SUBJECT DATA SHEET AND REQUIREMENTS

last modified: 9th February 2015

AIR POLLUTION CONTROL, WASTE WATER and SOLID WASTES MANAGEMENET

LEVEGŐ- ÉS VÍZTISZTASÁG-VÉDELEM, HULLADÉKKEZELÉS

1 Code	Semester Nr. or fall/spring	Contact hours/week (lect.+semin.+lab.)	Requirements p / e / s	Credit	Language
BMEGEÁTAG04	(6.) spring	3+0+0	p	3	English

2. Subject's responsible:

Name:	Title:	Affiliation (Department):
Dr. Jenő Miklós SUDA	assistant professor	Dept. of Fluid Mechanics

3. Lecturer:

Name:	Title:	Affiliation (Department):
Dr. Péter LÁNG	professor	Dept. of Building Service Eng. & Process Eng.
Dr. Kinga FEHÉR BOTHNÉ	assistant professor	Dept. of Building Service Eng. & Process Eng.
Dr. Mihály PARTI	ret. professor	Dept. of Fluid Mechanics
Dr. Jenő Miklós SUDA	assistant professor	Dept. of Fluid Mechanics

4. Thematic background of the subject: Based on the knowledge of Environmental Management Systems, physical and chemical phenomena of environmental processes, engineering applications

5. Compulsory / suggested prerequisites:
Compulsory: Environmental Management Systems / BMEGT42A003/

6. Main aims and objectives, learning outcomes of the subject: The main aim of the course is to provide sufficient and up-to-date theoretical background and practical knowledge in air pollution control, wastewater treatment and solid wastes management for mechanical engineers. Getting acquainted with the theoretical background, measurement principles, application areas, advantages and limitations of various environmental protection techniques applied in industrial practice. The main objectives are: getting acquainted with physical, chemical and biological methods & possibilities of separation, recovery and deformation of various pollutants of gaseous and solid phase; typical tasks of waste water treatment methods & technologies, basic processes and engineering equipment of the technology; characteristics of solid wastes, characterisation, collection and treatment, theoretical basics of burning solid wastes, typical equipment, solid waste disposal and recycling. The students are prepared to be able to recognize & evaluate the environmental protection problems and to solve the most typical engineering problems in topics of air pollution control, wastewater and solid wastes management. Based on the acquainted knowledge the students will be capable to solve also more complex problems of this subject with further study & research.

7. Method of education: lecture 3h/w, seminar 0h/w, laboratory 0h/w
Lecture room presentations (oral & blackboard presentations, with help of projected ppt slides, handout)

8. Detailed thematic description of the subject:
Part I. Solid waste management (Dr. Láng, P.) 3×3h lectures: Types, sources, properties, quantities, and qualities of solid wastes. On-site handling, storage and processing of solid wastes. Collection, transfer and transport of solid

wastes. Solid wastes processing techniques. Biological, chemical and energetic resource recovery processes. Ultimate disposal.

Part II. Waste water management (Bothné Dr. Fehér, K.) 4×3h lectures: Wastewater characteristics, pre-treatment (primary, secondary, tertiary treatment). Primary separation or clarification wastewater treatment techniques. Physical-chemical wastewater treatment techniques. Biological treatment techniques for biodegradable waste water. Wastewater sludge treatment techniques, sludge disposal.

Part III. Treatment of gaseous components (Dr. Parti, M.) 4×3h lectures: Notations in absorption. Equilibrium, equilibrium curve. Selection of solvent. Material balances, operating line, minimum liquid-gas ratio. Flow sheet for absorption of sulphur dioxide. Notations in adsorption. Equilibrium, adsorbents, adsorption plant, packed beds, regeneration of adsorbents. Application of adsorption (organic gases and vapours, sulphur dioxide). Chemical waste gas treatment, explosion range, material and heat balance, heat recovery. Other processes. Advantages and disadvantages.

Part IV. Particle removal from gases (Dr. Suda, J.M.) 3×3h lectures: Aerosols. Particle dynamics. Mass balance of a separator, overall/fractional efficiency. Mean particle concentration, particle mass flow rate, isokinetic sampling. Particle removal from gases: main forces/effects. From settling chambers, pre-separator louvers, Venturi-scrubbers, cyclones, surface & depth filtration, electrostatic precipitation.

9. Requirements and grading

a) in term-period: Four mid-term tests. Duration 45 minutes each, held on the 4th, 8th, 12th and 14th week. Achieving at least 30% of each test separately is a must, and total minimum achievable average result of the four tests is to be at least 40%. The tests are 25% equally weighted, total sum is 100 points. Grading:

0 % ≤ fail (1) < 40 % 40 % ≤ satisfactory(2) < 55 % 55 % ≤ medium(3) < 70 %
70 % ≤ good(4) < 85 % 85 % ≤ excellent(5) ≤ 100 %

In the case of the student succeeds above 65% for 3 of the four tests, the final mark will be increased to the next mark: e.g. good(4) instead of medium(3) etc.

b) in examination period: -

c) The students are subject to disciplinary measures against the application of unauthorized means at mid-terms, and the application of the 1/2013. (I.30.) Dean's Order must be followed.

10. Retake and repeat: One retake opportunity is given for each test in the mid-term period (on the closest Thursday 18:15h, in lecture room "K150"). Moreover, one retake possibility is available as second retake from one unsuccessful test on the week for retakes (15th education week). Any further movements are due to the Code of Studies and Exams of BME.

11. Consulting opportunities: Consultation hours: by email appointments and as it is indicated on the department's website. Weekly consulting hours will be provided. The consultation time can be enquired at the department administration after the registration week of the active semester. Exam consultation is provided the day before the exam.

12. Reference literature (compulsory, recommended):

- Lecture handouts are available on the Department's websites from each part (www.ara.bme.hu / www.epget.bme.hu)
- http://www.ara.bme.hu/oktatas/tantargy/NEPTUN/BMEGEATAG04

13. Home study required to pass the subject:

Contact hours	42	h/semester
Home study for the courses	8	h/semester
Home study for the mid-semester checks	4x10h	h/check
Preparation of mid-semester homework	-	h/homework
Home study of the allotted written notes	-	h/semester
Home study for the exam	-	h/semester
Totally:	90	h/semester

14. The data sheet and the requirements are prepared by:

Dr. Péter LÁNG	professor	Dept. of Building Service Eng. & Process Eng.
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