

Faculty of Architecture

IMPORTANT NOTES

If for one subject you can find several different types (lecture, practice, laboratory) of courses then please choose one and only one course from each type in order to be able to perform the subject's requirements successfully. Civil Engineering courses are on the website separately. Courses chosen from the offer of Faculty of Civil Engineering will be checked and arranged individually by the departmental coordinator.

Subject code	Subject name	ECTS credit	Grade type
BMEEPAG0236	CAAD and Architects Informatics F	3	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER	WED:10:15-12:00;	
This course aims to expand the existing CAD knowledge of students to be able to create and modify complex CAD models easily. During the course, we use Archicad, so a basic knowledge of the program is expected.			
Subject code	Subject name	ECTS credit	Grade type
BMEEPAG0249	Constructive CAAD CE	3	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER	WED:10:15-12:00;	
Advanced CAD modelling course for students who are familiar with AutoCAD. The course deals with modeling concepts and techniques, texture, lighting and rendering. In the second part of the semester students work more or less autonomously (with occasional one-on-one consultations) on a model of their choice. See: http://www.epab.bme.hu/en/?ccce/			
Subject code	Subject name	ECTS credit	Grade type
BMEEPAG0995	Architectural Research for Exchange Students - AG	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.			
Subject code	Subject name	ECTS credit	Grade type
BMEEPAGA501	Architectural Informatics 3 - CAD for Architects	3	Mid-term mark
Course type	Course code	Timetable information	
Lecture	EN0-ER	THU:10:15-11:00;	
Practice	EN1-ER	THU:11:15-13:00;	
Use of state-of-the-art CAAD software to develop professional architectural solutions. Extensive use of 3-D computer model development. Architectural documentation with computers. Computer animation and fly-through pictures for architectural space analysis.			
Subject code	Subject name	ECTS credit	Grade type
BMEEPAG0995	Architectural Research for Exchange Students - EG	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.			

Subject code	Subject name		ECTS credit	Grade type
BMEEPEK0995	Architectural Research for Exchange Students - EK		6	Mid-term mark
Course type	Course code	Timetable information		
Practice	EN1-ER			
Architectural Research for Exchange Students on the topics of construction technology and management. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPEKA501	Construction Management 1 - Basics of Construction		2	Mid-term mark
Course type	Course code	Timetable information		
Lecture	EN1-ER	TUE:14:15-16:00;		
The goal of the subject is to present basic information on the technologies and organization of construction work, with special respect on construction activities of sub and superstructures. Considering the character of the subject both theoretical and practical knowledge is essential, therefore besides the lectures the site visits play emphasized role as well. Main topics: The construction process. Phases and participants of the construction process (roles, responsibilities, connections, etc.). Technical preparation and controlling of the construction. Handover and take-over of the building (reviewing the constructions; quality and quantity; and the plans) Introduction to construction technologies, conditions, requirements. Aspects of selecting the technology. Sequence of construction works (the follow-up of processes). Main equipment of construction (earthwork, foundation work, construction of loadbearing structures, etc.) Material supply on site; to the site. Informations about the construction site. Construction site planning. Time scheduling. Types, relations. List of operations, survey for quantities, labour schedule, plant schedule, material schedule.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPEKA701	Construction Management 3 - Planning of Construction Technology		4	Exam
Course type	Course code	Timetable information		
Lecture	EN0-ER	TUE:12:15-14:00;		
Practice	EN1-ER	WED:08:15-10:00;		
The goal of the subject is to present information on the planning of elementary construction technologies related to superstructures and finishing work. The subject introduces how to apply recent innovations of building technologies during design and realisation. It gives a basic knowledge to evaluate construction options and make appropriate decisions about technology. There are case studies of building technologies used in construction of loadbearing structures, finishing and cladding works. The practical part contains workshops on planning of construction technologies: connection of structures and technologies, volume calculation, resource estimation, scheduling and construction site planning.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPEKS901	Construction Management 5. - Special construction projects		2	Mid-term mark
Course type	Course code	Timetable information		
Lecture	EN1-ER	WED:12:15-14:00;		
The course's aim is to give up-to-date information on different special fields of construction in three blocks. In the first block the construction technologies of special, sub- and superstructures are shown, involving topics like metro tunnels, metro stations, special slurry walls, special reinforced concrete superstructures and formwork systems. In the second block traditional and modern materials and technologies are presented regarding to eco- and green architecture, like construction technologies of the passive buildings, or green facades. In the third block students get information on the application of traditional construction technologies, restoration methods and the maintenance of monuments and historic buildings. Besides the theoretical lectures many site visits are organized to present the practical aspects of the subject as well.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPES0995	Architectural Research for Exchange Students - ES		6	Mid-term mark
Course type	Course code	Timetable information		
Practice	EN1-ER			
Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.				

