ADVISORY BOARD SCGC
EXECUTIVE SUMMARY OF THE ADVISORY BOARD MEETING 2016

Composition of the Board

Board members:

- Agnes Bombrun: Head of Ingredients Research, Givaudan AG, Dübendorf
- Thierry de Preux: Managing partner, Board Consulting, Paudex
- Alain Fuchs: President and CEO, CNRS, Paris, France
- Andreas Heyl: Chief Techn. Officer, Specialty Ingredients, Lonza AG, Visp
- Reto Naef: Novartis Pharma AG, Prime Force consultant & CEO Topadur Pharma AB, Basel
- Stefan Palzer: Vice-President/Director R&D, Beverage division, Nestec Ltd., Vevey

Process of the consultation:
The members of the board were asked to answer a list of questions about education at SCGC in advance to the meeting (Appendix A). During the meeting in the presence of Agnes Bombrun, Thierry de Preux and Andreas Heyl (Stefan Palzer was absent and Alain Fuchs and Reto Naef had to cancel their travel at the last minute), a general introduction about SCGC, ISIC, the doctoral school and ADEC was given. The board then met students and teaching assistant delegates. After a lunch with the members of the teaching commission, the curriculum was discussed in detail in the afternoon (See Appendix B, Agenda).

General Education

A/ General Impression on EPFL students in chemistry or chemical engineering

Profile of Chemists and Chemical Engineers: EPFL chemistry graduates are highly appreciated for their strong scientific backgrounds with good basis in mathematics and physics and their hard working attitude.

However, the capacity to adapt to new situation rapidly, one of the major assets of EPFL students in the past, has decreased in the last years (“EPFL produces followers, not leaders”). Being able to learn and adapt rapidly should be the main goal of education. Using the right tools for higher work efficiency is also important. Nonscientific skills are often lacking.

Market and Career in the Field: There is still a strong need for people educated in the field, especially for chemical engineers. Chemical engineers are now also increasingly hired at the PhD level. Flexibility is important (geographical and topical) and linear careers are very rare. Two types of scientists are appreciated: the experts and the managers, with different career paths. However, for
experts also soft skills are essential (“You are hired based on your hard skills, but fired based on your soft skills”)

B/ Entry to EPFL

The EPFL should in all cases keep the highest standards. The idea of the MAN (Mise à Niveau for weaker students) was broadly approved by the advisory board, who suggested adding courses on work organization, often seen as a source of failure.

C/ General Content of Studies

Developing Soft Skills: The board was very positive on the scientific content of the studies, but highlighted the need for better soft skills. In particular, students were seen as not proficient enough in the use of written and oral communication tools such as word, excel, power point or just how to write emails. Working in teams should be also more exercised. These skills should be more intensively trained during laboratory courses and exercises sessions. Soft skills should be trained since the first year, but should become even more at the center of education during master and PhD.

Computing Skills: Good skills in computing are essential nowadays, as is a good knowledge of available resources in the internet.

Working Independently: Generally, the studies were found excessively scholar and fractioned with too many exams to allow the development of a good intellectual independency. Continuous control can only make the situation worse, as the students will not learn to work independently.

SHS and MBA: Whereas the board was in favor of SHS lectures, it proposed that they should be more linked to global issues of current high importance for scientists. A MBA can be a good asset on the job market, but it cannot compensate lack of scientific competence.

D/ General Format of Studies

EPFL should support the use of modern teaching techniques, such as MOOC, but the direct contact between teachers and students should stay at the center of education. Required travelling on multiple sites for studying, while sometimes diminishing efficiency, is an excellent preparation for the “real world” later, as is working and interacting with people from different cultures and languages.

Bachelor

First Year: The structure of the first year with a strong propedeuticum in maths and physics found a strong approval with all board members. However, the quantity of chemistry in first year was more under discussion, going from an ideal of 30% for members with chemical engineering background to 50% for members with chemistry background.

Late Separation Chemists/Chemical Engineers: Was seen mostly as a strength and brand mark of EPFL, even if it can lead to some missing knowledge in some core fields for the engineers.

Language: The board strongly recommended systematically introducing English in the bachelor already. Independent of the language, writing skills should be more developed.
**Practical Education:** The board did not agree on the best proportion of laboratory courses (from 10 to 20 h) a week. Nevertheless, they emphasize the fact that even more important that the quantity was a strong link between practice and theory, which seems to be lacking in our current curriculum.

**Content:** The content was found adequate. The following fields could be eventually further strengthened:
- Differentiate soft and hard material sciences, link between material structure and properties
- Technology of dispersed systems
- Improve understanding of acids and bases (link between theory and practice)
- Current applications of chemistry and role of existing chemicals

Furthermore, some members found the structure of the bachelor excessively scholar, with only few free choices left to the student.

In addition, the board supported the possibility to do an exchange with another university in the third year, as long as it was well planned from the education/career point of view. The possibility to do a bachelor thesis/internship was found interesting, but only without lengthening the bachelor. As hiring is not done at the bachelor level, this professionalizing step is not really yet required.

---

**Master Programs**

**Master at 120 credits:** The board unanimously supported the introduction of the 120 credits in chemistry. The introduction of a research internship is a very valuable decision to prepare students.

**Industry internship:** The internship was considered as an essential part of the education and serves as basis for hiring in several companies. The board members would also encourage strongly the chemists to gain an experience in industry during the newly introduced research internship. Doing a minor appears less attractive, unless part of a specific career goal.

**International experience:** Is certainly important at the master level, but should be coherent with the pursued education/career goal.

**Content:** The content was found adequate. Concerning possible orientations, the board told that there is no general better choice; it all depends of personal interest and the projected internship/master work, which will influence of course the future possible job profile. The following fields could be eventually further strengthened:
- Design of Experiments techniques (DOE) with PCA methodology
- Biocatalysis for chemical synthesis
- Key steps in downstream processes
- Science of solid/liquid materials and microstructures
- Food physics and food process engineering: soft matter, foams, emulsions, formulation, preservation
- Uses of internet resources (databases, Scifinder)
- Regulatory affairs and patenting

In general, lectures on extremely specialized topics were found less useful.
Doctoral School:

**Importance of PhD for job market:** A PhD is essential for jobs in R&D, less for production and supply chain. However, also engineers are increasingly hired at the PhD level.

**Teaching experience:** is considered as very important, because it leads to the development of soft skills.

**Soft Skills:** The development of soft skills is essential and should be systematically trained at the PhD level, as PhD scientists are expected to lead teams later. Soft skills are needed especially for project management, personal management and communication (oral and written). A basic economical understanding is also important. PhD students should also learn to manage frustration and increase their work efficiency, making use of the best tools available.

**Specialization and Interdisciplinarity:** A PhD needs to lead to an expert knowledge in a field. Nevertheless, PhD students should remain open to other scientific and non-scientific fields. “A PhD should be specialized, but the topic can be interdisciplinary”. Being able to work with specialists in other fields and non-scientists is especially important.