



Master en Architecture

Semester 1

	Lecture (UE)	Exercise (UE)	ECTS
MARCH-DS-S1 Design Studio			10
MARCH Design with Integrated Disciplines I		120	10
MARCH-DS-S1 Design Studio			10
MARCH GIS Workshop (Optional)	16		0
MARCH-DS-S1 Design Studio			10
MARCH-DS-S1 Rhino workshop (Optional)	18		0
MARCH-AR-S1 Architecture			4
MARCH Research Methods in Architecture	18		4
MARCH-AR-S1 Architecture			4
MARCH Seminar on Representation sem1 & sem3	18		4
MARCH-EU-S1 European Urbanisation			4
18-12 Cities, Masterplanning and Urban Governance	30		5
MARCH-GL-S1 Globalisation			8
MARCH Globalisation and Planetary Urbanisation	24		4
08-51 - Geographical Information Systems: Analysis and Mapping	44		5
MARCH-ELECTIVE-S1			4
04-73 Global Environmental Change in the Anthropocene (Optional)	24		4
International Development, Sustainability and Policy Coherence (Optional)	30		5



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Semester 2

	Lecture (UE)	Exercice (UE)	ECTS
MARCH-DS-S2 Design with Integrated Disciplines II			12
Design with Integrated Disciplines II		180	12
MARCH-AR-S2 Architecture II			9
Energy efficiency of buildings 1,2 laboratory tests included	60	15	4
History of European Urbanism	30		5
MARCH-EU-S2 European Urbanisation II			9
Urban and Landscape Design within Europe	30		5
MARCH-EU-S2 European Urbanisation II			9
17-52 WebGIS and Geoprocessing (track B) (Optional)	34		5
MARCH-EU-S2 European Urbanisation II			9
Transport Systems Analysis (Optional)	45		4

Semester 3

	Lecture (UE)	Exercice (UE)	ECTS
MARCH-DS-S3 Design Studio			12
MARCH Design with Integrated Disciplines III (Greater Geneva)		180	12
MARCH Design with Integrated Disciplines III INDIVIDUAL WORK	1		0
MARCH-AR-S3 Architecture			10
MARCH Seminar on Representation sem1 & sem3	18		4
MARCH-AR-S3 Architecture			10
Steel & Composite Structures 1 – High Rise Buildings	45		5



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	Lecture (UE)	Exercice (UE)	ECTS
MARCH-AR-S3 Architecture			10
MARCH Visual and Cultural Studies	18		3
MARCH-EU-S3 European Urbanisation			3
MARCH Comparative analysis: laws, regulations, norms	18		3
MARCH-SE-S3 Seminar			5
MARCH Seminar on Project Management	30		5

Semester 4

	Lecture (UE)	Exercice (UE)	ECTS
MARCH-DS-S4 Design Studio - Final Master Thesis			30
MARCH-DS-S4 Final Master Thesis	180		30

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MARCH Design with Integrated Disciplines I

Module:	MARCH-DS-S1 Design Studio (Semester 1)
ECTS:	10
Language:	Anglais
Mandatory:	Oui
Evaluation:	Rating:50% participation in the studio, 50% final project presentation: at the beg. of February 2020
Professor:	KATSIKIS Nikolaos, WEICHOLD Ivonne

MARCH GIS Workshop

Module:	MARCH-DS-S1 Design Studio (Semester 1)
ECTS:	0
Objective:	Course content: <ul style="list-style-type: none">• Introduction to ArcGIS. Basic concepts• Operation with the table of Attributes.• Editing layers• GIS common files and datasets• Spatial data sources, projections and Coordinate Systems• Designing and exporting maps• Vector tools• Spatial selection and selection according to Attributes• Extract and proximity tools• Aggregating data to customized grids and meshes• Raster tools• Representing topography. Digital Elevation Models and surface analysis• Density maps• Interpolation maps
Description:	The course offers an introduction to Geographic Information systems using the ESRI Arcmap software package. The course is specifically designed for Architecture students and aims to introduce them to basic concepts, methodologies and tools in geospatial analysis in order to better inform spatial decision making in their design studio course.
Language:	Anglais

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Mandatory: Non
Professor: KATSIKIS Nikolaos

MARCH-DS-S1 Rhino workshop

Module: MARCH-DS-S1 Design Studio (Semester 1)
ECTS: 0
Objective: The course offers an introduction to the Rhino 3D, with emphasis on workflows for three-dimensional (3D) modelling using Rhino commands. The course will cover basic 2d drawing, tracing and drafting techniques and their application to creating 3d form and surfacing. Additionally, the course will offer an introduction to Rhino grasshopper and parametric design.
Description: Course content:

- Introduction to the interface and navigation of Rhino 3D
- Drawing, creating and editing geometry using curves, arcs and using 2D Rhino commands
- Methods of generating 3D geometry and editing tools
- Rhino grasshopper and parametric design

Language: Anglais
Mandatory: Non
Professor: DAUWE Simon

MARCH Research Methods in Architecture

Module: MARCH-AR-S1 Architecture (Semester 1)
ECTS: 4
Description: Students will be introduced to research methods in architecture.

This course will introduce students to architectural research and will provide tools and techniques on the master's level. These techniques include, among others, historical, archival, ethnographical, experimental, survey, mapping, statistical, and qualitative analysis methods.

