

The College of Pharmaceutical Sciences, an inquiry-based undergraduate honours programme for the training of pharmaceutical scientists

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Objective: In addition to a bachelor-master trajectory for the education of practising pharmacists, the Utrecht University offers a research master programme Drug Innovation [1]. Recently it was decided to design an additional undergraduate programme aimed at attracting talented students from an international context, who are interested in a research career within the pharmaceutical field. This initiative is in accordance with the University's policy to sustain its position as a research institution of high international quality, and to provide research focus areas with an interdisciplinary approach.

Design principles: The College of Pharmaceutical Sciences (CPS) was designed according to the principles of inquiry-based learning [2]. Several reasons prompted for this educational approach:

- selected students are expected to be highly motivated, gifted and talented;
- students are trained for the discovery and development of drugs in a research environment;
- students must be able to cope with the speed at which new knowledge becomes available.

It is important to foster high-end learning, higher-order thinking skills, self-regulated learning and creativity. Talented students ask for more speed, less repetition and challenges during education. Inquiry-based learning are dose approaches to learning that are driven by a process of inquiry. It is a student centred approach that encourages students to actively explore and seek new evidence. The teachers' role is to support and facilitate students in developing their own personal understanding of scientific concepts [3]. In this way the students are stimulated to take more responsibility for their own learning process. Inquiry-based learning is usually organized as collaborative work in small groups, thereby giving the additional advantage of improving team-working and project management skills of students.

Curriculum: The "drug development pipeline" functions as the organizing principle for the first year of the curriculum. Students follow the drug pipeline in reversed order (from therapeutic application to molecular design) in order to connect to the incoming students' world as good a possible and to follow a natural course of interest-driven study at progressively more detailed physiological, cellular, biochemical and molecular levels later in the year. At the same time, this sequence repeats the historical development of the relevant science areas. Year 1 consists of four 10-week courses: Drug Use (epidemiology, therapeutics), Drug Delivery (pharmaceutics, pharmacokinetics), Drug Action (physiology, cell biology, pharmacology) and Drug Target (medicinal chemistry). In their second year students follow two mandatory courses in Neuroimmuno-pharmacology and Analytical Techniques, followed by a wide choice of electives offered in the chemical, biomedical and pharmaceutical field. In year 3 students follow a mandatory course Drug Discovery and Development as a preparation for their individual undergraduate research project, which is carried out in their final half year.

Teaching-learning environment: Students should become familiar with a research environment as soon as possible. Therefore, all courses are constructed around a set of authentic problems: examples are writing a disease file or drug file, designing a clinical trial, designing and carrying out an epidemiological study, a biochemical experiment or a chemical synthesis. Most of the time the students are free to choose their own subject or research question they want to work on. Practical work by the students is carried out in the research laboratories of the department, rather than in designated teaching facilities, and direct interaction with principal investigators, Ph.D-students and/or technicians is organized throughout the curriculum. The inquiry-based environment, supported by contact with researchers, provides a research-based environment were the students are stimulated to learn and work as a researcher [4]. For all courses and tutoring of students the English language is used exclusively.

Selection of students: After application, students are selected on the basis of their motivation, research interests, scientific orientation and language capability. The selection procedure involves submission of a motivation letter and letters of reference, writing a (timed) essay about a biomedical or pharmaceutical subject and a personal interview. A maximum of 50 students is selected annually.

Conclusion: A novel international, selective, research-based undergraduate honours programme, aimed at the training of research scientists in the pharmaceutical field, was developed [5]. The first evaluations indicate that the students feel highly challenged by the programme and are stimulated to be creative and independent learners.

References:

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