Project Oriented Learning Environment
University of Applied Sciences Aargau, Switzerland

An Interdisciplinary Learning Platform for Students of European Universities Using Modern Information and Collaboration Technologies

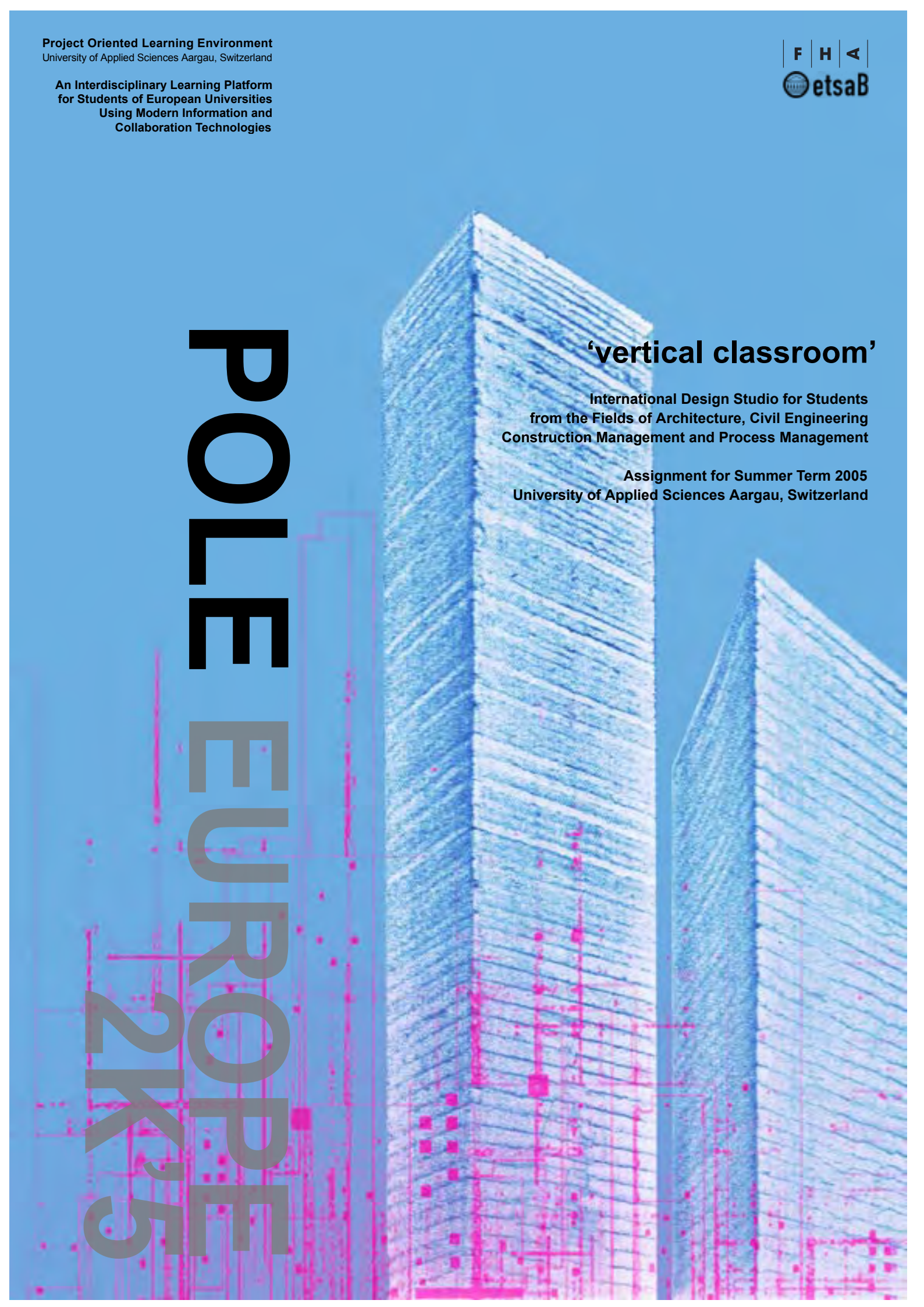
FHA
etsaB

POLE EUROPE 2K5

‘vertical classroom’