Subject code	Subject name	ECTS credit	Grade type
BMEEPET0407	History of Architecture Theory 1	2	Exam
Course type	Course code	Timetable information	
Lecture	EN1-ER	MON:12:15-14:00;	
<p>The subject History of Theory of Architecture I. follows the structure of preliminary architectural history courses focusing on the determinant theories of architecture of different periods. The exploration of the most important tendencies and notions of theory of architecture is based on the preliminary history of architecture studies in an essentially chronological structure, evaluating them in critical analysis and searching their role in the history of ideas. Lecture topics include: Categories and concepts of theory in the history of architecture from antiquity to the raise of modernism in the beginning of the 20th century. Vitruvius and his interpretations. Architectural theory in the Middle Ages from early Christianity to late Gothic period. Humanism and the revival of antique architecture in the 15th. The column orders and commentaries on Vitruvius; the theory of the ideal city. Baroque in the reform of the catholic church. Academic movement in France and Classicism in Italy in the 17th . Theory of architecture in France in the 18th century. Enlightenment and revolutionary architecture. 19th century theories in England, France and Germany; the interpretation of medieval and classical heritage. The dilemma of eclecticism. Pioneers of modernism and their manifests. The pluralism in the interpretation of architectural space; architecture and philosophy.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPET0995	Architectural Research for Exchange Students - ET	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
<p>Similarly to the international practice the course aims primarily research activity in architecture and its documentation. The possible horizon of the research topics is determined by the course lists of the departments and the personal interest of the students. Beside the architectural topics the course will give an appreciation of interdisciplinary and special fields in international environment too. The project work will demonstrate generic and specific skills and understanding of the open and synthetic character of the research. The objective of this course is to hone the skills of analysis and abstraction in order to develop a framework for research. The student should be able to draw from precedent in the art, architecture and engineering in the development of this framework, which will act as scaffolding for the theoretical, experimental and creative decisions. This course will consist of a series of consultations to the teachers, but the essay should write by the student. The available topics are given by the Departments of the Faculty. The student can propose also a special topic for research during the course, but the teacher has to be agreeing with the proposal. Course list 2014/2015/fall semester teacher post course language students theme Dr. VUKOSZACUTE;VLYEV, ZORACUTE;n Associate professor English max. 2 Contemporary architecture Dr. KRAUML;HLING, JAACUTE;nos Associate professor English max. 1 Architectural analysis of sacral buildings DARAGOACUTE;, LAACUTE;SZLOACUTE; DLA Associate professor English max. 1 Architectural analysis of historic ensembles PAZAACUTE;R, BEACUTE;la DLA Assistant professor English, Deutsch max. 2 Contemporary architecture Zeitgenouml;ssische Architektur Dr. GY. BALOGH, AACUTE;gnes Assistant professor English max. 1 19th century architecture</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPETA101	The Beginning of Architecture, Vernacular Architecture	3	Exam
Course type	Course code	Timetable information	
Lecture	EN0-ER	MON:12:15-14:00;	
Practice	EN1-ER	MON:14:15-15:00;	
<p>The course gives an overview of the architecture in the first period of the evolution of human culture. The classes follow chronology ndash; mainly in the first part of the course ndash; with focusing on the development of building constructions and the development of settlements. Prehistory: Palaeolithic human claim to space, from the cave to the hut. Building activity of Neolithic peasants, one-celled houses and fortified settlements. Introduction to building construction in the Near East and Europe. In the second part the course gives an overview of the vernacular architecture of the world. Native architecture: comparative outline of the architecture of hunting, pastoral and farming peoples. Construction, building materials and decorations. Native American, African and European architecture. The practical lessons show details were delivered in the lecture before. The drawings drawn by students help them to understand the colourful world of common and rural architecture.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPETA301	History of Architecture 3 (Medieval)	3	Exam
Course type	Course code	Timetable information	
Lecture	EN0-ER	MON:14:15-16:00;	
Practice	EN1-ER	MON:16:15-17:00;	
<p>The architecture of the Late Roman Empire. The born of Christianity and its bdquo;Necessity architecturerdquo;.</p>			

