Code	Subject	Sem. I					Sem. II					Sem. III					Sem. IV				
		W	C	Lb	P	Lb-NO	W	C	Lb	P	Lb-NO	W	C	Lb	P	Lb-NO	W	C	Lb	P	Lb-NO
M-UZ 1	Foreign Language			15					15												
M-UZ 2	Culture Creation Related Aspects of Building Industry	15																			
M-UZ 3	Management and marketing						15			10											
M-UZ 4	Mathematics	15	15																		
M-UZ 5	Physics of Building Structures II											15									
M-UZ 6	Engineering Geology	15		10																	
M-UZ 7	Structural Analysis II	30	20																		
M-UZ 8	Structural Dynamics						30	10			10										
M-UZ 9	Finite Element Method											15			15	10					
M-UZ 10	Basics of Numerical Methods in Engineering	10		10		15															
M-UZ 11	Concrete Structures						15	10		5	5	15	10		5	5					
M-UZ 12	Steel Structures						15	10		5	5	15	10		5	5					
M-UZ 13	Technology of Concrete Production II	15		15																	
M-UZ 14	Bridges						15			5	5	15			5	5					
M-UZ 15	Land Transportation Engineering						10			10		10			10						
M-UZ 16	Industrial Building						10	10			5										
M-UZ 17	Diploma Seminar														30					30	
M-UZ 18	Thesis																				
		100	35	50	0	15	110	40	15	35	30	85	20		70	25	0	0	0	30	0
TOTAL HOURS:		200					230					200					30				

Lb-NO – laboratory with non-stationary education techniques

Total hours in terms I – IV: 660

Subject	Foreign language						Code	M-UZ 1
Semester	1	Hours		15			ECTS credits	2,0
			l	t	lb	d		
							Assessment	NE
Department	Foreign Languages Department						Code	SPNJO
Persons Responsible	Renata Nowakowska-Kłusak							

Contents

The languages offered are: English, German, French, Swedish, Spanish, Italian and Russian.
The classes focus on language for special purposes. In order to give each student the
opportunity to learn a foreign language, the department organises classes for various levels
of ability: beginners, lower intermediate, intermediate and advanced. Students who wish to
improve and perfect their knowledge can attend additional language clubs.

References:

Prerequisites Codes:

Subject	Culture Creation Related Aspects of Building Industry						Code	M-UZ 2
Semester	1	Hours	15				ECTS credits	2,0
			l	e	l	d		
							Assessment	NE
Department	of Fundamentals of Building and Material Engineering						Code	KPBIM
Persons Responsible	Waldemar Affelt							

Contents

Monuments of technology, industry and civil engineering in context of cultural heritage. Cultural and socio-econimocal values; case studies of the Stone Sluice in Gdańsk, Saline of Ciechocinek, historical bridge over the Vistula river in Tczew. Tangible and untangible values; concept of authenticity as a basic value of built environment. Public enhancement and promotion of the cultural values of building and civil engineering heritage. Outline of construction history; case studies: Roman concret opus caementitium, construcytion of the cupola of the Santa Maria in Firence, canal Du Midi in France, Ironbridge in England. Polish monuments and sites within the World Heritage List. Sustainable preservation and management of cultural heritage.

References: Affelt W. Dziedzictwo w budownictwie. Wydawnictwo PG Gdańsk 1999.

Małachowicz E. Konserwacja i rewaloryzacja architektury w zaspołach i krajobrazie. Oficyna Wydawnicza Politechniki Wrocławskiej. Wrocław 1994.

Prerequisites Codes

Subject	Management and Marketing						Code	M-UZ 3
Semester	2	Hours	15 (l)			10 (d)	ECTS credits	3,0
				t	e		Assessment	E
Department	Technology and Management in Building						Code	
Persons Responsible	Zdzisław Kowalczyk							

Contents

The subject and directions of development of organization and management. Management and its function. Environment, goals. Planning. Organizational structures. Human resource management. Styles of management. Definition and elements of marketing. Function of marketing. Segmentation and typology of a market. Marketing research. Marketing-mix. Product, price, promotion, place.

