# The syllabus of Probability and Statistics

<table>
<tr><td colspan="6">课程基本信息（Course Information）</td></tr>
<tr><td>课程代码<br>（Course Code）</td><td>MA119</td><td>学时<br>（Credit Hours）</td><td>48</td><td>学分<br>（Credits）</td><td>2.5</td></tr>
<tr><td rowspan="2">课程名称<br>（Course Name）</td><td colspan="5">（中文）概率论与数理统计</td></tr>
<tr><td colspan="5">（英文）Probability and Statistics</td></tr>
<tr><td>课程属性<br>(Course Type)</td><td colspan="5">公共基础课程</td></tr>
<tr><td>开课院系<br>（School）</td><td colspan="2">Department of Mathematics（英文）</td><td>开课学期<br>（Term）</td><td colspan="2">The 1st term（英文）</td></tr>
<tr><td>先修课程<br>（Prerequisite course）</td><td colspan="5">（英文）Calculus, Linear Algebra</td></tr>
<tr><td>授课教师<br>（Instructors）</td><td colspan="5">Lin QIU（英文）</td></tr>
<tr><td>课程简介<br>（Description）<br>300-500 字</td><td colspan="5">Probability and statistics is a mathematical discipline which studies stochastic phenomena. Now it is widely used in industrial and agricultural production, science and technologies. This course is one of the important basic courses for engineering majors in comprehensive universities, through which students shall know the general conceptions and methods about probability and statistics, master the basic definitions, theories and corresponding methods, master the methods to deal with random phenomenon by means of establishing the basic statistical models and master the necessary ability in English listening, speaking and so on. We stress theory and practice combined, in order to help students promote their ability of applying statistical methods in their daily life and scientific research.</td></tr>
<tr><td colspan="6">课程教学大纲（course syllabus）</td></tr>
<tr><td>*学习目标<br>(Learning Outcomes)</td><td colspan="5">After completing the course, students should understand and master:<br>1．The concept of random events, the relationship between events and calculations related. The calculation laws for probabilities.<br>2．The concept and the properties of conditional probability. Methods to solve probability problems by multiplication rule, total probability formula and Bayes' Rule. The concept of independent events. Methods to solve probability problems by the independence of the events.<br>3．The concept and the properties of conditional probability. Methods to solve probability problems by multiplication rule, total probability formula and Bayes' Rule. The concept of independent events. Methods to solve probability problems by the independence of the events.<br>4．Multidimensional random variables. Two dimensional random variables. Bivariate distributions, marginal distributions and conditional distributions. The concepts and properties of cumulative distribution function (cdf) and probability density function (pdf) of continuous distributions, random variable independency, the distribution of functions with respect to random variables. Master the methods to solve</td></tr>
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| | the distribution of the function of independent random variables.<br>**5.**The definitions, properties and calculations of expectation and variance. Expectation and variance of Binomial distribution, Poisson distribution, Uniform distribution, Exponential distribution and Normal distribution. The definition, properties and calculations of covariance and correlation coefficient.<br>6.The Chebyshev's Inequality. Bernoulli's Law of Large Numbers, Chehyshev's Law of Large Numbers, the Central Limit Theorem. To estimate the probability of the random events by the Chebyshev's Inequality or the Central Limit theorem.<br>7.The concepts of population, individual, statistic and its distribution. The Chi-Square distribution，the t distribution，the F distribution. The distributions of statistics frequently used from normal population.<br>8.Parametric estimation with the method of moment and the method of maximum likelihood. Efficiency of estimations. The interval estimation of the parameter of the normal distribution.<br>9.The basic idea and definition of testing hypotheses. The testing methods for expectation and variance of the normal population. |

*教学内容、进度安排及要求

(Class Schedule & Requirements)

| 教学内容 topics | 学时 Credit hours | 教学方式 Teaching methodology | 作业及要求 tasks | 基本要求 Intended learning outcomes | 考查方式 Assessment methods |
|---|---|---|---|---|---|
| Random events and probability | 4 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| Conditional probability | 4 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| Random variables and their distributions | 8 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| Multidimensional random variables and distribution | 6 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| Numerical Characteristis | 6 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| The law of large numbers and the Central Limit Theorem | 4 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| Basic concepts of mathematical statistics | 6 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |
| Parameter estimation | 6 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | Check and correct hw |

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| | Testing Hypotheses | 4 | lecture in the classroom with ppt | Written assignment | master concepts,do all hw. | |
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| 考核方式 (Assessment methods and Grading) | finial exam (80%) and assignment (20%) | | | | | |
| 教材或参考资料 (Textbooks & Other Reading Materials) | [1] Morris H.DeGroot ， Mark J.Schervish, Probability and Statistics ( fourth edition),China Machine Press, 2012<br>[2] Jay.L. Devore, Probability and Statistics, 5th ed. Higher Education Press, 2010<br>[3] H. Jeffreys, Theory of Probability, 3rd ed. Oxford: Oxford University Press, 1998<br>[4] J.T. McClave, T. Sincich, A First Course in Statistics, 7th ed. Upper Saddle River, NJ: Prentice Hall; London: Prentice-Hall International, 2000<br>[5] S.M. Ross, Introduction to Probability and Statistics for Engineers and Scientists,2nd ed. San Diego, CA; London: Harcourt/Academic, 2000<br>[6] V.K. Rothagi, S.M. Ehsanes, An Introduction to Probability and Statistics, 2nd ed. New York, Chichester: Wiley, 2001<br><br>（英文） | | | | | |
| 备注 （Notes） | （英文） | | | | | |