

20 Years Life Technologies at the University of Applied Sciences Western Switzerland Valais

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Abstract: The Faculty and Institute of Life Technologies of the HES-SO Valais offer attractive educational and R&D programmes in three areas: analytical chemistry, biotechnology and food technology. The Faculty offers a three-year Bachelor degree programme with three specializations as well as follow-on Masters programmes. The strategic research priorities of the Institute are quite diverse: the search for analytical solutions for chemical, cosmetic, pharmaceutical and food applications; isolation and characterisation of active substances extracted from aromatic and medicinal plants; development and optimisation of biotechnological processes for the production of therapeutic biomolecules; development and production of novel foodstuffs; food quality and food safety. The Faculty and the Institute employ a highly qualified staff of over 50 people to carry out these tasks. A large range of facilities is available to cover the needs of education, research and other activities.

Keywords: Analytical chemistry · Biotechnology · Food technology · Higher education · Life technologies

1. Introduction

The Engineering Department of the HES-SO-Valais celebrates its 20th anniversary this year. On November 11, 1988 the Engineering School of Valais was officially established at Sion. Originally organized in four departments (electrical and mechanical engineering, chemistry, food technol-

ogy) it has over the years undergone several face lifts, the most important of which took place in 2002, when its teaching activities were reorganized in two Faculties, Industrial Systems und Life Technologies, and a new study specialization, Biotechnology, was established.

The staff at the Faculty and Institute of Life Technologies consists of about fifty people, including 18 professors and lecturers (chemists, biologists, microbiologists, biotechnologists, food technologists) supervising and coaching some thirty scientific and technical staff members. All professors are researchers-teachers whose teaching load is on average 60%, the remaining time being used for Institute activities. Furthermore every year the Faculty trains four laboratory technician apprentices in chemistry and biology.

2. Formation

The Faculty of Life Technologies brings together all the competences needed for an attractive and particularly well-targeted study programme in:

- Analytical Chemistry
- Biotechnology
- Food technology

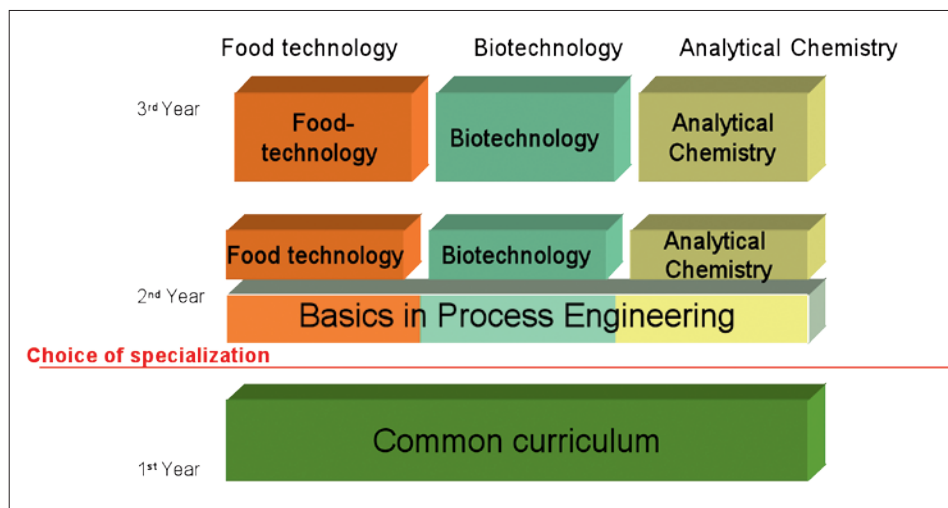
2.1. BSc Curriculum

A novel feature of the three-year Bachelor curriculum (180 ECTS credits) is the fact that it comprises a common curriculum for about half this time and in particular for the whole first year. After the first year, which is an assessment year that must be passed as a whole before the student can continue, the student chooses a specialization. The second year consists of reinforcement modules; the third year comprises specialization modules. The education concludes with a final degree thesis that lasts for 11 weeks and usually concerns industrial themes. In contrast to the university system, the HES bachelor education is job-oriented. At the moment the Faculty comprises approximately 150 students, of whom 40% are women.

The programme Bachelor curriculum is presented in the Scheme.

Engineers in Life Technologies possess very distinct professional profiles, which makes them very rapidly operational.

