HafenCity Universität Hamburg

Module Guide

Resource Efficiency in Architecture and Planning (REAP)

BSPO-MSc-REAP-23

Summer Semester **2024**

Contents

Structure of the Study Program

Brief Profile

German Version below

The Master of Science Degree Programme REAP – “Resource Efficiency in Architecture and Planning” is an international and interdisciplinary programme at HafenCity University Hamburg that is concerned with sustainable planning on different scales.

It aims to enable participants to promote sustainable architecture and urban development in different geographical and cultural settings.

Lectures and seminars are grouped around the central project work: real-time, real-world case studies, in which students, with help and guidance from faculty, develop recommendations and solutions for applied tasks.

The REAP programme consists of 17 study modules taught over 2 academic years. During their studies, REAP students will obtain knowledge and skills within the following areas:

- Sustainability
- Water, Material and Energy Cycles in the city
- Resource efficient urban technologies and infrastructure
- Economics and administration of buildings and urban services
- Legal and policy instruments
- Urban Planning on different scales
- Skills development: dimensioning, preception, assessment and decision making in the field of sustainable resource technologies
- Research methods and decision support techniques

REAP is not an architectural design course.

The master course is not focused on a single discipline -it is interdisciplinary and follows an integrative and multidimensional planning approach.

Kurzbeschreibung

Der Masterstudiengang REAP - "Ressourceneffizienz in Architektur und Planung" ist ein internationaler und interdisziplinärer Studiengang an der HafenCity Universität Hamburg, der sich mit nachhaltiger Planung auf verschiedenen Ebenen beschäftigt.

Ziel ist es, die Teilnehmer zu befähigen, nachhaltige Architektur und Stadtentwicklung in unterschiedlichen geografischen und kulturellen Kontexten zu fördern.

Die Vorlesungen und Seminare gruppieren sich um die zentrale Projektarbeit: reale Fallstudien, in denen die Studierenden mit Hilfe und unter Anleitung der Dozenten Empfehlungen und Lösungen für angewandte Aufgaben entwickeln.

Das REAP-Programm besteht aus 17 Studienmodulen, die über 2 Studienjahre hinweg unterrichtet werden. Während ihres Studiums erwerben die REAP-Studenten Kenntnisse und Fähigkeiten in den folgenden Bereichen:

- Nachhaltigkeit
- Wasser-, Material- und Energiekreisläufe in der Stadt
- Ressourceneffiziente städtische Technologien und Infrastruktur
- Wirtschaft und Verwaltung von Gebäuden und städtischen Dienstleistungen
- Rechtliche und politische Instrumente
- Stadtplanung auf verschiedenen Ebenen
- Kompetenzentwicklung: Dimensionierung, Wahrnehmung, Bewertung und Entscheidungsfindung auf dem Gebiet der nachhaltigen Ressourcentechnologien
- Forschungsmethoden und Techniken zur Entscheidungsfindung

REAP ist kein Studiengang für Architekturentwurf.

Der Masterstudiengang ist nicht auf eine einzelne Disziplin ausgerichtet - er ist interdisziplinär und verfolgt einen integrativen und multidimensionalen Planungsansatz.

Module Plan

The corresponding examination regulations are published at:

https://www.hcu-hamburg.de/studierendenservices/pruefungsamt/studien-und-pruefungsordnungen

HafenCity Universität Hamburg, REAP

Modulplan REAP (M.Sc.)

Subject area	Semester 1	CP	Semester 2	CP	Semester 3	CP	Semester 4	CP
Fundamentals and Methods	**REAP-M-MOD-101** **Facets of Sustainability** COMPULSORY MODUL	5	**REAP-M-MOD-201** **Urban Material Cycles** COMPULSORY MODUL	5				
	REAP-M-MOD-102 **Research Methods and Statistics**	5	**REAP-M-MOD-202** **Urban Energy Flows** COMPULSORY MODUL	5				
	REAP-M-MOD-103 **Legal and Economic Instruments of Environmental Policy**	5	**REAP-M-MOD-203** **Urban Water Cycles** COMPULSORY MODUL	5				
	REAP-M-MOD-104 **Methods of Integrative Urban Planning** COMPULSORY MODUL	5						
Resources, Technologies and Environment (Students have to select 2 modules of this block)					**REAP-M-MOD-301** **Climate Responsive Architecture and Planning** OPTIONAL MODUL	5		
					REAP-M-MOD-302 **Technologies for Sustainable Water Resource Management** OPTIONAL MODUL	5		
					REAP-M-MOD-303 **Technologies for Sustainable Material Cycles** OPTIONAL MODUL	5		
					REAP-M-MOD-307 **General Elective I: Resources, Technologies and Environment** OPTIONAL MODUL	5		
Resources, Institutions and Instruments (Students have to select 2 modules of this block)					**REAP-M-MOD-304** **Economics and Planning of Technical Urban Infrastructure Systems** OPTIONAL MODUL	5		
					REAP-M-MOD-305 **Decision Support and Project Evaluation** OPTIONAL MODUL	5		
					REAP-M-MOD-306 **Material Flow Analysis and Life Cycle Assessment** OPTIONAL MODUL	5		
					REAP-M-MOD-308 **General Elective II: Resources, Institutions and Instruments** OPTIONAL MODUL	5		
Projects	**REAP-M-MOD-105** **Project I** COMPULSORY MODUL	5	**REAP-M-MOD-204** **Project II** COMPULSORY MODUL	10	**REAP-M-MOD-309** **Project III (Joint Project)** COMPULSORY MODUL	10		
Fachübergreifende Studienangebote	**BS-M-MOD-01** **Project Management** Project Management - Lecture 2,5 Project Management - Seminar 2,5 COMPULSORY MODUL	5	**Q-M-MOD-01** **Q-Studies** Q-Studies I 2,5 Q-Studies II 2,5 COMPULSORY MODUL	5				
Thesis							**REAP-M-MOD-401** **Master Thesis** OPTIONAL MODUL	30
Σ CP 120	Σ CP Semester 1	**30**	Σ CP Semester 2	**30**	Σ CP Semester 3	**30**	Σ CP Semester 4	**30**

Gruppengrößen / Group Sizes

Die Lehrveranstaltungen in REAP (M.Sc.) umfassen in der Regel folgende Gruppengrößen:

- Vorlesungen (nur REAP): 10-50
- Vorlesungen (FaSt bzw. übergreifend für mehrere Studiengänge): 10-240
- Seminare: 10-50
- Übungen: 10-50
- Projekte: 10-30

The courses in REAP (M.Sc.) generally comprise the following group sizes:

- Lectures (REAP only): 10-50
- Lectures (FaSt or overlapping for several degree programs): 10-240
- Seminars: 10-50
- Exercises: 10-50
- Projects: 10-30

