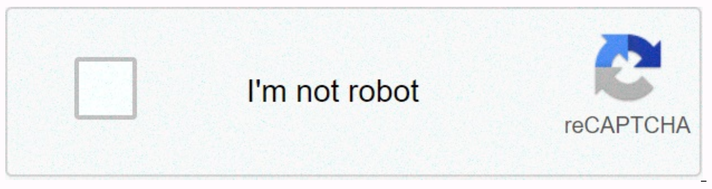

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Math 154 ucsd spring 2019

Announcements: First day of class on March 30 at 3 p.m. Zoom Meeting (meeting link here password graphs) Homework: Exams: Lectures Recordings: Upcoming Lecture Slides Other: Courses Lecture B: MWF 15:00-3:00 50pm in 101 Center Hall Discussion: (B01) Tu 8am-8.50pm on MM102 1 (B02) Tu 9am-9.50pm aM 102 2pm (B03) Tu 10:00-10:50 am on TM102 1 (B04) Tu 11:00-11:50 am on TM102 1 (B05) Tu 1 12pm-12.50pm in TM102 1 (B06) Tu 1pm-1.50pm in TM102 1 (B07) 7pm-7pm :50pm to AP & M 2402 course Description: Integral calculus features a variable for applications. Antiderivatives, definite integrations, basic theorem of the calculus, methods of integration, areas and quantities, separable differential formulas. (No credit given if taken after or at the same timemath 20B.) Prerequisites: AP Calculus AB score 3, 4, or 5 (or equivalent to AB subscore in the B.C. exam), or Math 10A, or Math 20A. Textbook: Calculus: Concepts and Contexts, Edition 4, by James Stewart Homework: Homework will be due pretty much every Monday at 5 p.m. for the corresponding drop box located in the basement of AP & M. There are nine homework assignments. Links to assignments appear in the following schedule. Write your full name and section number on the front page of your homework. Also, please cut each page together. We don't accept late homework. However, the lowest homework score is reduced. Readings: The approximate lecture theme schedule can be found below. Before attending the presentation, read the appropriate part of the textbook. Exams: Midterms 1: Thursday, April 25, 8:00-8:50 in York 2722 Midterms 2: Thursday, May 23, 8:00pm-8.50pm-York 2722 final exam: Saturday, June 8, 8am-11pm am Peterson 108 Homework and exam policies: You can use an 8.5 11 inches, double-sided, handwritten sheet of notes during each exam. Photocopying of notes is not allowed. Mobile phones, calculators or any other assistance are not allowed during exams. Bring your student ID for each exam. Work is classified for clarity and correctness. After your homework and exams are back, you should return to work immediately in TA to request a regrade. Provide a written explanation of which problem you want to reclassily and why. Regrade requests are not taken into account when your homework or exam leaves the room. If you don't download your homework or exam during discussion, you need to arrange to pick up ta within a week of it being returned in order for all regrade requests to be considered. There's not going to be a makeup exam. You must meet the final order to pass the class. Class: Homework and exam grades will be posted on TritonEd. Closing grades will be calculated as the maximum of the following two classification systems and using the table below: 10% Homemade 25% midterm exam 1, 25% midterm exam 2, 40% final exam 10% Homework, 25% Best half-year score, 65% Final exam Final exam A A- B + B B- C + C- D F 99 93 90 87 83 80 77 73 70 60 Instructor Information: Leesa B. Anzaldo lbanzaldo@ucsd.edu Office Watch: MW 11am-12.30pm on 7414 AP & M. Available by appointment. TA Information: (B01, B02) Shreya Ganesaraman sganesar@eng.ucsd.edu Office Clock: Tuesdays 2 pm to 4 pm at 5722 Mayer (B03, B04) Ryan Schneider ryschnei@ucsd.edu Office Hours: MW 1 pm to 3 pm-5412 AP & M (B05, B06) Jun Lau jblau@ucsd.edu Office Hours: Fridays 8-9:30 a.m. at 6436 AP & M (B07) Matthew Ung m2ung@ucsd.edu Office Hours: Wednesdays 1pm-2pm-5218 AP & M Piazza: In addition to going into office and forming study groups, students can get help by posting questions/answers here. A full resolution of homework issues cannot be given up before the due date. Academic accommodation: Students requiring accommodation must submit an OSD certificate letter and AN OSD accommodation proposal to the teacher as soon as possible. Classroom behavior and academic integrity: All class members must always respect each other. Academic dishonesty will not be tolerated. Click here for more information on how to promote scientific integrity and the consequences of fraud. Apr 1Section 4.8 - Antiderivatives Apr 3Section 4.8 - Antiderivatives Apr 5Section 5.1 - Areas and distances April 8th HW 1 due April 10Section 5.2 - A definite integral apr 12Section 5.2 - A definite integral apr 15Section 5.3 - definite assessment of integrals, HW 2 due April 17Section 5.4 - Basic item of Calculus Apr 19Section 5.5 - The replacement rule April 22Section 5.6 - Integration components, HW 3 due April 24Review, Exercise Midterm 1 April 25Midterm 1: 8:00-8:50 On York 2722 April 26Section 5.6 - Integration parts Apr 29Section 5.7 - Additional integration techniques, HW 4 due May 1Section 5.... 7 - Additional integration techniques May 3Section 5.10 - Incorrect integrations May 6Section 5.10 - Incorrect integrals, HW 5 due To May 8Section 6.1 - Areas May 10.2 - Volumes May 13, HW 6 May 15th Stage 7.1 - Modeling differential equations May 17Section 7.2 - Direction fields May 20Section 7.3 - separate equations , HW 7 due May 22Review, Exercise Midterm 2 May 23Midterm 2: 8:00-8:50 York 2722 May 24Section 7.4 - Exponential growth and decay May 27No class May 29Section 7.5 - The logistics equation, HW 8 due May 31Section 8.1 - Sequences June 3. Solutions june 7Review June 8Final exam: 8:00-11:00 Peterson 108 Page 2 section 4.8 (1-34 yet, 39, 42, 50) [university program | graduate program | faculty] All courses, faculty ilists, and curriculum and training requirements described here change or replace it without notice. Courses: For more information about course descriptions not found in the 2020-21 uc San Diego General Catalog 2020-21 catalog, contact the department. The following prerequisites can be replaced by an equivalent or higher level course. The list of offered quarters is conditional only. Please contact the Department of Mathematics to determine the actual course offerings each year. MATH 2. Introduction to College Mathematics (4) A highly adaptive course designed to build students' strengths while increasing overall math understanding and skill. This multimodality will now focus on study topics designed to improve conceptual understanding and mathematical relevance: linear relationships; exponents and polynoms; rational expressions and equations; models of second-degree and polynomial functions and radical equations; exponential and logarithmic functions; and geometry and trigonometry. Only workload credit - not for baccalaureate credits. MATH 3C. Precalculus (4) Features and graphs. Linear and polynomial functions, zeros, inverse functions, exponential and logarithmic, trigonometry functions, and their inverse functions. Emphasize understanding of algebraic, numerical, and graphical approaches using graphics calculators. (No credit given if taken after MATH 4C, 1A/10A, or 