# Immanuel Lutheran College

## S.7 Mathematics & Statistics Course Outline (2009 – 2010)

Textbook: New Way Mathematics & Statistics for HKASL (2nd Edition), Chow Wai-keung, Li Kam-yuk, Manhattan Teacher(s): Ho KC

Reference Book: A Concise Course in Maths & Stat. For HKASLE, C. S. Lee, Learner's Series

***Chapter 12 – Probability***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 2/9 to 18/9 | 1. Students should have some ideas about set notations and be able to describe a set of objects and its subsets.<br>2. Represent a set by various methods including Venn diagrams. | 2 | Set notation | Exercise 12.1 |
| | 3. Students should have some ideas about sample space, event and be able to apply set operations to events.<br>4. Students should be able to define mutually exclusive events | 1 | Sample space and events | Exercise 12.2 |
| | 5. Understanding Classical Definition of probability, Relative Frequency and the fundamental properties of probability. | 2 | Probability | Exercise 12.3 |
| | 6. Applying multiplication principle, permutation and combination methods for counting in finding probability. | 3 | Methods of counting | Exercise 12.4 |
| | **Total:** | 8 | | |

***Chapter 13 – Probabilities of Compound***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 19/9 to 30/9 | 1. State the addition rules and apply them to find probabilities. | 2 | Addition rule | Exercise 13.1 |
| | 2. Definition and calculate conditional probabilities. | | Conditional probabilities | Exercise 13.2 |
| | 3. State the multiplication rules and apply them to find probabilities. | 2 | The Multiplication rule | Exercise 13.3 |
| | | | Independent events and the special multiplication rule | Exercise 13.4 |
| | 4. Bayes' theorem | 2 | Bayes' Theorem | Exercise 13.5 |
| | **Total:** | 1 | Chapter 11-13 | **Test 1** |

***Chapter 14 – Discrete Probability Distribution***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 5/10 to 23/10 | 1.Understanding the meaning of random variable and state its basic characteristics. | 2 | Random variables | Exercise 14.1 |
| | 2.Understanding the meaning of a discrete probability distribution and represent it by a mathematical function. | 2 | Probability Distributions and Probability Function | Exercise 14.2 |
| | 3.Explain the meaning of a probability function | | | |
| | 4.Define the expectation of a discrete random variable and solve simple problems involving expected values. | 2 | Expectation | Exercise 14.3 |
| | 5.Interpret the variance and the standard deviation of a random variable. | 2 | Variance and Standard Deviation | Exercise 14.4 |
| | **Total:** | 8 | Chapter 11-14 | **First Term UT** |

***Chapter 15 – Some Special Discrete Distributions***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 2/11 to 17/11 | 1. Definition of some special probability distributions and be able to solve some problems involving the distributions | | | |
| | a. Bernoulli distribution | 2 | The Bernoulli Distribution | Exercise 15.1 |
| | b. Binomial distribution | 1 | The Binomial Distribution | Supp. Exercise |
| | c. Geometric distribution | 2 | The Geometric Distribution | Exercise 15.2 |
| | d. Poisson distribution | 2 | The Poisson Distribution | Exercise 15.3 |
| | | 2 | | Exercise 15.4 |
| | Revision | 1 | | Supp. Exercise |
| | **Total:** | 10 | Chapter 14-15 | **Test 2** |

***Chapter 16 – The Normal Distribution and Its Applications***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 18/11 to 3/12 | 1.To understand the meaning of continuous probability distribution, probability density function (pdf) | 2 | Continuous probability distributions | Exercise 16.1 |
| | 2.Calculate probabilities of a continuous probability distribution as areas under the pdf curve | 1 | Basic knowledge of a continuous probability distribution | |
| | 3.Define the mean and the variance of a continuous random variable and state some of their simple properties | | | |
| | 4.Define the normal distribution | 2 | The Normal distribution | Exercise 16.3 |
| | 5.Solve problems involving applications of normal distributions | 2 | Application of the normal distribution | Exercise 16.4 |
| | 6.Use appropriate normal distributions to approximate binomial distributions | 2 | Normal approximation to the Binomial | Exercise 16.5 |
| | **Total:** | 9 | Chapter 16 | **Test 3** |

***Chapter 17 – Population Parameters and Sample Statistics***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 4/12 to 11/12 | 1.State the purpose of studying a sample | 1 | Random Samples and Sampling Distributions | Exercise 17.1 |
| | 2.Explain the meaning of the sampling distribution of a statistic and construct sampling distributions for the mean and the variance in simple cases | | | |
| | 3.Recognize that for a large random sample, the mean is a good estimate of the population mean and the variance is a good estimate of the population variance | 2 | Relationship between Sample Mean and Population mean | Exercise 17.2 |
| | | 2 | Relationship between Sample Variances and Population variance | Exercise 17.3 |
| | **Total:** | 5 | | |

***Chapter 18 – Comparison of Empirical Frequency Distributions with Fitted Distributions***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 14/12 to 20/1 | 1.Follow the general procedure for fitting a theoretical distribution to an empirical frequency distribution<br>2.Examine the discrepancies between the fitted and the observed class frequencies and draw reasonable conclusions regarding the goodness of fit | 2 | Fitting a Discrete Uniform Distribution | Exercise 18.2 |
| | 3.Apply the general procedure and examination of discrepancies above to the fitting of the distribution models to empirical frequency distributions with the model parameters either given or estimated from the given data. | 2 | Fitting a Poisson Distribution | Exercise 18.3 |
| | | 2 | Fitting a Binomial Distribution | Exercise 18.4 |
| | | 1 | Fitting a Normal Distribution | Exercise 18.5 |
| | **Total:** | 7 | | |

***Revision –***

| Date | Objectives | Periods | Contents | Relevant Ex. / Tests |
|---|---|---|---|---|
| 21/1 to 5/2 | Revision | 10 | | Supp. Exercises<br>**Test 4**<br>**Mock Exam** |