工学数学 C Engineering Mathematics C

Tokyo Institute of Technology

Department of International Development of Engineering (IDE)

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2011年度講義スケジュール

花岡 11回
10月 5,7,12,14,18(火),19,26,28.
11月 2,4,9
小テスト 10/18,10/28,11/9

<u>高田</u>4回 11月 11, 16, 18, 25

期末テスト 11月30日 (水)

成績評価 Grading System



Text Book

Alfred H-S. Ang and Wilson H. Tang (1975)

Probability Concepts in Engineering Planning and Design, <u>Volume I</u> Basic Principles, John Wiley & Sons. New York.

Alfred H-S. Ang and Wilson H. Tang (2007)

Probability Concepts in Engineering, Emphasis on Application in Civil and Environmental Engineering, John Wiley & Sons. New York.

改訂 土木・建築のための確率・統計の基礎 (2007) 監訳 伊藤, 亀田; 訳 能島, 阿部 丸善株式会社

Outline

1. Basic Probability Concepts	確率の基礎
2. Probability Distribution	確率分布
3. Parameter Estimation	推定·検定
4. Regression Analysis	回帰分析

Importance of Modeling in Engineering

Modeling is an important part of most <u>decision-making</u>. To simplify and abstract important relationships underlying the provision and use of transport. The methods allow us to study the relationships underlying transport decision-making.



Formulated under conditions of **uncertainty** Include concepts and methods of **probability**

Probability in Civil Engineering

Example 1

In designing a right-turn lane at a highway intersection, the *probability* of 3 or more cars waiting for right turns will be needed to determine the length of the right-turn lane.



Example 2

When making policy for improving the efficiency of bus service, such as reducing bus fare, the *probability* that the travelers will shift from other modes to bus will have to be identified in the mode choice analysis.



Example 3

In designing the building foundation, there has to be concern of the sufficient safety margin. However, an excessively large safety margin may yield an unnecessary costly support system. Therefore the required safety margin may be viewed as a problem involving the trade-off between cost and *probability* of failure.



Example 4

The protection of a large farm from flooding requires the construction of a main culvert (排水路) at the junction of a roadway and a stream. The size of the culvert would depend on the *probability* of flooding within a given period (ex., ten years).