The born of the monumental Christian architecture ndash; Early Christian architecture in Rome. ndash; Early Christian architecture in the eastern Provinces: Palestine, North Africa, Syria ndash; Late Roman and Oriental traditions. Early Byzantine architecture in Thessalonica and in Constantinople. Load bearing structures of the Early Christian period. Different types of barrel vaults, Roman-type cross vault. ndash; Syrian influences in Armenia. The bdquo;Iconoclasmrdquo; and the aftermath in Greece. Architecture in the radius of influence of Byzantium. The comparison of the basilicas in Rome and in Syria. ndash; Ravenna. The penetration of Christian architecture into barbarian Europe ndash; bdquo;Scattered monumentsrdquo;. Byzantine vaulting systems. The main stream of the Romanesque architecture: the Carolingian architecture with the bdquo;evangelizerrdquo; Benedictine movements, the three periods of the German-Roman Empire. The Langobard architecture in North-Italy. The Romanesque vaulting systems: Romanesque cross vault, Sexpartite vaulting, bdquo;groin-ribrdquo; vaulting. Squire-bayed and free vaulting systems ndash; the pointed arch. Basilica and bdquo;false basilicardquo; type space organization. ndash; The retrospective interregional influences in Romanesque architecture. ndash; Antique influences. Byzantine influences. The progressive interregional influences in Romanesque architecture ndash; monastic movements: Benedictine and Cistercian, Norman bdquo;Imperialrdquo; Romanesque architecture. Morphology of medieval detailing. The Early French Gothic cathedrals. ndash; The flourishing period of the French cathedrals, and its influences in South-France, in England, in Germany and in Italy. Interregional influences in gothic architecture: Cistercian gothic formations, the Franciscan and Dominican movements. ndash; The special characteristics of English and German gothic architecture. Late gothic vaulting systems: Cylindrical (or net vaults) and Spherical (or stellar) vaults. Halls and false-halls ndash; Civic movements in Late Gothic in Germany and the proto-renaissance in Italy. Medieval secular architecture.

Subject code	Subject name	ECTS credit	Grade type
BMEEPETA501	History of Architecture 5 (19th century)	3	Mid-term mark
Course type	Course code	Timetable information	
Lecture	EN0-ER	FRI:10:15-12:00;	
Practice	EN1-ER	FRI:12:15-13:00;	

The period of this History of Architecture subject is the lquo;long nineteenth centuryrdquo; from the 1750s to the 1910s. In this era the architecture and the art turned to the past, to the previous styles using them in a new approach. The architects had discovered the history of art and artistic liberty at the same time. At the turn of the 20th century the art and also the architecture searched for new ways instead of using historical architectural elements or motifs. The changes led to the Modern Movement when buildings were being erected without decoration or ornaments in the first quarter of the 20th century. This period was divided into different eras, but these types of periodization were different in different countries and changed in the course of the 20th century. Beside the question of styles 19th century is important not only because of the appearing of new structures and materials in the architecture but because of the great development in the field of the functional planning. While following the timeline, the classes concentrate on the development of the styles in several areas of Europe (Great Britain, France, Germany, Russia) looking out to the United States of America too, because there the styles reflected the European ones.

Subject code	Subject name	ECTS credit	Grade type
BMEEPETO901	History of Hungarian Architecture 2.	2	Mid-term mark
Course type	Course code	Timetable information	
Lecture	EN0-ER	WED:14:15-16:00;	

The course gives an overview of Hungarian architecture from the end of the 18th century up to now. While following the timeline, the classes concentrate on the main problems of the investigated periods, like the question of historicism, international and national sources between the 2 Wars, socialist realism in the 1950s, technology and high-rise in the 1960s, built environment in the 1970s, post-modernism in the 1980s. As the problem of identity (national or regional architecture) is a recurrent theme through the whole period, the course pays a special attention to it.

Subject code	Subject name	ECTS credit	Grade type
BMEEPETO921	Theory of Architecture Design	2	Exam
Course type	Course code	Timetable information	
Lecture	EN0-ER	THU:12:15-14:00;	

The course aims at awakening and strengthening the studentsrsquo; abilities, interest, to reflect on architectural design, in accordance with their own cultural background, in the original spirit of theorizing: thinking of, looking at, with freedom and criticism. Considering the special and unique position of this continuous reflective activity as an operative and constitutive part of the architectural design practice, the course not only picks up special themes of history and contemporary discourses, but also concentrates on mobilizing the students practical and theoretical skills, already acquired during their previous studies.

