

國立彰化師範大學
數學系博士班畢業條件表暨課程架構表
(114學年度入學學生適用)

National Changhua University of Education
Graduation Requirements and Course Structure for PhD Program of Mathematics
(Applicable for students in 114 academic year)

列印日期(Print Date:2024/11/21)

一. 系必修課程

I. Department Required Courses

課程名稱 Course Name	學分/學時 Credit(s) / Hour(s)	年級 Grade	學期 Semester
論文指導(一) Thesis Supervision I	3/0	2	1
博士論文 Doctoral Dissertation	0/0	2	2
論文指導(二) Thesis Supervision II	3/0	2	2

二. 系選修課程

II. Department Elective Courses

課程名稱 Course Name	學分/學時 Credit(s) / Hour(s)	年級 Grade	學期 Semester
變分法(一) Calculus of Variations I	3/3	1	1
實分析(一) Real Analysis I	3/3	1	1
統計學(一) Statistics I	3/3	1	1
數學教育論文寫作(一) Writing on Mathematic Education Research I	3/3	1	1
數理統計(一) Mathematical Statistics I	3/3	1	1
統計諮詢理論與實務 Statistics Consultancy-Theory and Practice	3/3	1	1
高等幾何學(一) Advanced Geometry I	3/3	1	1
機器學習 Machine Learning	3/3	1	1
網頁技術 Webpage Technology	3/3	1	1
特殊函數(一) Special Functions I	3/3	1	1
隨機計算(一) Stochastic Calculation I	3/3	1	1
資料庫 Databases	3/3	1	1
生物統計 Biostatistics	3/3	1	1
生物資訊專題(一) Topics in Bioinformatics I	3/3	1	1

泛函分析(一) Functional Analysis I	3/3	1	1
偏微分方程(一) Partial Differential Equations I	3/3	1	1
代數拓撲(一) Algebraic Topology I	3/3	1	1
非線性分析(一) Nonlinear Analysis I	3/3	1	1
高等機率論(一) Advanced Probability Theory I	3/3	1	1
凸性分析(一) Convex Analysis I	3/3	1	1
資料分析(一) Data Analysis I	3/3	1	1
代數專題(一) Topics in Algebra I	3/3	1	1
動態系統學(一) Dynamical Systems I	3/3	1	1
解析數論(一) Analytic Number Theory I	3/3	1	1
高等數論(一) Advanced Number Theory I	3/3	1	1
密碼學 Cryptography	3/3	1	1
數學教育專題(一) Topics in Mathematical Education I	3/3	1	1
分割理論(一) Theory of Partitions I	3/3	1	1
數學結構(一) Mathematical Structures I	3/3	1	1
測驗統計理論研究(一) Modern Measurement Theory I	3/3	1	1
定點理論 Fix Point Theory	3/3	1	1
數論專題(一) Topics in Number Theory I	3/3	1	1
高等演算法(一) Advanced Algorithms I	3/3	1	1
常微分方程(一) Ordinary Differential Equations I	3/3	1	1
隨機過程(一) Stochastic Process I	3/3	1	1
半母數迴歸分析 Semi-parametric regression analysis	3/3	1	1
生物資訊 Bioinformatics	3/3	1	1
組合(一) Combinatorics I	3/3	1	1
應用貝式統計方法專題(一) Topics in Applied Bayesian Statistical Methods I	3/3	1	1
統計推論(一) Statistical Inference I	3/3	1	1
時間序列(一) Time Series Analysis(一)	3/3	1	1

數位影像處理理論與實務 Digital image Processing	3/3	1	1
數位學習專題(一) Topics on E-learning(一)	3/3	1	1
中醫統計學(一) Statistics for Chinese Medicine I	3/3	1	1
數學教育研究法專題(一) Topics in Mathematics Education Methodology I	3/3	1	1
模論專題(一) Topics in Module Theory (I)	3/3	1	1
碎形幾何學(一) Fractal Geometry (I)	3/3	1	1
隱寫分析 Introduction to Steganalysis	3/3	1	1
資料分析專題：智慧製造 Topic on Data Analysis: Smart Manufacturing	3/3	1	1
變分法(二) Calculus of Variations II	3/3	1	2
實分析(二) Real Analysis II	3/3	1	2
統計學(二) Statistics II	3/3	1	2
最佳化理論 Optimization Models	3/3	1	2
數學教育論文寫作(二) Writing on Mathematic Education Research II	3/3	1	2
數理統計(二) Mathematical Statistics II	3/3	1	2
高等幾何學(二) Advanced Geometry II	3/3	1	2
資訊網路 Interactive Webpage Design	3/3	1	2
特殊函數(二) Special Functions II	3/3	1	2
隨機計算(二) Stochastic Calculation II	3/3	1	2
計量財務 Quantitative Finance	3/3	1	2
資料探勘 Data Mining	3/3	1	2
生物資訊專題(二) Topics in Bioinformatics II	3/3	1	2
動態系統學(二) Dynamical Systems II	3/3	1	2
泛函分析(二) Functional Analysis I I	3/3	1	2
偏微分方程(二) Partial Differential Equations II	3/3	1	2
代數拓撲(二) Algebraic Topology I I	3/3	1	2
非線性分析(二) Nonlinear Analysis I I	3/3	1	2
高等機率論(二) Advanced Probability Theory II	3/3	1	2

