

**REGULATIONS FOR THE DEGREE OF
MASTER OF STATISTICS
(MStat)**

These Regulations will apply to students admitted in the 2007-2008 academic year and thereafter.

(See also General Regulations)

Any publication based on work approved for a higher degree should contain a reference to the effect that the work was submitted to the University of Hong Kong for the award of the degree.

Admission requirements

- MS 1. To be eligible for admission to the courses leading to the degree of Master of Statistics a candidate
- (a) shall comply with the General Regulations;
 - (b) shall hold
 - (i) a Bachelor's degree with honours of this University; or
 - (ii) another qualification of equivalent standard from this University or another University or comparable institution acceptable for this purpose; and
 - (c) shall satisfy the examiners in a qualifying examination if required.
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Qualifying examination

- MS 2. (a) A qualifying examination may be set to test the candidate's academic ability to follow the courses of study prescribed. It shall consist of one or more written papers or their equivalent.
- (b) A candidate who is required to satisfy the examiners in a qualifying examination shall not be permitted to register in the curriculum, until he/she has satisfied the examiners in the examination.
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Award of degree

- MS 3. To be eligible for the award of the degree of Master of Statistics, a candidate
- (a) shall comply with the General Regulations; and
 - (b) shall complete the curriculum and satisfy the examiners in accordance with the regulations set out below.
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Length of curriculum

- MS 4. (a) The curriculum of the part-time programme shall extend over not less than two academic years of study. Candidates shall not be permitted to complete the curriculum in more than 3 academic years, except with the approval of the Faculty Board.
- (b) A candidate with appropriate qualification and professional experiences may, on production of appropriate certification of having satisfactorily completed any of the courses as specified in the syllabuses, be exempted from those courses in the curriculum when he/she is admitted to the M.Stat. programme, subject to the approval of the Head of Department.

Completion of curriculum

- MS 5. To complete the curriculum, a candidate
- (a) shall follow the courses of instruction and complete satisfactorily all prescribed written, practical and project work;
 - (b) shall satisfy the examiners in the prescribed courses and in any prescribed form of examination; and
 - (c) if appropriate, shall complete and present a satisfactory project report in lieu of one written paper in the examination, if such option is provided in the syllabus.
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Examinations

- MS 6. (a) Where so prescribed in the syllabuses, coursework or a project report may constitute part or whole of the examination for one or more courses.
- (b) An assessment of the candidate's coursework during his/her studies, including completion of written assignments and participation in project work or laboratory work, as the case may be, is taken into account in determining the candidate's result in each course. Except where otherwise stated, the weight assigned to coursework will be 25% of the total marks.

MS 7. A candidate who has failed to satisfy the examiners at his/her first attempt in courses totalling not more than half of the number of credits of courses in the examination held during any of the academic year of study, whether by means of written examination papers, project report and coursework assessment, may be permitted to present himself/herself *either*

- (a) for re-examination in the course or courses of failure by the end of that academic year, which results in the award of no more than a pass grade; *or*
- (b) in the next academic year, for re-examination in the course or courses of failure, with the curriculum repeated or for examination in the same number of new courses, except that courses designated as compulsory are not replaceable under this provision..

MS 8. Subject to the provisions of Regulation MS 5(c), a candidate who has failed to present a satisfactory project report may be permitted to submit a new or revised project report within a specified period.

MS 9. Failure to take the examination as scheduled, normally results in automatic course failure. A candidate who is unable because of illness to be present for one or more papers in any written examination may apply for permission to present himself/herself at a supplementary examination to be held before the beginning of the following academic year. Any such application shall be made on the form prescribed within two weeks of the first day of the candidate's absence from the examination. An examination in these circumstances shall not be subject to regulation in MS 7(a) above.

- MS 10. A candidate who
- (a) has failed to satisfy the examiners in more than half the number of credits of courses to be examined during any of the academic year, or in any course at a repeated attempt; or
 - (b) is not permitted to submit a new or revised project report under the provision of MS 9; or
 - (c) has failed to satisfy the examiners in their project report at a second attempt;
- may be required to discontinue his/her studies.
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Examination results

MS 11. At the conclusion of the examination, and after presentation of the project paper if applicable, a pass list shall be published. A candidate who has shown exceptional merit at the whole examination may be awarded a mark of distinction, and this mark shall be recorded in the candidate's degree diploma.

SYLLABUS FOR THE DEGREE OF MASTER OF STATISTICS

The Department of Statistics and Actuarial Science offers a postgraduate programme leading to the degree of Master of Statistics, extending over two years of part-time study. The programme is designed to provide graduates with training in the principles and practice of statistics. Candidates should have knowledge of matrices and calculus.

STRUCTURE AND EVALUATION

The period of study extends over two years part-time commencing September. All courses offered are on a semester basis. Candidates must take at least 48 credits in the two years of study. Among the 48 credits of courses, students should take the two compulsory courses STAT7003 and STAT7004. Only under exceptional academic circumstances can the compulsory course STAT7003 or STAT7004 be replaced by an elective course.

The programme offers great flexibilities for students who wish to take a general approach or a specialized theme in Risk Management or Statistical Informatics.

Risk Management theme

The required courses are as follows: STAT7003, STAT7004, STAT8003, STAT8015, STAT8014, STAT8017 and any two of other courses.

Statistical Informatics theme

The required courses are as follows: STAT7003, STAT7004, STAT8013, STAT7005, STAT7006, STAT8017 and any two of other courses.

A student may choose to have his/her theme printed on the transcript if he/she has satisfied one of the theme requirements above.

Unless stated otherwise, the weights assigned to performance in the examination and an assessment of coursework in evaluating a candidate's final grade in each course will be in the ratio 75:25.