References:

P. Kotler, Marketing. Analiza, planowanie, wdrażanie, kontrola, Geberhner i Ska Warszawa
J.A.F. Stoner, R.E.Freeman, D.R.Gilbert Kierowanie, PWE Warszawa
red. A.K.Koźmiński, W.Piotrowski, Zarządzanie. Teoria i praktyka. WN PWN

Prerequisites — Codes

Subject	Mathematics						Code	M-UZ 4
Semester	1	Hours	15 (l)	15 (t)			ECTS credits	5,0
					lb	d	Assessment	E
Department	of Differential Equations						Code	KRR
Persons Responsible	Józef Kamieński, Eligiusz Mieloszyk							

Contents

Trigonometric Fourier series. Dirichlet conditions. Tensor algebra. Similar matrices. A basis of the vector space. Linear operation and its matrix. Methods for obtaining eigenvalues and eigenvectors. Tensors with valence one and two. Inertial tensor. Invariants. Complex–valued functions. Limit of sequence of complex numbers. Limit of a function. Continuity of a function. Derivatives of complex-valued functions. Cauchy integral theorem. Taylor series. Laurent series. Operational calculus. Laplace transform. Convolution of functions. Borel theorem. Calculus of variations. Definition of functional, Euler equation, Jacobi equation, Jacobi condition.

References:

Prerequisites — Codes:

Subject	Physics of Building Structures II						Code	M-UZ 5
Semester	3	Hours	15 (l)	(t)	(e)	(d)	ECTS credits	2,0
							Assessment	E
Department	of Fundamentals of Building and Material Engineering						Code	KPBIM
Persons Responsible	Marek Krzaczek, Sławomir Dobrowolski							

Contents

Field based thermal imaging method. Methods for thermal renovation of buildings. Unconventional in heat sources. Evaluating heat transfer parameters in the building on the basics of an energy flow model prepared for a selected technological design. Studying the actual state of thermal insulation an existing building using a thermal imaging camera. Influence of moisture in building materials on heat capacity. Capillary tension in materials.

References:

1. Płoński W., Pogorzelski J.A.: Fizyka budowli. Arkady, W-wa 1981
2. Bogosłowski W.N.: Fizyka budowli, Arkady, W-wa 1976

Prerequisites — Codes

Subject	Engineering Geology						Code	M-UZ 6
Semester	1	Hours	15 (l)	(t)	10 (lb)	(d)	ECTS credits	3,0
							Assessment	E
Department	of Hydrogeology						Code	KHiGI
Persons Responsible	Wiesław Subotowicz							

Contents

General information related to geological structure of the Earth.
Genesis and mineral composition of rocks of magmatic, sedimentic and metamorphic origin.
Ground waters.
Engineering geological properties of soil.
Geo- and morphodynamic processes and their significance in civil engineering.

References:

Prerequisites — Codes:

Subject	Structural Analysis II						Code	M-UZ 7
Semester	1	Hours	30 (l)	30 (t)	(e)	(d)	ECTS credits	9,0
							Assessment	E
Department	Structural Mechanics						Code	KMB
Persons Responsible	Czesław J. Branicki							

Contents

Matrix form of basic theorems in statics and stability of structures.
Stiffness matrices for elements. Beam element resting on an elastic subgrade.
Matrix analysis procedure. Solution of the system of linear algebraic equations.
Special elements. Timoshenko beam element, element of a finite sizes node, beam element semi-rigidly connected to nodes, elements having eccentric nodes. 3D trusses. Theory of 2nd order.
Iterative procedure of the P-Delta analysis for planar frames. Computer calculations
Approximate solution of 2nd order theory problems by the finite element method, geometric stiffness matrices. Stability analysis. Application of computer software to solve stability problems
for beams and frames. Computer calculations.

References:
Structural Analysis – computer approach. Vol. 1, Chapt. 4 (Authors: C. Branicki and G. Rakowski). Arkady Warszawa: 1991/1992.
Branicki C.: *Computer analysis of wire structures by Direct Stiffness Method*. GUT textbook, Gdańsk 1999.

Prerequisites — Codes

Subject	Structural Dynamics					Code	M-UZ 8
Semester	2	Hours	30 (l)	10 (t)	10 (Lb-NO)	ECTS credits	4,0
						Assessment	E
Department of	Structural Mechanics					Code	KMB
Persons Responsible	Czesław Branicki						

Contents

Single degree-of-freedom system.
Discrete systems of n degree-of-freedom.
Analysis of structural systems subjected to dynamic load.
Distributed mass systems.
Vibrations due to earthquake excitations.

References:
Rakowski G., editor; Structural Analysis, computer approach. vol. 2, Arkady 1992 (in Polish).
T. Cmielewski, Z. Zembaty; Fundamentals of Structural Dynamics, Arkady 1992 (in Polish).
C.J. Branicki; Computer Analysis of Structures by Direct Stiffness Method. GUT texbook, Gdańsk 1999.