Abkürzungen **Abbreviations**

Modularten		Modul Types	
PF	Pflichtmodul	C	Compulsory Module
WP	Wahlpflichtmodul	CE	Compulsory Elective
W	Wahlmodul	E	Elective
Lehrveranstaltungsformen		Course Types	
VL	Vorlesung		Lecture
SE	Seminar		Seminar
UE	Übung		Exercise / Practical Seminar
LP	Laborpraktikum		Practical Laboratory Course
P	Projekt		Project
ST	Stegreifarbeiten		Impromptu Writing Assignment
PK	Praktika		Internships
EX	Exkursion		Field Trip
OK	Online-Kurs		Online Course
Prüfungsleistungen		Assessments	
K	Klausur		Exam
M	Mündliche Prüfung		Oral Exam
R	Referat		Presentation
S	Semesterarbeit		Term Paper
ST	Stegreifarbeiten		Impromptu Writing Assignment
KO	Kolloquium		Colloquium
D	Dokumentation		Documentation
PR	Präsentation		Presentation
H	Hausarbeit		Written Assignment
AQT	Aktive Qualifizierte Teilnahme		Active Qualified Participation

Module Descriptions

Facets of Sustainability	REAP M.Sc. HCU Hamburg

REAP-M-Mod-101	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-101	C	3	150 h	5	1	1
Subject Area				Module Coordinator		
Fundamentals and Methods				Prof. Irene Peters, Ph.D. (Infrastrukturplanung und Stadttechnik)		

Courses

Title	Course type	SWS (Contact Hours)
Facets of Sustainability	lecture	3 SWS (= 31,5 h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Facets of Sustainability	31,5 h	0		118,5 h	150 h

Objectives and contents

Objectives of qualifications (Competencies)

- "Ecological literacy": Acquaintance with basic mechanisms occurring in and affecting the natural world: e. g. biogeochemical cycles, food webs etc.
- Acquaintance with major sustainability deficits, regionally and globally, of the physical-ecological and social kind (e.g., climate change, biodiversity decline, micropollutants, the plastics crisis, poverty, environmental injustice)
- "Connecting the dots": Appreciating the connectedness of sustainability aspects and deficits across the globe (environmental degradation, poverty, education, democracy, human rights observance, lifestyles, health, economic regimes, international trade, global sourcing of raw materials)
- Basic notion of different disciplinary approaches towards operationalizing the concept of sustainability, (e. g. from ecology and economics), appreciating their disciplinary roots, their applicability and usefulness

Contents of the module

- How sustainability and sustainability deficits have been perceived over the last centuries. Classics of the environmental and sustainability literature (e. g. Schumacher, Carson, Club of Rome) and policy documents relating to sustainability (e. g. Brundtland Report, Agenda 21)
- Disciplinary and interdisciplinary approaches for analyzing the sustainability theme, concepts operationalizing "sustainability" (e. g. the Planetary Boundaries framework)
- Introduction to a range of selected sustainability deficits (ecological and otherwise) and efforts to redress them, with a revisiting of their scientific foundations, presented by guest speakers, experts in their field (e. g. climate change, the threat to freshwater resources, the global food system, raw materials mining, environmental justice),
- Sustainability politics and metrics: Guiding principles and action plans the world has come up with, at the international, national and local levels; sustainability indicators
- Students' own encounters with sustainability deficits, in their own geographical and political contexts at home

Recommended literature

- The materials for this class vary with the varying topics each year. Some staple resources include:
- - World Commission on Environment and Development (1987). Our Common Future. (Also known as the Brundtland Report)
- - The papers on „Planetary Boundaries", latest September 2023, see stockholmresilience.org
- - The IPCC Assessment Reports and Special Reports (www.ipcc.ch)
- - Various United Nations Reports on different resources, like World Water Report (see unwater.org)

Forms of teaching and learning

Lectures and class discourse, with inputs from different guest speakers, experts in their fields, and contributions by students

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
Assessment methods and criteria (type, duration & scope)
Semester work (S)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Physics and chemistry at the high-school diploma level
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Frequency of Offering
Every winter term
Course Language
English

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Research Methods and Statistics	REAP M.Sc. HCU Hamburg

REAP-M-Mod-102	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-102	C	3	150 h	5	1	1
Subject Area				Module Coordinator		
Fundamentals and Methods				Prof. Irene Peters, Ph.D. (Infrastrukturplanung und Stadttechnik)		

Courses

Title	Course type	SWS (Contact Hours)
Research Methods and Statistics	lecture	3 SWS (= 31,5 h contact time)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Research Methods and Statistics	31,5 h	118,5 h			150 h

Objectives and contents

Objectives of qualifications (Competencies)
• Ability to appreciate what constitutes the scientific method • Ability to critically reflect the scientific authority of different information sources • Ability to perform some basic inferential statistics • Ability to appreciate the malleability of statistical analysis • Encounter with a programming language (e. g., Matlab, R, Python …) Experience to search for, obtain, and understand data; import and format data for analysis in a programming languages
Contents of the module
• What constitutes the scientific method? • Rules of academic work, esp. conventions for referencing sources (input by HCU librarians) • Introductory statistics, descriptive and inferential • Students develop a topic for an inferential statistical analysis and obtain data for it (with instructor's support) • Students conduct an inferential statistical analysis in a programming language
Recommended literature
• - George Orwell (1946). Politics and the English Language. • - Samir Okasha (2016). Philosophy of Science. A Very Short Introduction. 2nd edition.Oxford University Press. • - Jeremy Balka Statistics (https://www.jbstatistics.com) • - Documentation of the language used for statistical analysis; currently it is Python
Forms of teaching and learning
Lectures and consultations with instructor to discuss student ideas for statistical analysis

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester work (S)
ECTS awarding criteria
Successful completion of the module examination.
Calculation of the module grade
S = 100 %
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Mathematics at the high-school diploma level
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Frequency of Offering
Every winter term
Course Language
English

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Legal and Economic Instruments of Environmental Policy	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-103	C	3	150 h	5	1	1
Subject Area				Module Coordinators		
Fundamentals and Methods				Prof. Dr. Martin Wickel, LL.M. Recht und Verwaltung		

Courses

Title	Course type	SWS (Contact Hours)
Legal and Economic Instruments of Environmental Policy	Lecture	3 SWS (31,5 h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Legal and Economic Instruments of Environmental Policy	31,5 h	118,5	included in self study	0	150

Objectives and contents

Objectives of qualifications (Competencies)
• Understanding of the legal and economic concepts of human and organisational action. • Understanding of the rationale of different types of environmental policy measures. • Good knowledge of specific fields of International and European environmental law. • Understanding of the instruments in the field of national (Germany and other EU Member States) environmental l law. • Ability to relate an environmental goal to a choice of instruments to achieve this goal
Contents of the module
• Principles of environmental laws. • Types of instruments in the environmental law (command and control, economic, procedural, informational, constutional law etc.) • Types of environmental policy measures (emission control, BACT regulation, fees, tradeable permits, subsidies, feed-in-tariffs, etc.) in theory and practice, with examples from Europe and around the world. • Role of international law in the construction of national law (in particular, EU law vs. national law of the EU member states).
Recommended literature
Sterner, Coria: Policy Instruments for Environmental and Natural Resource Management, 2nd ed. 2011 Pahl-Weber, Henckel, The Plannings System and Planning Terms in Germany Further literature will be given in the course
Forms of teaching and learning
Lecture (complemented by individual student inputs for specific subjects).