International Design Studio for Students from the Fields of Architecture, Civil Engineering Construction Management and Process Management

Assignment for Summer Term 2005
University of Applied Sciences Aargau, Switzerland



Organisation POLE Europe

Lead POLE
Prof. Daniel Kündig
University of Applied Sciences Aargau
POLE Europe, Wissenspark, CH-5210 Windisch
tel +41 (0)1 254 53 53
d.kuendig@fh-aargau.ch

Lead POLE
Prof. Dr. Christoph Holliger
University of Applied Sciences Aargau
Klosterzelgstrasse 2, CH-5210 Windisch
tel +41 (0)56 462 44 06 / +41 (0)62 777 27 75
ch.holliger@fh-aargau.ch

Head Information Technologies
Prof. Dr. Ing. Manfred Breit
University of Applied Sciences Aargau
Klosterzelgstrasse 2, CH-5210 Windisch
tel +41 (0)56 462 44 94 / +41 (0)79 204 63 46
m.breit@fh-aargau.ch

Technical Assistance Information and Web Technologies
Hans Rudolf Strebel
University of Applied Sciences Aargau
Klosterzelgstrasse 2, CH-5210 Windisch
tel +41 (0)76 317 30 67
hr.strebel@fh-aargau.ch

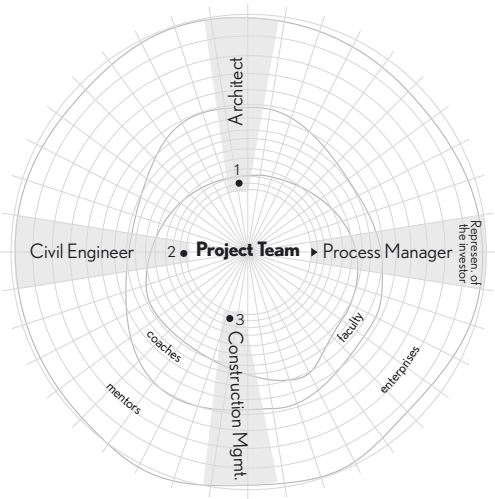
Operational Guidance and Coordination
Manuel Alberati
University of Applied Sciences Aargau
POLE Europe, Wissenspark, CH-5210 Windisch
tel +41 (0)79 483 16 00
m.alberati@fh-aargau.ch

Table of Contents

1 POLE Europe Main Features: Introduction

University students are nowadays increasingly challenged within their specific core disciplines. In addition however, they are also supposed to develop skills in order to apply this particular knowledge in practice. This ideally goes hand in hand with a sense of maturity of the individuals' character vis-à-vis the social, cultural, and economical environment. The practical application of theoretical knowledge can thus only be implemented successfully if these three basic elements are taken into account.

In addition to university students' disciplinary knowledge, the ability to work efficiently within multicultural environments has become increasingly important. This realisation has led to a more proactive stance by universities with regards to networking and offering joint courses, which is where POLE Europe, i.e. Project Oriented Learning Environment, is actively involved in. In the course of this new collaboration, the complementary aspect has gained in importance. An example for this is the liaising between strongly research-oriented and more practically oriented universities with the common goal of being able to implement results effectively and time-specifically. In this process, the POLE Europe course puts particular emphasis on improved cultural know-how, which is reflectd in the international composition of the POLE Europe teams.



POLE Europe sees itself as a learning system cooperating with foreign universities. It does so within a reflexive context that takes into account the various cultures involved. This results in the creation of new solutions regarding teaching and learning methods. The students are at the core of this concept, and are given the opportunity to develop process-oriented expert knowledge through interdisciplinary teamwork. Simultaneously, they learn how to work independently and deal with current problem cases through the use of modern information and communication tools.

Processes within POLE Europe are mainly organised by the teams themselves. The courses also increasingly tend to amalgamate various lines of work in order to give way to new, holistic, and interdisciplinary perspectives. This concept makes for a comprehensive platform, giving students the opportunity to develop their full potential.
The teamwork in the POLE Europe courses allows the students to further expand their specific professional skills, and gives them the opportunity to develop competencies that are necessary in order to adapt to a continuously changing work environment. The courses also provide students with means to evaluate and substantiate their team and communication skills.

