STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Heat, Momentum and Mass Transfer		**1010632211010630266**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**1 / 1**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Thermal Engineering	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
Second-cycle studies	**full-time**

No. of hours				No. of credits
Lecture: **1**	Classes: **1**	Laboratory: **1**	Project/seminars: **-**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**
Technical sciences	**3 100%**

Responsible for subject / lecturer:

dr inż Robert Kłosowiak
email: robert.klosowiak@put.poznan.pl
tel. 2212
Wydział Maszyn Roboczych i Transportu
http://www.fwmt.put.poznan.pl/

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of heat and mass transfer processes in thermal engineering
2	**Skills**	Is able to calculated heat flux in different surface and flow configurations
3	**Social competencies**	Is able to improve professional competencies and be ready to collaborate in team

Assumptions and objectives of the course:

Introduction of heat, momentum and mass transfer processes. Ability to calculate heat flux in conduction, convection and radiation.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Has a basic knowledge of heat and mass transfer processes - [K1A_W08]

Skills:

1. Is able to perform technical calculations in heat transfer - [K1A_U17]

Social competencies:

1. Understand the need and knows the possibility of lifelong learning - [K1A_K01,]

Assessment methods of study outcomes

exam

Course description

Introduction. Conduction-differential equations, boundary conditions. Thermal properties of materials. Conduction in fins. No stationary conduction. Numerical methods. Convection. Models of turbulence. Convection in channels. Convection from different surfaces. Radiation. Heat transfer at boiling and condensation. Heat exchangers.

Basic bibliography:

1. Brodowicz K.: Teoria wymienników ciepła i masy, PWN 1982
2. Hobler T.: Ruch ciepła i wymienniki, WNT 1979
3. Kostowski E.: Przepływ ciepła, Wyd. P. Śl. 1991
4. Kostowski E.: Zbiór zadań z przepływu ciepła, Wyd. P. Śl. 1988
5. Staniszewski B. Red.: Wymiana ciepła ? zadania i przykłady, PWN 1965
6. Staniszewski B.: Wymiana ciepła, PWN 1979
7. Wiśniewski St., Wiśniewski T.: Wymiana ciepła, WNT 1997
8. Holman J.P., Heat transfer, London McGraw-Hill 1992

Additional bibliography:

1. Madejski J.: Teoria wymiany ciepła, Szczecin, WUPSz 1998
2. Bejan A.: Heat Transfer, John Wiley & Sons, Inc., New York 1993

Result of average student's workload

Activity	Time (working hours)
1. Participation in the lecture	60
2. Preparing to lecture	5
3. Fixation of the lecture	5
4. Consultation	2
5. Preparing for exam	20
6. Participation in the exam	3

Student's workload

Source of workload	hours	ECTS
Total workload	70	3
Contact hours	40	1
Practical activities	20	1