COURSE DESCRIPTION CARD

The name of the course/module		Code
Materials		**A_K_1.1_003**

Main field of study	Educational profile (general academic, practical)	Year / term
ARCHITECTURE	**general academic**	**I/1**

Specjalization	Language of course:	Course (core, elective)
-	**Polish**	**Core**

Hours				Number of points
Lectures: **30**	Classes: **-**	Laboratory classes: **-**	Projects / seminars: **-**	**3**

Level of the studies:	**Form of studies** (full-time studies/part-time studies)	**Educational area(s)**	**ECTS distribution (number and %)**
I	**Full-time studies**	**Technical Sciences**	**3 100%**

Course status in the studies' program (basic, directional, other) (general academic, from a different major))

Directional **-**

Responsible for course:

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Lecturer:

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Faculty of Architecture
ul. Nieszawska 13 A, 60-965 Poznań
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Prerequisites defined in terms of knowledge, skills, social competences:

1	**Knowledge:**	- Student has explicit, general knowledge of structures of building facilities and architectural material, - Student has explicit, general knowledge of physics and chemistry
2	**Skills:**	- student can acquire information from publications, data bases and other sources, can integrate and interpret the said information and draw conclusions as well as voice and justify opinions
3	**Social competences:**	- student can work and cooperate in a team, assuming a number of different roles therein - student correctly identifies and resolves dilemmas in the scope of different social situations during trading operation of building materials

Objective of the course:

The aim of the course is transfer knowledge in the scope of architectural materials technology as a discipline which deals with research and using properties of materials and construction products for rational use their in architecture. The course is aimed on transfer knowledge in the scope of materials and construction products to the extent necessary in architect profession.

Lectures are divided into 4 thematic parts:

A. Classification of materials and products used in architecture.
B. Construction products in architectural practice – basic information.
C. Requirements for construction products and products properties.
D. General characteristics of materials and products used in architecture.

Learning outcomes

Knowledge:

number (symbol)	As a result of the course, the student is able to:	Reference to the outcomes of the learning process in the area of technical sciences
W01	has knowledge of the strength of materials	AU1_W09
W02	has knowledge of materials technology	AU1_W10
Skills:		
U01	has self-education skills	AU1_U02
U02	can select materials of respective aesthetic properties, as well as physiochemical, structural, fire-fighting and acoustic properties required for architectural designing and urban planning	AU1_U24
Social competences:		
K01	is aware of the importance of non-technical aspects and effects of engineering activities, in this impact upon the environment and liability for environment affecting decisions	AU1_K05
K02	can think and act in an entrepreneurial, creative and innovative manner	AU1_K07

The evaluation methods

Formative assessment:
Active participation in lectures confirmed with attendance at minimum 2/3 lectures.
Grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

Summative assessment:
Written exam
Final grading scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

Positive grade for module depends on achieved by student all learning outcomes specified in the syllabus.

Course contents

A. Classification of materials and products used in architecture.

1. Classification referring to Vitruvian features of architectural work:
   Firmitas (durability), Utilitas (functionality, usability), Venustas (ornamentation).
1.1. Materials and construction products (durability).
1.2. Separating and closing materials and products (functionality, usability).
1.3. Materials and ornamental products (decorativeness).
2. Classification referring to the degree of processing materials articles by human.
2.1. Natural materials (stone, wood, clay, jute, wool etc.).
2.2. Artificial materials made by man.
3. Classification referring to the method of materials fusion and products in building structure.
3.1. Products built on a permanent basis
3.2. Mobile products, not permanent fixtures (equipment elements, sliding systems of partition walls and double floors, elements of interiors arrangement, blinds, etc.)
4. Assortment classification of materials and products used in architecture
4.1. Natural stone materials
4.2. Ceramic products
4.3. Concretes
4.4. Building mortars
4.5. Bituminous binder
4.6. Building glass and glassware
4.7. Timber and wood-based materials
4.8. Metals and metal materials
4.9. Articles of plastic
4.10. Products for thermal insulation
4.11. Products for sound insulation
4.12. Products for waterproof insulation and damp-proof insulation
4.13. Painting products, paints, protection emulsion
4.14. Textile products
4.15. Architectural accessories, construction equipment, products for architectural interior and furnishing

B. Building products in architectural practice – basic information.

1. Determination of properties of construction products
1.1. Importance of correct determination of the construction products to draw up technical specification describing the object of contract in tenders for construction works (Act of 29 January 2004 of Public Procurement Law, Journals of Law of 9 February 2004)
1.2. Construction product as the object of the contract.
1.3. The method of describing products in project documentation and in tender specifications.
1.4. Trademarks of products in project documentation and in tender specifications.
2. European system of products normalization
2.1. Harmonized standard.
2.2. Standard of product (EN 45020)
3. Introduction to turnover of construction products and it use in architecture.
3.1. Accreditation and certification in European Union (EN 45020).
3.2. Notified units (EN 45000).
3.3. Testing, control, conformity evaluation.
3.4. Modular approach.
   Basic modules of conformity evaluation in directives of „new approach" (Decision 90/683/EEC, 93/465/EEC).