Prerequisites: — Codes

Subject	Finite Elements Method					Code	M-UZ 9
Semester	3	Hours	15 (l)	15 (t)	10 (Lb-NO)	ECTS credits	4,0
						Assessment	E
Department	Bridges					Code	KM
Persons responsible	Jacek Chróścielewski						

Contents

Introduction – application of numerical methods in theory of structures. Notation – tensor analysis
revisited. Strong and weak formulation of linear initial boundary mechanical problem (IBVP) –
equations structure. Finite element method (FEM) – finite dimensional approximation of IBVP, types
of formulation. Idea of interpolation – the core of FEM, elements classification. Discretization -
– domain, independent variables. Element models. Displacement – based elements – formulation
of isoparametric elements matrices, numerical integration, locking phenomena, spurious energy
modes. Standard FEM analysis – data structure. Selected problems of FEM application – calculations,
solutions convergence, results verification and interpretation. FEM programs – professional and own.

References

BATHE K.J.: *Finite Element Procedures in Engineering Analysis*. Englewood Cliffs: Prentice-Hall 1982.

ZIENKIEWICZ O.C.: *Finie Element Method*.

Prerequisites	Codes			

Subject	Basics of Numerical Methods in Engineering						Code	M-UZ 10
Semester	1	Hours	10 (l)	(t)	10 (l)	15 (Lb-NO)	ECTS credits	4,0
							Assessment	E
Department	Structural Mechanics						Code	KMB
Persons Responsible	Paweł Kłosowski							

Contents

Numerical methods in mechanics.
Methods of solving of systems of linear equations.
Eigenvalue problem. Roots of non-linear equations.
Interpolation and approximation of functions.
Numerical integration.
Ordinary differential equations of first and second order.

References:

- Nowacki W., Theory of elasticity, PWN, Warsaw, 1970 (in Polish)
- Fung Y.C., Foundations of salid mechanics, Prentice-Hall, 1965 (Polish transl., PWN,Warsaw,1970)
- Green A.E., Zerna W., Theoretical elasticity, Oxford, London, 1968
- Kmiecik M., Wizmur M., Bielewicz E., Nonlinear analysis of plates, Gdańsk University of technology, 1995 (in Polish)

Prerequisites	Codes			

Subject	Concrete Structures						Code	M-UZ 11
Semester	3	Hours	15	10	5	5	ECTS credits	6,0
			l	t	e	Lb-NO		
							Assessment	E
Department	of Concrete Struct. and Techn. of Concrete						Code	DCSTC
Persons Responsible	Piotr Korzeniowski							

Contents

Properties of concrete and reinforcement steel. Methods for analysis and dimensioning of reinforced concrete structures. Shrinkage and creeping. Behaviour of a beam subject to bending. Reinforcement calculation and design for bending. Stiffness. Calculation of deflection and crack width. Shear in a beam subject to bending. Reinforcement calculation and design for shearing. Calculation of skew cracks. Axial compression. Spiral reinforced columns. Behaviour of elements subject to eccentric compression and eccentric tension. Calculation and design of reinforcement for eccentric compression and tension. Torsion. Calculation and design of reinforcement for torsion. Design, forming and placing of reinforcement in slabs, beams and columns.

References:
J.Kobiak W.Stachurski, Konstrukcje żelbetowe, t.1, Arkady, Warszawa 1984
W.Starosolski, Konstrukcje żelbetowe, t.I, Wydawn. Naukowe PWN, Warszawa 2000
A.Łapko, Projektowanie konstrukcji żelbetowych, Arkady, Warszawa 2000

Prerequisites	Codes			

Subject	Steel Structures						Code	M-UZ 12
Semester	3	Hours	15	10	5	5	ECTS credits	6,0
			l	t	e	Lb-NO		
							Assessment	E
Department	of Steel Structures						Code	KKM
Persons Responsible	Jerzy Ziółko							

Contents

Introduction to steel's and aluminum role in steel construction (review of examples). manufacturing steel. Introduction to the engineering properties of steel (alloy components, thermal treatment). Brittle fracture of steel. Steel grades and quality. Selection of steel quality in relation to requirements. Hot rolled steel elements. Cold rolled steel elements. Connectors. Bolts (grades). Principle of load transmission (splice joints, tension joints). Introduction to rivet joints. Self tapping screws, self drilling screw, blind rivets, shot fired pins.

References:
1. Łubiński M.: Filipowicz A., Żółtowski W.: Konstrukcje metalowe. Część I. Arkady, Warszawa 2000.
2. Żmuda J.: Podstawy projektowania konstrukcji metalowych. Arkady, Warszawa 2001.
3. Rykaluk K.: Konstrukcje stalowe. Podstawy i elementy. D.W.E., Wrocław 2001.
4. PN-90-/B-03200. Konstrukcje stalowe. Obliczenia statyczne i projektowanie.