Students will learn how to compose a bibliography and how to deal with a disciplinary and interdisciplinary corpus according to their subject. They will learn how to develop a question of discursive interest and how to construct a critical reflexion and a theoretical work responding to this question. They will learn how to integrate design components and graphic analysis in their research, and finally how to represent and edit architectural research.

The course has several components: lectures, discussions, and a written research report. Class sessions will consist of discussions on a variety of research techniques and the progress of your written research report.



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20.09.2019
Scientific Writing & Research Methods – part 1
Library visit, Learning centre Belval

27.09.2019
Lecture about Scientific Research Projects
Karin Thilleul, École nationale supérieure d'architecture de Nancy

04.10.2019
Lecture about Research Methods in General
Karin Thilleul, École nationale supérieure d'architecture de Nancy

11.10.2019
Scientific Writing & Research Methods – part 2
Individual Work

25.10.2019
Lecture on Metageographies of Cartographic Representation
Nikos Katsikis

Language: Anglais

Mandatory: Oui

Evaluation: 50 % participation in the seminar, 50 % final paper. Assignment: Position paper upon research that is performed in the framework of the design studio 1 (scientific text, including footnotes and references- 1000 words- submission deadline: 21.01.2020).

Remark: Linda Groat & David Wang (2002)
Architectural Research Methods. New York: John Wiley & Sons, Inc.

Professor: WEICHHOLD Ivonne

MARCH Seminar on Representation sem1 & sem3

Module: MARCH-AR-S1 Architecture (Semester 1)

ECTS: 4

Objective: 08/11 Representation as a way to include architecture into urban and social fictions (landscape painting a.o.)

15/11 Studying the work of protagonists such as Constant, Thomas Schütte, John Hejduk, Rem Koolhaas, Flores & Prats...

22/11 Projection : Metropolis (Fritz Lang)

29/11 Multimedia artist : David Evrard - http://www.erg.be/m/wiki/David_Evrard.html

06/12 Theater performance artist and director : Fictions collectives, Marie Mortier

<https://www.fictionscollectives.com/marie-mortier>

<https://www.fictionscollectives.com/leila-gaudin>



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13/12 Theorist on film, directeur CNA : Paul Lesch

https://www.fr.uni.lu/recherche/flshase/identites_politiques_societes_espaces_ipse/staff/paul_lesch

20/12 Final presentations in groups

Description:

Students will be introduced to the notion of representation in architecture. This seminar aims at offering a basic knowledge on the origins of architecture and landscape representation and how it developed into the realm of social and urban fiction. Students will get the opportunity to analyse different protagonists in architecture and art history by observing the relationship between design approach, choice of media and representational techniques. The course will emphasize the notion of collective fiction including architecture as a structural component within a commonly shared narrative. Students should either improve or test ways of creating their own tale in a small group based on a real territory of their choice, located in Luxembourg.

Language:

Anglais

Mandatory:

Oui

Evaluation:

50 % participation in the seminar, 50 % final presentation

Students will prepare in groups collective fictions on a particular urban situation in Luxembourg, by means of a chosen medium (can be anything such as drawing, text, picture, model, short video clip...) and present their approach at the end of the course (20/12).

Remark:

X-Ray architecture

Beatriz Colomina

Lars Muller publishers, April 2019

Visioning technologies

The architecture of sight

Edited by Graham Cairns

Routledge, 2017

La phénoménologie de la perception - The phenomenology of perception

Maurice Merleau-Ponty

Gallimard, mai 1976

Architecture and science fiction film :

Philip K. Dick and the spectacle of home

David T. Fortin

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Routledge, May 2011

"The Explosion of Space: architecture and the filmic imaginary"

in : Film Architecture : Set designs from Metropolis to Bladerunner

Dietrich Neumann

Prestel, August 2000

Journal Article

The End of the Classical: The End of the Beginning, the End of the End

Peter Eisenman

Perspecta Vol. 21, pp. 154-173

The MIT Press , 1984

Professor: SCHMIT Carole

18-12 Cities, Masterplanning and Urban Governance

Module: MARCH-EU-S1 European Urbanisation (Semester 1)

ECTS: 5

Course learning outcomes: On completion of the course, a student should be able to

- orientate in the general discussion of the rationale, justification and trajectories of urban planning,
- make an informed judgement on the gap between contents and procedures of planning on the one hand and its effective outcomes on the other hand,
- identify the various elements of i) physical planning and ii) the political process, i.e. activities addressed as forms of governance.

Description: The aim of this course is to make students familiar with central concepts and approaches of urban planning, policy and governance, with a particular emphasis placed on the origins, rationale and elements of physical planning. Physical planning is key to the urban process, by determining land use, providing infrastructure and circulation, and by situating facilities in a way that it might support an efficient overall development of places. For this purpose, particular planning instruments have been developed and applied in much of the industrialized world, such as general land-use plans, particular building plans or more comprehensive, strategic framework plans. Also, informal instruments and procedures such as participative planning became quite popular recently.

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However, the rationale of planning to steer development (and the related belief in planning to be able to do so) has been challenged by a variety of events, both originating from changes within the planning system and, even more so, of the outside world. A fragmented socio-economic development, processes of individualization, and most notably globalization have been putting a rising pressure on urban and regional places to adapt. Particularly market forces in planning and development and also the increased competitive dynamics among spatial units such as nations, regions and cities turned out to determine planning ambitions. As a consequence, these processes have been shaping the agenda of regulating processes, plans and institutions quite significantly.

