Cracow University of Technology
Faculty of Civil Engineering
Chair of Building Design and Building Physics L-4

Civil Engineering 1st Cycle

DIPLOMA PROFILE

Building Design – Form, Function and Energy

Diploma Profile / Subjects related to Diploma Projects

	Semester VI	1L	2P	Semester VII	1L	2P
	Building Design – Form, Function and Energy					
	Architectural and Building Design		2	Architectural and Building Design		1
	Computer Aided Building Physics	1		Low Energy Building Enclo-sure	1	1

Tadeusz Kosciuszko

Cracow University of Technology

COURSE CARD

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full time — Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1. COURSE INFORMATION

Course name in English	Architectural and buidling design
Course code	WIL CE I
Course category	Courses related to the Field of Study
No. of ECTS points	6.0
Semester	6 and 7

2. CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	0	0	0	0	30	0
7	0	0	0	0	30	0

3. COURSE OBJECTIVES

Objective 1 preparation of materials for future design type diploma

4. PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fundamentals of Civil Engineering
2 Building Physics
3 Architecture and Urban Design

5. LEARNING OUTCOMES

LO1 Skills	Ability to set up the design requirements for designed building.
LO2	Ability to prepare the site layout according to MPZP or WZiZT.
LO3	Ability to prepare the building conceptual, structural and materials guidelines.
LO4	Ability to prepare the building permit design with the level of accuracy required for further design works.

6. COURSE CONTENT

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Building permit design of a chosen building. Building permit design of a chosen building. Usually this building is the subject of diploma **for structural, thermal or acoustical** design and calculations.	60

Tadeusz Kosciuszko

Cracow University of Technology

COURSE CARD

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: Subject related to Diploma

Study form: full time — Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1. COURSE INFORMATION

Course name	Computer Aided Building Physics
Course code	WIL CE I
Course category	Subject related to Diploma
No. of ECTS points	1
Semester	6

2. CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
6	0	0	0	15.0	0	0

3. COURSE OBJECTIVES

Objective 1 - Computer software supporting basic calculations connected with heat and humidity transport through the building components.

Objective 2 – The principles of selection of 2D and 3D geometry model to calculate heat flux and surface temperatures

Objective 3 – Presentation of restrictions and simplifications used in modeling.

4. PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

Positive result of final test of Building Physics

5. LEARNING OUTCOMES

LO1 Knowledge Student knows standards and guidelines of the detailed calculation of thermal bridges and their influence on thermal balance.
LO2 Knowledge Student knows computer programs supporting calculation of heat and humidity transport through the building components.
LO3 Skills Student is able to use the selected computer programs supporting decisions of proper selection of building partitions.
LO4 Skills Student is able to critically evaluate the results of numerical analysis of mass transport and energy balance for building component.
LO5 Social competences Student draws conclusions and describes the results of own work.

6. COURSE CONTENT

Computer lab		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
C1	Introduction: Thermal bridges, heat flux, surface temperature - calculation methods.	2.0
C2	Calculation of total transmission losses including the influence of thermal bridges. Calculation of linear thermal transmittance using computer software	5.0
C3	Principles of modeling of 2D thermal bridges in THERM program. Calculation of linear thermal transmittance for three different thermal bridges in the analyzed building.	5.0
C4	Simulation of dynamic phenomena of temperature and humidity transport in the building components. Interpretation of the results of the computer calculations.	3.0

Tadeusz Kosciuszko

Cracow University of Technology

COURSE CARD

Faculty of Civil Engineering

Field of study: Civil Engineering — Study profile: general academic

Study form: full time — Field of study code: BUD

Study cycle: 1st

Specialty: no specialty

1. COURSE INFORMATION

Course name	Low Energy Building Enclosure
Course code	WIL CE I
Course category	Subjects related to Diploma Projects
No. of ECTS points	2
Semester	7

2. CLASS TYPE, NUMBER OF HOURS ACCORDING TO THE STUDY PLAN

Semester	Lecture	Class exercise	Laboratory	Computer lab	Design exercise	Seminar
7	15	0	0	0	15	0

3. COURSE OBJECTIVES

Objective 1 Introduction of the basic principles of energy use and balance.
Objective 2 Detailed solutions of low energy building design.
Objective 3 Computational assessment methods and aspects of the building components.

4. PREREQUISITES IN TERMS OF KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1 Fundamentals of Civil Engineering

2 Physics of Building Structures

5. LEARNING OUTCOMES

LO1 Knowledge	Student knows the basic rules of design and construction of low energy building.
LO2 Skills	Student is able to make the appropriate design decisions regarding a low energy building and its structural details.
LO3 Skills	Student knows how to check basic requirements regarding heat and moisture.
LO4 Social competences	Student understands importance of sustainable development and sustainable building design.

6. COURSE CONTENT

Lecture		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
L1	Heat transfer basic issues, component and whole building approach. Formal requirements.	4
L2	Material thermal features for stationary and transient analysis.	4
L3	Selected building components: walls and flat roofs. Detailed design.	4
L4	Low energy building design rules of thumb and examples. Specific solutions.	3

Design exercise		
No.	Subject matter of the course Detailed description of thematic blocks	No. of class hours
D1	Design of low energy building enclosure - material and component selection, calculation of thermal characteristics, detailed solutions of joints. Two-dimensional heat flow simulation by means of computer software. Requirements check.	15