HafenCity Universität Hamburg

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Overall concept of the architecture course at HafenCity University

Preamble

Profile of HafenCity University

HafenCity University, the university of architecture and metropolitan development, is a university that focuses on subjects about the built environment. The courses in urban planning, metropolitan culture, urban design, architecture, engineering, geodesy, geo-information systems and resource efficiency in architecture and planning (REAP) are taught partly as joint programmes and offer interdisciplinary research in the common subject area of the built environment.

This practised, functioning interdisciplinary nature in research and teaching, the absence of university islands within a manageable university, where everyone knows each other, is what sets HCU apart and also provides the ideal structural framework in which to research the complex questions of our time across the disciplines.

Within the built environment the courses focus on the most pressing aspects of our time, on digitalisation and climate; both the greatest global motors for change that are bringing about unprecedented environmental changes and social transformation[1]. The future design of the built environment has a key role within this change, as the construction and operation of infrastructure and real estate is one of the largest consumers of resources[2] and emitters of CO2, on the one hand, and social transformation creates new forms of behaving, living and being together with the associated need for new building typographies, on the other.

HCU sees itself as a university that seizes and researches these social and technological challenges, intervenes and, thanks to its guiding force, influences the relevant changes in the urban environment, particularly in metropolitan areas.

[1] This results in subjects such as sustainable building, material cycles, alternative materials, BIM, robotics, AI, AR/VR, new professional fields, types of construction adapted to new ways of living etc.
[2] https://www.ressource-deutschland.en/themen/bauwesen/

Needs and challenges

Today, enormous complexity characterises planning and building more than ever before. Alongside altered and complex rules and regulations, new targets because of the environment and climate as well as social changes currently pose the major challenges for planning the built environment. More than half of the entire national gross waste is generated by the construction industry alone[3], which is also responsible for a considerable share of CO2 emissions and the dramatic shortage of existing resources. This involves new assessment criteria for building projects together with extended areas of responsibility for their planners. Current urban building projects arise partly on the basis of complex participatory processes. New building-owner models, such as building collectives and co-operatives and foundation models financed by crowd funding, generate entirely new project structures. New possibilities for building digitalisation, constraints in terms of the certification of buildings, constantly growing technical and constructive requirements for the technical building equipment, energy savings, fire protection and acoustics etc., require the use of a variety of specialist planners and experts.

Function and role of the architect

Architects see themselves as generalists[4] who design and manage the entire process chain of a building project. This also includes urban, conceptual, discourse-orientated and artistic articles in the areas of building culture. Today, however, they are no longer in a position to manage the myriad of tasks referred to above themselves as omnicompent master builders[5]. Nevertheless, thanks to their specialist training and their interdisciplinary knowledge, architects are ideally placed to coordinate the variety of stakeholders and to take responsibility for the quality of the overall result.[6] [7].

This includes the phases of the construction programme, the concept, construction and implementation. Architects support construction projects from the initial idea right through to completion and are responsible for the project's success in the entire process[8]. The complex aspects and requirements mentioned above must be taken into account extensively when designing construction

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[3] Sibylle Wilke, „Abfallaufkommen", Text, Umweltbundesamt, 19. Juli 2013, https://www.umweltbundesamt.de/daten/ressourcen-abfall/abfallaufkommen.

[4] Akkreditierungsverbund für Studiengänge der Architektur und Planung, *Fachliche Kriterien für die Akkreditierung von Studiengängen - Architektur*, 6. Aufl. (Berlin, 2018), 3: " 2.1 Qualifikationen, die durch das Curriculum erworben werden sollen...", https://www.asap-akkreditierung.de/de/fachrichtungen/architektur.

[5] As they continue to be responsible for the work and its production, digitalisation expertise (concept, planning, coordination, etc.) and climate-friendly construction are essential for architects of the future.

[6] Bund Deutscher Architekt*innen, „Der Beruf des Architekt*innen", Stellungsnahme, August 2005, https://www.bda-bund.de/2008/07/der-beruf-des-Architekt*innen/.