Against this background, the course explores urban planning theories, practices and discourses in certain detail. The first part of the course is devoted to giving an overview of the more recent historical development of planning. The respective time span starts by and large at the peak of industrialization (late 19th and early 20th century), leading to recovery planning after World War II and then emphasizing the competing ideal-types of planning since the 1950s/60s: modernist vs. traditional planning, compact vs. dispersed development. Today's master planning of urban expansion, large-scale infrastructure projects or eco-city communities will give most recent insight into the world of planning, yet will also be critically interrogated.

On this basis, in the second part of the course participants will have the opportunity to work on selected plans – being these designed for developing a building, a 'project', an urban district, selected parts of infrastructure or concerning the future of entire territories. The aim of this exercise is to reconstruct the plans' contents, justification and implementation, leading to a critical assessment of the plans' outcomes and thus of urban planning at all. The course finally discusses more recent approaches to re-assert steering processes in the context of 'governance', that is, the multi-level and cross-sectoral interaction of various public and private agents set in place to achieve political goals.

- A short history of urban and regional planning
- Comprehensive planning and the challenge to integration
- From urban dynamics to evaluating plans, programmes and practices
- Essentials of planning, policy and urban governance
- Case study work on selected plans

Language:	Anglais
Mandatory:	Oui
Evaluation:	25 % guided reading and course presentation; 75 % paper report
Remark:	Selected references

Allmendinger, P., Houghton, G. (2009): Commentary: Critical reflections on spatial planning. *Environment and Planning A* 41, 2544-2549

Faludi, A. (1970): The planning environment and the meaning of "planning". *Regional Studies* 4(1), 1-9

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Salet, W. (2014): The Authenticity of Spatial Planning Knowledge. *European Planning Studies* 22 (2), 293–305

Scott, A. J. (2013): Emerging cities of the third wave. *City* 15 (3-4), 289-321 (with images and captions by Elvin Wyly)

Professor: HESSE Markus

MARCH Globalisation and Planetary Urbanisation

Module: MARCH-GL-S1 Globalisation (Semester 1)

ECTS: 4

Course learning outcomes: Introduce students to the major contours of geographical organization of the world economy and world urbanization

Introduce students to major theoretical frameworks in globalization research

Introduce students to major theoretical approaches to studying world urbanization

Critically interrogate the agency of design disciplines within these contexts

Description: The course examines the major processes that characterize the production of space in the contemporary globalized world. Introducing an understanding of urbanization as a condition of geographical organization, the course examines the restructuring of the world economy in relation to the growth and development of urban environments around the world. It introduces students to major literatures both on globalization (global commodity chains, global production network, transportation geography, economic geography), and in globalized urbanization (global cities, network cities, planetary urbanization). It interrogates how the structure of cities around the world reflects an increasingly integrated spatial and social division of labor. Major questions include: the shifting geographical structure of major economic sectors, flexible organization of production systems, logistics and transport systems and how they relate to the restructuring of urban agglomeration patterns (industrial, post-industrial), post-metropolitan urban formation (edge cities, polycentric metropolis), the dynamics of urban regions and network cities. The course also addresses issues of inequality and uneven development, both within and between regions. Furthermore, it examines the related challenges and investigates the agency of architecture and urban design within this context.

The course is structured as a theoretical introduction to seminal literatures on globalization and world urbanization. It is organized around four interrelated parts: Introduction to urbanization, globalization and the production of space at various scales.

The structure and geography of the world economy - world trade and organization of production systems

The structure and geography of urbanization – agglomeration patterns and their interrelations.

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The challenges and agency of designers within the contemporary condition of globalized urbanization.

Teaching modality:	Course Structure: The course is structured as a theoretical introduction to seminal literatures on globalisation and world urbanisation. It is organised in four parts: Urbanisation and the production of space at various scales – from the city to the planetary The structure and geography of the world economy - world trade and organisation of production systems The structure and geography of urbanisation – agglomeration patterns and their interrelations. The challenges and agency of designers within the contemporary condition of globalised urbanisation.
Language:	Anglais
Mandatory:	Oui
Evaluation:	40% participation in the seminar, 30% midterm project, 30% final paper
Remark:	Assignments: There are two assignments for the course: Assignment 01 is the midterm project (30%), which is due on Week 06. Details on the assignment will be handed out during Week 03. Assignment 02 is the final project (30%), which will be handed in the form of a report, including both a visual, and a textual component of no more than 3000 words. Details on the final assignment will be handed out during Week 06.
Professor:	KATSIKIS Nikolaos

08-51 - Geographical Information Systems: Analysis and Mapping

Module:	MARCH-GL-S1 Globalisation (Semester 1)
ECTS:	5
Course learning outcomes:	On completion of the course a student should be able to - explain and apply the basic principles and functions of a GIS - describe and apply the methods for acquisition, storage and manipulation of spatial data, - describe and apply standard GIS spatial analysis techniques - design and apply basic GIS models and relate them to geography and spatial planning objectives - use the ESRI ArcGIS software suite for vector-based data management, GIS overlay analyses and the aforementioned methods
Description:	The course aims at providing definitions and conceptual background in Geographical Information Systems (GIS) and Science (GISc) and relating them to geography and spatial planning. Students will be introduced to the basic structure, principles, functions and modelling with GIS. The students will develop GIS practical skills using ESRI ArcGIS software and relate them to GIS theory and concepts, along the following mixed theory/practice modules: - Introduction to GIS and ArcGIS - Mapping basics and symbology - Querying and joining data - Spatial and attribute selection