Compulsory Courses

STAT7003. Foundations of statistics (6 credits)

Motivated by real problems involving uncertainty and variability, this course introduces the basic concepts and principles of statistical inference and decision-making. Ideas developed will include probability modelling, statistical distributions; parametric classes; the likelihood principle; maximum likelihood estimation; likelihood ratio tests; hypotheses testing. (Only under exceptional academic circumstances can this compulsory course be replaced by an elective course.)

STAT7004. Linear modeling (6 credits)

Much of the analysis of variability is concerned with locating the sources of the variability, and many current statistical techniques investigate these sources through the use of 'linear' models. This course presents a unified theory of such statistical problems including regression; variance and covariance analyses; design of experiments; and their practical implementation with statistical packages. Assessment: 40% coursework, 60% examination.

Elective courses

STAT7005. Multivariate methods (6 credits)

In many disciplines the basic data on an experimental unit consist of a vector of possibly correlated measurements. Examples include the chemical composition of a rock; the results of clinical observations and tests on a patient; the household expenditures on different commodities. Through the challenge of problems in a number of fields of application, this course considers appropriate statistical models for explaining the patterns of variability of such multivariate data. Topics include: multiple, partial and canonical correlation; multivariate regression; tests on means and covariances; multivariate ANOVA; principal components analysis; factor analysis; discriminant analysis and classification; cluster analysis; multidimensional scaling.

Assessment: 40% coursework, 60% examination.

STAT7006. Survey research methods (6 credits)

Inferring the characteristics of a population from those observed in a selection or sample from that population is a situation often forced on us for economic, ethical or technological reasons. Against the background of practical situations, this course considers the basic principles, practice and design of sampling techniques to produce objective answers free from bias. Emphasis will be on current and local problems.

STAT8002. Project (6 credits)

A project in any branch of statistics or probability will be chosen, through consultation between students and lecturers. A substantial written report is required. This must be submitted by April 30 of the academic year. (A detailed proposal will be required, which should not be overlapped with the other courses. Availability of this course is subject to approval.)

STAT8003. Time series forecasting (6 credits)

A time series consists of a set of observations on a random variable taken over time. Such series arise naturally in climatology, economics, finance, environmental research and many other disciplines. In addition to statistical modelling, the course deals with the prediction of future behaviour of these time series. This course distinguishes different types of time series, investigates various representations for them and studies the relative merits of different forecasting procedures.

Assessment: 40% coursework, 60% examination.

STAT8012. Reading course (6 credits)

This course consists of supervised reading supplemented by written work and prescribed coursework. A candidate will specialize in one topic under the guidance of a lecturer. Topics vary yearly depending on the current interests of staff. A written report is required in lieu of a written examination paper. It must be completed and submitted by April 30 of the academic year. (A detailed proposal with specific topics and scope of the reading course will be required. Availability of this course is subject to approval.)

STAT8013. Statistical data analysis (6 credits)

Based on the two compulsory courses, STAT7003 and STAT7004, and adding categorical data analysis methods, this course develops the practical skills needed to deal with real data collected locally or internationally. Emphasis will be on hands-on experience with a computing statistical software such as SAS. Consulting experience may be presented in the form of case studies. A project paper may be used in place of all or part of the written examination.

STAT8014. Risk analysis (6 credits)

“Risk” is a familiar subject to the people of Hong Kong. Hong Kong has many weathered crises. In the financial sector, the subject called value-at-risk or VaR is highly relevant. Financial risk is certainly not the only phenomenon that Hong Kong people have experienced. We have problems such as geohazards and environmental hazards (e.g. red tides, air pollution and water pollution). It is well recognized that many crisis events exhibit similar features and are amenable to statistical analysis and modelling. Some of the usual statistical techniques in risk analysis are Monte Carlo simulation and extreme value analysis. This course aims to look at these approaches to some detail and apply them to some real data sets.

Assessment: 40% coursework, 60% examination.

STAT8015. Actuarial statistics (6 credits)

The main focus of this module will be on financial mathematics of compound interest with an introduction to life contingencies and statistical theory of risk. Topics include simple and compound interest, annuities certain, yield rates, survival models and life tables, population studies, life annuities, assurances and premiums, reserves, joint life and last survivor statuses, multiple decrement tables, expenses, individual and collective risk theory.

STAT8016. Biostatistics (6 credits)

Statistical methodologies and applications in fields of medicine, clinical research, epidemiology, biology and biomedical research are considered.

The types of statistical problems encountered will be motivated by experimental data sets. Important topics include design and analysis of randomized clinical trials, group sequential designs and crossover trials; survival studies; diagnosis; statistical analysis of the medical process.

STAT8017. Data mining techniques (6 credits)

With the rapid developments in computer and data storage technologies, the fundamental paradigms of classical data analysis are mature for change. Data mining techniques aim at helping people to work smarter by revealing underlying structure and relationships in large amounts of data. This course takes a practical approach to introduce the new generation of statistical data mining techniques and show how to use them to make better decisions. Topics include data preparation, association rules, trees and rules for classification and regression, cluster analysis, classical statistical models and non-linear models such as neural networks.

Assessment: 100% coursework.

STAT8018. Marketing intelligence (6 credits)

This course aims to introduce various important and practically relevant statistical models and methodologies, which can be used in present-day marketing research. Students will be exposed to a number of examples demonstrating the value of marketing intelligence in modern enterprises. Topics to be covered include market response models, cluster analysis for market segmentation, perceptual mapping and conjoint analysis for product positioning, discrete choice models and artificial intelligence methods for marketing decision making.

Assessment: 50% coursework, 50% examination.

EXAMINATION

Each course shall be examined by one three-hour written paper with the exception of STAT8002, STAT8012, STAT8017 and possibly STAT8013.