Prerequisites	Codes			

Subject	Technology of Concrete Production						Code	M-UZ 13
Semester	1	Hours	15 (l)		15 (lb)		ECTS credits	5,0
				t		d		
							Assessment	NE
Department	of Concrete Constructions & Technology						Code	KKBiTB
Persons Responsible	Andrzej Małasiewicz, Dorota Starościak							

Contents

Genesis and definition of concrete, binder, admixtures, additives and gravel. Basic parameters of
binders. Gypsum and lime binders: types and characteristics. Types and classification of cements.
The components of concrete, chemical and mineral composition. Special cements. Weathering and
renewing of cement. Gravel: classification, origin and characteristics. Water for concrete mix.
Concrete mix. Admixtures and additives. Methods of concrete design. Concrete mix production.
Vibration and re-vibration. The influence of temperature for fresh concrete. Concrete care. Special
concretes.

References:	Neville A.M.-"Właściwości betonu", Kraków 2000			
Prerequisites	Codes			

Subject	Bridges						Code	M-UZ 14
Semester	3	Hours	15 (l)		15 (d)	5 (Lb-NO)	ECTS credits	4,0
				t				
							Assessment	E
Department	Bridges						Code	KM
Persons Responsible	Krzysztof Wąchalski							

Contents

Elementary information about bridges, definitions. Classification bridge construction.
Pavements on road and rail bridge. Deck of road and rail bridge. Bridge supports,
abutments, pillars, construction details, principle methods of calculations. General types of
steel bridges : beam, truss, box, arch, suspension, cable-stayed bridges. Composite
bridges : cross sections, static schemas, types of steel-concrete connection, erection
methods, principle methods of calculations. Concrete bridges : beam, plate, frame, arch,
principle methods of calculations. Same equipments of bridge : bearings, joins, drainage.
Tunnels : cross sections, erection methods.

References:

Czudek H., Radomski W.: *Podstawy mostownictwa*. PWN, Warszawa 1983.
Ryżyński A., Wołowicki W., Skarżewski J., Karlikowski J.: *Mosty Stalowe*. PWN,
Szelągowski F.: *Mosty metalowe*. WKiŁ, Warszawa 1966.
Szczygieł J.: *Mosty z betonu zbrojonego i sprężonego*. WKiŁ, Warszawa 1974 (1972).
Leonhardt F.: *Podstawy budowy mostów betonowych*. WKiŁ, Warszawa 1982.

Prerequisites	Codes			

Subject	Land Transportation Engineering						Code	M-UZ 15
Semester	3	Hours	10			10	ECTS credits	4,0
			l	t	e	d		
							Assessment	E
Department	Highway Engineering						Code	KID
Persons Responsible	Ryszard Krystek, Andrzej Massel, Waldemar Cyske							

Contents

Transport systems. Beginning of the motorization and urban development. Land transport system in the beginning of XX century. Municipal transport – contemporary dilemma. Road traffic characteristic. Basic elements of car roads. Road junctions and interchanges. Municipal transport's planning. Individual and public transport. Road traffic safety. Road pavements. Earth work. Capping layer. Road base. Asphalt mix. Basic elements of railway construction. Basic principles of the railway exploitation. General information about the railway building and maintenance Environment protection problems of the transport. Road accidents and motorization development visions. Highways and motor transport crisis. Transport systems integration.
References: Engineering of traffic. WKiŁ, Warszawa 1999

Prerequisites	Codes			

Subject	Industrial Building						Code	M-UZ 16
Semester	2	Hours	10	10		5	ECTS credits	3,0
			l	t	e	Lb-NO		
							Assessment	E
Department	of Fundamentals of Building and Material Engineering						Code	KPBIM
Persons Responsible	Zbigniew Wilk, Jacek Tejchman							

Contents

Classification and properties of industrial floors. Concrete floors with steel and polipropylen fibres. Resin, chemistry resistant and elastic floors. Investigations and calculations of industrial floors. Damages, repairs and conservancy of industrial floors. Construction of silos and calculation of silo loads from bulk solids. Calculations of internal forces in cylindrical silos. Calculations of internal forces in rectangular silos. Reinforcement of silos.
References:

Prerequisites	Codes			

Subject	Diploma Seminar						Code	M-UZ 17
Semester	4	Hours				30	ECTS credits	2,0
			l	t	l	d		
							Assessment	E
Department							Kod	
Persons Responsible								

Contents

The students prepare a introductory graduate project from their diploma thesis.

References:

Prerequisites Codes

Subject	Thesis						Code	M-UZ 18
Semestr	4	Hours					ECTS credits	6,0
			l	t	e	d		
							Assessment	E
Department	of Fundamentals of Building and Material Engineering						Code	
Persons Responsible	Jacek Tejchman							

Contens

Name of purpose, scope and working plan for the thesis. Supervisions, completation and presentation of thesis.

References:

Perequisites Codes: