COURSE OUTLINE

1. GENERAL

SCHOOL	FOOD AND NUTRITIONAL SCIENCES		
ACADEMIC UNIT	FOOD SCIENCE AND HUMAN NUTRITION		
LEVEL OF STUDIES	BACHELOR OF SCIENCE		
COURSE CODE	**265**	**SEMESTER**	6th
COURSE TITLE	COMPUTER APPLICATIONS IN FOOD PROCESSING		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures and computational practicals	3	3
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Field of Science
PREREQUISITE COURSES:	Mathematics, Computer Programming, Food Engineering, Unit Operations in Food Engineering, Food Preservation
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course introduces the principles and methodologies for modeling and optimizing food related processes through computational tools. The course material includes: Introduction to modeling of food processes. Nonlinear algebraic equations. Systems of linear and non-linear algebraic equations. Simple and multiple linear and nonlinear regression. Systems of ordinary differential equations - Initial Value Problems. Numerical integration. Introduction to optimization. Linear programming. Applications through EXCEL and MATLAB.

Upon successful completion of this course the student will become familiar with the use of mathematical equations to describe the basic phenomena observed in food processes. He will learn the basic numerical methods for solving various mathematical problems, and the use of the EXCEL and MATLAB software for modeling and optimization in food processing.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Computational work
Analyze and synthesize data and information
Work autonomously

3. SYLLABUS

1. Course Structure/Requirements. Introduction to **modeling** in food processing. Basic concepts in using EXCEL.
2. **MATLAB** I: Learning basic commands, vectors and matrices in MATLAB.
3. **MATLAB** II: Graphs and programming (m-files).
4. Solving mass balances (**systems of linear algebraic equations**). Examples in MATLAB and EXCEL.
5. Solving food engineering and food biotechnology problems, expressed through **non - linear algebraic equations** or systems of nonlinear algebraic equations.
6. Numerical methods of "Successive substitutions", "Bisection", "Newton-Raphson" for solving **nonlinear algebraic equations**.
7. Curve fitting of experimental data (**regression analysis**, least squares method). Examples using EXCEL and MATLAB.
8. **Analytical solution** for temperature profile calculation for products heating by conduction. Calculation of the temperature at the geometric center of a slab using the EXCEL. Comparison with literature values from charts .
9. **Ordinary differential equations** - initial value problems. Simulation of lactose hydrolysis by beta- galactosidase using MATLAB.
10. **Numerical integration**. Calculation of the F value of a thermal process using EXCEL and MATLAB.
11. Introduction to **process optimization**. Basic definitions of optimization problems.
12. **Simple and multiple, linear and nonlinear regression analysis**. Determination of parameter by of least squares method using EXCEL. Procedure "SOLVER". Simultaneous determination of D and z values by nonlinear regression analysis.
13. **Linear programming** with MATLAB. Example of cost optimization in selecting various foods to achieve a balanced diet of a child using MATLAB.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Teaching in a computer laboratory (power point presentation and blackboard writing for theory). On hands practice with EXCEL and MATLAB. Class notes
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Final examination (50% of the final course grade). Solving problems using EXCEL and MATLAB. II. Weekly (computational) homework (50%)

Activity	***Semester workload***
Lectures and on hands practice	39
Weekly homework	26
Autonomous study	10
Total contact hours and training	***75***

5. ATTACHED BIBLIOGRAPHY

CLEVE B. MOLER, ΑΡΙΘΜΗΤΙΚΕΣ ΜΕΘΟΔΟΙ ΜΕ ΤΟ MATLAB (μετάφραση), ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, ΑΘΗΝΑ, 2010.

ΜΟΥΣΑΣ ΒΑΣΙΛΕΙΟΣ Χ., ΒΑΣΙΚΗ ΧΡΗΣΗ ΚΑΙ ΠΡΟΓΡΑΜΜΑΤΙΣΜΟΣ MATLAB 7 (ΠΕΡΙΕΧΕΙ CD), ΕΚΔΟΣΕΙΣ ΙΩΝ ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ & ΣΙΑ ΟΕ, ΠΕΡΙΣΤΕΡΙ, 2009

PAUL CORNELL, ΑΝΑΛΥΣΗ ΔΕΔΟΜΕΝΩΝ ΜΕ ΤΟ MICROSOFT EXCEL (μετάφραση), ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, ΑΘΗΝΑ, 2004.