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Scheme. Curriculum of the BSc programme

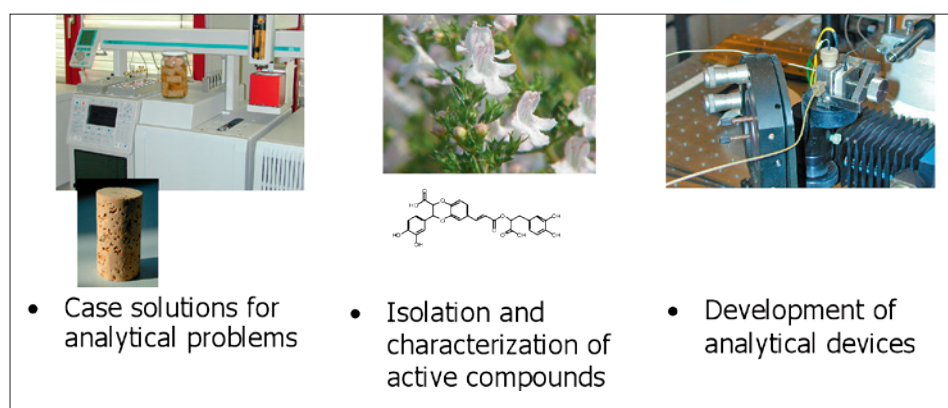


Fig. 1. Main research fields in the analytical chemistry unit

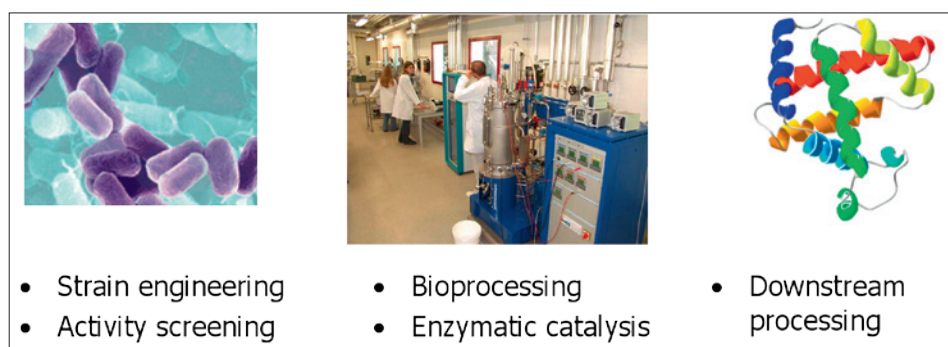


Fig. 2. Main research fields in the biotechnology unit

An *engineer in analytical chemistry* possesses the necessary competences for developing and optimizing analytical methods as required by industry and by the scientific community. He or she is capable of ensuring the monitoring of production processes and the quality control of products. He or she is also capable of managing an accredited analytical laboratory.

An *engineer in biotechnology* possesses the necessary competences for running bio-

reactors that industrially produce or transform molecules of high added value, using microorganisms, enzymes and mammalian cells. He or she also masters purification operations up to the final product.

An *engineer in food technology* possesses the necessary competences for developing new foodstuffs that satisfy the requirements of the consumers, as well as for managing an industrial production line. He or she masters the concepts of food quality and food safety.

2.2. MSc Curriculum

The Faculty is an active partner of the nationwide Masters degree in Life Sciences; from 2009 on it will offer a three-semester programme (90 ECTS credits) in the following areas:

- Analytical Sciences and Natural Product Chemistry
- Bioprocesses and Bioconversions
- Food Safety Management

3. R&D

The Institute of Life Technologies is active in three areas: Analytical Chemistry, Biotechnology and Food Technology. The applied research activities range from process to product development, and also include the development of analytical methods as well as the characterisation of products. Chemical, physical, biological, microbiological and sensory analyses are among the services offered by the Institute. Most of its laboratories are accredited ISO 17025, type C (STS 093). The Institute also provides consultancy in the area of food safety.

The Institute is in daily contact with companies (large ones as well as SMEs) and provides its skills and infrastructures to them in order to implement – in partnership with the client – research projects, service contracts or consulting. All the services provided are subject to a price quotation and a specific contract.

3.1. Analytical Chemistry

The research programmes of the analytical chemistry research unit focus on case solutions of analytical problems, the isolation and characterization of active compounds and the development of analytical devices (Fig. 1). These activities are applied to chemical, pharmaceutical and cosmetic products, as well as to food and food related products and to natural substances. Special attention is given to the environmental analytical sciences.

3.2. Biotechnology

Biotechnology is an important area of activity of the Institute. Biotechnology relies on the general but application-oriented objective of combining molecular and cell biology with both well-known and novel process technologies. With the help of a large range of analytical equipment very diverse bioanalytical problems can be solved (Fig. 2). As a member of superregional research networks the project partners are guaranteed quality at national and even international level. Research and development is carried out on application- and product-oriented topics. The activities centre on the production of biomolecules by means of biotechnological processes, using microor-



Fig. 3. Main research fields in the food technology unit

ganisms and cell cultures, the development and optimization of bioprocesses (strain engineering and process development) and the isolation and purification of products (downstream processing).

3.3. Food Technology

Since the beginning of this century people are looking for food products that promote health and increase well-being. People expect science and research to improve

their quality of life. First of all, foodstuffs should be natural and require a minimum number of technical operations. The Institute uses part of its resources for the development of novel foodstuffs, cosmetics and phytotherapeutic products in order to come up to consumers' expectations with respect to quality, safety and authenticity (Fig. 3). It is engaged in research in functional foods, nutrition for athletes and medicinal nutrition. Whenever possible it makes use of indigenous resources like alpine plants, fruits, vegetables.

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