Subject code	Subject name	ECTS credit	Grade type
BMEEPETT721	History of Art	2	Exam
Course type	Course code	Timetable information	
Lecture	EN0-ER	FRI:10:15-12:00;	
<p>Beginnings of the art: the pictures of the cavemen. ndash; Ancient art of the East: Egypt. ndash; Classical art of the Antiquity: Greek and Roman art. ndash; Early Christian and Medieval art. ndash; Renaissance and Baroque art. ndash; The art at the age of Enlightenment: Gothic revival, Classical revival, Classicism. ndash; Romanticism, Realism, Impressionism, Postimpressionism. Bibliography: Ernst H. Gombrich: The Story of Art, Phaidon, 1995; Michael Levey: A History of Western Art; and other (selected) books of WORLD OF ART series: Thames and Hudson, Oxford University Press; etc.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPIP0995	Architectural Research for Exchange Students - IP	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
<p>Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPKO0995	Architectural Research for Exchange Students - KO	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
<p>Similar to the international practice aims the course primary research activity on architecture and its documentation. The possible horizon of the research topics is determined by the course lists of the departments and the personal interest of the students. Beside the architectural topics will give the course an appreciation of interdisciplinary and special fields in international environment too. The project work demonstrating generic and specific skills and understanding of the open and synthetic character of the research. The objective of this course is to hone the skills of analysis and abstraction in order to develop a framework for research. The student should be able to draw from precedent in both art, architecture and engineering in the development of this framework, which will act as scaffolding for the theoretical, experimental and creative decisions. This course will consist of a series of consultations to the teachers, but the essay should be written by the student. The available topics are given by the Departments of the Faculty. The student can propose also a special topic for research during the course, but the teacher has to be agree with the proposal.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPLA0995	Architectural Research for Exchange Students - LA	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
<p>Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPRA0995	Architectural Research for Exchange Students - RA	6	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-ER		
<p>Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.</p>			
Subject code	Subject name	ECTS credit	Grade type
BMEEPRA0702	Drawing 7.	2	Mid-term mark
Course type	Course code	Timetable information	
Practice	EN1-BR	MON:16:15-18:00;	

Practice	EN1	
Practice	EN1-ER	MON:16:15-18:00;
Lecturing and practising the architecture oriented use of colours. Introduction to the theory of colours. Effect of colours on human beings. Investigation of relation between architectural forms and colours. Principles of colour design of the built environment.		
Subject code	Subject name	ECTS credit Grade type
BMEEPAT701	Department's Design 2.	3 Mid-term mark
Course type	Course code	Timetable information
Practice	EN1-ER	WED:14:15-17:00;
Practice	EN1-RE	
This subject based on interior design. The design process focuses on abstract formal approach. Students create different 3D possibilities in the first half of the semester, then they analyse them. The project becomes in this way interior design. The design project based on the fundamental decisions and 3D modelling, which are completed by manual works.		
Subject code	Subject name	ECTS credit Grade type
BMEEPST0655	Design of Reinforced Concrete Structures	2 Mid-term mark
Course type	Course code	Timetable information
Lecture	EN1-ER	FRI:08:15-10:00;
The subject introduces students into the way of design of approximate dimensions, joints and structural solutions of reinforced concrete structures. Invited lecturers expose some of the most significant recent investments in reinforced concrete in Hungary. The aim of the course is to develop the ability of students - on the basis of EUROCODE 2 - to adopt architectural dimensions and to evaluate the effect of the chosen architectural lay-out onto the structural solution.		
Subject code	Subject name	ECTS credit Grade type
BMEEPST0995	Architectural Research for Exchange Students - ST	6 Mid-term mark
Course type	Course code	Timetable information
Practice	EN1-ER	
Architectural Research for Exchange Students on the topics of the Department's competency. The aim of the subject is to carry out a research on a special topic. The research contains specifying and processing the related international literature, summing up the findings in a study and finally a presentation. The language of the research depends on the consultant - the available topics are listed on the department's homepage.		
Subject code	Subject name	ECTS credit Grade type
BMEEPSTA101	Introduction to structural design	2 Exam
Course type	Course code	Timetable information
Lecture	EN0-ER	TUE:10:15-12:00;
The most important methods of analysis and design of engineering structures are presented, together with their modelling, and the applied approximations. It is shown how high school statics (and math) can be applied to engineering structures. The understanding of the behaviour of structures is emphasized.		
Subject code	Subject name	ECTS credit Grade type
BMEEPSTA301	Strength of Materials 1	4 Exam
Course type	Course code	Timetable information
Lecture	EN0-ER	TUE:10:15-12:00;
Practice	EN1-ER	MON:12:15-14:00;
Basic concepts of strength of materials. Behavior of solid bodies. Material laws, constitutive equations: elasticity and plasticity. Central tension and compression. Design criterion. Pure shear. Steel and carpenter joints. Pure bending. Second moment of inertia. Bending in elastic stress state. Symmetric bending and skew bending. Eccentric tension and compression. Core of section. Materials not having tensile strength. Bending in plastic stress state. Bending combined with shear. Calculation of shear stresses. Design for bending. Normal force ndash; moment interaction curve. Torsion. Plane stress state. Possible failure conditions: rupture and yield. Elastic energy.		