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester work (collection), oral presentation, term paper.
ECTS awarding criteria
Successful completion of the examinations
Calculation of the module grade
semester work (1/4), oral presentation (1/4), term paper (1/2)
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
none
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room for at least 40 participants
Frequency of Offering
Winter term
Course Language
English

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Methods of Integrative Urban Planning	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-104	C	3 SWS	150 hours	5	1.	1 Semester
Subject Area				Module Coordinators		
Fundamentals and Methods				Prof. Dr. Martin Wickel, LL.M. Recht und Verwaltung		

Courses

Title	Course type	SWS (Contact Hours)
1. GI Science	lecture	2 SWS (21 h)
2. Methods of Integrated Urban Planning	seminar	1 SWS (10,5 h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
1. GI Science	21 h	79 h	Included in self-study	0 h	100 h
2. Methods of Integrated Urban Planning	10,5 Sh	39,5 h		0 h	50 h

Objectives and contents

Objectives of qualifications (Competencies)

- Knowledge of methods of integrated planning, decision making and presentation skills.
- Self-organization and project-organization.
- Implementation of different methods and support of REAP project work (P1, P2 and P3).

Contents of the module

I. GI Science

- Knowledge about characteristics and complexity of spatial data (geometrical, thematic, topological, temporal components) and the importance of a proper data modeling stage.
- Introduction to suitable GIS data models for a given application (advantages and disadvantages of vector and raster as well as methods for the transformations between each other).
- Introduction to suitable operations for a given application based on an understanding of the principles of basic geometrical, thematic and topological operations.

Basic principles of modern cartographical representation of qualitative and quantitative data

II. Methods of Integrative Urban Planning

- Methodology of scenario techniques, thinking about the future in different variations, pictographic descriptions of different future scenarios.
- Introduction to instruments of economic evaluation of projects, application-oriented simplified methodology.
- Introduction to the goal tree (approaches, leading lines, objectives, assessment criteria).
- Project planning phases (site analysis, concept, development of overall framework, details, SWOT-analysis).
- Project structures, time management, (multicultural) decision making and network in projects/ working groups.
- Certification system „sustainability in neighborhoods“ (introduction to DGNB system).
- Development of illustrations of existing data and concepts overlapping contents (integration).
- Graphic presentation methods (posters, flyers, brochures).

Recommended literature

• Lo, C.P. & Yeung, A.K.W. (2002): Concepts and Techniques of Geographic Information Systems. Prentice Hall. • Longley, P.A et al. (2005): Geographic Information Systems and Science. Wiley. • Wheeler, S.M. (2013): Planning for Sustainability. Creating Livable, Equitable and Ecological Communities.Routledge. • Couch, C. (2016): Urban Planning: an introduction. Palgrave Macmillan. • Fürst, D.; Scholles, F. (2008): Handbuch Theorien und Methoden der Raum- und Umweltplanung. Rohn. • Therivel, R. (2010): Strategic environmental assessment in action. Earthscan. • Wood, C. (2003) Environmental Impact Assessment – A Comparative Review. Prentice Hall. • Kiker, G.A.; Bridges, T.S.; Varghese, A.; Seager, T.P.; Linkov, I. (2005): Application of Multicriteria Decision Analysis in Environmental Decision Making. In: Integrated Environmental Assessment and Management 1 (2), 95-108.

Forms of teaching and learning
Lecture (connected to REAP projects, implementation of methods in REAP projects; coaching in following semesters),
Plenum, excursions occasionally

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
Passed examination
Calculation of the module grade
Semester work: 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
none
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
none
Frequency of Offering
Winter term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Project I (Joint Project)	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-105	C	2 SWS	150 hours	5	1.	1 Semester
Subject Area				Module Coordinators		
Projects				Prof. Weidlich Technical Infrastructure Management		

Courses

Title	Course type	SWS (Contact Hours)
Project I	project	2 SWS (21h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Project I	21 h	129	In selfstudy	31,5	150h

Objectives and contents

Objectives of qualifications (Competencies)
• Ability of planning and conducting interdisciplinary exercises in a short, fixed period with the focus on selected international metropolitan cities or regions (except Hamburg). • Self-organization of more independent, integrated and work-related exercises in groups. • Project-organization and development of core skills such as communication, cooperation and a multi- and interdisciplinary approach.
Contents of the module
• Targets and contents of the project will be elaborated each semester by the REAP-team. • Students can make suggestions about the contents of the project. • Targets and contents of the project are based on the modules of the current semester.
Recommended literature
World Future Council/HafenCity University, Regenerative Cities (available online) Hellige, H.D. (2018). The reception of the resilience concept in the energy discourse, and genesis of the theory of resilient energy system design. In Gößling-Reisemann, S., Hellige, H.D., & Thier, P. (2018). The Resilience Concept: from its historical roots to theoretical framework for critical infrastructure design. ISSN 1613-4907. https://doi.org/10.26092/elib/572Chelleri, L. (2012). From the «Resilient City» to Urban Resilience. A review essay on understanding and integrating the resilience perspective for urban systems. Documents d'Anàlisi Geogràfica, 58, 287–306. https://doi.org/10.5565/rev/dag.175
Forms of teaching and learning
Project: Autonomous project work in groups (complemented by seminar and content of the modules of the current semester), Plenum, excursions occasionally

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
regular participation (at least 80 %)
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
None
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room, with equipment for online/hybrid sessions.
Frequency of Offering
Winter term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Urban Material Cycles (UMC)	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-201	C	3 SWS	150 h	5	2	1 Semester
Subject Area				Module Coordinators		
Fundamentals and Methods				Prof. Dr.-Ing. Gesa Kapteina (Building Materials) Prof. Irene Peters, Ph.D. (Technical Urban Infrastructure Systems)		

Courses

Title	Course type	SWS (Contact Hours)
Urban Material Cycles	Lecture	3 SWS (31,5 h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Urban Material Cycles	31,5 h	118,5 h	included in self study	0 h	150 h

Objectives and contents

Objectives of qualifications (Competencies)

Being acquainted with a range of urban material streams: construction materials (conventional and renewable), material streams for operating technical infrastructures, material streams present in municipal solid waste; their energy and environmental profile over their life cycle, conventional disposal paths and recycling opportunities.

Being capable of recognizing and promoting opportunities to implement resource efficiency and circular economy processes in construction and solid waste management.