Professionals from relevant industries form an essential part of POLE Europe. Their participation contributes a high degree of practical knowledge, linking professional practice and academic education. This exchange allows for a rapid transfer of knowledge and technology and acts as a motivating factor for the participating students. In remoulding the landscape of university teaching and learning, POLE Europe also intends to provide an impact concerning decision-making and creation of practical work processes. In association with university teaching staff, industry mentors are therefore instrumental in contributing expert knowledge and regular feedbacks to the teams.
Through collaboration in interdisciplinary teams guided by process management students (see plate), students from various fields of expertise are given the opportunity to understand the individual processes involved and acknowledge their relation to the social, economical, and political dimensions.

2 Introduction

From past to present, the construction of high-rise buildings has often been inspired by prestige and man's wish to demonstrate prosperity and might. The ancient Egyptians were probably the first culture to erect tall buildings as a symbol of power; the Pyramid of Cheops, constructed in about 2570 BC and still standing today, is the tallest at a total height of 147 meters. Another example illustrating powerful symbolism are elevated temple sites, which have been built by many ancient cultures to worship various deities. The famous Italian medieval towers erected between the 13th and 15th century AD, such as the Torre degli Asinelli in Bologna, further illustrate how the hight of buildings underlined the status of, in this case, distinguished Renaissance families.

Multi-storey buildings, in this context more aptly described as high-rise buildings (the American term), were first designed in the United States during the second half of the 19th century; notable centres for this development included Chicago and New York. Advances in the construction of steel frames and lifts were crucial to this development, as was the steady progress in the field of modern short distance traffic that allowed the transport of a large number of people to such buildings, while economic aspects certainly also were of great importance. During the past decade, construction activity of high-rise buildings mainly shifted towards Asia, which is also the location of the presently tallest building in the world, called the "Taipei 101", which has 101 floors and is 508 meters tall. The competition for the tallest building is doubtlessly going to continue, as modern technology sets virtually no frontiers any more. Construction costs for buildings exceeding eighty floors however result in disproportionate costs, the main reasons for this being the investments for structures able to withstand high wind pressure, and the according technical installations. Such a seemingly irrational quest for ever higher buildings also often faces scepticism, criticism, or just downright rejection; such negative attitudes may be motivated by religion, politics, ecological or aesthetic considerations. In addition, the tragic events from the 9/11 catastrophe cast further doubts on the construction of high-rise buildings, in particular concerning security aspects.

Contemporary high-rise, or multi-storey buildings, are mainly used as office or living space. As early as the 1920s, Le Corbusier had been reflecting at length on the notion of a "Vertical City", which he termed his "project of a contemporary city for three million inhabitants". 1947 saw the realisation of the "Unité d'Habitation" in Marseille, which consisted of a small city within a high-rise building, complete with apartments, hotel, shopping facilities, hairdresser, post office, and a vast roof-deck encorporating a kindergarden, playgrounds, and gymnasium. A rather rare phenomenon is the use of multi-storey buildings for universities, rather than office or living space. One example, the "Cathedral of Learning", is located in Pittsburgh, where it was constructed in the 1930s; further examples include the monumental structure of the "Lomonossow University" in Moscow, which is 240 meters tall, and the high-rise structure of Leipzig University, which is 120 meters tall.

POLE 2K'5 "Vertical Classroom" will deal with the development of a university which may be located in one or several multi-storeyed buildings. The aim is to break out of the traditional plain perception of a university campus, and to design a university site with a novel space arrangement, which allows a re-evaluation of spaces and the links between them. Parallel to this, the requirements of innovative teaching and learning methods, as well as a flexibility for the future development of the university, must be taken into account.

Several questions must be asked in order for this task to reach a fruitful conclusion: are multi-storey buildings at all suitable as a shell for university use? What does it actually mean for students, professors, and other employees, to study, work, and live in such a building? How can the anonymisation of the individual be avoided, and how could one at the same time increase the flow of information? Can such a structure be cost-effective at all (keywords: cost of operation and maintenance costs; the ratio of major floor space vis-à-vis net floor space)? How can the four-fold mandate of the university, including teaching, research, advanced training, and supply of services, be implemented in a high-rise building? These are but a few questions which demand thorough answers.

3 Assignment „Vertical Classroom“

3.1 Task Description: Research and Case Study

The first task involves the search for solutions regarding the encorporation of the university, with all its relevant functions, within a high-rise building. This demands the evaluation of crucial issues on all levels, including architecture, engineering, organisational matters, economic efficiency, didactics, etc. All of these need to be taken into consideration and given due attention in order for the team members to become thoroughly acquainted with the task at hand. The primary target is the design of a new kind of high-rise building, which fulfills both the present and future requirements of a university. The conclusions reached after this preliminary step shall be verified by means of a case study which involves the design of a new university campus in Windisch/Switzerland; if necessary, the preliminary findings need to be adapted and improved during this process. The general framework for this case study is described in chapters 3.2 to 4. The task set by POLE Europe involves the design of a project which fulfills all the qualitative requirements of a university regarding functionality, sustainability, economic efficiency, and the requirements of urban construction. The projects developed should create a landmark, i.e. lend a particular sense of identity to the campus and the area of Brugg/ Windisch, while also visualising the particular qualities which imbue the university with a special aura of values such as outlines in this leaflet.

POLE Europe intends for these projects to point out whether and under which circumstances a university can function within a high-rise building without any limits, and if such a project is viable on a high-quality level. The practical use of the concept within a case study such as described above is intened to provide a basis for the solution to this problem.

3.2 Overall Concept

The University

The university has a four-fold mandate to fulfil, which comprises teaching and advanced training, research, design, and the supply of services. There are five departments dealing with these tasks: Design and Art, Pedagogy, Social Work, Engineering, and Economics. The localized nature of these departments intends to provide ideal conditions in order to fulfil the requirements of the above-described mandate through inter- and trans-disciplinary means of working. Additional factors that substantiate ideal working conditions on the one hand include the great potential for encounters for members of the university among themselves, as well as encounters between the universtiy and the public, the economy, other schools, persons engaged in the cultural sector, and politics.

The Campus
The campus consists of the so-called Haller-Buildings in the area of Klosterzelg, the staff quarters at the Königsfelden clinic, the planned leisure facilites on the Mühlematte, and the new premises contained in the planning perimeter with the inegrated edifice of the FH Nord.
The campus is busy during the entire year, and active on various levels beyond university-based events. These elements include cultural events, conventions, leisure facilities, shopping facilities, exhibitions, trade fairs, conferences, and a range of various supply services. The bustling environment further includes board and lodging.

The New Premises
Multi-storeyed Buildings and the Basement
The basement of the multi-storeyed buildings incorporates attractive areas of both public and academic nature. Among other elements, this includes the new refectory, a new library, a new Customer Care Centre (CCC), accession points to the deparments and institutes, as well as the cafeterias, shops, and service enterprises. The basement constitutes an element of the park and acts as a link between the park and the train station. As part of a the sculptural landscape-architecture, it manages to mould spaces into a complex relationship within the overall context, which in turn provides the opportunity to act as a meeting point of creative minds.

The new premises are characterised by a high degree of economic efficiency and their taking into consideration of ecological factors. Additional factors include a great degree of general flexibility, and the potential for alternate usage. Most of the rooms are flexible with regard to their use, and can be used in conjunction by several departments. Each department has a meeting point comprising an enquiry office, the office of the management, the administration, and the teaching staff. The new buildings have three such meeting points; in addition, there is a centre for advanced training with an information point and a certain number of class rooms built to a particularly high standard. The centre for advanced training is situated close to the event hall, the lecture halls, and the other class rooms. The managment of the entire university is also situated in the perimeter that is to be designed.

