

博士班研究生資格考試實施辦法

1.考試日期：另行公告。

2.報名日期：開學後一週內。

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3.考試科目：下列六科中選考二科：

(1)分析 (2)代數 (3)統計 (4)機率 (5)微分方程 (6)演算法

4.其他規定：三年內至少通過一科，四年內要過二科，每位學生每科得重考二次；限四年內通過二科，符合下列規定者其中一科得以經指導教授同意，以 1 篇 SCI/SSCI 論文抵免之；選擇以論文抵免者需於第八學期結束前一個月前被接受並向系上提出申請，由系上組成 3-5 人之委員會，經委員會審查通過始符合抵免資格。

(1)為 SCI/SSCI 期刊。

(2)以本校名義發表(在職生得以在職單位與本校共同列名)。

(3)不得列為畢業門檻規定之論文。

(4)與指導教授共同發表，且學生之作者排名為指導教授除外之第一位。

(5)需於博士班第八學期結束前一個月前結束前被接受。

分析考試範圍

主要內容：

1、Real analysis：

Elementary set theory, elementary general topology, Lebesgue measure theory, Lebesgue integral, convergence theorems, L^p -space, absolute continuity, Hilbert spaces, Banach spaces, open mapping theorem, closed graph theorem, uniform boundedness theorem, Convolutions, Approximations of the identity.

2、Complex analysis：

Elementary properties of holomorphic functions, rational functions, linear fractional transformations, infinite series, integration, Cauchy's integral formula, residue theorem, harmonic functions, analytic continuation, entire functions.

參考書籍：

1、Wheeden and Zygmund：Measure and Integral

2、Rudin：Real and Complex Analysis

3、Royden：Real Analysis

代數考試範圍

主要內容：

- 1、Group Theory：Group action. Sylow's theorem, Structure of groups of finite order, Fundamental theorem of abelian groups, Groups with chain conditions, Free groups.
- 2、Ring Theory：Commutative rings, Localization, Noetherian rings, Structure of Artinian rings, Module Theory, Radical theory.
- 3、Field Theory：Field extension, Finite fields, Galois theory.
- 4、Linear Algebra：Jordan and Rational Forms. Hermitian, Unitary, Normal Matrices.

注意事項：

難度比照代數通論期末考題。

參考書籍：

- 1、T. W. Hungerford：ALGEBRA (chapter 1-9) .
- 2、Hoffman：Linear Algebra.

統計考試範圍

主要內容：

Sample, population, statistics, sampling distribution, sufficiency, maximum likelihood, moment method, estimation equation, least squares, weighted least squares, Bayes estimators, unbiasedness, information inequality, likelihood ratio tests, evaluation of tests and Neyman-Pearson Lemma, unbiased tests, the duality between tests and confidence sets, consistency, asymptotic normality and efficiency, asymptotic tests based on likelihoods and chi-square tests.

參考書籍：

Casella, G. and Berger, R.L. (2002), Statistical Inference, 2nd edition, Brooks/Cole Cengage Learning. (網路有 pdf 檔)

機率考試範圍

1. Large sample theory
 - Various mode of convergence
 - Law of large number
 - Central limit theorem and its ramifications
2. Characteristic function
3. Random walk and Martingale

參考書籍：

K. L Chung : A course of probability theory

微分方程考試範圍

主要內容：

1、 Ordinary differential equations：

- (a) Linear system with constant coefficients.
- (b) Stability of Equilibria.
- (c) Limit cycles and the Poincare-Bendixon theorem.

2、 Partial Differential Equations：

- (a) 1st order equations.
- (b) Stokes' and Green's Theorems.
- (c) Fundamental solutions.
- (d) Laplace equation and Poisson equation. The Maximum principle.
- (e) Second order parabolic equations. The Maximum principle. Existence and uniqueness of initial boundary value problems.
- (f) Second order wave equations.

參考書籍：

- 1、 Hirsch and Smale： Differential equations, Dynamical systems, and linear Algebra (Chapter 1-9, 11) .
- 2、 F. John： Partial Differential Equations (Chapter 1, 3, 4, 5, 7) .
- 3、 W. A. Strauss： Partial Differential Equations (Chapter 2, 3, 4, 5, 6, 7) .

演算法考試範圍

主要內容：

參考書籍：

- 1、 “Computer Algorithms C++”,
by E. Horowitz, S. Sahni and S. Rajasekaran
- 2、 “Introduction to Algorithms”,
by T. H. Cormen, C. E. Leiserson and R. L. Rivest
- 3、 “Introduction to Parallel Computing”,
by A. Grama, A. Gupta, G. Karypis, V. Kumar