[7] https://www.academia.edu/32935719/The_Future_for_Architects

[8] Although the architect plans on behalf of the client during a project, they also have a more far-reaching social responsibility. The success of a project is not determined by fulfilling the programme and function at as low a cost as possible, but rather by balancing complex criteria that extend throughout the entire life cycle of the building, which includes its overall impact on climate, the environment, resources and society.

projects, are incorporated in the concepts, and shape the architecture by which the work and success of the project are ultimately measured. Here, their comprehensive technical knowledge enables architects to identify design, building regulation, construction, economic, social, and climate-relevant aspects and to integrate these into a high quality and sustainable architectural concept.

Overall concept the architecture course

A sustainable building culture requires a cultural transformation that breaks away from tried-and-tested models and structures and will be supported by future architects, our professors, alumni and PhD graduates. This is why we focus on the future, adopt an artistic, transdisciplinary approach to research and during the course broach pressing questions of the future, which the students resolve with design expertise and scientific methods to design a viable and sustainable environment in the future.

Framework

Specialisation[9] within the specialist disciplines of an architecture course imposes a restriction on the subject matter and excludes graduates in the job market, does not correspond to the generalist nature of the architectural profession and is viewed critically by accreditation organisations[10]. With our profile we want to provide our graduates with essential skills and a breadth of expertise for tomorrow's professional architect.

The profile of the architecture course evolves primarily from the requirements for architecture, and within the university profile, with a focus on digitalisation and climate and with a particular emphasis on future life, planning and building in metropolitan areas. In so doing, the course of study uses the established interdisciplinary structures and synergies and continues to contribute to strengthening the relevant interdisciplinary teaching and research activities of HCU.

Guiding principle in architecture

If digitalisation and climate are the university's focal points, in this subject area they are the questions surrounding future planning and construction for architects. Digitalisation will fundamentally change future planning processes[11]. To combat climate change, we must quickly develop new, resource-friendly construction methods as a matter of urgency. The social transformation accompanying the major changes must be analysed proactively and requires new building typographies.

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[9] Specialisation in specific areas, such as "building redevelopment", "industrial construction" etc.

[10] Akkreditierungsverbund für Studiengänge der Architektur und Planung, *Fachliche Kriterien für die Akkreditierung von Studiengängen - Architektur*, S.5.

[11] These planning processes are far more than the "development of plans", affect the entire life cycle of a building and include artistic design (architecture), process design (e.g. involvement and participatory processes), constructive planning, implementation and operation etc.

Climate change, digitalisation and social transformation are not simply profile points of HCU but the major global challenges facing mankind. To this end, architects must contribute responses and solutions within the scope of their spheres of influence (planning and construction) and help to shape the built environment in terms of these radical changes for the future. Architects are therefore far more than just service providers responsible for a project's success. They have a temporally far-reaching, macrosocial responsibility, have to anticipate the environmental compatibility and the social impact of their projects in planning and have the vision to design the future built environment in the macrosocial context.

The graduates

The negative impact of human endeavour on climate, the environment and resources is serious, and its consequences result in a clear realisation: if we want to preserve large regions of this planet for future generations as a versatile and viable living space, we cannot continue to pursue the route we have taken thus far. Fundamental global change including new strategies and technologies are therefore required as well as their speedy implementation. Clever, critical, brave, visionary and foresighted contemporaries are required to inspire, research, develop, communicate and implement this.

To this end, it is crucial to communicate the principles of architecture to the students based on the current state of the art and science, on the one hand, and on the other, also to enable them to take on the challenges of the future “as agents of change”.

As part of a bachelor’s degree, the architecture course of study provides a comprehensive, in-depth basic knowledge, an overall understanding of design and the ability to cooperate across a variety of disciplines. The students acquire interdisciplinary and independent working methodologies – both basic skills for studying for the master’s degree.

In light of the anticipated changes and their unpredictability, we will provide our graduates with sustainable skills alongside current specialist knowledge that will enable them to identify and analyse the variety and relevance of future changes and develop and apply solutions for these. The students develop these reflection, process and methodological skills on the master’s degree course.