The Central Element for Public Use: The Event Hall
By building an event hall, Brugg and Windisch plan to create a new cultural and social centre which will include a range of local, regional, and national attractions. The hall is intended to function as a symbol that will lend the regional area of Brugg and Windisch importance on a national scale. The various kinds of use include the following:
- concerts, musicals, theatre, and dance
- conventions of professional organisations, businesses, and political parties
- society events
- festivities and banquets
- functioning as the auditorium maximum of the university
- science conventions and seminars
- exhibitions and fairs

The event hall is to be designed in an operational context with the refectory of the University of Applied Sciences, as the refectory ensures the gastronomical services within the hall. The running of the hall must be possible either independently or networked with the management of the University of Applied Sciences. The location of the event hall allows the delivery of goods via trucks and provides a direct connection to the car-park. The event hall is intended to form part of the basement structure.

3.3 Basic Room Types and Their Requirements

The total required space of the University of Applied Sciences has been roughly divided into the following categories:

Category	Major Floor Space/MFS per m2 unit	Requirements
Class Rooms (including adjoining rooms)	80 / 100	Class rooms with daylight illumination, ranging from 8 to 144 persons (area from 80 to 100 m2)
Lecture Halls (including adjoining rooms)	150 / 200	One lecture hall each with fixed inclined seating for 96 to 144 persons (150/200 m2)
Laboratories	100 – 500	Working rooms for research and design & development, intended for on-the-job training; partly in the style of the class rooms, partly specially equipped with regard to floor loading and media requirements
Studios	100	Class rooms for handicrafting, form design, music studies, home economics; designed in the style of the class rooms with special facilities as required
Work Places for Students	3 per student	Single PC and multiple PC located in large rooms and studios, partly in combination with the library
Offices	15 - 200	Offices for management, services, teaching staff and assistants, located in single and double offices with 24, 18, and 15 m2 open-plan offices with varying surface areas
Library	1950 exclusive of working spaces for students	Library for books and various other media, divided into an open access library, a normal library including a repository, all located in administrative offices with daylight illumination; the repository may be located in the ground-floor NB: heightened floor loading for the open access library (7.5 kN/m2) and the repository (12.5 kN/m2). The library is to be supplemented with a reading room and work spaces for the students. The surface area of this additional structure is to be calculated in conjunction with the working spaces for the students

Refectory/Cafeteria	1500 / 150 - 300	Refectory providing seating for 420 persons, and a kitchen with a capacity for 800 meals; located in close combination with the event hall and the library Cafeterias (150-300 m2) located in the various buildings
Infrastructure	various	Various rooms for infrastructure and related services, meetings, photocopying, etc.
Event Hall	1200	The hall with flexible seating offers room for 800 persons (concert seating); the room is divisible. For exhibition purposes, the room can be expanded via the Foyer, possibly also expansion via the adjoining traffic area
Adjoining Rooms of the Event Hall / Stage	800	Stage (size 12x20 m) and use of the according adjoining rooms.

3.4 Requirements for Additional New Surface Areas

Category	Major Floor Space/MFS, m2
Class rooms, including adjoining rooms (80 und 100)	4800
Two lecture halls, including adjoining rooms (150 und 200)	350
Studios	3000
Work places for students	3300
Offices	2200
Library	1950
Refectory/Cafeteria	1650
Infrastructure	2750
Event Hall	1200
Adjoining Rooms / Stage / Technology	800
Total	**22'000**

The new premises require parking space (capacity 300 cars) and bicyle sheds (capacity 500). Campus-related alternative usages include restaurants, copyshops, crèches, shops, etc., and are to be considered in the planning of the spaces listed above.

Definitions of MFS (Major Floor Space) and FS (Floor Space)
According to SIA Norm 416:
„The Major Floor Space / MFS is that part of the net floor area which acts towards the purpose of the building's utilisation in a narrower sense."
„The Floor Space / FS forms the on all sides enclosed and covered ground-floor area of the accessible floors, including the surface areas of the wall cross-sections."

The following proportion constitutes an approximate guide value:
FS = 1.6 x MFS

3.5 Requirements Concerning Accessability and Internal Traffic Routes

The new areas must fulfil the following requirements:

- The delivery of goods is to be carried out centrally via freight vehicles; the delivery point is located in the vicinity of the refectory, the Event Hall, and the store rooms of the University of Applied Sciences. This allows the cargo handling via pallet transporters
- The internal distribution via Euro-pallettes is possible
- All the rooms can be reached by wheelchair users
- Underground passages connect individual buildings or parts of buildings, which allows the transport of goods via palettes and facilitates the coverage with various media (water, electricity, etc.)