Subject code	Subject name		ECTS credit	Grade type
BMEEPSTA501	Design of Load-Bearing Structures		6	Exam
Course type	Course code	Timetable information		
Lecture	EN0-ER	TUE:10:15-12:00; FRI:08:15-10:00;		
Practice	EN1-ER	WED:10:15-12:00;		
Basic conceptual and computational design methods of load-bearing structures are discussed for reinforced concrete-, steel-, timber and masonry buildings. The main goal is to gain knowledge about structural design problems and principles of structural design in order to understand how and why the load-bearing structure influences the work of an architect.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPTCEP01	Interdisciplinary, Project based Design 1.		16	Mid-term mark
Course type	Course code	Timetable information		
Practice	EN2-ER	TUE:08:15-16:00; FRI:08:15-16:00;		
Practice	EN1-ER	MON:08:15-16:00; THU:08:15-16:00;		
The subject is based on the cooperation of the departments of the Faculty of Architecture. Students work in studios in groups with individual tasks as well instructed by teachers of the departments involved. There are two design tasks to be solved during the semester, that can be chosen freely from the offered opportunities. Each task is to solve in seven weeks. Some of the tasks are: sport hall for Olympic Games in Budapest, Dwelling Underground, Suspension in Architecture, The Green in the Metropolitan Area (green walls, green roofs) etc.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPU10103	Phases of Urban Development, City of Budapest		2	Mid-term mark
Course type	Course code	Timetable information		
Lecture	EN1-ER-BR	FRI:12:15-15:00;		
The goal of the course is to give foreign students coming to Budapest an overview of the current urban developments and at the same time help them to acquire a better understanding of the urban, architectural and cultural aspects of the city. The course starts with a short general overview of the historical development of Pest and Buda. Most in-class lectures nevertheless deal with current ongoing urban projects of the city, including urban renewal projects, housing estate renewals, new public spaces and new real estate developments. The lectures are followed by site visits, accompanied by specialists of various programmes. For fulfilling the requirements a small practical assignment has to be solved by the students individually.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPU10893	Cities of the World		2	Mid-term mark
Course type	Course code	Timetable information		
Lecture	EN1-ER-BR	FRI:12:15-15:00;		
Elective course of the Department of Urban Planning and Design dealing with current trend of Urbanisation around the world focusing on the topics:- Global cities and contemporary urbanisms ndash; an introduction to the course- De-industrialization and urban dynamics- Politics and markets shaping the form of the global city- Urban sprawl and the regeneration of the inner city- Sustainable urban futures and the quality of life				
Subject code	Subject name		ECTS credit	Grade type
BMEEPU10995	Architectural Research for Exchange Students - UI		6	Mid-term mark
Course type	Course code	Timetable information		
Practice	EN1-ER-BR			
Architectural research for exchange and international students: with the professional leadership of the tutors of the Department of Urban Planning and Design students work on individual research topics (eg.. Urban History, Urban Typologies, Urban Morphologies, Housing estates etc.). The course is based on individual work, with a final output of an essay.				
Subject code	Subject name		ECTS credit	Grade type
BMEEPU1A501	Urban Design 1		2	Exam
Course type	Course code	Timetable information		
Lecture	EN-ER-BR	TUE:08:15-10:00;		
The subject is the theoretical course of the fifth semester, with 2 hours lecture weekly. The task of the course is to introduce students to the theoretical background of Urban Planning and Design with specially focusing on the				

knowledge and skills necessary for the successful participation in the Design courses later on in the curriculum. The course deals with the historical background, fundamental theories, basic typologies, most wide spread forms and basic sustainability aspects of urban design and planning.