Contents of the module

Introduction to major construction materials (mineral binders, concrete, steel, glass, wood) and other materials used in construction of buildings and infrastructure:

- Mining, refining, production process of material
- Performance, physical and chemical properties, typical applications
- Recyclability, status of recycling for the material
- Basic knowledge of energy and resource use and emissions over the material's life cycle
- Regimes for incentivizing circular economy processes
- Reuse vs. demolition of buildings and built infrastructure
- Supply chain management options (esp. for globally sourced materials with non-sustainable extraction)

Fundamentals of municipal solid waste management, with sensitivity to conditions in different geographical contexts:

- Municipal solid waste stream and its composition
- Conventional disposal paths and disposal facilities, and associated resource use and emissions
- Recycling technologies and facilities, resource use and emissions implied by recycling path(s), status of recycling for waste stream (fractions), emissions and regulatory regimes for incentivizing circular economy processes
- Synergies with industrial waste and wastewater management (e.g., concerning the bio-organics fractions)

Recommended literature

Various materials (references and material will be given in the course)

Hemeda, Sayed, Sustainable Construction and Building Materials IntechOpen, 2019, https://directory.doabooks.org/handle/20.500.12854/130818

Hebel, Dirk E., Cultivated building materials industrialized natural resources for architecture and construction gttp://www.gbv.de/dms/weimar/toc/893435767_toc.pdf

Forms of teaching and learning

Lectures and class discourse, with inputs from different experts from HCU and other institutions

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
Assessment methods and criteria (type, duration & scope)
written exam (90 min)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
100% of the written exam
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
physics and chemistry at the high-school diploma level
Applicability of Module
This module is usable for REAP (M.Sc.) and open for other master programmes as an elective.
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
none
Frequency of Offering
every summer term
Course Language
English

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Urban Energy Flows	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-202	C	3 SWS	150 hours	5	2.	1 Semester
Subject Area				Module Coordinators		
Fundamentals and Methods				Prof. Weidlich (Technical Infrastructure Management)		

Courses

Title	Course type	SWS (Contact Hours/Week)
Urban Energy Flows	Lecture	3 SWS (2,25h/week)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Urban Energy Flows	31,5 h	118,5	In selfstudy	0	150h

Objectives and contents

Objectives of qualifications (Competencies)
• Understanding concepts of energy, exergy, energy efficiency, and laws of thermodynamics • Understanding the principles of power plants, combined heat and power (CHP) plants running on fossil fuels and/or renewable energy • Knowledge of Electricity distribution systems, district heating and cooling • Knowledge of Energy demand for transport and communication systems • Understanding Sankey Diagrams, Merit Order Diagrams and energy statistics
Contents of the module
• Basics on energy demand and supply (forms of energy, conversions, and indicators for energy efficiency) • Electricity production plants, introduction of renewable energy into urban energy systems (technologies) • Energy demand for the transport • Using renewable energies in an urban environment (techniques and contributions) • Visualisation of energy flows by using Sankey Diagrams
Recommended literature
Sovacool, Benjamin K.; Brown, Marilyn A.; Valentine, Scott V. (2016): Fact and fiction in global energy policy. Fifteen contentious questions. Baltimore: Johns Hopkins University Press. Frederiksen, Svend; Werner, Sven (2013): District heating and cooling. Lund: Student literature Ketfi O., Merzouk M., Kasbaidji Merzouk N., El Metenan S.(2015): Performance of a Single Effect Solar Absorption Cooling system (lithium bromide-water), Science Direct 74, 130-138 Al-Hallaj, Said; Kiszynski, Kristofer (2011): Hybrid hydrogen systems. Stationary and transportation applications. London: Springer (Green energy and technology)
Forms of teaching and learning
Lecture (complemented by tutorial and individual student inputs for specific subjects), Plenum, excursions occasionally

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester work (S)
ECTS awarding criteria
successful completion of the module examination.
Calculation of the module grade
S = 100%

Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Awareness of energy needs in cities and of urban and architectural planning and building procedures (content).
Applicability of Module
This module is usable for REAP (M.Sc.).
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room
Frequency of Offering
Summer term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Urban Water Cycle	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-203	C	3 SWS	150 Std.	5	2	1 Semester
Subject Area				Module Coordinators		
Fundamentals and Methods				Prof. Dr.-Ing. Wolfgang Dickhaut (Umweltgerechte Stadt- und Infrastrukturplanung)		

Courses

Title	Course type	SWS (Contact Hours)
Urban Water Cycle	lecture	3 SWS (31,5 Std.)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Urban Water Cycle	31,5 Std.	118,5	In selfstudy	0	150 Std.

Objectives and contents

Objectives of qualifications (Competencies)
- Understanding of the basic water-cycle situation in urban areas and the key strategies for sustainable water resource management. - Skills development: perception, assessment and decision making in the field of water-cycle management.
Contents of the module
- Water-cycle in urban areas – present situation and key strategies, using international examples: o Context :Urban Water cycle and adaptation to climate change o Stormwater: differences from the natural water-cycle (precipitation e.g. rainfall, rate of flow, infiltration, evatransporation, differences between the world's regions o Flowing waters: in urban areas, differences from natural flowing water o Wastewater and its impact on human beings and water bodies, potentials for recycling, criteria for treatment selection - Overview of alternative technologies in Stormwater- and Wastewater managment: o Consolidation of standard technologies of wastewater treatment and rainwater treatment (in Europe), e.g. centralized wastewater plants (treatment processes, mechanical and biological; sewer system). o Wastewater: Potentials for recycling, separation of streams, criteria for treatment selection, advantages and disadvantages of different treatment systems o Stormwater: Measuretypes of „Water sensitive Urban design"
Recommended literature
Hoyer, Jacqueline / Dickhaut, Wolfgang / Kronawitter, Lukas / Weber, Björn; Water Sensitive Urban Design – Principles and Inspirations for Sustainable Stormwater Management in the City of the Future; Jovis Verlag, 2011 United Nations Environment Programme, 2008, Every Drop Counts Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency SUSTAINABLE SANITATION AND WATER MANAGEMENT TOOLBOX; http://www.sswm.info/ The United Nations World Water Development Report 3; WATER IN A CHANGING WORLD; 2009
Forms of teaching and learning
excursion (optional)

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester work (S)
ECTS awarding criteria
Successful completion of the module examination

Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
none
Applicability of Module
This module is usable for REAP (M.Sc.) and is open for other study programmes as an elective.
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
none
Frequency of Offering
every summer term
Course Language
english

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Project II (Joint Project)	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-204	C	3 SWS	300 hours	10	2.	1 Semester
Subject Area				Module Coordinators		
Projects				Prof. Weidlich (Technical Infrastructure Management)		

Courses

Title	Course type	SWS (Contact Hours/Week)
Project II	project	3 SWS (2,25h/week)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Project II	31,5 h	268,5	In selfstudy	31,5	300h

Objectives and contents

Objectives of qualifications (Competencies)
• Learn about the principles and indicators of sustainable urbanism through a guided analysis of urban neighborhoods in Hamburg • Develop innovative resource efficient interventions which enhance the sustainability of the neighborhood • Ability of planning and conducting bigger and interdisciplinary exercises in a short, fixed period based on the skills of Project I. • Self-organization of more independent, integrated and work-related exercises. •
Contents of the module
• Targets and contents of the project will be elaborated each semester by the REAP-team. • Students can make suggestions about the contents of the project. • Targets and contents of the project are based on the modules REAP-M-Mod-201 – REAP-M-Mod-203 of the current semester.
Recommended literature
Brown, Lance Jay, and David Dixon. Urban Design for an Urban Century : Shaping More Livable, Equitable, and Resilient Cities, John Wiley & Sons, Incorporated, 2014. ProQuest Ebook Central, http://ebookcentral.proquest.com/lib/hcuhamburg-ebooks/detail.action?docID=1676116. Cidell J. Imagining Sustainability Creative Urban Environmental Governance in Chicago and Melbourne. 2017, ISBN: 978-1-138-92607-3
Forms of teaching and learning
Project: Autonomous project work in groups (complemented by seminar and content of the modules of the current semester), Plenum, excursions occasionally

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
regular participation (min. 80%)
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 8,33 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
None
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room
Frequency of Offering
Summer term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Climate Responsive Architecture and Planning	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-301	CE	3 SWS	150 hours	5	3.	1 Semester
Subject Area				Module Coordinators		
Resources, Technologies and Environment				Prof. Dirk Krutke (Technische Gebäudeausrüstung)		

Courses

Title	Course type	SWS (Contact Hours)
Climate Responsive Architecture and Planning	seminar	3 SWS (31,5h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Climate Responsive Architecture and Planning	31,5 h	118,5	In self-study	0	150h

Objectives and contents

Objectives of qualifications (Competencies)
• Potential to reach Zero-Energy-Situations in the different main climates zones. • Knowledge of interdependencies between buildings, their arrangement in urban space, energy demand, comfort and user behaviour.
Contents of the module
• Comfort criteria (specially thermal in summer and visual). • Passive-solar optimization of buildings, passive cooling methods and their application to different climatic locations. • Urban design requirements for climate-responsive energy applications. • Low-energy planning strategies for urban quarters and buildings. • Urban buildings as energy generators. • Building user behaviour and its impact on energy performance of buildings and the sustainability of urban environments. • Vernacular architecture and best practice examples as sources for climate responsive building design. • Tools for the assessment of climate and derivation of design rules.
Recommended literature
David Mackay: Without the hot air, www.withouthotair.com Brian Cody, Form Follows Energy , Birkhäuser, 2017
Forms of teaching and learning
Lectures for input, individual student inputs for specific subjects, seminar discussions.

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
Regular active participation (compulsory attendance for at least 80% of the session dates)
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
Regular active participation and successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Recommended: Successful completion of the module REAP-M-Mod-101 and REAP-M-Mod-202
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room
Frequency of Offering
Winter term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Technologies for Sustainable Water Resource Management	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-302	CE	3 SWS	150 Std.	5	3	1 Semester
Subject Area				Module Coordinators		
Resources, Technologies and Environment				Prof. Dr.-Ing. Wolfgang Dickhaut (Umweltgerechte Stadt- und Infrastrukturplanung)		

Courses

Title	Course type	SWS (Contact Hours)
Technologies for Sustainable Water Resource Management	lecture	3 SWS (31,5 Std.)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Technologies for Sustainable Water Resource Management	31,5 Std.	118,5	In selfstudy	0	150 Std.

Objectives and contents

Objectives of qualifications (Competencies)

Knowledge of different technologies in sustainable decentralised domestic wastewater and faecal sludge and rainwater management.
Skills development: dimensioning, perception, assessment and decision making in the field of sustainable decentralised domestic wastewater, faecal sludge and rainwater management.

rainwater management.

- Context :Urban Water cycle and adaptation to climate change
- Technologies for a sustainable decentralised domestic wastewater and faecal sludge management:
  - Technologies, e.g. grey water treatment, water toilets with liquid/solid separation, dry toilets, membrane filtration, biogas plants, DEWATS, Faecal Sludge emptying and transportation technologies.
  - Integration of wastewater and faecal sludge management in urban/ settlement planning.
  - Integration of wastewater management in the planning of individual buildings and sites.
  - Wastewater and faecal management – examples and assessment criteria in the selection of technologies in developing countries.
- Technologies for decentralised sustainable rainwater management:
  - Technologies, e.g. Rainwater infiltration technologies, e.g. surface, trench, gulley and trench, shaft,
  - Water evaporation, Decentralised retention, Rainwater usage, Planted roofs, Rainwater treatment, e.g. soil filter.
  - Integration of rainwater management in urban/settlement and landscape planning.
  - Integration of rainwater management in the planning of individual buildings and sites.
  - Rainwater management – examples and assessment criteria in the selection of technologies in developing countries

Recommended literature

Hoyer, Jacqueline / Dickhaut, Wolfgang / Kronawitter, Lukas / Weber, Björn; Water Sensitive Urban Design – Principles and Inspirations for Sustainable Stormwater Management in the City of the Future; Jovis Verlag, 2011
United Nations Environment Programme, 2008, Every Drop Counts Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency
SUSTAINABLE SANITATION AND WATER MANAGEMENT TOOLBOX; http://www.sswm.info/
Elizabeth Tilley, Lukas Ulrich, Christoph Lüthi,Philippe Reymond and Christian Zurbrüg; Compendium of Sanitation Systems and Technologies; EAWAG; 2014; www.sandec.ch/compendium .
English translations of significant publications of the DWA Set of Rules, 52 DWA-Standards and Guidelines, DWA-Topics and various brochures in pdf format (single user) - Edition April 2016
ICLEI; SWITCH Training Kit _ Integrated Urban Water Management in the City of the Future; 2011
BORDA; Decentralised Wastewater Treatment Systems (DEWATS) and Sanitation in Developing Countries; 2009
Strande, L., Ronteltap, M. & Brdjanovic, D. (Eds.) (2014). Faecal Sludge Management: Systems Approach for Implementation and Operation. IWA.
Tayler, K. (2018). Faecal sludge and septage treatment - A guide for Low and Middle Income Countrie

Forms of teaching and learning

excursion (optional)

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester work (S)
ECTS awarding criteria
Successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
none
Applicability of Module
This module is usable for REAP (M.Sc.) and open for other masterprogrammes as an elective.
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
none
Frequency of Offering
every summer term
Course Language
english

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Technologies for Sustainable Material Cycles	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-303	CE	2 SWS	150 hours	5	3.	1 Semester
Subject Area				Module Coordinators		
Resources, Technologies and Environment				Prof. Wilts (Circular Economy)		

Courses

Title	Course type	SWS (Contact Hours)
Technologies for Sustainable Material Cycles	Lecture	2 SWS (21h)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Technologies for Sustainable Material Cycles	21 h	129	In selfstudy	0	150h

Objectives and contents

Objectives of qualifications (Competencies)
• Knowledge of the standard technologies for material cycles and recycling. • Competence of decision making in the field of selection of material related technologies.
Contents of the module
• Planning strategies for long life cycles of buildings, building elements and building materials. • Technologies for material conservation and appropriate construction. • Technologies for building element (product) and building material (material) recycling. • Planning procedures for recycling adapted construction and selection of materials.
Recommended literature
Various materials (references and material will be given in the course)
Forms of teaching and learning
Lecture (complemented by tutorial and individual student inputs for specific subjects), Plenum, excursions occasionally

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Successful completion of the module REAP-M-Mod-201 is recommended.
Applicability of Module

This module is usable for REAP (M.Sc.) and open for other masterprogrammes as an elective.
Special requirements for workplaces
(room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room
Frequency of Offering
Winter term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Economics and Planning of Technical Urban Infrastructure Systems	REAP M.Sc. HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP/SP-M-Mod-304	CE	3	150 h	5	3	1
Subject Area				Module Coordinator		
Resources, Institutions, and Instruments				Prof. Irene Peters, Ph.D. (Infrastrukturplanung und Stadttechnik)		

Courses

Title	Course type	SWS (Contact Hours)	
Economics and Planning of Technical Urban Infrastructure Systems	Lecture	3 SWS (= 31,5 h)	30

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Economics and Planning of Technical Urban Infrastructure Systems	31,5 h	118,5 h			150 h

Objectives and contents

Objectives of qualifications (Competencies)

(To clarify: "Technical Urban Infrastructure Systems" here covers primarily energy supply, water supply, wastewater management, and solid waste management. The course does not deal with all of these each year, applications vary.)
Students have an appreciation of

- the principles underlying the (economic) functioning of technical urban infrastructure service markets (elements of Industrial Organization and Regulatory Economics)
- the need for regulation of technical infrastructural service markets, and different regulatory regimes and institutions
- competition law and infrastructural planning law in concert with urban development and stakeholder actions
- the potential for digitalization to enhance performance and resource efficiency of technical infrastructure service provision

Contents of the module

(To clarify: "Technical Urban Infrastructure Systems" here covers primarily energy supply, water supply, wastewater management, and solid waste management. The course does not deal with all of these each year, applications vary.)
Joint module of REAP and Urban Planning, offering …

- basic economic and legal concepts relevant for technical infrastructure service markets, like: Cost patterns, market forms (e.g. competition in the market vs. for the market), regulatory models (e.g. rate-of-return or yardstick) regulatory institutions (e.g. in Germany, Federal Network Agency and the Monopoly Commission)
- glimpses into the history of regulation, liberalization, de- and re-regulation of technical infrastructure service sectors in the U.S. and Europe, with exemplary emphasis on Germany and examples from other countries
- competition law and examples of infrastructural planning law at European Community and German national levels
- aims and success of regulatory reform and planning law provisions in the technical urban service sectors
- potential of digitalization, models of smart infrastructure management (e.g., infrastructure BIM, decentralized digital load supply management, smart tariffs, urban neighborhoods as actors in the energy market)
- role and scope of the municipality, and municipal actors, in shaping infrastructural service provision and markets
- examples of real-world implementation of technical urban infrastructure projects (e.g. heating grids, virtual power plants, microgrids, source-separation wastewater projects…) in their technical and project development aspects
- … all this in light of "smart" provision to enhance performance and resource efficiency and to promote sustainability goals

Recommended literature

The materials for this class vary with evolving research and development. Some of the resources for this class include

- Fraunhofer Institute for Solar Energy Systems (https://www.ise.fraunhofer.de/en.html)

- Agora Energiewende (https://www.agora-energiewende.org)

- Monopolies Commission of Germany (https://www.monopolkommission.de/en/)

- W. Brian Arthur (2015). Complexity and the Economy. Lecture at the Stanford Complexity Group, December 3, 2015.

Forms of teaching and learning

Lecture with seminar elements, possibly including excursion(s) to a technical infrastructure facility like a heat storage system

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
None
Assessment methods and criteria (type, duration & scope)
Semester Paper (S)
ECTS awarding criteria
Successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
A basic understanding of the (technical) functioning of technical urban infrastructure systems (energy and water supply, wastewater and solid waste management)
Applicability of Module
This module is usable for REAP (M.Sc.) and Urban Planning (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Frequency of Offering
Every winter term
Course Language
English

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Cost-Benefit Analysis of Technical Infrastructure Projects	REAP M.Sc. HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP/SP-M-Mod-305	CE	3	150 h	5	3	1
Subject Area				Module Coordinator		
Resources, Institutions, and Instruments				Prof. Irene Peters, Ph.D. (Infrastrukturplanung und Stadttechnik)		

Courses

Title	Course type	SWS (Contact Hours)
Cost-Benefit Analysis of Technical Infrastructure Projects	Lecture	3 SWS (= 31,5 h contact time)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Cost-Benefit Analysis of Technical Infrastructure Projects	31,5 h	118,5	in selfstudy		150 h

Objectives and contents

Objectives of qualifications (Competencies)
For students to be able to understand, to critically appraise and to perform simple versions of ex-ante and ex-post decision support and project evaluation along the methodological lines of • Cost-Benefit Analysis (emphasis of the course) • Alternatives in Decision Analysis (smaller part of course time)
Contents of the module
Joint module of REAP and Urban Planning, offering … • Common theoretical foundations (Decision Theory) for Cost-Benefit Analysis and Decision Analysis • Economic Cost-Benefit Analysis: Essential elements such as different accounting frameworks (financial and economic accounting), discounting, valuation of intangibles (through monetization), shadow pricing, etc. • Elements of Decision Analysis, esp. in contrast to Cost-Benefit Analysis (e.g. monetization vs. refraining from monetization; elicitation of decision maker's and makers' preferences, i.e. individual vs. aggregate preferences) • Elements common to both types of analysis (e.g., the treatment of uncertainty) • Case studies as examples for the application of Cost-Benefit and Decision Analysis
Recommended literature
Frank Ackerman and Lisa E. Heinzerling (2005). Priceless. On Knowing the Price of Everything and the Value of Nothing. The New Press. European Commission (2014). Guide to Cost-Benefit Analysis of Investment Projects. Ronald A. Howard and Ali E. Abbas (2015). Foundations of Decision Analysis. Pearso
Forms of teaching and learning
Lecture with seminar elements

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
none
Assessment methods and criteria (type, duration & scope)
Semester work (S)
ECTS awarding criteria
Successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade

The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Mathematics at the high-school diploma level
Applicability of Module
This module is usable for REAP (M.Sc.) and Urban Planning (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Frequency of Offering
Every winter term
Course Language
English

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Material Flow Analysis and Life Cycle Assessment	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-306	CE	3 SWS	150 hours	5	3.	1 Semester
Subject Area				Module Coordinators		
Resources, Institutions and Instruments				Prof. Weidlich Technical Infrastructure Management		

Courses

Title	Course type	SWS (Contact Hours)	
Material Flow Analysis and Life Cycle Assessment	Lecture	3 SWS (31,5h)	28

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Material Flow Analysis and Life Cycle Assessment	31,5 h	118,5	In selfstudy	0	150h