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- Projections
- Data collection (GPS) and digitization
- Creating and editing data
- Geoprocessing vector data
- ModelBuilder and multi-criteria evaluation and analysis

Language: Anglais
Mandatory: Oui
Evaluation: 40 % laboratory exam, 30 % GIS and spatial analysis project, 30 % weekly assignments

Remark: Chrisman N. (2003). Exploring Geographical Information Systems - 2nd edition international - 320p, Wiley & sons.
 Maguire D.J, Batty M., Goodchild M.F. (2005). GIS, Spatial Analysis, And Modeling - 496p. ESRI Press
 de Smith M.J., Goodchild M.F., Longley P.A. (2007). Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools - 414p. Troubador Publishing.
 Longley P.A., Goodchild, M.F., Maguire D.J., Rhind, D.W. (2005). Geographic Information Systems and Science , 2nd Edition - 536p. Wiley & Sons
 Ormsby T, Napoleon E, Burke R, Groessl C, and Bowden L 2008. Getting to Know ArcGIS Desktop: Basics of ArcView, ArcEditor, and ArcInfo

Professor: JONES Catherine

04-73 Global Environmental Change in the Anthropocene

Module: MARCH-ELECTIVE-S1 (Semester 1)
ECTS: 4
Language: Anglais
Mandatory: Non
Professor: KÖNIG Ariane

International Development, Sustainability and Policy Coherence

Module: MARCH-ELECTIVE-S1 (Semester 1)
ECTS: 5
Objective:

- To introduce students to predominant theories of development
- To introduce students to development strategies in the context of globalization through discussions with development actors
- To provide an understanding of the social and environmental impacts of development strategies



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- Description:** The field of international development is generally analyzed in terms of policy effectiveness or moral issues related to the imbalance of wealth in the global arena. Such approaches have often limited development debates to material questions focusing on issues such as: the commitment of advanced industrial states to development through public investment; the efficiency with which funds are distributed in development strategies; the moral/political objectives that often are associated with development aid, microfinancing, etc.
- This course aims to build on this approach to international development by examining cooperation within the context of social cohesion. The premise on which this course is based contends that development is not simply an economic issue because it relates to various relationships between different actors in global affairs, such as: international organizations, states, civil society, individual citizens and economic organizations and companies. Thus, the course asks: "What impact do European actors (including Luxembourg) have on international relationships within the framework of international development?" The course proposes a series of debates, each one focusing on a specific topic related to social cohesion and international cooperation. Following a general introduction by the course instructors, the course will be centered on discussions with practitioners and experts in the field of international development.
- Language:** Anglais, Français
- Mandatory:** Non
- Evaluation:** Students must complete a 10 to 15 page research paper at the end of the course.
- Remark:** Bibliographie
- Amartya Sen. Development as Freedom. Anchor, 2000.
- Jeffrey Sachs. The End of Poverty. Penguin, 2006.
- J. Timmons Roberts and Amy Bellone Hite. The Globalization and Development Reader: Perspectives on Development and Global Change. Wiley Blackwell 2007.
- (optional) Harlan Koff. Social Cohesion in Europe and the Americas. PIE-Peter Lang, 2009.
- Professor:** KOFF Harlan, HÄBEL Sandra

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Semester 2

Design with Integrated Disciplines II

Module: MARCH-DS-S2 Design with Integrated Disciplines II (Semester 2)

ECTS: 12

Course learning outcomes: Students will learn how to develop a design project from the scale of a territory to the scale of a neighbourhood. The final design project will expose a process of a critical analysis of the socio-spatial condition in which it has been developed and show conceptual, graphic and technical professionalism.

Description: The second semester studio deals with some classic antagonisms of urbanism: the spectres of city and nature, community and individuality, energy and ecology. Building upon the research, accumulated data and strategic maps of the design studio in semester one, students work in groups of three in defining themselves the spatial setting of their projects: Whether in the centre of a historic city, in suburban or rural areas, in shrinking or expanding landscapes. The goal of the studio focuses in developing dialogic approaches in order to bring the above-mentioned antagonisms into productive interactions and to develop an integrated design approach, which will take into account the social, cultural, economic and ecologic aspects of our continuously changing society. Therefore, students will be introduced to basic frameworks of urban analysis, develop design tools and learn how to integrate cognition in human sciences. The studio will emphasize the interplay between different scales, from the territorial to the neighbourhood, thus articulating the relationship between urbanistic structures and architecture in its volumetric framework, as well as landscape architecture in its materiality. Being aware of the impossibility of anticipating the whole complexity of territorial transformation, the result is not meant to be a classic masterplan, but rather an open processual urbanism, defining strategic structures, systems and rules, while leaving enough space for a more natural evolution.