凸性分析(二) Convex Analysis II	3/3	1	2
資料分析(二) Data Analysis I I	3/3	1	2
統計計算 Statistical Computing	3/3	1	2
代數專題(二) Topics in Algebra II	3/3	1	2
解析數論(二) Analytic Number Theory I I	3/3	1	2
高等數論(二) Advanced Number Theory I I	3/3	1	2
數學教育專題(二) Topics in Mathematical Education I I	3/3	1	2
分割理論(二) Theory of Partitions II	3/3	1	2
數學結構(二) Mathematical Structures I I	3/3	1	2
測驗統計理論研究(二) Modern Measurement Theory I I	3/3	1	2
定點理論專題 Topics in Fix Point Theory	3/3	1	2
數論專題(二) Topics in Nmuber Theory II	3/3	1	2
高等演算法(二) Advanced Algorithms II	3/3	1	2
常微分方程(二) Ordinary Differential Equations II	3/3	1	2
隨機過程(二) Stochastic Process II	3/3	1	2
數位學習 e-Learning	3/3	1	2
組合(二) Combinatorics II	3/3	1	2
應用貝式統計方法專題(二) Topics in Applied Bayesian Statistical Methods II	3/3	1	2
統計推論(二) Statistical Inference II	3/3	1	2
時間序列(二) Time Series Analysis(二)	3/3	1	2
資訊隱藏 Introduction to Data hiding	3/3	1	2
數位學習專題(二) Topics on E-learning(二)	3/3	1	2
中醫統計學(二) Statistics for Chinese Medicine II	3/3	1	2
數學教育研究法專題(二) Topics in Mathematics Education Methodology II	3/3	1	2
模論專題(二) Topics in Module Theory (II)	3/3	1	2
碎形幾何學(二) Fractal Geometry (II)	3/3	1	2
高等資料探勘 Advanced data mining	3/3	1	2

統計計算書報討論 Seminar on Statistical Computing	2/2	2	1
空間統計書報討論(一) Seminar on Spatial Analysis I	2/2	2	1
數學哲學書報討論(一) Seminar on Philosophy of Mathematics I	2/2	2	1
偏微分方程書報討論(一) Seminar on Partial Differential Equations I	2/2	2	1
動態系統學書報討論(一) Seminar on Dynamical Systems I	2/2	2	1
密碼學書報討論(一) Seminar on Cryptography I	2/2	2	1
常微分方程書報討論(一) Seminar on Ordinary Differential Equations I	2/2	2	1
實分析書報討論(一) Seminar on Real Analysis I	2/2	2	1
賽局論書報討論(一) Seminar on Game Theory I	2/2	2	1
機率書報討論 Seminar on Probability Theory	2/2	2	1
隨機測度論(一) Stochastic Control Theory I	3/3	2	1
機率論論文選讀(一) Readings on Probability Theory I	3/3	2	1
橢圓型偏微分方程專題 Topics in Elliptic Equations	3/3	2	1
拋物線型偏微分方程專題(一) Topics in Parabolic Equations I	3/3	2	1
偏微分方程論文選讀(一) Reading in Partial Differential Equations I	3/3	2	1
論文選讀(一) Topics on Research I	3/3	2	1
李氏群(一) Lie Groups I	3/3	2	1
李氏代數(一) Lie Algebras I	3/3	2	1
微分拓撲(一) Differential Topology I	3/3	2	1
數學結構(三) Mathematical Structures (III)	3/3	2	1
數值分析專題(一) Topics in Numerical Analysis I	3/3	2	1
資優數學專題(一) Topics in Mathematics for Gifted I	3/3	2	1
數學教育論文選讀(一) Readings in Mathematics Education I	3/3	2	1
密碼學論文選讀(一) Reading in Cryptography (I)	3/3	2	1
動態系統論文選讀(一) Reading in Dynamical Systems I	3/3	2	1
數學課程論文選讀(一) Mathematical Curriculum Literature I	3/3	2	1
數論論文選讀(一) Readings on Number Theory(I)	3/3	2	1

