projects (optional)
  - Option in master (Physics for Society/Fysica in de maatschappij, Onderwijs, Research)
- extra-curricular:
  - Inspiring presentations on research by professors, 1ba Toga project
  - Speed date with alumni

Summary of the discussion:

- The panel recognises that our programmes already contain a broad offer in personal development and work field oriented skill training possibilities
- The experience of panel members affiliated to other universities is that in their institutes most options related to personal development and work field oriented skills are extra-curricular / additional.
- Representatives of the work field comment that courses that are most requested by companies are more practical /directly applicable such as: C++, GPU programming, finite element simulations. Not all panel members agreed that this kind of training (in particular teaching a specific language or a specific software package) is the task of an academic education.
- (Company) internships are an interesting possibility to develop these kind of skills, but it is best to offer them on an optional basis and not compulsory in the curriculum. Participation of our students in company internships is currently very low. To increase the interest of students in such internships and to create more awareness (of both students and companies), company visits could be considered as part of one of the courses in the bachelor program.
- The panel members agreed that these skills are important for the broader development of the students, but are not of the opinion that better development of such skills training will make our graduates more attractive for employers in industry (with remark that this was never the main purpose).

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Question 3: Research orientation: *In what way and to what extent should a bachelor and master programme in physics be oriented towards specialised present-day scientific research in modern physics? How would you describe an optimal balance between specialisation in the domain of the master's thesis on the one hand, and keeping a sufficiently broad view on the various domains of modern physics on the other hand? Do you see possibilities for further optimizing both aspects, starting from the current programme?*

Current situation: Our educational programme (in particular the master) aims for a strong connection with the research groups and research subjects at the department. This is obviously implemented through the specialisation profiles (condensed matter physics, nuclear physics, and theoretical physics), but also through the learning line on Research and Research Skills, which includes the courses: Experiments in Modern Physics (compulsory), Research Methods in Condensed Matter Physics, Research Methods in Nuclear Physics, Capita Selecta in Theoretical Physics, Research Internship, and Master thesis (compulsory). The goal of this research line is that students develop themselves as independent researchers. Evidently, students that opt for the research option (including a research minor (≥ 12 sp) ≠ research major) are additionally trained in this respect.

The second aspect of this question deals with the equilibrium between broad training (different domains of modern physics) and specialization. This is implemented in the master (the bachelor naturally concentrates on broad training) via the truncus communis (broad knowledge) versus the specialization profiles and the option (specialization).

Summary of the discussion: The panel members all agreed that training in the master should be research based, so the discussion mainly dealt with the balance between broadening and specialisation. The panel members recognize that this is a difficult exercise and overall appreciate the way both broadening and specialization are implemented in the master. More specialisation may lead to students that are better prepared to start a PhD research in a specific topic, while broader training will give the students more options for different career paths in different (sub-)fields. The panel also notes that there is quite some flexibility in the composition of the individual study programme so that students can (partly) decide themselves how much specialisation they like.

Some panel members raised concerns about the 'forced' broadening via the research minor within the research option. The added value of specialisation in a different discipline as the research major was not evident to all panel members. Other panel members considered the compulsory broadening as a positive element that stimulates an open learning attitude and trust that students can also acquire specialized knowledge in a second different topic.

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Question 4: Internationalisation: *To what extent is it important that physics bachelor/master students have obtained an international experience by the end of their study? What are good formats for such international experiences? Do you see opportunities for further optimising the internationalisation in the study programme?*

Current situation: The students in the bachelor and master of physics have currently the following options/obligations with respect to internationalisation:

- International exchange programmes (Erasmus) – mostly during the master; model programmes are recently offered for 3rd bachelor students in Leuven (optional). Bachelor Fysica Kortrijk promotes Erasmus exchanges in the 3rd bachelor, in particular with the University of Leiden (optional).
- 16% of the students in the English Master of Physics are international students.
- Students are informed about the possibility to participate in international summer schools and internships (own initiative, optional).
- Compulsory master's course with international visit to large scale experimental facilities (obligatory)
- International environment: lecturers and supervisors of bachelor project, master thesis
- Experiments at international large scale facility in the framework of the master thesis (optional)
- Colloquium, capita selecta.... (optional)

Summary of the discussion:

- The current offer with respect to internationalisation is sufficient. Members of other universities judge that the fraction of students that make an Erasmus exchange is good.
- The panel members are of the opinion that internationalisation, in particular foreign study exchanges, are a valuable experience for the broader development of the student (network building, good for PhD afterwards, develop skills such as taking initiative and independence, ...), but can have the (obvious) drawback of a less coherent course package (and in some cases also lower quality of the courses).
- While the representatives of universities do value an international exchange as an important asset in a CV, this was less the case for representative from industry (unless the exchange was directly relevant for the job, for instance if one learned x-ray techniques at a synchrotron).
- It was advised to give more attention to the possibility students have to participate in summer internships. This may be attractive for students that prefer not to go abroad for a full semester or do not want to "disturb" the coherence of their study programme. It is unclear if students are sufficiently aware of this possibility.

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3 Approval of the report

After the self-evaluation, the report has been sent to all participants for approval. Remarks on the report could be sent by mail before February 15th, 2019. Remarks have been included (final February 18th, 2019).