2A/20A.) Three or more years of high school math or equivalent is recommended. Prerequisites: Math Placement Exam qualifying score, or ACT Math score 22 or higher, or SAT Math score 600 or higher. MATH 4C. Precalculus of science and engineering (4) Review of polynoms. Graphical functions and relationships: graph rational functions, effects of linear changes in coordinates. Circular functions and right triangle trigonometry. Confirm the function concept: exponential, logarithmic, and trigonometry functions. Vectors. Tapered sections. Polar coordinates. (No credit given if taken after MATH 1A/10A or 2A/20A. Two credit units if the MATH is taken after 3C.) Three or more years of high school math or equivalent is recommended. Prerequisites: Math Placement Exam qualifying score, or MATH 3C, or ACT Math score 25 or higher, or AP Calculus AB score (or subset) 2. MATH 10A. Calculus I (4) Differentiating functions of a variable with applications. Features, graphs, continuity, constraints, derivatives, tangent lines, optimization issues. (No credit given if taken after or simultaneouslyMATH 20A.) Prerequisites: Math Placement Exam qualifying score, or AP Calculus AB score 2, or SAT II Math Level 2 score 600 or higher, or MATH or MATH 4C. MATH 10B. Calculus II (4) Integrated calculus of functions of a variable with applications. Antiderivatives, definite integrals, basic theorem, theorem of the calculus, areas and quantities, separable differential formulae. (No credit given if taken after or at the same timemath 20B.) Prerequisites: AP Calculus AB score of 3, 4, or 5 (or equivalent AB substituting for BC exam), or MATH 10A, or MATH 20A. MATH 10C. Calculus III (4) Introduction to the functions of more than one variable. Vectorgeometry, partial derivatives, speed and acceleration vectors, optimization problems. (No credit given if taken after or at the same time as 20C.)

Prerequisites: AP Calculus BC score 3, 4, or 5, or MATH 10B, or MATH 20B. MATH 11. Calculus-based introductory probability and statistics (5) Events and probabilities, conditional probability, Bayesian formula. Separate and continuous random variables: average, variance; binomial, Poisson distributions, normal, uniform, exponential distributions, central limit item. Sample statistics, condincode intervals, hypothesis testing, regression. Applications. Introduction to probability and statistical analysis software. The relationship between probability and statistics, the numerical results of real data and data analysis have now been the focus. Prerequisites: AP Calculus BC score 3, 4, or 5, or MATH 10B or MATH 20B. MATH 15A. Introduction to discrete mathematics (4) Basic discrete mathematical structure: sets, relationships, functions, sequences, equivalence relationships, partial orders, and number systems. Methods of reasoning and evidence: propositional logic, predicative logic, induction, recursion, and pigeonhole principle. Endless sets and diagonals. Basic counting techniques; permutation and combinations. Applications are given digital logic design, elementary number theory, design programs, and evidence of program correctness. Students who have completed math 109 cannot receive credits for MATH 15A. Credit is not offered for both MATH 15A and CSE 20. Equivalent CSE 20. Prerequisites: CSE 8B or CSE 11. Prerequisite courses must be completed in a grade C- or better. MATH 18. Linear algebra (4) Matrix algebra, Gauss elimination, determinants. Linear and afin alters, basics of Euclidean spaces. Eigenvalues and eigenvectors, second-degree forms, orthogonal matrices, diagonalization of symmetrical matrices. Applications. Calculate symbolic and graphical solutions using Matlab. Students do not receive credit for both MATH 18 and 31AH. Prerequisites: Math Placement Exam qualifying score, or AP Calculus AB score 3 (or equivalent AB subset BC exam), or SAT II Math Level 2 score 650 or higher, or MATH 4C, or MATH 10A, or MATH 20A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 20A. Calculus of science and engineering (4) foundations differential and organic calculus is a variable. Features, graphs, continuity, a derivative, tangent line. Applications algebraic, exponential, exponential, and trigonometry functions. Introduction to integral. (Two credits were given if taken after MATH 1A/10A and no credit was given if taken after MATH 1B/10B or MATH 1C/10C. Previously numbered MATH 2A.) Prerequisites: Math Placement Exam qualifying score, or AP Calculus AB score 3 (or equivalent AB subset BC exam), or SAT II MATH 2C score 650 or higher, or MATH 4C or MATH 10A. MATH 20B. MATH 20B. MATH 20B. Calculus science and engineering (4) Integrated calculus has a variable and applications, exponential, logarithmic, hyperbolic, and trigonometry functions. Methods of integration. Endless series. Polar coordinates in the plane and complex exponential. (Two credits if taken after math 1B/10B or MATH 1C/10C.) Prerequisites: AP Calculus AB score is 4 or 5, or AP Calculus BC score is 3, or MATH 20A is a grade C- or better, or MATH 10B is a grade C- or better, or MATH 10C is a grade C- or better. MATH 20C. Calculus and analytical geometry for science and engineering (4) vector geometry, vector functions, and their derivatives. Partial differentiation. Maxima and minimums. Dual integration. (Two credit units if taken out after MATH 10C. PREVIOUSLY NUMBERED MATH 21C.) Prerequisites: AP Calculus BC scores 4 or 5, or MATH 20B for a grade C or better. MATH 20D. Introduction into differential formulas (4) Common differential formulas: precise, separable and linear; constant co-ions, indeterminating variables, variations of parameters. Systems. Series solutions. Laplace is transformed. Engineering techniques. Calculate symbolic and graphical solutions using Matlab. (Previously numbered MATH 21D.) It can be considered as a re-credit of MATH 21D. Prerequisites: MATH 20C (or MATH 21C) or MATH 31BH with C or better. MATH 20E. Vector Calculus (4) Change by changing multiple integrates, Jacobian, Line Integrators, Green Lot. Vector fields, gradient fields, divergence, curlyness. Sphere/cylindrical coordinates. Taylor series in several variables. The surface organics, Stoke theorem. Gauss theorem. Conservative fields. Prerequisites: MATH 18 or MATH 20F or MATH 31AH and MATH 20C (or MATH 21C) or MATH 31BH with C or better. MATH 31AH. Honors Linear Algebra (4) First quarter of three-quarters honors integrated linear algebra/multi-variable calculus sequence for well-prepared students. Topics include real/complex number systems, vector spaces, linear transformations, bases and dimensions, base change, eigenvalues, eigenvectors, diagonals. (Credit not offered for both MATH 31AH and 20F.) Prerequisites: AP Calculus BC score 5 or consent instructor. MATH 31BH. Honors Multi-variable calculus (4) The second quarter of three-quarter honors integrated