

INSTITUTE OF LIFE SCIENCE & TECHNOLOGY
EXCHANGE PROGRAMME RENEWABLE ENERGY, MATERIALS & PROCESSING
MODULE: ANALYSIS OF COMPLEX SYSTEMS 2017-2018

Renewable Energy, Materials & Processing	Year 4	Term 13
Theme coordinator	Dr ir G Lammers	
Instructor	Dr M.E.F. Apol	
Code	CTVH2ACS	
Content	The module Analysis of complex systems deals with statistical analysis of complex, dynamical systems, using advanced methods such as multivariate data analysis, Principal Component Analysis (PCA) and Analysis of Variance (ANOVA). The basic principles of various software packages will be reviewed. Finally, an introduction to Statistical Process Control (SPC) is given.	
Learning Objectives	<p>After completing this module, the successful student will be able to:</p> <ul style="list-style-type: none"> • Perform numerical integration using Excel; • Perform computersimulations using the package VisSim; • Perform simulations and use other numerical methods using the package MathCad; • Perform linear and nonlinear regression of experimental data using Excel and SPSS; • Perform and interpret several ANOVA methods using SPSS; • Perform and interpret correlations and correlation functions using SPSS; • Perform and interpret Principal Component Analysis using SPSS; • Assessment of process quality via Statistical Process Control. 	
Competencies	Research (III), Experimentation (II), Self-Management (II)	
Level	In-Depth (III), Intermediate (II)	
Method of Instruction	Instructional lectures and computer lessons, alternating 2 classes per week, 90 minutes each.	
Language	English	
Literature	<ul style="list-style-type: none"> • J.N. Miller & J.C. Miller (2010), Statistics and Chemometrics, 6th ed., Pearson Education, ISBN 978-0-273-73042-2. H 8 Multivariate analysis • M.E.F. Apol (2011), Oplossingsstrategieën, available via Blackboard. • M.E.F. Apol (2012), Analysis of complex systems, available via Blackboard. • Studiewijzer VisSim, available via Blackboard. • D.L. Massart & Y. Vander Heyden: From Tables to Visuals: Principal Component Analysis, Part 1, LC.GC Europe 17(11) 586-591, 2004, available via Blackboard. • D.L. Massart & Y. Vander Heyden: From Tables to Visuals: Principal Component Analysis, Part 2, LC.GC Europe 18(2) 84-89, 2005, available via Blackboard. <p>Some parts of the above will be skipped. This will be announced via Blackboard</p>	
Web	Blackboard course Theme 14 Chemical Engineering	
Module type	Required	
Grading	Final report, summarizing the solutions to several problems in a Chemical Engineering context.	
Course load (ECTS)	4	
Contact time	20 hours	
Self study time	92 hours	
Prerequisites		
Frequency	1× per academic year	