Objectives and contents

Objectives of qualifications (Competencies)
• Understanding the principles and application of Material Flow Analysis and Life Cycle Assessment.
Contents of the module
• Principles of Material Flow Analysis (MFA) and Life Cycle Assessment (LCA), their foundations, extensions and limitations. • Computer-aided application of MFA and LCA. • Computer aided Life Cycle Assessment (according to ISO 14044), application: ◦ Goal and scope definition. ◦ Life cycle inventory analysis (LCI); including data collection, definition of system boundaries, modelling of material flows. ◦ Life cycle impact assessment (LCIA); including selection of impact categories, category indicators, characterization models, normalization. ◦ Life cycle interpretation.
Recommended literature
Hauschild M.Z., Olsen S.I., Rosenbaum R.K., Life Cycle Assessment, Theory and Practice. 2018. Springer, ISBN 978-3-319-56474-6 ISBN 978-3-319-56475-3 (eBook), DOI 10.1007/978-3-319-56475-3 Grajcar, M., Rumiantceva K., Weidlich I. On the imaginary accuracy of the LCA on the basis of the houseboat in Hamburg. Conference of Environmental and Climate Technologies (CONECT). 15-17 May 2019, Riga, Latvia, DOI: https://doi.org/10.2478/rtuect-2019-0065
Forms of teaching and learning
Lecture (complemented by tutorial and individual student inputs for specific subjects), Plenum, excursions occasionally

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
S = 100%

Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
None
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room
Frequency of Offering
Winter term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

General Elective	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-307&308	C	2-4 SWS	150 hours	5	3.	1 Semester
Subject Area				Module Coordinators		
General Elective				Prof. Weidlich Technical Infrastructure Management		

Courses

Title	Course type	SWS (Contact Hours)
1)	1)	1)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
General Elective	1)	1)	1)	1)	150h

Objectives and contents

Objectives of qualifications (Competencies)
• Preparation and support of students Master theses (e.g. statistic courses for statistic evaluation of public survey).
Contents of the module
• Students will be advised according to their Master thesis theme to find the appropriate course. • Students can select one of the modules of offered study courses at HCU or other universities in Hamburg.
Recommended literature
Defined by selected module.
Forms of teaching and learning
Defined by selected module.

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
Defined by selected module.
Assessment methods and criteria (type, duration & scope)
Defined by selected module.
ECTS awarding criteria
Defined by selected module.
Calculation of the module grade
Defined by selected module.
Weighting of the module grade
The module grade is included in the final grade at a rate of 4.17 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Defined by selected module.
Applicability of Module

Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Defined by selected module.
Frequency of Offering
Winter term
Course Language
Deutsch/Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

1) results from selected course

Project III (Joint Project)	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-309	C	3 SWS	300 hours	10	3.	1 Semester
Subject Area				Module Coordinators		
Projects				Prof. Wilts (Circular Economy)		

Courses

Title	Course type	SWS (Contact Hours)
Project III	Project	3 SWS (31,5)

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Project III	31,5 h	268,5	In self study	In self study	300h

Objectives and contents

Objectives of qualifications (Competencies)
• Ability of planning and conducting bigger and interdisciplinary exercises in a concrete international environment. • Self-organization of deep interdisciplinary work- Based on the skills from Project I and Project II. • Joint project means that it is taught by instructors of different degree programmes and attended by students of different degree programmes
Contents of the module
• Targets and contents of the project will been elaborated each semester by the REAP-team. • Students can make suggestions about the contents of the project. • Targets and contents of the project are based on the modules of the current semester.
Recommended literature
Bates, G. & Jones, L. (2012): Monitoring and Evaluation: A guide for community projects. URL:http://www.cph.org.uk/wp-content/uploads/2013/02/Monitoring-and-evaluation-a-guide-for-communityprojects.pdf Clark, W.; Cooke, G. (2016): Smart green cities: toward a carbon neutral world. Routledge. EC (2004): Aid delivery methods - Project cycle management guidelines. URL:http://ec.europa.eu/europeaid/multimedia/publications/documents/tools/europeaid_adm_pcm_guidelines_2004_en.pdf Lehmann, S. (2015): Low carbon cities: transforming urban systems. Routledge. Wheeler, S.M. (2013): Planning for Sustainability. Creating Livable, Equitable and Ecological Communities.Routledge.
Forms of teaching and learning
Project: Autonomous project work in groups (complemented by seminar and content of the modules of the current semester), Plenum, excursions occasionally, field trip (if possible abroad)

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
regular participation
Assessment methods and criteria (type, duration & scope)
Semester Work (S)
ECTS awarding criteria
successful completion of the module examination
Calculation of the module grade
S = 100%
Weighting of the module grade
The module grade is included in the final grade at a rate of 8,33 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Recommended: Successful completion of the module REAP-M-Mod-101 Project I and REAP-M-Mod-204 Project II
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Seminar room
Frequency of Offering
Winter term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

Thesis	REAP (M.Sc.) HCU Hamburg

Module number	Type of module (C/CE/E)	SWS	Student workload	CP (according to ECTS)	Semester (proposed)	Duration
REAP-M-Mod-401	C	-	900 hours	30	4.	1 Semester
Subject Area				Module Coordinators		
Thesis				Prof. Weidlich (Technical Infrastructure Management)		

Courses

Title	Course type	SWS (Contact Hours/Week)
Thesis	Thesis	-

Teaching and learning activities

Title	face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
Thesis	-	900	In selfstudy	0	900h

Objectives and contents

Objectives of qualifications (Competencies)
• Application of the appropriate technical, scientific and/ or artistic methods proving the ability to work independently on a special topic in a short, fixed period and demonstration of a thorough knowledge/ understanding of the subject • Deepening abilities in interdisciplinary work alongside the ability to develop disciplinary methods/ knowledge and applying them in other fields • Development of core skills: communication, cooperation and a multi- and interdisciplinary approach
Contents of the module
• Students should make suggestions about the contents of their thesis • Targets and contents of theses outside the REAP-contents have to be approved
Recommended literature
Defined by selected thesis topic.
Forms of teaching and learning
Thesis: Autonomous work (students are supported by the appropriate REAP-specialist). Further important information can be found on the HCU-Website (Master > REAP > For Students > REAP Master Thesis Infos).

Assessment and ECTS awarding criteria

Precondition of examination (Pre-requisite for examination, attendance)
The thesis has to be written by single student, students wishing to work together (maximum 2) have to apply for it. The thesis must be completed within 22 weeks. At the end of the fixed period the student has to submit a written report.
Assessment methods and criteria (type, duration & scope)
The final assessment of the thesis is an oral exam (colloquium) and a presentation (TH, PR, KO). Submission: The thesis must be submitted digitally to the Examination Office not later than on the last day of the processing period. For the digital submission please save your work as pdf in the HCU-Cloud https://cloud.hcuhamburg.de with the file name as following "Last name thesis BA or MA". Further information: www.hcuhamburg. de/en/student-services/examination-office/thesisexamination/
ECTS awarding criteria
successful completion of the thesis, presentation and colloquium
Calculation of the module grade
TH = 75%, PR + KO = 25% The grade is determined by both reviewers equally.
Weighting of the module grade
The module grade is included in the final grade at a rate of 25 %.