linear algebra/multi-variable calculus sequence for well-prepared students. in many variables, Jacobimatrixes, extras and limited extras, with integration into multiple variables. (No credit is recommended for maths 31BH and 20C.) Prerequisites: MATH 31AH is a grade B- or better, or consent instructor. MATH 31CH. Honors Vector Calculus (4) Third Quarter Honors integrated linear algebra/multi-variable calculus sequence for well-prepared students. Topics include changing the formula of variables, integrating differential forms, external derivative, generalised Stoke theorem, conservative vector fields, options. Prerequisites: MATH 31BH is a grade B- or better, or consent instructor. MATH 87. First year student seminar (1) The first annual student seminar program aims to give new students the opportunity to explore the intellectual theme of a faculty member in a small seminary program. First-year student seminars are offered in all university classes and university colleges, and topics vary from quarter to quarter. Enrollment is limited to fifteen to twenty students, giving preference to entering first-year students. Prerequisites: none. MATH 95. Introduction to Teaching Math (2) (Cross-Listed EDS 30.) Let's visit students' math learning difficulties in more detail to prepare students to make meaningful observations about how K-12 teachers deal with these difficulties. Discover how students' imitations of their knowledge can use education to stimulate students' intellectual curiosity. Prerequisites: none. MATH 96. Putnam Seminary (1) Students develop their skills in analytical thinking as they solve and present solutions to challenging math problems in preparation for the William Lowell Putnam Mathematical Competition, a national university maths exam held every year. Students must sit at least half of the Putnam exam (due to the first Saturday in December) to receive a passing grade. Only P/NP grades. It may be credited up to four times. Prerequisites: AP Calculus AB score 4 or more, or AP Calculus BC score 3 or more, or MATH 20A. MATH 99R. Independent study (1) Independent study or research under the direction of a member of the faculty. Prerequisites: Must be the first-year standing and regent scientist. MATH 100A. Abstract Algebra I (4) First course is a rigorous three-quarters introduction to the methods and basic structures of higher algebra. Topics include groups, subgroups, and factor groups, homomorphisms, rings, and fields. (Students can't get credit for both math 100A and MATH 103A.) Prerequisites: MATH 31CH or MATH 109 or consent instructor. MATH 100B. Abstract Algebra II (4) Second course is a rigorous three-quarters introduction to the methods and basic structures of higher algebra. Themes include rings (especially polynomial rings) and ideals, unique factorization, linear algebra algebra vector spaces, including internal product spaces, determinants, diagonals. (Students cannot obtain credit for either MATH 100B or MATH 103B.) Prerequisites: MATH 100A or consent instructor. MATH 100C. Abstract Algebra III (4) Third course is a rigorous three-quarter introduction to the methods and basic structures of higher algebra. Topics include linear transformations, including the Jordanian canonical form and the rational canonical form; Galois theory, including the insoluble of quintetism. Prerequisites: MATH 100B or instructor's consent. MATH 102. Applied linear algebra (4) Second course in linear algebra from a computational yet geometric point of view. Elementary hermitian matrices, Schur theorem, normal matrices and second-degree forms. Moore-Penrose's overall reverse and least angular problems. Vector and matrix norms. Typical and unique values. Canonical forms. Determinants and multilinear algebra. Prerequisites: MATH 18 or MATH 20F or MATH 31AH and MATH 20C. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 103A. Modern Algebra I (4) First course is a two-quarter introduction to abstract algebra with some applications. The emphasis is on group theory. Topics include definitions and basic properties of groups, properties of isomerisms, and subgroups. (Students can't get credit for both math 100A and MATH 103A.) Prerequisites: MATH 31CH or MATH 109 or consent instructor. MATH 103B. Modern Algebra II (4) Second course is a two-quarter introduction to abstract algebra with some applications. The emphasis is on rings and fields. Topics include definitions and basic properties of irreducicity of rings, fields and ideas, homomorphisms, polynoms. (Students cannot obtain credit for either MATH 100B or MATH 103B.) Prerequisites: MATH 103A or MATH 100A or consent instructor. MATH 104A. Number theory I (4) Elementary number theory with applications. Topics include individual factorization, irrational numbers, residual systems, congruents, primitive roots, reciprocity laws, second-degree forms, arithmetic functions, partitions, diophantin equations, prime numbers distribution. Applications include fast Fourier conversion, signal processing, codes, cryptography. Prerequisites: MATH 100B or MATH 103B. Students who have not met the listed prerequisite(s) may log in with the teacher's consent. MATH 104B. Number Theory II (4) Themes of number theory such as finotive fields, continuous fractions, diophantin equations, character sums, zeta and theta functions, prime number theorem, algebraic integer, quadratic and cyclical fields, primary ideal theory, class number, second degree forms, units, Diophantine approximate, p-th digits, elliptical curves. Prerequisites: MATH or the instructor's consent. MATH 104C. Number theory III (4) Topics in algebraic and analytical numbers MATH 104B. MATH 105. Basic Number Theory (4) The course covers the basic arithmetic properties of integers, the applications of diophantin equations and elementary diophantin proximity theory. Prerequisites: MATH 31CH or MATH 109. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 106. Introduction to algebraic geometry (4) Flat curves, Bezout-theorem, singularity plane curves. Affine and projective spaces, affine and projective varieties. Examples of the above. The instructor may choose to include some commutative algebra or some calculation examples. Prerequisites: MATH 100B or MATH 103B. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 109. Math Reasoning (4) This course uses a variety of subjects of mathematics to introduce students with rigorous mathematical evidence, emphasizing quantifiers, induction, negation, evidence of contradiction, naïve set theory, equivalence relationships and epsilon delta evidence. It has to be done from all class. Prerequisites: MATH 18 or MATH 20F or MATH 31AH, and MATH 20C. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 110. Introduction to partial differential equations (4) Introduction to partial differential equations focusing on equations in two variables. Topics include heat and wave equation at an interval, Laplace's equation on rectangular and circular ranges, separation of variables, boundary conditions and eigenfunctions, introduction to the Fourier series, software methods for solving equations. Formerly MATH 110A. (Students do not receive credit math 110 and MATH 110A.) Prerequisites: MATH 18 or MATH 20F or MATH 31AH and MATH 20D and MATH 20E or MATH 31CH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 111A. Mathematical modeling I (4) Introduction to mathematical modeling in the physical and social sciences. The themes vary, but include mathematical models for epidemics, chemical reactions, political organisations, magnets, economic mobility and the geographical distribution of species. You can take credit two times when the topic changes. Prerequisites: MATH 20D, MATH 18 or MATH 20F or MATH 31AH, and MATH 109 or MATH 31CH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 111B. Mathematical modelling II (4) Continuation of mathematical modelling in the physical and social sciences, using advanced techniques that expand to selected subjects and further enhance the mathematical theory presented in MATH 111A. Prerequisites: MATH 111A or instructor's consent. MATH 112A. Introduction to Biology Part I (4) Part II a two-course demonstration of the use of mathematical theory and techniques in the analysis of biological problems. Topics include differential formulas, dynamic systems and probability theory, which are applied to biological problems arising from population dynamics, biochemical reactions, biological osciltors, gene regulation, molecular interactions and cell function. Can be coscheduled in MATH 212A. Recommended preparation: MATH 130 and MATH 180A. Prerequisites: MATH 11 or MATH 180A or MATH 183 or MATH 186, and MATH 18 or MATH 31AH, math 20D and BILD 1. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 112B. Introduction to Mathematical Biology II (4) Part Two is the introduction to the use of mathematical theory and techniques for analyzing biological problems. Topics include partial differential formulae and stochastic processes applied to biological problems, especially with spatial movement such as molecular diffusion, bacterial chemotaxis, tumor growth and biological samples. You may be scheduled with MATH 212B. Recommended preparation: MATH 180B. Prerequisites: MATH 112A and MATH 110 and MATH 180A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 114. Introduction to computational stoodistics (4) Topics include random number generators, variance reduction, Monte Carlo (including Markov Chain Monte Carlo) simulation, and numerical methods of stocastic differential formulas. Methods illustrate applications in biology, physics, and finances. You may be scheduled with MATH 214. Recommended preparation: CSE 5A, CSE 8A, CSE 11 or ECE 15. Students must complete a computer programming course before enrolling in MATH 114. Prerequisites: MATH 180A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 120A. Complex analysis elements (4) Complex numbers and functions. Analytical functions, harmonic functions, elementary conformation mappings. Complex integration. Performance series. Cauchy's theory. Cauchy's formula. Leftover item. Prerequisites: MATH 20E or MATH 31CH, or the instructor's consent. MATH 120B. Applied complex analysis (4) Applications of the residual item. Conform mapping and applications for possible theory, flows and temperature distributions. Four-way transformations. Laplace transformations, and applications integrated and differentials. Selected topics such as Poisson's formula, Dirichlet's problem, Neumann's problem or special features. Prerequisites: MATH 120A or consent instructor. MATH 121A. Foundations for Teaching and Learning Mathematics I (4) (Cross-listed EDS 121A.) The teachers' knowledge base content, pedagogy and student learning) in the context of advanced mathematics. It's this it is based on previous courses, where these components of knowledge were dealt with exclusively in the context of secondary mathematics. Prerequisites: EDS 30/MATH 95, Calculus 10C or 20C. MATH 121B. Foundations for Teaching and Learning Math II (4) (Cross-listed in EDS 121B.) Explore how learning theories can consolidate conceptual development observations with individual students, as well as the development of knowledge in the history of mathematics. Examine how teaching theories explain the impact of the teaching approaches discussed in previous courses. Prerequisites: EDS 121A/MATH 121A. MATH 130. Differentials and dynamic systems (4) Introduction to standard differential formulas from the point of view of dynamic systems. Topics include use on lines and circles, two-dimensional linear systems and phase stages, nonlinear plane systems, index theory, limit cycles, bifurcation theory, biology, physics and electronics. Formerly MATH 130A. (Students do not receive credit math 130 and MATH 130A.) Prerequisites: MATH 18 or MATH 20F or MATH 31AH and MATH 20D. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 140A. Foundations of Real Analysis I (4) First course in a strict three-quarters order of real-world analysis. Topics include the real number system, the basic topology, numeric sequences, and sequences, continuity. (Students cannot obtain credit for both math 140A and MATH 142A.) Prerequisites: MATH 31CH or MATH 109. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 140B. Foundations of Real Analysis II (4) Second course is a rigorous three-quarter analysis. Topics include differentiation, Riemann-Stieltjes integrals, sequences and function sequences, power series, Fourier series and advanced features. (Students can't get credit for both math 140B and MATH 142B.) Prerequisites: MATH 140A or consent instructor. MATH 140C. Foundations real analysis III (4) Third course is a rigorous three-quarter series of real-world analysis. The themes include various functions of multiple real variables, the implicit and inverse function theorem, the Lebesgue organic, infinite dimensional normalt spaces. Prerequisites: MATH 140B or instructor's consent. MATH 142A. Introduction to Analysis I(4) First course in an introductory two-quarter order of analysis. Topics include the real number system, numeric sequences and sequences, infinite constraints, functions limitations, continuity, differentiation. Students do not receive credit for MATH 142A if they are after or at the same time MATH 140A. Prerequisites: MATH 31CH or MATH 109. Students who have not completed the listed with the agreement of the instructor. MATH 142B. Introduction to Analysis II (4) Second course course two-quarter sequence analysis. Topics include Riemann integrals, sequences and sequences of functions, uniform convergence, Taylor series, introduction to analysis in several variables. Students will not receive