The aim is for the undergraduate architects to leave HCU as expert, critical, responsible and visionary architects.

Profile of the architectural course of study

Teaching

The broad technical spectrum of the architect (see p. 4, Function and role of the architect) is represented in colours in the module plans of the BA and MA course in the four areas of learning: theory, design, construction and management. This structuring enables different areas to be compared, exemplifies the distribution of the teaching workload, and guarantees a broad technical knowledge on the part of graduates.

Currently, 90 students are being admitted in the winter semester for the 6-semester bachelor’s course and 50 students for the 4-semester master’s course. On the bachelor’s course, current technical knowledge and the tools of the trade are conveyed alongside the skills that are explained in further detail below, and on the master’s course future issues are handled and methodological skills developed.

Bachelor's course

On the bachelor's course, the students are provided with the basic technical knowledge and skills for the architectural profession. The content is clearly defined for the most part, regularly inspected as part of accreditations and therefore very similar in a comparison of universities (see Comparison of university curricula, p.18). Only the weighting, teaching and structure differs from university to university. The bachelor's course is distinguished by its teaching (see below) and the students' skills, enabling them to take the master's course.

Consecutive study

The bachelor's course in architecture at HCU has a consecutive structure in two respects. On the one hand, the content builds on itself; on the other, the different learning formats challenge students who act increasingly independently. The architecture course starts experimentally and without any lecture formats. The students are encouraged to learn actively and independently without any pre-conceived ideas. Knowledge is gained during the first semester via guided experiments. The students acquire technical skills independently in the three following semesters, which they later apply in projects. This "consecutive independence" through experimentation – identifying and applying – culminates in the free bachelor's dissertation, where the students can select the subject themselves, look for qualified examiners based on the subject matter, agree the topic and scope with the examiners and produce the dissertation under their own initiative. On the bachelor's course, our students therefore develop their independence and methodological expertise, which will qualify them for study on the master's course.

Project study

The integrative projects form the highlight of the bachelor's course. They are the most time-consuming and intensive module. As part of the project work, sometimes over two semesters, the students have to translate complex subject matter into high quality architecture themselves. Other modules, such as structural design and structural theory, are integrated into the projects and do not act as accessory matter but make a substantial contribution to the concept and the project's success. During the bachelor's study we work through projects together and not on concepts in isolation. In so doing, the students put interdisciplinary working methodologies to the test by integrating experts from different disciplines into the project work. During the 5th semester, projects are dealt with in interdisciplinary groups with other courses at HCU using A+ interfaces[12]. The students learn about the complexity of integral planning, acquire interdisciplinary working methodologies and process-

[12] A+, read as "A plus", is architecture and a further course of study that offers courses and projects together. There are currently A+I (engineering), A+S (urban planning), A+UD (urban design) formats. These interfaces are not only effective in the 5th BA semester but also apply to dissertations and on the master's course.

based structures. We provide the students with the principles of consistent interdisciplinary project work, which they put into practice themselves on the master's course.

Master's course

Whereas basic current technical skills were conveyed and developed on the bachelor's course, the master's course focuses on resolving complex topics of the future relevant to profile and architecture[13].

Future labs

We pose 2-3 of such questions each semester and these are handled interdisciplinarily in future labs across different courses, modules and teaching fields[14]. The students pursue the pressing subjects of the future for the architectural profession and develop solutions and possible applications for these using scientific and experimental methods. In terms of subject matter, the master's course focuses solely on the future of the architectural profession, while on the bachelor's course, current technical skills were still being learnt and the benchmark was the current office routine. On the master's course we want to develop expertise and technical skills relevant for the future and contribute to shaping tomorrow's environment and working world.

[13] By further topics we mean urgent problems the solution of which cannot be found among today's findings and behavioural patterns but require a complete rethink. "In 10 years time, how will we...?"

[14] Examples of questions could be "How can we build and live in urban spaces in a way that is climate neutral in the future?" or "How can we plan multifunctional structures parametrically?" etc.

