# Towards Inclusion in Higher Education: Addressing Special Needs in a Computer Science Degree Program

Igor Miladinovic
Unversity of Applied Sciences Campus Vienna, Austria

Sigrid Schefer-Wenzl
Unversity of Applied Sciences Campus Vienna, Austria

**Abstract:**

Higher education institutions are increasingly challenged to accommodate a heterogeneous student population with diverse educational needs. Students with disabilities, chronic illnesses, neurodevelopmental conditions such as autism spectrum disorder or ADHD, specific learning difficulties, and mental-health-related impairments may encounter barriers that are not immediately visible but can substantially affect participation and academic success. Research indicates that these barriers arise not only from an individual impairment but also from the interaction between students and inflexible learning environments, assessment formats, teaching practices, technologies, and organizational structures [1,2]. These issues are particularly relevant in computer science education, where programming assignments, laboratory work, time-constrained examinations, collaborative projects, complex development environments, and a high degree of self-directed learning may create additional challenges.

This contribution presents our approach to addressing special educational needs within the Computer Science and Digital Communications (CSDC) bachelor's program at the University of Applied Sciences Campus Vienna (Hochschule Campus Wien). The program combines computer science and digital communications and includes programming, networking, software engineering, laboratory work, projects, and individual specialization [3].

Our objective is to develop an inclusive learning environment that combines individual reasonable accommodations with the gradual implementation of proactive inclusive course design. Rather than changing academic learning outcomes, the approach aims to remove barriers that are not essential to achieving or demonstrating those outcomes.

An important conceptual basis for this development is Universal Design for Learning (UDL). UDL recognizes learner variability and recommends providing multiple means of engagement, representation, and action or expression rather than designing teaching for an assumed "average" learner and adapting it only retrospectively [4]. Research in higher education suggests that UDL can improve accessibility and participation, while emphasizing that individual accommodations remain necessary because universal design cannot address every student's needs [1,5]. Recent work addressing computer science education also demonstrates the potential of UDL-based approaches for supporting neurodivergent learners and making demanding computing courses more accessible [6,7].

At institutional level, Hochschule Campus Wien provides structures for accessible studying. Its Gender & Diversity Management offers information and consultation for applicants and students with disabilities, chronic illnesses, and neurodivergent conditions and supports the clarification of individual accessibility requirements during admission and study [8]. The legal framework is provided, among other provisions, by the Austrian Fachhochschulgesetz (FHG). Section 13(2) establishes a right to an alternative examination method when a documented disability makes the prescribed examination method impossible, provided that the content and requirements of the examination remain unchanged [9]. This distinction is fundamental to our approach: inclusive education does not imply reducing academic standards, but removing barriers to demonstrating the required competencies.

Within the CSDC program, several concrete individual accommodations have already been implemented. Depending on a student's documented needs, additional examination time can be granted. Furthermore, deadlines for projects and distance-learning assignments can be extended where necessary. Students may also use alternative examination methods when the standard examination format constitutes a barrier and an alternative format allows the same intended learning outcomes to be assessed. These measures are considered individually and are intended to provide equitable conditions while preserving the academic requirements of the respective course.

The experience gained from these individual accommodations also informs our next development step: moving from predominantly reactive accommodation towards a more proactive accessibility-by-design approach. Several areas have been identified for further implementation.

First, teaching materials should increasingly follow accessibility principles, including clearly structured digital documents, accessible PDFs and presentation slides, sufficient visual contrast, meaningful alternative text, captioned audiovisual materials, and compatibility with assistive technologies. Providing learning materials and assignment information sufficiently early can additionally support students who require more time for preparation or organization.

Second, course organization can reduce cognitive and organizational barriers through explicit learning objectives, transparent assessment criteria, predictable deadlines, written instructions accompanying oral explanations, examples of expected outcomes, and the decomposition of larger programming projects into manageable milestones. Such measures can be particularly helpful for students experiencing difficulties related to executive functioning, attention, or information processing, while potentially benefiting the entire student cohort.

Third, we aim to further develop flexibility in assessment without compromising learning outcomes. Our existing practices of extended examination time and alternative examination formats provide an initial basis for this approach. A key principle is to distinguish the competency that an assessment is intended to measure from characteristics of the assessment format that are not themselves part of the learning outcome. Depending on the course, appropriate measures may therefore include additional time, alternative examination settings, technical assistance, or equivalent alternative examination formats.

Fourth, inclusion requires support for teaching staff. We therefore propose the development of a practical CSDC Inclusive Teaching Checklist addressing accessible teaching materials, course organization, communication, laboratory environments, assessment, group work, and procedures for responding to accommodation requirements. Short staff-development activities and exchange of experiences among lecturers can help transform accessibility from a series of individual interventions into a program-level quality criterion.

Finally, students should be actively involved in evaluating and improving these measures. Anonymous feedback mechanisms and structured consultation with students who experience educational barriers can identify challenges that may otherwise remain invisible to lecturers. Research involving neurodivergent university students demonstrates the importance of student perspectives: teaching practices regarded as inclusive in principle may themselves become barriers if they are implemented without sufficient flexibility [10]. Inclusive education therefore requires an iterative process of implementation, evaluation, and adaptation.

Based on our experiences, we propose a three-level model for inclusive computer science education: (1) accessible-by-default teaching, aimed at reducing barriers for all students; (2) flexible course and assessment design, allowing different pathways towards equivalent learning outcomes; and (3) individualized accommodations, including additional examination time, extended submission deadlines, and alternative examination methods where required. Future work will focus on systematically evaluating these measures through student feedback, lecturer experiences, accessibility reviews, and indicators related to participation and academic progression.

Our experience suggests that special educational needs in computer science should not be addressed exclusively as exceptional individual cases. Accessibility can instead become an integral component of teaching quality and curriculum development. Combining Universal Design for Learning principles with established individual accommodations, institutional support, and continuous student participation offers a practical pathway towards a more inclusive computer science program while maintaining its academic and professional learning outcomes.

**Keywords:**
Inclusive higher education; special educational needs; computer science education; Universal Design for Learning.