

# Vision for teaching at ETH Zurich

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Prof. Dr. Günther Dissertori, Rector of ETH Zurich

## *ETH Zurich's teaching approach*

*Creating successful solutions calls for successful thinkers and doers. ETH's excellent education plays a vital role in addressing the daunting scientific, technical, ecological, economic and societal challenges of the future.*

## Starting point and goal

The "Vision for teaching at ETH Zurich" was drafted by Rector Günther Dissertori in spring 2023 and then finalised in several steps. The basis for the vision is, on the one hand, the preparatory work of the Vision 2040 project, which was completed in summer 2021 and led by Dr Judith Zimmermann (Rector's Staff, Strategic Initiatives Group) and Dr Chris Luebke (Strategic Foresight Hub, Office of the President), and, on the other hand, the work of Working Group 4 "Vision Teaching & Learning 2040" of the Rectorate's Student Growth Task Force, which ran from May 2022 to November 2023 and was led by Professor Andreas Vaterlaus, Vice Rector for Curriculum Development, and Professor Ulrike Lohmann. The primary trigger for these work processes were the forecasts for the growth in student numbers over the next 10-15 years and, associated with this, the question of what challenges will arise for teaching at ETH Zurich due to future developments and resources that do not grow at the same rate.

The two working groups mentioned above dealt with the question of how universities will develop over the next 10 to 15 years. They based their work on a wide variety of forecast scenarios, some with a regional and some with a global perspective. Drawing on these future scenarios, the "Vision for Teaching at ETH Zurich" addresses the question of what the challenges in the higher education sector will look like in 10 to 15 years and how ETH Zurich should meet these challenges in the area of teaching.

The "Vision for Teaching at ETH Zurich" is therefore not a vision for the immediate future, but a look ahead to the next decade. From this point on, we will then turn our attention to find promising ways of meeting future challenges, based on the current situation.

# A vision for teaching at ETH Zurich

## Vision for teaching at ETH Zurich

We prepare our students to face the world's greatest challenges by equipping them with the best tools for tackling the unknown problems of our unpredictable future. We seek not only to equip them with knowledge and skills, but also to cultivate the resilience and adaptability needed for coping with failures and turning these into opportunities for learning and problem solving.

## Mission Statement for teaching at ETH Zurich

To achieve the teaching vision, ETH is pursuing the following four goals:

- ETH Zurich actively engages in top-level university teaching in the natural and technical sciences. It offers the next generation of academics a comprehensive higher education to equip them for mastering the great challenges ahead.
- Thanks to the outstanding achievements of its researchers and excellent links with industry, business, society and academia, ETH Zurich educates its students by drawing on the latest scientific findings and focusing on the needs of companies at the forefront of innovation in Switzerland and globally.
- An innovative didactic framework and an excellently trained teaching staff dedicated to passing on their knowledge form the foundation for achieving the teaching mission.
- ETH Zurich is committed to the pursuit of excellence. The students' education prepares them to assume key positions and leadership roles in research and business, to act as responsible and discerning members of society, and to tackle the most pressing issues of our time.

By consistently pursuing these four goals, ETH Zurich will remain, both in teaching and research, the undisputed leading house for science and technology in Switzerland and a top university worldwide. Here the university plays a decisive role in securing and extending Switzerland's leading global position in research and development.

In order to fulfill its mission, ETH focuses its teaching on the following four areas:

1) solving global challenges and transferring knowledge to society and the industry; 2) integrating new knowledge, new technologies and new didactic methods; 3) designing study curricula to take into account new knowledge, increasing diversity and the evolving needs of students; 4) further developing the campus as a place for exchanging experiences.

# ETH's four teaching priorities in the context of current challenges

## 1) To be a pioneer in solving global and regional challenges and in transferring knowledge to society and the economy:

The world is becoming ever more complex and the challenges facing humanity grow apace. We cannot yet gauge the consequences of these changes.

**ETH Zürich's** core mission is to enable its students not only to acquire and apply knowledge in the here and now, but also to master the potential challenges of the future. The ETH degree programme is designed to provide a sound and comprehensive specialist education at the cutting edge of research, along with a solid understanding of context and a broad range of skills. In this way, it equips students to solve both disciplinary and interdisciplinary issues and to work effectively in a collaborative manner.