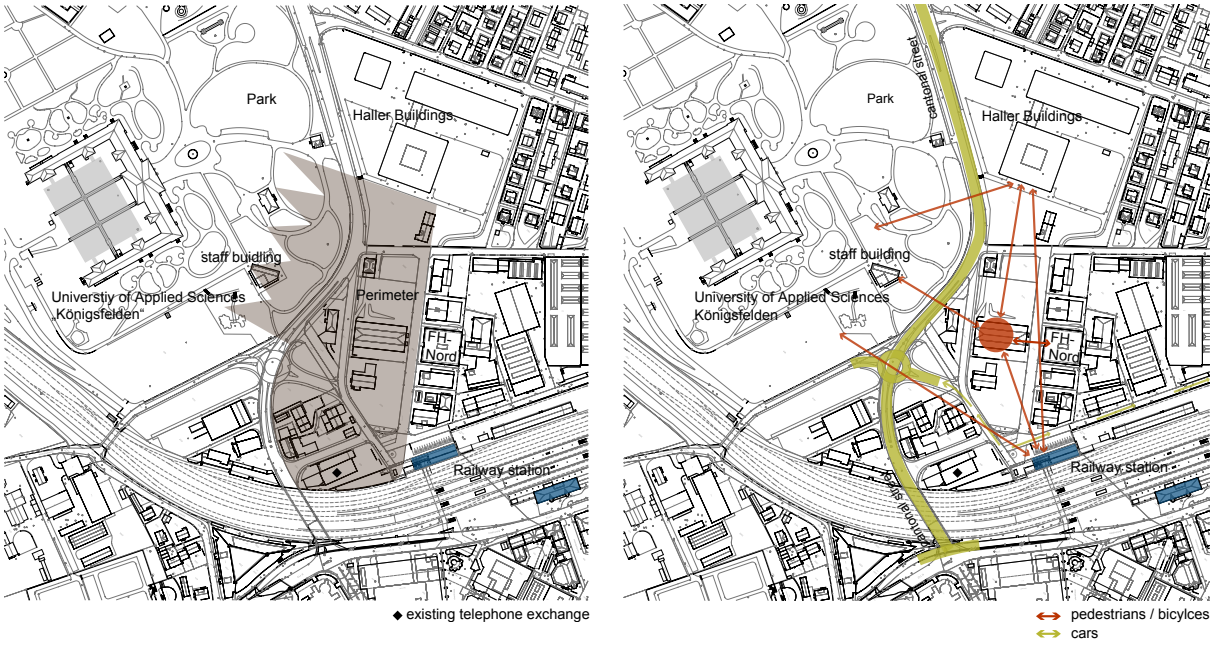
3.6 Planning and General Conditions

- The university has to be planned in multi-storeyed buildings
- a minimal distance of 6 m must be observed between the building structure and the cantonal main street
- The cantonal main street, together with the roundabout, may not be moved; however, it can be overbuilt with the basement structure
- The current legal basis, as well as the respective norms, must be adhered to.

4 Perimeter

The planning zone is situated in the municipality of Windisch, which in turn is located in the urban development area called “Vision Mitte” in the immediate vicinity of Brugg railway station. Detailed information relating to the municipality of Windisch will be handed out separately.

The North of the perimeter is closed off by the cantonal road and the railway line. The West is delineated by the alignment of the existing buildings, while the South reaches the planning zone which is marked by the green space and the slope right before the Haller-buildings of the university. A small part of the park belonging to the Königsfelden clinic in the Southeast of the perimeter is also included. Part of the planning zone is currently covered with buildings; these include a market hall, a garage, a restaurant, and a telephone switchboard. With the exception of the telephone switchboard, all the other structures can be torn down. The existing cantonal road with the planned roundabout must be left intact as planned. The development within the perimeter, as well as the planning with regards to the existing buildings, forms the heart of the POLE project. It is important that the access between the new university and the existing Haller-buildings, as well as the park of the Königsfelden clinic, not be interrupted, as this area will incorporate the the new campus. Equally important is the transport connection to the main railway station and the main road.