Flipped classroom

This implies a radical teaching transformation, as the previous experience of both the professors and the students are no longer sources of information but rather the experimental research process and its complex integration, scientific methodology skills and process design[15]. The collective knowledge is developed in the future lab (flipped classroom); teaching staff not only make their mark through their comprehensive knowledge but also through their organisational skills and ability to design processes. Monodisciplinary projects are not effective for complex subjects and always give way to interdisciplinary teamwork. The projects merge in the labs; the limits of the modules become blurred in the everyday of the lab.

Research-based teaching in the future labs

The future labs on the master's course are, by definition, dedicated to questions that go beyond the status quo to address the problems and challenges of the future. The fields, questions and their possible answers evolve in parallel to the dynamics of social, scientific, environmental and climate development. The labs build on each other but do not repeat themselves. Equally, there is minimal repetition in the content of the modules. Subjects and content can build on each other but they can also be non-incremental. In terms of methodology, a future lab is therefore always a mode of research-based teaching that evolves from a relevant, open question and appropriate, in some cases, very visionary and provocative hypotheses, the response to which and possible understanding of which are still unknown at the start of the lab.

Depending on the nature and focal point of the lab, this research-based teaching is always contested by transdisciplinary teams. These are made up of professors, academic staff, external experts, student assistants and, for the most part, of students on the master's programme itself. The results developed jointly in each laboratory are presented and published jointly and on the behalf of the university. The master's students practise scientific methods, work in complex groups, gather initial research experience and therefore already take part in research and scientific publications during their studies.

Structure of the curriculum

The master's course, like the bachelor's course, is divided into the four areas of design, construction, theory and management and essentially consists of elective compulsory subjects. Following a single-semester orientation phase, the students select the subjects from at least two of these areas and therefore select their major fields of study themselves. The current flexible structure is therefore

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[15] "Make a clean sweep": the idea of the laboratory turns the old pattern of authority and behaviour on its head and prevents stereotyped thinking. Soft skills, such as empathy, the ability to think outside the box, organisational skills, networking etc., become skills that support the project and are encouraged among the students as part of the future labs.

ideally designed for future labs, as the modules' specialist disciplines contribute to answering each future question, and the modules are integrated into the labs. The flexible structure of the module plan always enables the lab idea and the interdisciplinary project work.

Digitalisation and climate on the course

Sustainable, resource-friendly construction methods are taught primarily in the construction department's teaching seminars from the 2nd semester onwards.

Digital design and planning processes are diverse, have long since been present in all parts of the course and shape the study of architecture and professional practice[16]. And yet, there is a different focus and different development opportunities in the four disciplines. The social and cultural effects of digitalisation and climate change are examined, among other things, in the theory section. Digital design methods (methodological focus) and parametric design tools (typological focus) are used in the design section, for example. Three-dimensional constructions, among other things, are developed, enriched with data, analysed and optimised in the construction section. The management section includes the structure, design, visualisation and validation of complex sequences and processes with the help of digital tools.

Digital tools are provided and taught in study-related structures (see below). With the help of various exchange formats and quality assurance, we guarantee the development and implementation of the main areas of focus on the bachelor's and master's course.

Study-related structures

Digitalisation does not only change the planning process but also requires that the future architects master the variety of digital tools (software). The students have to acquire these skills alongside their studies, and we will provide extra-curricular structures for this purpose in the future, which the academic staff[17] will run and which will be under the control of the deanship[18].

Digitorials

Learning how to use profession-specific software is taught in workshops given by the students. Tutorials, handbooks and FAQs are made available on the HCU server. This structure is managed by

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[16] Digitalisation on the course relates specifically to the design and planning processes within architecture and not to Covid 19-related digital teaching (e.g. digital-only semester). Although the overall concept was completed during the period of the pandemic, the subjects in this overall concept were set out beforehand and should continue to influence the period after the pandemic.

[17] These structures are not included in the general budget and must be financed by HCU using third-party resources and could be used to top up existing academic staff contracts.