Course structure

The studio is organized around three blocks:

The first block focuses on defining and analysing the different sites and contexts of the project, as well as positioning them within associated references. Students work in groups of three, and building upon the analysis of the first studio define the specific areas of interest, and directions of their proposals.

At the same time, they analyse and present a series of references drawing from the following projects: Vienna Superblocks, and the architecture of Red Vienna; Projects from IBA Berlin; Early 20 th century Soviet Architecture; Garden cities; Münchner modell / 03 Architekten.

The second block of the studio focuses on developing a design project at urban scale integrating adjacent disciplines, and developing the necessary representation means. The studio requires the development of design drawings on various scales, from 1:5000 to 1:200



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Finally, the last block of the studio will focus upon the further development of the projects towards the final presentation, including drawings, models, and presentation narrative.

Language:	Anglais
Mandatory:	Oui
Evaluation:	50% participation in the studio, 50% final project presentation.
Professor:	HERTWECK Florian, KATSIKIS Nikolaos

Energy efficiency of buildings 1,2 laboratory tests included

Module:	MARCH-AR-S2 Architecture II (Semester 2)
ECTS:	4
Objective:	Concepts for energy efficient and comfortable buildings
Description:	<p>Part I: Basics in building physics and energy efficiency of buildings (Prof. Maas, 2h / 2.5 ECTS)</p> <ul style="list-style-type: none">• Role of the building• Actual situation of administrative buildings• Contaminants in buildings• Comfort and needs of occupants• How to assure thermal comfort• Windows (gains, losses, orientation)• Air tightness• Thermal inertia• Ventilation, cooling• Heat pumps and solar collectors• Heat recovery• heating needs, final energy and primary energy• coefficients of performance• energy performance certificates• the norm EN832• the Energy Performance of Buildings Directives (EPBD): 2002/91/EC & 2010/31/EU <p>Part II: Technical installations (Prof Scholzen)</p> <ul style="list-style-type: none">- Introduction: active and passive measures- Heating: Heat load, heating systems, heat Production and distribution- Ventilation needs- wet air, psychrometric diagram (Mollier)- Air-conditioning: Chillers, Room Air Cooling, Air handling Units- Free Cooling

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- Technical Installations for low energy or passive buildings

Lab. Sessions:

Introduction and general guidelines for the measurements, Thermography, Blower-door test, Measurement of humidity, Measurement of heat flux, Acoustic Measurement

Teaching modality: Lecture + Lab.

Language: Anglais

Mandatory: Oui

Evaluation: Written exam

Remark: Part I:

1. Roulet, Santé et qualité de l'environnement intérieur dans les bâtiments, 2004, Lausanne
2. Multiple handouts during the lessons
3. W. Feist, das Niedrigenergiehaus, C.F. Müller, 1998
4. RWE Bau Handbuch, VWEW Energieverlag, 2004

Part II: Script

Part Lab. Sessions : Hand-out's

Professor: MAAS Stefan, SCHOLZEN Frank

History of European Urbanism

Module: MARCH-AR-S2 Architecture II (Semester 2)

ECTS: 5

Course learning outcomes: Students will be introduced in the history of European urbanism in theory and projects. They will learn how to read and interpret European urban structures, morphologies and typologies and to what extent they are conditioned by socio-political transformation.

Description: This seminar will show how much the history of European cities is characterized by both: numerous paradigmatic fractures and, at least in the framework of the European historic city, a tremendous continuity. The students will learn two levels of urban history and how these levels coincide: first, on a more transdisciplinary level, the social, economic and political condition of the urban evolution, and second, on a more disciplinary level, how to read and identify urban morphologies and their relationship to architectural typologies. In this context, the seminar will start with some premodern examples (the baroque city until the landscape of Karl Friedrich Schinkel) and will put, in a second part, a focus on three important urban renewal projects, which responded to the rapid growth of the emerging capitalism and industrialisation: Haussmann in Paris, Cerdà in Barcelona, Hobrecht in Berlin.

A third focus will be projected on the upcoming modern movement, first with the reformatory ideal of the Garden city and its territorial translation by Hermann Jansen for Greater Berlin, then with more functionalist doctrines and projects of Le Corbusier, Ludwig Hilberseimer or Ernst

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May, the CIAM and the Charte d'Athènes . A forth spotlight will be brought on the post-war reconstruction period and the ideal of the automobile city, a fifth on various forms of criticism of the functionalist city: from TEAM X to critical regionalism, from Italian and Austrian radical architecture to Japanese metabolism, from neo-rationalism to postmodernism.

A fifth spotlight will put into relationship major urban theories in the post-growth condition (Rossi's *Architettura della città* , Venturi's *Learning from Las Vegas*, Rowe's *Collage City*, Koolhaas' *Delirious New York*, Ungers' *City in the city*, Krier's *Cities within the city*) and a sixth will show how the city has during the twentieth century slowly become something what Jean Gottmann meant by "megalopolis", described with such notions as the sprawl, *città diffusa* or conurbanisation. Finally, we will show different analysis, methods and projects in this post-urban condition (*Zwischenstadt*, *hyperville*, *Netzstadt*, *After sprawl*, *New Urbanism*, *Métropole douce*...) and what we would call *Dialogic City*.