代數論文選讀(一) Readings on Algebra(I)	3/3	2	1
數學建模的評量與教學 Assessment and Instruction of Mathematical Modeling	3/3	2	1
混沌動態系統(一) Chaos and Dynamical Systems I	3/3	2	1
隨機過程專題(一) Topics in Stochastic Process I	3/3	2	1
非線性分析專題(一) Topics in Nonlinear Analysis I	3/3	2	1
動態系統專題 Topics in Dynamical systems	3/3	2	1
泛函分析專題(一) Topics in Functional Analysis I	3/3	2	1
代數曲線論 Algebraic Curves	3/3	2	1
資訊安全專題(一) Topics in Information Security I	3/3	2	1
同調代數(一) Homology Algebra I	3/3	2	1
長期追蹤資料分析專題(一) Topics in Longitudinal Data Analysis I	3/3	2	1
環論專題(一) Topics in Ring Theory I	3/3	2	1
資訊安全 Information Security	3/3	2	1
數學教育研究的統計方法:理論與應用(一) Statistical Method for Research in Mathematics Education-theory and application I	3/3	2	1
空間統計專題(一) Topics in Spatial Statistics I	3/3	2	1
資料探勘專題(一) Topics in Data Mining I	3/3	2	1
矩陣理論(一) Matrix Theory I	3/3	2	1
資訊隱藏論文選讀(一) Topics in Data hiding (I)	3/3	2	1
健康資料庫加值應用 Value-added applications on health related databases	3/3	2	1
隱寫分析論文選讀(一) Readings on Steganalysis(I)	3/3	2	1
數位影像處理論文選讀(一) Readings on Digital Image Processing(I)	3/3	2	1
實分析書報討論(二) Seminar on Real Analysis II	2/2	2	2
賽局論書報討論(二) Seminar on Game Theory II	2/2	2	2
空間統計書報討論(二) Seminar on Spatial Analysis (II)	2/2	2	2
偏微分方程書報討論(二) Seminar on Partial Differential Equations II	2/2	2	2
動態系統學書報討論(二) Seminar on Dynamical Systems II	2/2	2	2
密碼學書報討論(二)	2/2	2	2

Seminar on Cryptography II			
常微分方程書報討論(二)	2/2	2	2
Seminar on Ordinary Differential Equations II			
數學哲學書報討論(二)	2/2	2	2
Seminar on Philosophy of Mathematics II			
機率論論文選讀(二)	3/3	2	2
Readings on Probability Theory II			
拋物線型偏微分方程專題(二)	3/3	2	2
Topics in Parabolic Equations II			
論文選讀(二)	3/3	2	2
Topics on Research II			
李氏群(二)	3/3	2	2
Lie Groups II			
李氏代數(二)	3/3	2	2
Lie Algebras II			
微分拓撲(二)	3/3	2	2
Differential Topology II			
隨機測度論(二)	3/3	2	2
Stochastic Control Theory II			
數學結構(四)	3/3	2	2
Mathematical Structures (IV)			
數值分析專題(二)	3/3	2	2
Topics in Numerical Analysis II			
資優數學專題(二)	3/3	2	2
Topics in Mathematics for Gifted II			
數學教育論文選讀(二)	3/3	2	2
Readings in Mathematics Education II			
偏微分方程論文選讀(二)	3/3	2	2
Reading in Partial Differential Equations II			
密碼學論文選讀(二)	3/3	2	2
Reading in Cryptography (II)			
動態系統論文選讀(二)	3/3	2	2
Reading in Dynamical Systems II			
數學課程論文選讀(二)	3/3	2	2
Mathematical Curriculum Literature II			
數論論文選讀(二)	3/3	2	2
Readings on Number Theory(II)			
代數論文選讀(二)	3/3	2	2
Readings on Algebra(II)			
隨機控制論	3/3	2	2
Stochastic Control Theory			
混沌動態系統(二)	3/3	2	2
Chaos and Dynamical Systems II			
隨機過程專題(二)	3/3	2	2
Topics in Stochastic Process II			
非線性分析專題(二)	3/3	2	2
Topics in Nonlinear Analysis II			
泛函分析專題(二)	3/3	2	2
Topics in Functional Analysis I I			
資訊安全專題(二)	3/3	2	2
Topics in Information Security II			
同調代數(二)	3/3	2	2
Homology Algebra II			
長期追蹤資料分析專題(二)	3/3	2	2

Topics in Longitudinal Data Analysis II			
環論專題(二) Topics in Ring Theory II	3/3	2	2
數學教育研究的統計方法:理論與應用(二) Statistical Method for Research in Mathematics Education-theory and application II	3/3	2	2
空間統計專題(二) Topics in Spatial Statistics II	3/3	2	2
資料探勘專題(二) Topics in Data Mining II	3/3	2	2
矩陣理論(二) Matrix Theory II	3/3	2	2
資訊隱藏論文選讀(二) Topics in Data hiding(II)	3/3	2	2
隱寫分析論文選讀(二) Readings on Steganalysis(II)	3/3	2	2
數位影像處理論文選讀(二) Readings on Digital Image Processing(II)	3/3	2	2
表現理論專題 Topics in Representation Theory	3/3	4	2