[18] Students and academic staff are often more proficient users than professors. This structure has to be renewed given the regular changes to personnel, satisfies the fast pace of digitalisation and guarantees that it is always up to date and is renewed.

the professors and the aim is for it to be run and organised by academic staff. The ability to use specific software may be a requirement for participation in curricular teaching seminars.

Common data environment (CDE)

Interdisciplinary cooperation in the labs should be made possible on a common data environment (CDE) in order to have the developed process modules available for the respective teams at any time. This CDE must be set up, maintained and configured with different interfaces based on the questions. Developed structures, applications and databases are to be maintained and remain usable for all students. Information management processes may therefore be practised and implemented on the basis of this shared data environment. Equally, quality assurance processes may be established and implemented to ensure reliable and consistent information processes. Like the digitorials, the aim is for this infrastructure to be overseen by professors and run by academic staff and student tutors.

HOOU infrastructure

A digital teaching, learning and research platform and a digital project archive set up via the Hamburg Open Online University, which supports and manages the future labs, and continually documents the results. E-learning formats are developed in this way, which support continuous learning as a digitally prepared counterpart to the analogue teaching format. The results catalogued and published in the project archive may continue to be consolidated with additional information, so that a cycle of knowledge emerges that continuously expands and improves the quality of the project archive.

Architectural research

Current state of research

We use the interdisciplinary possibilities and partnerships within the HCU for joint research projects. These bridges to other studies were established with interface professorships, the so-called A+ professorships. Therefore, the cooperative joint research projects on the subject of “climate-adapted transformation of infrastructure spaces” is coordinated from architecture. The design research is supported using resources from the executive chair, and an architecture research initiative has developed an artistic-scientific research profile, which is today a unique selling point for architecture at HCU. We have effectively introduced scientific and design expertise in workshops on the development of main thoroughfares in Hamburg initiated by the urban development authority (BSW) and chief planning director.

Research disciplines

The research into architecture at HCU has two pillars: design-based research and transdisciplinary research. Design-based research is an early research discipline that has its basis in the design

expertise of architects and creates new academic access to architecture as a discipline. Within a broad network of international architectural faculties, the architectural concept and the architectural project is qualified as an academic cognitive process.

Transdisciplinary research is dedicated to complex research subjects of the built environment, is research that is based on solutions and applications and that makes use of a variety of scientific research methods. This research is characterised by the complex research questions, their, in some cases, unclear problems and the calculated lack of clarity due to the complexity. In contrast with interdisciplinary research, transdisciplinary research effectively includes non-academic disciplines[19]. The most well-known example of this is research into sustainability. This holistic research has evolved from the generalist project culture of architects and renders them ideal for this kind of research.

Relevance of research for future labs

The relevant research fields of the future labs always depend on context and will therefore be predominantly established in the areas of climate, environment and resources, as well as digitalisation and social change for the foreseeable future. The future labs act as “research incubators” within architecture. In them, the initial pressing research questions are formulated, design and transdisciplinary research methods conveyed, and the next generation of academics trained. Professors and PhD staff participate in different areas of focus (subject groups), from which also academic doctoral theses are derived alongside publications.

The research-based teaching of the future labs is a small research format below the dissertations whose results are publicised at short intervals. The future labs are therefore a very prominent shop window for the university and make its research profile visible, provide an insight into its current research activities and an outlook view of relevant questions of the future. At the same time, they are also an interface and networking platform with the outside world, as well as a motor that constantly drives transdisciplinary research and publication activities forward.

[19] „Transdisziplinarität“, in *Wikipedia*, 27. September 2020, https://de.wikipedia.org/w/index.php?title=Transdisziplinarit%C3%A4t&oldid=204036483.

Research associations

The architecture course distinguishes itself within the research community through its transdisciplinary integration and the ability to integrate and resolve complex questions with different disciplinary research methods. With this profile the HCU is an attractive research partner for other specialised research institutions, as the complex questions of the future are not to be resolved in a disciplinary way, and this qualification opens up new research fields for our research partners. Its disciplinary research findings may contribute to resolving urgent research questions and be conveyed in case studies in the future labs and practical application formats. This bridging function with future professional practice makes the research profile of the course recognisable and valuable for the public.