Language:	Anglais
Mandatory:	Oui
Evaluation:	5 % ar t i c i p a t i o n i n t h e s e m i n a r , 50% written exam
	Mandatory readings:
	Leonardo Benevolo, <i>The History of the City</i> , 1980.
	Hanno-Walter Kruft, <i>A history of architectural theory</i> , 1990.
Professor:	HERTWECK Florian

Urban and Landscape Design within Europe

Module:	MARCH-EU-S2 European Urbanisation II (Semester 2)
ECTS:	5
Description:	Philippe Coignet: The 4 classes series explores specific thematic in relationship to major projects and readings : landscape + program, landscape + topography, landscape + ecology and landscape + infrastructure. In addition to these lectures, we'll focus on the paradox between design and methodology in landscape architecture around cases studies. Readings and exercices will be expected.
Language:	Anglais
Mandatory:	Oui
Professor:	WEIER Christian, COIGNET Philippe



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17-52 WebGIS and Geoprocessing (track B)

Module: MARCH-EU-S2 European Urbanisation II (Semester 2)

ECTS: 5

Course learning outcomes: On completion of the course students should be able to :

Part 1:

- Create, manage and display raster data
- Demonstrate the use a variety of raster analysis tools from the Spatial Analyst toolbox
- Be familiar with the use of functions for Image Analysis
- Work with Raster calculator to undertake map algebra.

Part 2:

- Understand the fundamental principles of WebGIS
- Describe different web GIS formats and tools
- Map data and research outcomes within ArcGIS and Google maps and vice-versa
- Understand the principles of web-mapping and its associated technologies
- Create an interactive map without coding (using FOSS)
- Understand and write code for visualizing a simple web map application

Description: The course provides an introduction to the topic of web GIS and GIS processing. It is divided into two parts. In the first part of the module students will gain both an understanding of and hands-on practice with advanced geoprocessing and GIS modelling functions using both raster and vector data. We will use ESRI ArcGIS Spatial Analysis functions for analysis and modelling. In the second part of the course, we will introduce students to the fundamental principles of WebGIS. Students will gain practical experience using different web publishing technologies to visualise and display geographic data and modelling outcomes online.

Language: Anglais

Mandatory: Non

Evaluation: 50 % participation in weekly GIS practicals

50 % project report including mapping output to a blog

Professor: JONES Catherine, SCHIEL Kerry

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Transport Systems Analysis

Module: MARCH-EU-S2 European Urbanisation II (Semester 2)

ECTS: 4

Objective: This course provides the fundamentals of traffic and transport systems theory: it aims at understanding and managing the relationship between demand for mobility and the various transportation systems and explains how these lead to economic and societal problems such as congestion, pollution, etc.

The goal is to provide a broad view of transportation systems analysis covering both private and public transport systems, and to complement this overview with a discussion of aspects like congestion analysis and management, intelligent transportation systems, traffic data collection methods, and new sustainable options (travel sharing, multi-modality, e-cars, etc.).

Course learning outcomes:

1. Provide the student the student with a basic knowledge of transportation systems and to get in touch with the most relevant issues addressed by transportation systems theory.
2. Introduce the student to theoretical and practical tools to analyse traffic and transport systems, to solve traffic management and infrastructure planning and design problems.

Description:

1. Introduction to transport systems analysis and transport planning and management;
2. Supply systems and traffic flow theory: Urban and motorway systems, definition of capacity, Macroscopic models (fundamental diagram approach);
3. Demand and Travel behaviour: Basics of random utility theory, decision making processes, choice set generation; 4-stage modelling, OD estimation from traffic data
4. Traffic assignment and equilibrium: Traffic assignment processes; equilibrium principles;
5. Planning and scheduling of Public Transport: Timetabling, railway capacity, safety systems, real-time rescheduling and management; PT planning and design, sustainable mobility, multimodal networks
6. Infrastructure planning and design: Basics of transport economics, pricing problems, road maintenance strategies, design and planning of new infrastructures

Theme:

1. The complexity of modelling transportation networks is elaborated in detail, from the analysis of the demand to the arising of congestion problems and how to mitigate them.
2. Different management solutions are described in the second part of the course to learn how to reduce transportation costs, and seek sustainable mobility targets.

Teaching modality: Lecture



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Language:	Anglais
Mandatory:	Non
Evaluation:	Written Examination
Remark:	Course handouts, course notes. Cascetta E. Transport Systems Analysis. Springer (complementary reading) Ortuzar J. and Willumsen P. Transport Modelling. Wiley (complementary reading)
Professor:	VITI Francesco

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Semester 3

MARCH Design with Integrated Disciplines III (Greater Geneva)

Module: MARCH-DS-S3 Design Studio (Semester 3)

ECTS: 12

Objective: Course structure:

- Defining and analysing the framework of the project
- Developing a design project at architectural scale integrating adjacent disciplines
- Elaborating the design on various scales, from 1/500 to 1/10
- Representing and presenting the final project

Course learning outcomes:

- Students will learn how to develop a design project from the scale of a neighborhood to the scale of the architectural object.
- The final design project will expose a process of a critical analysis of the socio-spatial condition in which it has been developed, and show conceptual, graphic and technical virtuosity.