Additional Information

Previous knowledge / Requirements for participation (in form and content) in accordance with examination regulations
Applicability of Module
This module is usable for REAP (M.Sc.)
Special requirements for workplaces (room type / extent of use presence / extent of use project work and/or model construction in self-study)
Frequency of Offering
Every term
Course Language
Englisch

Valid from	Valid until	Version	last updated	Adopted on
WiSe 23/24		V.1 01	29.02.2024	

[Q] STUDIES	Masterstudienprogramm REAP Fachübergreifende Studienangebote (cross-curricular Program) HCU Hamburg

Module Number	Type (C/CE/E)	SWS	Workload	CP	Semester (proposed)	Duration
Q-M-Mod-001	C	4 SWS	150 hours	5 CP	2	1-2 Semester

Teaching and Learning Area	Person responsible for the module
Cross-Curricular Program	Prof. Dr. Gernot Grabher (Stadt- und Regionalökonomie)

Courses

Title	Course Type	SWS (Contact Hours)
[Q] STUDIES	1)	2 SWS (21. hours.)
[Q] STUDIES	1)	2 SWS (21. hours)

Student Workload

Title	Face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
[Q] STUDIES	21 hours	1)	1)	1)	75 hours
[Q] STUDIES	21 hours	1)	1)	1)	75 hours

Obejctives and Contents

Obejctives and Contents (Competencies)
- Reflective Competencies: Scientific analysis and reflection: Students can analyze what they have learned and they can integrate existing and new knowledge in complex contexts - Cultural competencies: Transdisciplinary and Intercultural Communication: Students will be able to engage in factual exchange with representatives of different academic fields of activity - Perceptual and creative competencies: Students are able to apply techniques for creative and innovative design independently - Competencies for action: Proactive and responsible action
Contents
[Q] STUDIES I und **[Q] STUDIES II:** Different event formats with a theoretical focus - Offers for training perception and creativity - Practical project work such as the conception of events and their implementation <u>teaching areas:</u> - Science | Technology | Knowledge - Media | Art | Culture - economy | politics | society
Recommended Literature
To be announced in Seminar
Teaching and Learning methods
If applicable, group work, project work in interdisciplinary working groups, e-learning components in the form of videos, digital synchronous teaching, face-to-face teaching, excursions (optional)

Examination achievements and requirements for the award of CPs

Precondition of Examination
Regular active participation (attendance required for at least 80% of the session dates)
Type of Examination
[Q] STUDIES I and II: Examination performance varies depending on the course chosen and will be announced at the beginning of the semester.
Prerequisites for the award of CP
80% participation, active participation, accompanying assignments

Composition of Module Mark
Examination of [Q] STUDIES I is 50% of the module grade. Examination of [Q]STUDIES is 50% of the module grade.
Weighting of the module grade
Results from the curriculum of the respective study program.

Supplementary information

Prior knowledge for participation in the module (form and content)
Knowledge and techniques of scientific work are recommended.
Usability of the Module/ Verwendbarkeit des Moduls/ Access requirements for future modules (mandatory or recommended)
Module is usable in Architektur (M.Sc.), Bauingenieurwesen (M.Sc.), Geodäsie und Geoinformatik (M.Sc.), REAP (M.Sc.), Stadtplanung (M.Sc.) und Urban Design (M.Sc.)
Special Need for Workplaces (Type of room / extent of use Presence / extent of use Project work and/or model building in self-study)
Frequeny of Offering
Each term
Teaching Language
1)

Valid from	Valid to	Version	Last updated	Decided on
WiSe 23/24 / SoSe XX		V.1 01	09.02.2024	

1) results from selected course

BASICS Project Management	Masterstudienprogramm REAP Fachübergreifende Studienangebote (cross-curricular Program) HCU Hamburg

Module Number	Type (C/CE/E)	SWS	Workload	CP	Semester (proposed)	Duration
BS-M-Mod-001	C	4 SWS	150 hours	5 CP	1	1 Semester

Teaching and Learning Area	Person responsible for the module
Cross-Curricular Program	Prof. Dr.-Ing. Thomas Krüger (Projektentwicklung und Projektmanagement in der Stadtplanung)

Courses

Title	Course Type	Contact Hours/Week (SWS)
1. Projectmanagement Lecture 2. Projektmanagement ARC/BIW/GEO/REAP/UD	Lecture Seminar	2 SWS (21. hours) 2 SWS (21 hours)

Student Workload

Title	Face-to-face teaching	self study,	thereof: examination preparation	thereof: projectroom allocation time	Total student workload
1. Projectmanagement Lecture 2. Projektmanagement ARC/BIW/GEO/REAP/UD	21 hours 21 hours	0 hours will be announced in the course	0 hours will be announced in the course	54 hours will be announced in the course	75 hours 75 hours

Objectives and Contents

Obejctives and Contents (Competencies)
Knowing the typical problems, instruments, methods, actors and organizational contexts of project management, its theoretical references and forms of practice, also beyond one's own discipline. Apply and reflect on the instruments and methods of project management in a discipline-specific context.
Contents
1) Lecture (depending on the study program, the German or English lecture is chosen) Basics: Project Management Lecture (for all English-language study programs) Instruments, actors, problems and organizational context of project management 2) Accompanying seminars Application and deepening of the lecture contents in the disciplinary context or according to study programs
Recommended Literature
1.) Lecture Basics: Project Management Lecture (English) Meredith, Jack R.; Mantel, Samuel J.; Shafer, Scott M. (2016): Project management. A managerial approach. 9. ed., internat. student version. Singapore: Wiley. Project Management Institute (2013). A Guide to the Project Management Body of Knowledge (PMBOK Guide) (5th ed.). Newton Square, PA: Project Management Institute, Inc.
Teaching and Learning methods
Lecture: Face-to-face event with eLearning components in the form of videos, digital synchronous course, excursion (optional) **Seminar:** Varies depending on the study program: group work, project work in interdisciplinary working groups, eLearning components in the form of videos, digital synchronous teaching, face-to-face teaching

Examination achievements and requirements for the award of CPs

Precondition of Examination
Lecture: none **Seminar:** 80 % Participation

Type of Examination
Lecture: Exam 90 min. **Seminar:** form of Examination tob e defined by ach program
Prerequisites for the award of CP
80% participation, active participation, accompanying assignments
Composition of Module Mark
Examination of the lecture is 50% of the module grade. Examination of the seminar is 50% of the module grade.
Weighting of the module grade
Module grade is 4.17% of the final grade.

Supplementary information

Prior knowledge for participation in the module (form and content)
None
Usability of the Module/ Verwendbarkeit des Moduls/ Access requirements for future modules (mandatory or recommended)
Module is usable in Architektur (M.Sc.), Bauingenieurwesen (M.Sc.), Geodäsie und Geoinformatik (M.Sc.), REAP (M.Sc.), Stadtplanung (M.Sc.) und Urban Design (M.Sc.)
Special Need for Workplaces (Type of room / extent of use Presence / extent of use Project work and/or model building in self-study)
Lecture: Large lecture hall (max. 200 participants) Seminar: if necessary rooms for group work; if necessary as block courses
Frequeny of Offering
1) Lecture each winter term 2) to be defined by ach program
Teaching Language
German/ English

Valid from	Valid to	Version	Last updated	Decided on
WiSe 23/24		V.1 01	09.02.2024	