C. Requirements for construction products and usable properties of products.

1. Physical and mechanical properties of products and materials.
1.1. Requirements for basic mechanical properties of products and materials.
1.2. Requirements for basic psychical properties of products and materials.
2. Requirements for fire safety (PN-EN 13501-1-4 :2008, PN-EN ISO13943).
2.1. Factors affecting the choice of fire properties of products and materials.
2.2. Fire resistance of products (PN-B-02851-1 :1997, PN-EN 1364 :2001, PN-EN 13501-2 :2005).
2.2.1. Requirements of fire load-bearing capacity "R";
2.2.2. Requirements of fire insulation "I",

2.2.3. Requirements of fire integrity „E”,
2.2.4. Requirements of radiation “W”.
2.2.5. Requirements for resistance to mechanical actions (strike of construction element destroyed in the fire).
2.2.6. Ability to fire protection (walls, poles, roofs) “K”.
2.3. The degree of fire spread (PN-B-02867 :1990).
2.4. Flammability of material (PN-B-02874 :1996).
2.4.1. Combustion rate: surface combustion rate, linear combustion rate, mass combustion rate, the rate of flame spread, rate of heat release.
2.4.2. Backfire, spontaneous combustion, same spreading of flame (after removal of energy source).
2.4.3. Smulder (burn material without flame and no visible light).
2.4.4. Thermal degradation of product (loss of mechanical and physical properties due to an increase in temperature during fire).
2.4.5. Toxicity risk as a result of products combustion.
2.4.6. Degrees of materials flammability (PN-B-02874 :1996, PN-B-02862 :1993)
2.5. Materials permeability for smoke (PN-EN 13501-4).
2.6. Classification of construction products in terms of requirements of fire safety (PN-EN 13501 -1 :2008, PN-EN 13501 -2 :2005).
3. Requirements of safety in the use of products and materials.
3.1. Safety of moving, reducing the slipperiness of floors.
3.2. Electrostatic effect of products.
3.3. Protection against sharp edges and corners of products.
4. Integrity properties of products and materials.
4.1. General issues.
4.1.1. Control of water vapor permeation (PN-EN 13970 :2004, PN-EN 13984 :2006).
4.1.2. A flow of air leak through construction product (PN-ISO 9972 :1999).
4.1.3. Gas tightness (PN-EN 1443 :2001).
4.1.4. Dustproof (PN-ISO 6241 :1994).
5. Hygrothermal requirements of products and materials (PN-ISO 6241 :1994).
6. Requirements of air cleanliness.
6.1. Reduction of emission of toxic substances contained in products and materials.
7. Acoustic requirements.
7.1. General issues, necessary to proper determination of products and materials properties in terms of acoustic requirements.
7.2. Requirements of sound-absorbing products and materials as well as elements of sound diffusion and elements of directing sound.
7.3. Requirements of acoustic insulation of products and materials (PN-EN 20140 :1990, PN-EN 12354 :2003, PN-EN ISO 717-1 :1999).
8. Visual requirements of products and materials.
9. Requirements of surface at the touch.
9.1. Tactile characteristics of products and materials surface.
9.1.1. Surface texture.
9.1.2. Surface roughness.
9.1.3. Surface dryness.
9.1.4. Surface temperature.
9.1.5. Surface flexibility.
10. Hygienic requirements.
10.1. Resistance to products soiling (wall and flooring materials).
10.2. Easily washable products, hard washable products and not washable products.
10.3. Indicators of inputs for maintaining cleanliness per unit area of floor and wall coverings.
10.4. Resistance of products for cleaning agents.
10.5. Sanitary and epidemiological risks associated with improper use products.
10.6. Resistance of products to biological corrosion.
10.7. Resistance of products to insects and microorganisms.
11. Aesthetic requirements.
11.1. Design and aesthetic characteristics of products surface.
11.2. Discoloration, chips, stains and efflorescence on the surface.

Basic bibliography:

Sadowski J. Akustyka architektoniczna. PWN. Warszawa-Poznań. 1976.
Stefańczyk B. Budownictwo ogólne. t. 1. Arkady. Warszawa. 2007.

D. General characteristic of materials and products used in architecture.
1. Natural stone materials.
2. Ceramic products.
3. Concretes.
4. Building mortars.
5. Bituminous binder.
6. Construction glass and glass products.
7. Timber and wood-based materials.
8. Metals and metal products.
9. Plastic products.
10. Products to thermal insulation.
11. Products to sound insulation.
12. Products to waterproof insulation and damp-proof insulation.
13. Painting products, paints, protecting emulsions.
14. Textile products.
15. Architectural accessories, construction equipment, products for arrangement and design architectural interiors.

Basic bibliography

Sadowski J. Akustyka architektoniczna. PWN. Warszawa-Poznań. 1976.
Stefańczyk B. Budownictwo ogólne. t. 1. Arkady, Warszawa, 2007.
Szosland, J. Podstawy budowy i technologii tkanin. WNT. Warszawa 1991
Żenczykowski W. Budownictwo ogólne. t. 1. Arkady, Warszawa, 1990

Supplementary bibliography:

The standards listed (in parentheses) of 4th part of study curriculum, assigned to particular thematic groups.

The student workload		
Form of activity	**Hours**	**ECTS**
Overall expenditure	60	3
Classes requiring an individual contact with teacher	45	2
Practical classes	0	

Balance the workload of the average student

Form of activity	Number of hours
participation in lectures	30 h
participation in classes/ laboratory classes (projects)	-
preparation for classes/ laboratory classes	-
preparation to colloquium/final review	-
participation in consultation related to realization of learning process	15 h
preparation to the exam	13 h
attendance at exam	2 h

Overall expenditure of student: **3 ECTS credits** **60 h**

As part of this specified student workload:

- activities that require direct participation of teachers: 2 ECTS credits