Description: The design of the winter semester 2019 is about the Greater Geneva design strategy 20500 in collaboration with ETH Zurich. The Students will receive a masterplan with a wide range of different plots characterized by different regulations. In a first phases, they will develop dialogic programmes related to their sites. The programmes will focus on affordable housing (cooperatives and similar programmes), an integration of collaborative office spaces, the interplay with urban agriculture, and a wide range of common activities. Thus, the project will have to reflect on what could be the Existenzoptimum of the 21st century. At the same time the students will simulate the possible volumetric envelop of the built space according to the master plan, and in the second phases articulate the programme within this built envelop. Simultaneously they will work at the scale of one typical housing unit in the scale of 1/20. For the Midterm critic they will develop coherent projects in terms of space, structure and materiality, in a scale of 1/100.

The structural aspect will be developed with students from the Master in structural engineering supervised by Prof. Christoph Odenbreit. Together with his students they will work on reusable and recyclable buildings in steel, wood or a composite of both. Every project will fulfil the following goals: zero CO2 emissions, zero fossil energy consumption, zero waste (means 100 % recyclability). The ecological dimensions has to go beyond the iconic green washing.

Language: Anglais

Mandatory: Oui

Evaluation: 50% participation in the studio, 50% final project presentation.

Professor: HERTWECK Florian

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MARCH Design with Integrated Disciplines III INDIVIDUAL WORK

Module:	MARCH-DS-S3 Design Studio (Semester 3)
ECTS:	0
Language:	Anglais
Mandatory:	Oui
Professor:	HERTWECK Florian

Steel & Composite Structures 1 – High Rise Buildings

Module:	MARCH-AR-S3 Architecture (Semester 3)
ECTS:	5
Objective:	Civil Structural Engineering

The learning targets concern different types of steel and steel composite structures of multi-storey- and tall buildings. Light flooring construction types and special bracing constructions for high-rise buildings in steel and steel composite structure are determined and analysed.

Special calculation methods, like the determination of the Eigenfrequency of a building and important constructional rules, for example the combination of different bracing elements are known.

Different Methods of optimizing the building construction elements - with the different target parameters like construction time, simplicity of assembly, degree of prefabrication and reduction of steel tonnage is known. Especially the last point is important, which insists in the basis for the later judgement of CO₂-equivalent concerning the sustainable construction with limited resources.

The student is able to work interdisciplinary in a team of structural engineers and architects.

Learning the mutual understanding is important in a sense, that different actors in the building sector have – according to their profession and assignment – different "languages" and also different targets to achieve.

Architectural Engineering

The student in Architectures is able to work in an interdisciplinary group of Architects and Structural Engineers.

He knows about the different challenges of high-rise buildings in comparison with residential buildings and multi-storey buildings.



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He can draft a high-rise building with consideration of the most important structural elements in combination with a structural engineer. He knows the different structural elements, which are necessary for the vertical load take down and the building's bracing.

Course learning outcomes:

Civil Structural Engineering

1. The student is able to work in an interdisciplinary team of Architects and Structural Engineers.
2. The student is able to propose different ways of constructing and analysing composite slab systems for high-rise buildings in steel and concrete and knows how to prove its load bearing capacity. The student can propose the different methods to brace high-rise buildings and is able to calculate the stability of the bracing system.
3. The student is able to draft different structural systems for wide span constructions, to name assessment criteria and to judge the respective advantages and disadvantages.
4. The student is able to draft and design a standard bridge with the special required proofs of fatigue for the steel details.

Architecture

1. The student is able to work in an interdisciplinary team of Architects and Structural Engineers.
2. The student is able to develop a rough draft of a high rise building with the knowledge about the necessity of structural systems

Description:

High Rise Buildings in Steel and Concrete Composite Structure

- Introduction
 - Exemplification of worldwide well known buildings
 - Slab structures in composite steel and concrete structures
 - Impacts on high rise systems
 - Bracing systems
 - Structural analysis
 - Circular Economy and Reusable Systems
 - Judgement criteria concerning construction time, simplicity of assembly, degree of prefabrication and reduction of resources namely steel tonnage and concrete volume
1. This course is focusing on the first theme: the design of large structures in steel and composites.
 2. The subject Sustainability is tackled in the chapter about reusable systems for a circular economy.

Teaching modality: Lecture and Workshops



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Language:	Anglais
Mandatory:	Oui
Evaluation:	Development of a High Rise Building – <ol style="list-style-type: none">1. Participation in the lectures and workshops2. Development and Draft of a HR building within an interdisciplinary team3. Quality and plausibility of the developed solution4. Final report with structural analysis, architectural drawings and structural drawings5. Final presentation
Remark:	Script C. Petersen; "Stahlbau", Vieweg-Verlag K.-J. Schneider; "Bautabellen für Ingenieure"; Werner Verlag "Betonkalender", Verlag Ernst und Sohn "Stahlbau-Kalender", Verlag Ernst und Sohn S. Bungale; S.E. Taranath; "Wind and Earthquake Resistant Buildings", W.F. Chen, E.M. Lui; "Handbook of Structural Analysis and Design"; Taylor and Francis, Boca Raton, USA
Professor:	ODENBREIT Christoph, KOZMA Andras

MARCH Visual and Cultural Studies

Module:	MARCH-AR-S3 Architecture (Semester 3)
ECTS:	3
Objective:	An introduction to contemporary art and museums: Art and architecture between cultural history, ideology, social realities, urban transformation and technical constraint. This course gives an introduction to main topics in contemporary art and provides an insight on the role of modern and contemporary art museums in western societies: it aims at understanding the relationship between the development of art, architecture and representation, while exploring the societal, political and urban aspects implied by the construction of such a museum.
Course learning outcomes:	-Provides the student with a knowledge of some aspects of recent art history and its iconography - Introduce the student to theoretical and practical tools to analyse needs and functionality of art museums.
Description:	<ol style="list-style-type: none">1. Introduction to main issues of modern and contemporary art2. Iconography and representation of utopia: how to read an artistic / architectural image ?



