

Course unit title:	Data Analysis and Management in Engineering		
Course unit code:	CEC350		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	3		
Semester when the unit is delivered:	6 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Christos Anastasiou		
Learning outcomes of the course unit:	<ol style="list-style-type: none"> 1. Explain basic statistical terms and concepts 2. Identify statistical methods that are suitable for exploring, describing and analysing engineering/construction-related data 3. Analyze, visualize, summarize, and report large data sets. 4. Build analytic models to help employers increase profits, reduce costs, or manage operations more efficiently. 5. Devise methodologies for collecting data needed for decision-making in the engineering business environment. 6. Work with specialized functions of such computer software / applications as MS Excel to analyse data and assist decision-making in engineering businesses. 7. Use a wide variety of data for planning and decision-making purposes; 8. Use data to describe program operations and/or practices; 9. Identify and articulate trends and patterns in data gathered over time 		
Mode of delivery:	Face-to-face		
Prerequisites:	None	Co-requisites:	None
Recommended optional program components:			
Course contents:	<p>This course will expose students to data analysis practices executed in the business world. Key areas such as the analytical process, how data is created, stored, accessed, and how the organization works with data and creates the environment in which analytics can flourish will be explored.</p> <p>The course will be delivered in a computer laboratory and will make use of commonly available data analysis applications (i.e. MS Excel).</p> <p>Sampling Concepts: Defining a Target Population, Representative Sample, Potential Consequences of Unrepresentative Sampling (Gaming the System), Over Representative Subgroups / Weighting, Sampling Methods (Cluster, Stratified, Simple Random)</p> <p>Descriptive Statistics: Summarizing and describing a collection of data, univariate and bivariate analysis, mean, mode and standard deviation, percentages and ratios, histograms, identifying randomness and uncertainty in data</p> <p>Inferential Statistics: Modeling assumptions, identifying patterns, regression analysis, T-test, Analysis of Variance, correlations, Chi-square</p> <p>Using Software (MS Excel): importing data, sorting, filters, tables, pivot tables, if-statements, conditional formatting, data analysis functions (descriptive statistics, frequencies, histograms), using Solver to Determine the Optimal Product Mix, to Schedule Your Workforce, to Solve Transportation or Distribution Problems, for Capital Budgeting, and for Financial Planning.</p>		
Recommended and/or required reading:			
Textbooks:	<ul style="list-style-type: none"> • Roxy Peck, Chris Olsen and Jay L. Devore. 2016. "Introduction to Statistics & 		

	Data Analysis - 5th Edition". Cengage Learning, 2016. ISBN 1305115341
References:	<ul style="list-style-type: none"> Wayne Winston. 2014. "Microsoft Excel 2013 Data Analysis and Business Modeling", Pearson Education, 2014. ISBN 0735681074
Planned learning activities and teaching methods:	<p>The course will be presented through theoretical lectures, demonstrations, and problem solving in a computer laboratory. The lectures will present to the student the course content and allow for questions. Part of the material will be presented using visual aids and solved examples/exercises, with a strong element of a hands-on-approach (learn-by-doing, using a computer). The aim is to familiarize the student with the different and faster pace of presentation and also allow the instructor to present related material (e.g. computer-based solutions techniques and models) that would otherwise be very difficult to do. Exercises will be given as homework which will be part of their assessment. Besides from the notes taken by students in class, all of the course material will be made available through the class website and also through the e-learning platform of the university. Finally the instructor will be available to students during office hours or by appointment in order to provide any necessary tutoring.</p>
Assessment methods and criteria:	<ul style="list-style-type: none"> Coursework 50% Final Exam 50%
Language of instruction:	English
Work placement(s):	No