Module Title:
Regression analysis

Module Code:
DA0103

Maximum Number of Students:
30

Total ECTS Credits
This should be the sum of the credits for each of the semesters in which the module is to run.
2

Notional Learning Hours
(a) Contact Time - 15__h
(b) Private Study - 5__ h

Format of Teaching:

Lectures	7__h
Laboratories or Practicals	8_h
Other	_____h

Teaching Strategy:
Please show how the contact hours are to be allocated in terms of the type of class involved.
Lectures will cover the theoretical part, addressing the basic understanding of different variants of the regression technique and procedures involved. Lectures will also stress, via examples, the importance of the technique in analytical chemistry and other branches of chemical sciences.
Laboratory exercises will cover a number of real problems (typical for chemical science, esp. analytical chemistry) to be solved using a personal computer and typical programs. Creation of graphs and interpretation of the results will also be covered.

Convener:

Assistant professor Wojciech Chrzanowski, PhD, DSc

University / Department:
The name of the University and Department responsible for the module.
Gdańsk University of Technology, Faculty of Chemistry, Department of Physical Chemistry

Language of Tuition:
English

Module Description - The Purpose or Aims:
This should specify the purpose of the module where it fits into the programme specification and what it aims to provide. Please list the Aims in numerical order.
The principal aim of this module is to provide students with basic orientation in the field of regression techniques and their applications in analytical chemistry.
Specifically the following aims should be achieved:

1. Provide an insight in the basic theory – permitting understanding the advantages and limitations of the techniques.
2. Provide skills permitting effective usage of standard programs permitting regression calculations.
3. Provide the students with abilities of proper understanding and interpretation of two-dimensional statistics.
4. Formation of skills allowing effective choice, effective application and/or modification of a procedure to the individual needs.

Specific Learning Outcomes for this module: (contributing to general learning outcomes GLO 1 – GLO 10)
Learning Outcomes should provide statements which articulate what the student has achieved upon completion of the course. What will a student know, understand or be able to do?

1. Getting general orientation in the scope and opportunities created by regression analysis. (GLO5)
2. Understanding the advantages and limitations of individual techniques (GLO5).
3. Learning usage of standard programs applied for regression calculations.(GLO 7)
4. Learning by examples the application of the techniques in question for solving chosen specific problems in analytical chemistry, esp. preparation of calibration curves. (GLO6).

Summary of Course Content:
This should be a summary paragraph of list of the topics to be covered by the module.
Lectures: Two dimensional population and sample. Correlation. Basic concepts of curve fitting. Lest-squares method. Measures of fit goodness. Basic linear (straight line) regression. Linearized regression. Multiple regression. Polynomial regression. Basic issues of nonlinear regression; practical use of simplex approach and Marquardt-Levenberg algorithm. Interpretation of the results obtained by regression procedures.
Practical: Usage of standard computer programs (Sigma Plot or MS Excel +VB) for performing regression calculations, esp. preparation of calibration curves.

Transferable Skills Taught:
Please list in numerical order the key skills taught e.g. communication, information technology, interpersonal skills, teaching/study skills. Please relate these to benchmark statements.
Information technology: Skills in information technology on the basic level will be enhanced, under the general scheme – how natural scientists and engineers use computers. Also, usage of standard programs for solving basic problems in two-dimensional statistics, correlation and regression.

Assessment Methods:
Details of assessment methods should include forms of assessment and the contribution of each to the summative assessment of the module. The relationship to the learning outcomes of the module should be explicit and the numbers of the various learning outcomes should be attached to the assessment methods listed. Please list in numerical order

Assessment will be done on the basis of a short written test including 10 closed questions and solving a practical problem suggested by the instructor or by a student (group of students). The students will send their solutions of the latter part for the evaluation by e-mail after the course.

Assessment Criteria:

Details of assessment methods should include forms of assessment and the contribution of each to the summative assessment of the module. The relationship to the learning outcomes of the module should be explicit and the numbers of the various learning outcomes should be attached to the assessment methods listed. Please list in numerical order.

Treshold:
Achieving 50% score at the closed question test and a minimum solving the practical problem with minimal errors.
Good:
Minor errors in the closed question test. Solid and thorough covering the practical problem.
Excellent:
Almost perfect closed test score. Individually suggested by the student (and accepted by the instructor) practical application.

Resource Implications of Proposal and Proposed Solutions:

Details on any resources required and should be included. Please also list e.g core texts; recommended reading material; equipment; films etc.

Handouts of the lecture presentations will be prepared and sent to the students in advance (2 weeks before the course starts).
Recommended textbooks (in order of preference):
1. W. P. Gardiner, Statistical Analysis for Chemists. A software-based Approach, The Royal Society of Chemistry, 1997.
2. D. Freedman, R. Pisani, R. Purves, Statistics, Norton & Company, New York 1998.
3. R. Johnson, Elementary Statistics, Duxbury Press, Boston.

Resources needed:

1. computer laboratory with a number of PCs at least equal to half of the students enlisted.
2. PCs should be supplied with standard programs for running two-dimensional statistics (Sigma Polt would be my program of choice, though MS Excel is also possible).
3. multimedia projector for lectures.

Pre-Requisites:

Any module(s) which must have been taken prior to the current module, or any specific background required to take this module.

General orientation in basic statistical concepts (random variable, Gaussian distribution) is required.