5 Work Methods and Requirements for Participants

All students will meet in Windisch/Switzerland both for the Kick-Off Meeting and the Final Presentation. The team work during term time, including reviews, will take place via internet and telephone conferences.
Whereas the tasks will have to be dealt with by the team as a whole, a focus on certain disciplinary aspects must also be implemented. These focal points on the other hand need to be networked and interwoven with the requirements as described above. The client wishes to see a comprehensive result in which the individual disciplines are networked and fulfil the following requirements:

Architecture
Urban planning concepts, spatial concepts for buildings, relation between usage and space, artistic expression, flexibility, sustainability.
Requirements: analysis, conceptual diagram, site sketch 1:1,000, ground plans/sectional drawings/facades 1:200, plates, 4D-representation (spatial changes with time factor taken into consideration), models (cardboard or wood) 1:200, volumetric model 1:1,000 according to basis provided, functional schemes.

Civil Engineering
Statical concept, constructive wording, relation between usage and engineering, safety, sustainability.
Requirements: analysis, conceptual schemes, ground plans/sectional drawings 1:200, 4D-representation (dynamic model), functional diagrams, dynamic calculations, proof regarding safety and usage, choice of details.

Construction Management
Course of action regarding construction, calculation and supervision of costs, construction, 4D-presentation.
Requirements: specification including functional specification of services, rough cost report, adjustment of changes regarding cost structure of the overall process of development, building site construction layout, construction flowchart, 4D-model of building shell, visualisation of development of costs (beggining, Reviews, End), presentation of major issues pertaining to the construction of the structure with emphasis on costs and construction method, choice and presentation of the construction method as pertaining to two specific issues.

Process Management
Process supervision, team management, quality management, achievement of objectives, public relations, networking.
Requirements: process manual, dynamic process planning, re-design, operations planning and according preparation, methodological project lead, conflict management, PQM including risk management, web presentation, presentations, concept to alert and keep the local population up to date. Co-ordination of the following tasks: building of a model, creating and print of a brochure for documentation, collecting all project-related computer generated information on CD.

6 General Information

6.1 Qualification Requirements
The requirements for participation in POLE Europe projects are of a high standard. Only students with good or excellent qualifications in their fields of expertise are considered. In addition, students must have finished four terms. In order to participate in POLE Europe projects, members should be able to integrate their personalities into the teams, deepen their expertise, communicate and deal with students from other fields and other cultures.

6.2 Course Language
Course language is English. Any documentation or presentation is to be prepared in English.

6.3 Teams
The POLE “vertical classroom” course is organised in cooperation with the University of Applied Sciences Aargau, ETSAB Barcelona, Bauhaus-University Weimar, Stanford University, Aalborg University, University of Brno, FH Trier and HTA Luzern. There will be max. nine teams, comprised of architects, civil engineers and process managers; certain positions may overlap.

6.4 ICT (Information and Collaboration Technologies)

Participating universities are responsible for providing their students with the necessary technical infrastructure. Organisational matters have to be discussed and fixed before the start of the course. The following is a list of ICT tools that need to be provided:

- 24 hours per day access to work stations, so students can work on their tasks and areable to communicate at all times (Windows 2000 Pro, Windows XP)
- 24 hours per day access to telephones with international access for conferenccalls
- Suitable IT support (firewalls, basic support)
- Internet access with at lest 256 kBits/s
- MS-Office inclusive Powerpoint and Frontpage, Acrobat Reader, ZIP and FTP programmes

FH Aargau, the local school in Windisch, provides the following applications and services for the duration of the project:

- Interactive platform for data exchange and communication
- Platform support
- Conference calls
- Smart boards for presentations and communication in Windisch
- Software: Allplan, Allplot, Cinema 4D
- IT terminals for the duration of the kick-off week and the preparation of the final presentation

Students are asked to bring their own notebook computers.