三. 先修科目

III. Prerequisite Courses

先修課程 Prerequisite Course	後修課程 Subsequent Course
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四. 畢業條件

IV. Graduation Requirements

- 一、本系最低畢業學分為18學分（不含論文指導、論文選讀與書報討論之學分）。
- 二、「論文指導(一)(二)」6學分及教育學分皆不計入畢業學分；凡註冊後應至少修習一門科目(含論文)，否則應辦理休學。已修畢最低畢業學分而論文尚在撰寫中者，次學年起每學期必須選修「博士論文」。
- 三、入學後，三年內至少通過一科資格考試，限四年內要過二科，每科得重考二次，並追溯至102學年度入學博士班學生。資格考試以70分為及格。未達上述規定者，應予退學。博士班學生應於二年內自行選定本系或本校統計資訊研究所專任教授、副教授或助理教授為指導教授；若指導教授退休或因故離職，學生應重新選定本系或本校統計資訊研究所專任教授、副教授或助理教授為指導教授。
- 四、凡選修本系開設科目一律採認為畢業學分；經指導教授同意可修習本、外校相關系、所博士班課程並列入畢業學分，至多6學分為限。
- 五、博士候選人除完成博士論文外，尚須依下列規定發表期刊論文（最低標準），才能取得博士學位：第七年畢業者，一篇具審查制度之期刊論文；第六年畢業者，一篇SCI期刊論文；第五年畢業者，具審查制度之期刊與SCI期刊論文各一篇（共二篇）；少於四年（含）畢業者，二篇SCI期刊論文。
- 六、學生須參與本系或統資所每學年舉辦之學術演講場次達2/3以上，並經所辦審查通過方可畢業。若有特殊原因者，得經指導教授或系主任同意後逕自參與其他相關演講並書寫心得報告。
- 七、碩士班學生曾修過分析通論(一)(二)或代數通論(一)(二)者，就讀本校博士班時，此四門科皆不計入畢業學分。
- 八、【研究生應於申請學位考試前修習通過於「臺灣學術倫理教育資源中心」(<https://ethics.nctu.edu.tw/>)網路教學平台之「學術研究倫理教育」課程等相關規定。】

Graduation Requirements

- The minimum graduation credit of the department is 18 credits (excluding the credits of thesis supervision, thesis selection and book and newspaper discussion).
- Dissertation Guidance (1)(2)" 6 credits and education credits are not counted as graduation credits, and those who should take at least one subject (including thesis) after

registration, otherwise they should be suspended. Those who have completed the minimum number of graduation credits and are still working on their dissertation are required to take the "Doctoral Dissertation" in each semester from the next academic year.

3. After admission, students must pass at least one qualification examination within three years, and pass two subjects within four years, and each subject must be retaken twice, and it will be retroactive to the doctoral students enrolled in the 102 academic year. The qualifying examination is marked with a score of 70 to pass. Those who do not meet the above requirements shall be withdrawn from the University. Doctoral students should choose a full-time professor, associate professor or assistant professor of the department or the Institute of Statistics and Information Technology of the university as their supervisor within two years, and if the supervisor retires or leaves for any reason, the student should re-select a full-time professor, associate professor or assistant professor of the department or the Institute of Statistics and Information Technology of the university as the supervisor.

4. All elective courses offered by the department will be regarded as graduation credits, and with the consent of the supervisor, the courses related to other schools and doctoral courses can be included in the graduation credits, with a maximum of 6 credits.

5. In addition to completing the doctoral dissertation, doctoral candidates must publish journal papers (minimum standards) in accordance with the following regulations in order to obtain a doctoral degree: one journal paper with censorship system for those who graduate in the seventh year, one SCI journal paper for those who graduate in the sixth year, one SCI journal paper for those who graduate in the fifth year (two papers in total) and one journal paper with censorship system and two SCI journal papers for those who graduate in less than four years (inclusive).

6. Students must participate in more than two-thirds of the academic lectures held by the department or the Institute each academic year, and can only graduate after being reviewed and approved by the department. If there are special reasons, they can participate in other relevant lectures and write a report with the consent of the supervisor or department chair.

7. For master's students who have taken General Theory of Analysis (1) (2) or General Theory of Algebra (1) (2), these four courses will not be counted as graduation credits when they study in the doctoral program of the university.

8. Graduate students should study the relevant regulations of the "Academic Research Ethics Education" course of the "Taiwan Academic Ethics Education Resource Center" (<https://ethics.nctu.edu.tw/>) online teaching platform before applying for the degree examination. **】**