The rapid pace of change in the world calls for an urgent transfer of knowledge from academia to practice and vice versa. While universities, as academic institutions, must stay connected to the global level, they must also supply the regional level with valuable output such as knowledge and skilled labour.

**ETH Zurich** adheres to Humboldt's unity of excellent teaching and outstanding research as its central premise. It also seeks to extend this by linking knowledge generation at the university with knowledge application in practice in the economy or industry. ETH is to continue evolving as a hub for ideas and a platform for transferring knowledge and technology between regional and global levels as well as between science, business and society.

Society and industry look to the university to educate and train people who are able and willing to deploy their knowledge and expertise for the common good and to shape a better future.

**ETH Zurich** believes that acquiring knowledge is only one aspect of learning; equally important is the ability to use such knowledge to assess and solve problems in an increasingly complex world. As well as enabling its students to acquire and apply academic knowledge, ETH should also make them aware of their responsibility to society at large as citizens, members of the academic community and a privileged social group.

## 2) To constantly incorporate new knowledge, technologies and methods in its degree programmes and to place new insights at the heart of its teaching

University courses must run close to the cutting edge of innovation; digital transformation and new technological breakthroughs must be embedded within the curricula. But with the increasing free availability of knowledge in the digital space, the role of the university is also changing from that of a guardian of knowledge to an institution of classification and critical questioning. This task will become even more critical as the pace of technological development accelerates.

**Knowledge alone is not enough; the goal of studying is understanding:** Students should acquire the skills for understanding and handling powerful new technologies, recognise their limitations and put relevant knowledge to best use. During a degree course, building up a foundation of specialised knowledge is essential. Yet, directly linked to this acquisition of knowledge, there is always a need for a critical examination of the “why” behind the knowledge imparted, of the professional parameters and limits of knowledge, of current scientific trends and social drivers, of hidden agendas and prejudices. In addition, a key component of every successful learning process is the practical application of knowledge and the experience of both success and constructive failure that go with it.

For ETH Zurich, the integration of new knowledge from basic research and advanced fields of application into the study curricula is paramount to the high quality of its education. Both the understanding of general theories and principles and the application of knowledge are a fundamental part of the degree programme. When students recognise and understand the educational goals and the underlying principles and tools of their subject, they are better able to assess how and why they can and should apply their knowledge. An effective means of promoting these skills is project and problem-based teaching within the framework of subject-specific and interdisciplinary projects.

Project-oriented, competency-based and individualised learning, along with a critical examination of what has been learned, demands considerable commitment and motivation from the lecturers. It also calls for top-level technical and teaching skills and an understanding of the role shift from “sage on the stage” to “guide on the side”.

Rapid digital transformation is opening up new opportunities in education. Knowledge transfer and performance assessment will increasingly be carried out through new digital channels assisted by artificial intelligence (AI).

In the future, digital teaching formats will also be vital tools for knowledge transfer at ETH Zurich. The resulting added value for teaching must be utilised by adapting teaching formats and infrastructure as well as providing specialised training for lecturers.

In line with the rise of AI and intensification of project-based teaching and with the shift in the study objective away from pure knowledge acquisition towards understanding and classifying specialist knowledge, performance assessment must move towards (continuous) observation of students in projects, direct personal interaction, oral discussion etc.

### 3) To consider the growing diversity and evolving needs of the students, as well as the declining half-life of knowledge when designing the study curricula

A core task of teaching is to enable access to new knowledge and technologies. This is a growing challenge in our rapidly changing world, since such knowledge must be constantly updated. Studying, once a phase of life between completing high school education and starting a career, is now becoming a process of lifelong learning.

Our students' backgrounds – origin, living environment, needs, capabilities – and the life experiences they bring, are growing more diverse. At the same time, the boundaries between the various types of education – gymnasium, other secondary schools, foundation courses, further education or practical training – are becoming more fluid and new routes to higher education are opening up. And while this diversity presents challenges when it comes to organising the teaching programme, it is also an opportunity for ensuring Switzerland's top position in academia.