6.5 Mentors and Faculty Support

Assistance and guidance during the project will also be provided by industry mentors, who will provide expertise from first-hand experience. Questions can be forwarded either by email, or via telephone. The overall responsibility for each individual student's educational guidance however remains with the respective university's faculty members.

6.6 Assessment and Grading

An international jury composed of one representative per discipline, plus two representatives in charge of POLE Europe, will assess the performance and team work, providing a written statement. The home universities are exclusively responsible for the grading of their students‘ performances and the awarding of ECTS credit points. A final certificate will be awarded to every student.

6.7 Assessment Criteria

The projects will be assessed by a jury composed of one member of each discipline, and two members of the POLE Europe management. Each team will be given an assessment in writing. The criteria will be distributed during the kick-off week.
POLE Europe strives to continuously improve its learning and teaching platform. One way of doing this is by inegrating external experts into the process, and having them participate in as many POLE Europe stages of the overall process as possible. In the field of evaluation and assessment, POLE has cooperated with Stanford University/California since the very beginning of the concept in the year 2000.
The participatory assessment will focus on the efficiency of the design processes and the adequate use of collaborative communication technologies.

6.8 Costs

Course participants pay a one-time fee of 300 Euros during the kick-off week. This amount comprises accomodation during the kick-off week and the final presentation and documentation costs. Travel costs and meals are to be paid by the participants, or the participating universities. Participants are also responsible for insurance matters.

6.9 Registration Procedure

- Contact your tutor or academic advisor
- Register via internet: www.pole-europe.ch; click on “announcement” in the main menu, and fill out the registration form
- Send a confirmation , co-signed by your tutor, to

FH Nordwestschweiz Aargau, POLE Europe
Prof. Daniel Kündig
Wissenspark
CH-5210 Windisch, Schweiz

Upon receipt of your application, the school will send you a confirmation letter and more detailed information about the course about three weeks before the kick-off.

For further enquiries, please visit
www.pole-europe.ch or send an email to
m.alberati@fh-aargau.ch

Responsible for POLE Europe 2K‘5 vertical classroom
Prof Daniel Kündig, Architect ETH SIA BSA,
FH Nordwestschweiz Aargau, POLE Europe
Wissenspark, CH-5210 Windisch
d.kuendig@fh-aargau.ch

Date	Windisch	Home University	Participants
14.02.05 Monday	Final date of registration		
07.03.05 Monday bis **13.03.05** Sunday	**Kick-Off Week** Start 14.00		Students POLE Lead (Faculty Members)
11.04.05 Monday	**Review I** 09.00 - 17.00 Participation via internet	Team 1 - 4	Faculty Members Mentors, POLE Lead
12.04.05 Tuesday	**Review I** 09.00 - 17.00 Participation via internet	Team 5 - 9	
17.05.05 Monday	**Review II** 09.00 - 15.00 Participation via internet	Team 1 - 4	Faculty Members Mentors, POLE Lead
18.05.05 Tuesday	**Review II** 09.00 - 15.00 Participation via internet	Team 5 - 9	
30.06.05 Thursday	**Final Presentation**	Team 1 - 4	Faculty Members, Mentors, POLE Lead, visitors
01.07.05 Friday	**Final Presentation**	Team 5 - 9	

In order to prepare the final presentation, the teams are invited to use the infrastructure provided by the FH Aargau. Accomodation will be provided from June 25 to July 2, 2004. The journey from the students' home universities to Windisch/Switzerland has to be organised by the students themselves.

7 Schedule

Bibliography:

Projektleitung Vision Mitte: Wettbewerbsprogramm Städtebaulicher Ideenwettbewerb im Bahnhofsgebiet „Vision Mitte“ Brugg / Windisch; Brugg / Windisch 2004
Judith Dupré: Wolkenkratzer; Köln 1996
Microsoft Encarta: www.encarta.de
Wikipedia: www.wikipedia.de
University of Pittsburgh: www.umc.pitt.edu

Further Links:

www.emporis.com/en/bu/sk/st/tp/ty/ed/
www.uni-hannover.de/uni/standort/continentalhh.htm
www.nrw-forum.de