

科目名 Course Title	500 計画数理学特論 (Probability and Statistics for Planning and Experimental Design)				
講義題目 Subtitle					
責任教員 Instructor-in-charge	萩原 亨 (Toru Hagiwara) [北方圏環境政策工学部門]				
担当教員 Other instructors	萩原 亨 (Toru Hagiwara)				
科目種別 Class specification	工学院専門科目 Engineering				
開講年度 Academic year	2012	開講学期 Semester	2学期	時間割番号 e3 Course No.	
授業形態 Class type	講義	単位数 Credits	2	対象年次 Expected Student	MC1~DC3
補足事項 Other Information	英語特別コースの”Probability and Statistics for Planning and Experimental Design”と同じクラスで開講する。				
キーワード Keywords:					
Experimental Design, Probability and Statistics for Engineering, Categorical Data Analysis, Generalized Liner Model					
授業の目標 Objectives:					
This course deals with the basic discussion of experimental design and the practical use of statistical procedures. It is important to design meaningful experiments for establishing causal relationship. Also, it is necessary to study the principles of probability to evaluate the significance of uncertainty on system performance. This course includes fifteen classes. Class 1 to 2 study the basic experimental design, Class 3 to 5 shows the meaning of random variable and need for and significance of probability and describe the random phenomena. Class 6 to 8 shows the important inferential methods. Classes 9 to 11 describe the multiple regression model and analysis of variance. Classes 12 to 15 study the generalized liner models.					
授業計画 Outline:					
(1) Rules for Research Study five rules that are generally followed to minimize incorrect conclusions from observations.					
(2) Standard Experimental Designs Study components of experimentation, principles of experimental design and control in experimentation.					
(3) Analytical models of random phenomena (3 times) Study definition of a random variable and many kinds of useful probability distributions, for example, the normal distribution, the binomial distribution, the poison distribution, the exponential distribution and so on.					
(4) Estimating parameters from observational data Study the role of statistical inference in engineering and the classical approach to estimate parameters.					
(5) Random sampling, data description, and some fundamental sampling distributions (2 times) Study the notions of population and samples, how to show properties of a set of data and some fundamental sampling distributions, for example, t-distribution and F-distribution, and tests of hypotheses					
(6) Multiple regression analysis and analysis of variance (3 times) Study concepts of the single and multiple regression models and the correlation analysis, and analysis of variance.					
(7) Introduction of generalized liner models (3 times) Study the maximum likelihood method and study generalized linear models for categorical and other discrete response data.					
(8) Special topic (1 time) Study R statistical software.					
成績評価の基準と方法 Grading: Based on results of homework during the course (40%) and final examination (60%)					
テキスト・教科書 Textbooks:					
Handout is distributed and references are indicated in the handout. Other good references are as follows:					
(1) Design and Analysis, A researcher's handbook, Geoffrey Keppel, 1991. (2) Probability Concepts in Engineering, Alfredo H-S. Ang and Wilson H. Tang, 2007. (3) Introduction to Liner Regression Analysis, Douglas C. Montgomery, 1992. (4) An Introduction to Categorical Data Analysis, Alan Agresti, 1996. (5) Extending the Linear Model with R, Julian J. Faraway, 2006.					
講義指定図書 References:					
参照ホームページ Website:					
備考 Note:					