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3. Case studies of contemporary art practices and museums

Organisation: Lectures, discussions and visit of a museum

Language: Anglais

Mandatory: Oui

Evaluation: 50 % participation during the course, 50 % home assignment.

Professor: LUNGHI Enrico

MARCH Comparative analysis: laws, regulations, norms

Module: MARCH-EU-S3 European Urbanisation (Semester 3)

ECTS: 3

Course learning outcomes: Students are introduced to the logic and structure of major laws and regulations related to the build environment at the building, urban and regional scale.

Students familiarise themselves with local, regional and European regulatory frameworks.

Students learn how to integrate regulatory constraints onto their design projects.

Description: Regulatory frameworks and regimes constitute a crucial element shaping the building environment at multiple scales: from the national and transnational, through national and European spatial development plans; to urban and regional, through masterplans and urban and regional plans; to the building scale through building codes and regulations. This course aims to introduce students to the logic and structure of major regulatory frameworks, focusing on the broader region of Luxembourg, but also on the European scale. Moreover, it aims to help students integrate regularity conditions into the design process.

Course Structure:

Overview of major regularly frameworks, actors, regimes and scales, both historical and contemporary and their impact on the build environment.

Focus on regional and European regulatory frameworks and local building codes and regulations.

Integration of regularity conditions into the design process.

Language: Anglais

Mandatory: Oui

Evaluation: 50 % participation in the seminar, 50% final project.

Professor: MAX VON ROESGEN

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MARCH Seminar on Project Management

Module: MARCH-SE-S3 Seminar (Semester 3)

ECTS: 5

Objective: The student has to be aware of the life cycle of a building and the different consecutive phases. A focus is set on the "conception phase" to guaranty a user needs adaptable building as main condition for a sustainable construction. The understanding of an infrastructure as support for the core business of an economic, public or private entity and as important part for the social and cultural development of an urban area will help to define the targets of any construction. She / he will learn about the differences between role and function in a project team and get informed about the link between legal requirements (construction laws in D/F/L context) and technical and process orientated constrains. As construction is the consequence of filling in contracts between partners who are linked by mutual performance bonds, the legal basics for contracting and tendering will be mentioned in the D/F/L context.

The student will be able to set up a project structure and get competences to lead a team and manage the tools in a more and more digital supported design process. (by using BIM-methods)

In a more practical part of the lecture and by using examples of university premises at Campus Belval, she/he will be trained to interpret the user needs to set up a space program for a research building.

Course learning outcomes: The student understands the principles of project management in a object orientated design process (BIM-methods) and can apply this as leader in a construction design team. She/he understands the design and construction process as filling in contracts between partners who are linked by mutual performance bonds.

Description: 1-Introduction:

"Building activity" as added value chain process: project management task - design task - building task - exploitation task.

Future trends for real estate development. (smart building, low emission, digitalisation..)

Future challenges for the added value chain process.

2-Project management task for building activity:

- Real estate lifecycle
- Phases in a construction process (timeline / technical sequence)
- Participants (role & function)
- Targets – tools – requirements
- Cost- quality- & risk-management for construction projects



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3-Design management:

Object orientated Design – BIM in construction process

Basic principles for object-orientated design

- Work-flow and communication in a data base network structure
- Definition of the role of the "users needs"
- Definition of object –qualities
- "Design team" for collaborative working (roles - requirements – communication – lead)

4.Construction and Exploitation management:

Milestones to transfer the project into "building status" / "exploitation status"

- Bid – contract – supervise- overhand

5.(option) Workshop: Concept definition for research and teaching real estate.

Language:

Anglais

Mandatory:

Oui

Evaluation:

50% participation in the seminar, 50% final written exam (90 min).

Remark:

Harris, McCaffer; Modern Construction Management; Wiley 2013

Eyon, John; Construction Manager's BIM handbook; Wiley Blackwell 2016

Sommer, Hans; Projektmanagement im Hochbau; Verlag Springer 2016

Hardin, McCool; BIM and Construction Management: Proven Tools, Methods, and Workflows; Wiley 2015

Diethelm, Gerd; Projektmanagement Band I und II; Verlag Neue Wirtschaftsbriefe 2000

Kochendörfer, Bernd; Bau-Projekt-Management, Verlag Teubner 2004

Viering, Markus G; Managementleistungen im Lebenszyklus von Immobilien; Verlag Teubner 2006

Girmscheid, Gerhard; Projektabwicklung in der Bauwirtschaft; Verlag Springer 2007.

Professor:

SCHEUERN Michael



Master en Architecture

Semester 4

MARCH-DS-S4 Final Master Thesis

Module:	MARCH-DS-S4 Design Studio - Final Master Thesis (Semester 4)
ECTS:	30
Language:	Anglais
Mandatory:	Oui
Professor:	SWINNEN Peter