**For ETH Zurich**, the deciding factor for admission to a university degree programme will continue to be the student's potential. But studying at ETH will change. Here we must focus on flexibility and agility, and capitalise on the opportunities offered by openness and diversity. ETH strives to meet the needs of its students, while encouraging them to take personal responsibility. The current tightly structured curricula and supplementary study programmes will become more flexible and individualised, teaching and continuing education will interlink, and operational processes and infrastructures will become more adaptable and versatile. In this way, we will create the best conditions for ETH to offer its diverse student body the right knowledge at the right time and provide the appropriate toolset and critical thinking skills for using this knowledge effectively.

### 4) To develop the campus into an inspiring place for the exchange of experiences between teachers and students and into a platform for dialogue between science and society

At its core, a university degree programme should be a lively process of exchange and collaboration between individuals. The university of the future will remain a place where people come together to research, teach and learn how to overcome challenges and solve problems. Exchanging knowledge in a virtual space is not enough; we will also require lively experimental spaces, where people can meet physically, discover the academic world, find their own place in this world and build their future together as social beings. During their education, students must have the opportunity to interact with other students, lecturers and researchers as well as with people from business and society, in order to set their future path and build our common future.

**ETH Zurich** therefore believes the campus is crucial and indispensable as a place for learning together and exchanging ideas, where students can deepen and put into context what they have learned and critically explore its meaning and usefulness. The campus also serves as an essential forum for interaction and dialogue with stakeholders from society, the business world and politics.

# «Vision Learning & Teaching 2040»: Participatory work process from November 2020 to July 2024

*The vision of ETH teaching of the future was developed in several steps from November 2020 to April 2024 in a participatory process involving representatives from all levels of ETH:*

## **November 2020 – July 2021: «Vision 2040» project, led by Dr. Judith Zimmermann and Dr. Chris Luebke**

In this workstream with 27 participants, including 15 professors and staff representatives from all departments, basic materials and topics for the development of teaching were compiled, organised and discussed.

## **Autumn semester 2021/22**

Consolidation and further development of the results by Prof. Dr. Andreas Vaterlaus, Vice-Rector Curriculum Development, and Dr. Judith Zimmermann.

## **From May 2022: Student growth task force, start of working group 4 “Vision Teaching & Learning 2040” under the leadership of Prof. Dr. Ulrike Lohmann and Prof. Dr. Andreas Vaterlaus, Vice-Rector Curriculum Development**

Preparation of a workshop format for the development of “vision islands” for the ETH of the future in two workshops (27.06.2022 / 06.10.2022) with representatives from all stands.

## **November 16, 2022: Mini-retreat of the Rectorate**

Use of the workshop format developed in WG 4 with three groups. Feedback of the results to WG 4 for the preparation of workshops as part of the teaching retreat on January 19, 2023.

## **Fall 2022: LET lecturer survey on the topic «What is your vision for Teaching in 2040»**

The response to this survey was large (494 responses from lecturers), the survey responses of a “visionary” nature (around 150 responses) were also combined to form a «vision island».

## **January 19, 2023: ETH teaching retreat**

Half of the participants in the teaching retreat (around 70 people) developed vision islands for teaching in 2040 as part of eight workshops. This resulted in a synthesis report.

## **February 2023**

Rector Günther Dissertori summarizes the results of all this preliminary work into a vision.

## **Spring semester 2023**

Rector Günther Dissertori's vision document is discussed in the Rector's Council, presented at the teaching retreat and further sharpened in exchange with Dr. Chris Luebke and Prof. em. Dr. Gerd Folkers.

## **Summer/fall 2023**

Editorial revision of the vision, further discussion in WG4 of the Student Growth Taskforce and in a mini-retreat of the Rectorate.

## **November/December 2023**

Final editing under external supervision by Mirko Bischofberger (Science Studios) and review of the finalized paper by Prof. em. Dr. Gerd Folkers and Prof. Dr. Nadia Mazouz. Adjustment of the final details.

## **March 7, 2024**

Discussion in the Stuko and definitive finalization incorporating the input received.

## **July 2, 2024**

Acknowledgement of “Vision 2040” by the ETH Executive Board.