credit for MATH 142B if they are after or at the same time MATH 140B. Prerequisites: MATH 142A or MATH 140A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 144. Introduction to Fourier Analysis (4) Rigorous introduction to the theory of Fourier series and Fourier transforms. Topics include the basic features of the Fourier series, average square point convergence, Hilbert spaces, Fourier series applications, Fourier transformation on the real line, inversion formula, Plancherel formula, Poisson summary formula, Heisenberg uncertainty principle, fourier transformation applications. Prerequisites: MATH 140B or MATH 142B. Students who have not met the listed prerequisite(s) may apply with the teacher's consent. MATH 146. Analysis of normal differential formulae (4) Strict introduction of systems for normal differential formulae. Topics include linear systems, matrix diagonal and canonical forms, matrix exponential, nonlinear systems, the existence and uniqueness of solutions, linearization and stability. Prerequisites: MATH 140B or MATH 142B. Students who have not met the listed prerequisite(s) may apply with the teacher's consent. MATH 148. Analysis of partial differential formulae (4) Strict introduction of partial differential formulae. Topics include initial and limit issues; first order linear and quasilinear equations, method of characteristics; wave and heat equals on the line, on a half-rope and in space; separation of variables for heatwave equations in an interval and Laplace equation on rectangles and plates; eigenfunctions of Laplacian and heat, wave, Poisson equations in bounded areas; and green features and distributions. Prerequisites: MATH 140B or MATH 142B. Students who have not met the listed prerequisite(s) may apply with the teacher's consent. MATH 150A. Differentialgeometry (4) Differentialgeometry of arcs and surfaces. Gauss and average curvatures, geodetic, parallel displacement, Gauss-Bonnet theorem. Prerequisites: MATH 20E and either MATH 18 or MATH 20F or MATH 31AH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 150B. Calculus is a long time (4) Calculus features several variable, inverse function items. Other topics may include external differential forms, Stokes theorem, maniculature, Sard theorem, elements of differential topology, singularity maps, disasters, additional themes of differential geometry, themes of geometry physics. Prerequisites: MATH 150A or consent instructor. Math Applicable Applicable and Computing (4) This course gives students experience applying theory to real-world applications such as the Internet and wireless communication problems. The course will include discussions with experts from the industry and students will be helped to conduct independent projects. Topics include graph display, tagging and embedding, random graphs, and randomized algorithms. You can take the credit three times. Prerequisites: MATH 20D and either MATH 18 or MATH 20F or MATH 31AH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 153. Geometry of high school teachers (4) Two- and three-dimensional Euclidean geometry develop a series of axioms. Pedagogical issues arise in mathematics and should be addressed in current research into teaching and learning geometry. This course is aimed at prospective high school math teachers. Prerequisites: MATH 109 or MATH 31CH, or consent instructor. MATH 154. Discrete mathematics and graph theory (4) Basic concepts of graph theory, including trees, walks, paths, and connectivity, cycles, proper theory, climax and edge-coloring, flat graphs, flows and combinatorial algorithms, which hall item, the max-flow min-cut item, Euler's formula, and the traveling vendor problem. For MATH 154, a loan is not recommended if you have previously bought 158 in maths. If MATH 154 and MATH 158 occur simultaneously, the program will only offer credit to MATH 158. Prerequisites: MATH 31CH or MATH 109. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 155A. Geometric computer graphics (4) Bezier curves and feature lines, but Casteljau structure for splitting, degree height, remitting curve control points, barycentric coordinates, rational curves. Programming skills are recommended. (Students can't get credit for both math 155A and CSE 167.) Prerequisites: MATH 18 or MATH 20F or MATH 31AH, and MATH 20C. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 155B. Topics in Computer Graphics (4) Spline Curves, NURBS, Knot Insertion, Spline Interpolation, Illumination Models, Radios, and Ray Tracking. Prerequisites: MATH 155A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 157. Introduction to mathematical software (4) The practical introduction of the use of various open source mathematical software packages, applied to a wide variety of topics within pure and applied mathematics. Most of these packages are based on the Python programming language, but no previous experience with mathematical software or computer programming is expected. All software on the CoCalc web platform ( ) that provides a consistent interface across any web browser. Prerequisites: MATH MATH and MATH 18 or MATH 20F or MATH 31AH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 158. Extremal Combinatorics and Graph Theory (4) Extremal combinatorics are studies of how big or small the finitial set can be with combinatorial limitations. We provide an introduction to graph theory, relationship, coloring, factors, and corresponding, extremal graph theory, Ramsey theory, extremal set theory, and introduction to probability combinatorial. Topics include Turan's theory, Ramsey's theory, Dilworth's theorem, and Sperner's theorem. A loan to MATH 158 is not recommended if MATH 154 was previously bought. If MATH 154 and MATH 158 occur simultaneously, the program will only offer credit to MATH 158. The strong performance of the MATH 109 or MATH 31CH is recommended. Prerequisites: MATH 31CH or MATH 109. Students who have not met the listed prerequisites can sign in with the teacher's consent. Math 160A. Elementary Mathematical Logic I (4) Introduction to recursion theory, set theory, evidence theory, model theory. Turing machines. Non-decidability of arithmetic and predicate logic. Evidence of induction and recursion. Cardinal and clearing numbers. Completeness and compactness lot of propositional and predicate calculi. Prerequisites: MATH 100A, or MATH 103A, or MATH 140A, or consent instructor. MATH 160B. Elementary Mathematical Logic II (4) Continuation of recursion theory, set theory, evidence theory, model theory. Turing machines. Non-decidability of arithmetic and predicate logic. Evidence of induction and recursion. Cardinal and clearing numbers. Completeness and compactness lot of propositional and predicate calculi. Prerequisites: MATH 160A or consent instructor. MATH 163. History of mathematics (4) Topics vary from year to year in the field of mathematics and their development. Topics may include the development of mathematics in the Babylonian period in the eighteenth century from the original sources, the foundations of history of mathematics and the development of modern mathematics. Prerequisites: MATH 20B or instructor's consent. MATHS 168A. Topics applied to mathematics-Computer Science (4) Topics should be selected in fields applied to mathematics and mathematical aspects of computing. You can take credit two times on different topics. Prerequisites: MATH 18 or MATH 20F or MATH 31AH, and MATH 20C. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 170A. Introduction to numerical analysis: Linear algebra (4) Analysis of numerical methods for linear algebraic systems and problems with the smallest squares. Methods of orthogonalization. Sick, conditioned problems. Eigenvalue and sing number of value calculations. Knowledge of programming is recommended. Prerequisites: MATH 18 or MATH 20F or MATH 31AH, and MATH 20C or MATH 31BH. who have not met the listed prerequisites may enroll with the consent of the instructor. MATH 170B. Introduction to numerical analysis: approximation and nonlinear equations (4) rounding and discretization errors. Calculate the roots of polynomials and nonlinear equations. Interpolation. Proximity of functions. Knowledge of programming is recommended. Prerequisites: MATH 170A. MATH 170C. Introduction to numerical analysis: Normal differential formulas (4) Numerical differentiation and integration. Common differential formulae and numerical solutions. Basic existence and stability theory. Difference equations. Limit problems. Prerequisites: MATH 20D or 21D and MATH 170B, or consent instructor. MATH 171A. Introduction to numerical optimization: Linear programming (4) Linear optimization and applications. Linear programming, the simple method, the duality. Selected topics from entire programming, network processes, shipping issues, inventory issues, and other applications. Three performances, one recite. Knowledge of programming is recommended. (No credit is allowed for MATH 171A and ECON 172A.) Prerequisites: MATH 18 or MATH 20F or MATH 31AH, and MATH 20C. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 171B. Introduction to numerical optimization: Nonlinear programming (4) Convergence sequences Rn, multi-variable Taylor series. Bisection and related methods for nonlinear equations in a variable. Newton's methods for nonlinear equations in one and many variables. Unlimited optimization and Newton's method. Equality-restricted optimization, Kuhn-Tucker theorem. Inequality-limited optimization. Three performances, one recite. Knowledge of programming is recommended. (Credit is not allowed for MATH 171B and ECON 172B.) Prerequisites: MATH 171A or instructor's consent. MATH 173A. Optimization methods for data analysis I (4) Introduction to convexity: convex sets, convex functions; geometry of hyperplanes; convex kit support features; hyperplanes and supporting vector machines. Linear and quadratic programming: optimum conditions; duality; primary and dual forms of linear carriers. active methods; internal methods. Prerequisites: MATH 20C or MATH 31BH and MATH 20F or 31AH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 173B. Optimization methods data analysis II (4) Unlimited optimization: linear minimum squares; randomized linear minimum squares; the method(s) of the most stiff descent; line search methods; conjugate gradient method; a comparison of the effectiveness of the methods; randomised/stocastic methods; non-linear minimum squares; norm minimization methods. Convex optimisation: optimal conditions; convex programming; Lagrangian relaxation; the method of multipliers; alternating alternating the method of multipliers; minimising the combination of standards. Prerequisites: MATH 173A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 174. Numerical methods of physical modelling (4) (linked to math 274) Floating point arithmetic, direct and iterative solution of linear equations, iterative solution of nonlinear equations, optimization, proximity theory, interpolation, quadrature, numerical methods for initial and limit problems in normal differential equations. (Students cannot obtain credit for both math 174 and PHYS 105, AMES 153 or 154. Students will not receive credit for MATH 174 if MATH 170A, B, or C has already been taken.) Graduate students will do an extra task/exam. Prerequisites: Math 20D or MATH 21D, and either MATH 20F or MATH 31AH, or consent instructor. MATH 175. Numerical methods for partial differential equations (4) (MATH 275) Mathematical background for working with partial differential equations. Finiable difference, finimate element and other numerical methods for the solution of elliptical, parabolic and hyperbolic partial differential formulas. (Formerly MATH 172. Students do not receive credit math 175/275 and MATH 172.) Graduate students do an extra paper, project, or presentation, with an instructor. Prerequisites: MATH 174 or MATH 274, or the instructor's consent. MATH 179. Projects in computer and applied mathematics (4) (matches MATH 279.) Mathematical models of physical systems resulting from science and engineering, good models and well-posed, numerical and other approximation techniques, solution algorithms for linear and nonlinear approximation problems, scientific visualizations, scientific software design and engineering, project-oriented. Graduate students will do an extra paper, project, or presentation to an instructor. Prerequisites: MATH 174 or MATH 274 or consent instructor. MATH 180A. Introduction to probability (4) probability spaces, random variables, independence, conditional probability, distribution, expectation, variance, common distributions, central boundary lot. (Two credit units were offered for MATH 180A if THE ECON 120A had not previously offered a loan if the ECON 120A offered a loan at the same time. Two units of credit are offered at MATH 180A if MATH 183 or 186 is taken earlier or simultaneously.) Pre-registration or simultaneous registration in MATH 109 is highly recommended. Prerequisites: Math 20C or MATH 31BH, or instructor's consent. MATH 180B. Introduction to stocastic processes I (4) Random vectors, multivariate densities, covariance matrix, multivariate normal distribution. Random walk, Poisson process. Other topics, if time permits. Prerequisites: MATH 20D and either MATH 18 or MATH 20F or MATH 31AH, and MATH 109 or MATH 31CH, and MATH 180A. Students who have not expressed the listed preconditions should MATH 180C. Introduction to stocastic processes II (4) Markov chains discreet and continuous time, random walking, recurring events. If time permits, the topics selected from stationary normal processes, the branching processes, the queuing theory. Prerequisites: MATH 180B or instructor's consent. MATH 181A. Introduction to mathematical statistics I (4) Multivariate distribution, features random variables, distributions related to normal. Parameter estimation, method of moments, maximum probability. Estimator accuracy and condinator intervals. Hypothesis testing, Type I and II. Pre- or concurrent registration in MATH 109 is highly recommended. Prerequisites: MATH 180A, MATH 18 or MATH 20F or MATH 31AH, and MATH 20C. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 181B. Introduction to Mathematical Statistics II (4) Hypothesis Testing. Linear models, regression and variance analysis. Goodness in seizure tests. It's not parametric stats. two credit units offered to MATH 181B if ECON 120B was previously used; not recommended credit if the ECON 120B is simultaneously. Pre-enrollment in MATH 109 is highly recommended. Prerequisites: MATH 181A or instructor's consent. MATH 181C. Mathematical statistics – Non-parametric statistics (4) The topics discussed may include classic rank tests, rank correlations, permutation tests, free data management, efficiency, confidence intervals, non-parametric regression and density estimation, res sampling techniques (bootstrap, jackknife, etc.) and cross validations. Pre-enrollment in MATH 109 is highly recommended. Prerequisites: MATH 181B or instructor's consent. MATH 181D. Statistical learning (4) Statistical learning refers to a set of tools for modelling and understanding complex datasets. It uses improvements in optimization, computing and, in particular, machine learning. This includes many methods, such as size reduction, rare depictions, variable selection, classification, boosting, bagging, supporting vector machines, and machine learning. Prerequisites: ECE 109 or ECON 120A or MAE 108 or MATH 181A or MATH 183 or MATH 186 or MATH 189. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 181E. Mathematical statistics – Time series (4) Analysis of trends and seasonal effects, autoregressive and moving averages models, forecasting, informal introduction of spectral analysis. Prerequisites: MATH 181B or instructor's consent. MATH 181F. Sampling surveys and experimental planning (4) Design of sampling surveys: simple, stratified, systematic, cluster, network surveys. Sources of bias in surveys. estimation and confidence intervals based on equal probability sampling. Design and analyze experiments: block, factorial, crossover, matching pair designs. Analysis analysis re-dating, and more comparisons. Prerequisites: ECE 109 or ECON 120A or MAE 108 or MATH 11 or MATH 181A or MATH 183 or MATH 186 or MATH 189. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 182. Hidden data in Random Stickers (4) Strict handling of the main component analysis, which is one of the most effective methods of finding signals amid the noise of large chunks of data. Topics include the unique decomposition of matrices by value, estimating maximum probability, methods of smallest squares, unbiased estimates, random matrices, Wigner's semicircle law, Markchenko-Pastur laws, universality of eigenvalue statistics, outliers, BBP transition, community perception applications and the Stopaedian block model. Students do not receive credit for both Math 182 and DSC 155. Math 102 is recommended but not required. Prerequisites: MATH 180A, and MATH 18 or MATH 31AH. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 183. Statistical methods (4) Introduction to probability. Discrete and continuous random variables-binomial, Poisson and Gauss distributions. Central border item. Data analysis and inferential statistics: graphical techniques, confecting intervals, hypothesis tests, curve join. (For MATH 183, credit is not recommended if ECON 120A, ECE 109, MAE 108, MATH 181A or MATH 186 was made earlier or simultaneously. Two units of credit are offered at MATH 183 if MATH 180A is taken earlier or at the same time.) Prerequisites: MATH 20C or MATH 31BH, or instructor's consent. MATH 184. List of Combinatorics (4) Introduction to the theory and application of combinatorics. List of combinatorial structures (permutations, whole partitions, configured partitions). Bijections, inclusion exclusion, normal and exponential generating functions. Numbered from MATH 184A; in the case of MATH 184, no loan offered if MATH 184A was previously bought. Credit is not recommended for MATH 184 if MATH 188 was previously taken. If math 184 and MATH 188 buy at the same time, it is only the recommended credit for MATH 188. Prerequisites: MATH 31CH or MATH 109. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 185. Introduction to calculation statistics (4) Statistical analysis of data using package programs. Regression, variance analysis, discriminatory analysis, main components, Monte Carlo simulation and graphical methods. The focus will be on understanding the relationships between statistical theory, numerical results, and real data analysis. Recommended preparation: exposure to computer programming (e.g. CSE 5A, CSE 7 or ECE 15) is highly recommended. Prerequisites: MATH 181A, or ECON 120B, and either MATH 18 or 20F or MATH 31AH, and MATH 20C or MATH 31BH. Students who have not completed the listed prerequisites can enroll the instructor's consent. MATH 186. Bioinformatics probability and statistics (4) This course covers matrices with applications for separate and random variables, data analysis and inferential statistics, probability estimates and biological problems. Introduction to Binomial, Poisson, and Gauss distributions, central limit theorem, applications of sequence and functional analysis of genome and genetic epidemiology. (For MATH 186, credit is not recommended if earlier or simultaneously ECON 120A, ECE 109, MAE 108, MATH 181A or MATH 183. Two units of credit are offered at MATH 186 if MATH 180A is taken earlier or at the same time.) Prerequisites: MATH 20C or MATH 31BH, or instructor's consent. MATHS 187A. Introduction to cryptography (4) Introduction to basic concepts and techniques of modern cryptography. Classic crypt analysis. Probability models are plain text. Monalphabetic and polyalphabetic substitution. It's a one-time system. Caesar-Vigenere-Playfair-Hill exchanges. The Enigma. Modern-day developments. The data encryption standard. Public key systems. Security aspects of computer networks. Privacy. It's an e-mail. Recommended preparation: programming experience. Numbered from MATH 187. Students do not receive credit for both MATH 187A and 187. Prerequisites: none. Mathematics of modern cryptography (4) The purpose of this course is to study modern public key cryptographic systems and cryptography (e.g. RSA, Diffie-Hellman, elliptical curve cryptography, grid-based cryptography, homomorphic encryption) and the mathematics behind them. We also look at other applications of these calculation techniques (e.g. whole factorization and attacks against RSA). Recommended preparation: Knowledge of Python and/or mathematical software (especially SAGE) would be useful, but not necessary. Prerequisites: MATH 187 or MATH 187A and MATH 18 or MATH 31AH or MATH 20F. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 188. Algebraic combinatorika (4) Strict introduction of algebraic combinatorics. Basic enumeration and generating functions. List of group actions: Polya theory. Posets and Sperner's property. q-analogs and unimodality. Partitions and tableaux. For MATH 188, credit is not recommended if MATH 184 or MATH 184A is previously booked. If math 184 and MATH 188 buy at the same time, it is only the recommended credit for MATH 188. Prerequisites: MATH 31CH or MATH 109 and MATH 18 or MATH 31AH and MATH 100A or 103A. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 189. Analysis and conclusion of exploratory data (4) Introduction to different quantitative methods and statistical techniques for analysing data, in particular big Get a quick overview of the likelihood of processing, analyzing, and displaying data Statistical language R. Additional topics include basic conclusion, sampling, hypothesis testing, bootstrap methods, and regression and diagnostics. It offers conceptual explanations of techniques and the possibilities of testing, implementing and practical practice in real and simulated data. Prerequisites: MATH 18 or MATH 20F or MATH 31AH, and MATH 20C and a BENG 134, CSE 103, ECE 109, ECON 120A, MAE 108, MATH 180A, MATH 183, MATH 186, or SE 125. Students who have not met the listed prerequisites can sign in with the teacher's consent. MATH 190A. The basics of topology I (4) Introduction to the presentation of point set topology: topological spaces, subspace topologies, product topologies, quotient topologies, continuous maps and homeomorphisms, metric spaces, interconnectedness, compactness, basic separation and countability axioms. Examples. The instructor can also choose other topics, such as Urysohn's lemma, Urysohn's theory of metrization. Formerly MATH 190. Students do not receive credit for MATH 190A and MATH 190. Prerequisites: MATH 31CH or MATH 140A or MATH 142A. Students who have not completed the prerequisites can log in with the teacher's consent. MATH 190B. Foundations Topology II (4) Introduction to the basic group: homotopy and path homotopy, homotopy equivalence, basic calculations of basic groups, basic group of circles and applications (such as withdrawals and fixed point items), there kampen lot, which spaces, universal covers. Examples of all of the above. The instructor can also choose additional themes, such as deck conversions and Galois correspondence, basic homology, compact surfaces. Prerequisites: MATH 190A. Students who have not met the listed prerequisite can sign in with the teacher's consent. MATH 191. Topics topology (4) Topics chosen by the instructor in the field of differential algebraic, geometric, and general topology. Prerequisites: MATH 190 or instructor's consent. MATH 193A. Actuarial Mathematics I (4) Probabilistic Foundations of Insurance. Short-term risk models. Survival distributions and life tables. Introduction to life insurance. Prerequisites: MATH 180A or MATH 183, or consent instructor. MATH 193B. Actuarial mathematics II (4) Life insurance and annuities. Analysis of premiums and premium reserves. Introduction to multiple vital functions and decrement models of time allows. Prerequisites: MATH 193A or instructor's consent. MATH 194. Financial mathematics (4) Introduction to mathematics in financial models. Basic probability models and related mathematical machines will be discussed, especially with regard to discrete time models. The concepts concerned include conditional expectation, martingás, optimal stopping, arbitrage pricing, hedging, European american opportunities. Prerequisites: MATH 20D, and either MATH 18 or MATH 20F or MATH 31AH, and MATH 180A. 180A. who have not met the listed prerequisites may enroll with the consent of the instructor. Students who do econ 120A instead of math 180A must obtain the teacher's consent to enroll. MATHS 195. Introduction to math teaching (4) Students will be responsible and teach a class part of a lower class math course. They also attend a weekly meeting on teaching methods. (Doesn't count as a minor or person.) Prerequisites: the instructor's consent. MATHS 196. Student Colloquium (1) A variety of topics and current research results on mathematics will be presented to guest lecturers and students under faculty management. It can only be taken to P/NP. Prerequisites: upper class status. MATH 197. Mathematics Internship (2 or 4) Is an enrichment program that provides work experience for public/private sector employers. In the positions available, students will work for a local company under the supervision of a faculty member and field supervisor. Units shall not be applicable to the main roster requirements. Prerequisites: completing ninety units, two upper-class math courses, a comprehensive 2.5 UC San Diego GPA, consenting as math faculty coordinator, and submitting a written contract. Class stamp required. MATHS 199. Independent study of university students (2 or 4) Independent reading of advanced mathematics for each student. Three points. (P/NP grades only.) Prerequisites: Permission for the department. MATH 199H. Honors Thesis Research for University Students (2-4) Honors Thesis Research for Seniors Participating In The Honors Program. The research is carried out under the supervision of a member of the faculty of mathematics. Prerequisites: admission to the Honors Program mathematics, department stamp. MATH 200A-B-C. Algebra (4-4-4) Group actions, factor groups, polynomial rings, linear algebra, rational and Jordanian canonical forms, single and hermitic matrices, Sylow theorem, ultimately generated Abelian groups, unique factorization, Galois theory, radicals resolvability, Hilbert Basis Theorem, Hilbert Nullstellensatz, Jacobson radical, semi-simple artinian rings. Prerequisites: the instructor's consent. MATH 201A. Basic Topics in Algebra I (4) Recommended for all students specializing in algebra. The basic topics include categorical algebra, commutative algebra, group representations, homological algebra, nonassociative algebra, ring theory. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: MATH 200C. Students who didn't buy math 200C can enroll with the teacher's consent. MATH 202A. Applied Algebra I (4) Introduction to algebra from a computer point of view. Groups, rings, linear algebra, rational and Jordan forms, single and hermizsa matrices, matrix decompositions, perturbation of eigenvalues, group representations, functions, fast Fourier transformation, transformation, algebra, Grobner grounds, fini-ed areas. Prerequisites: postgraduate permanence or instructor's consent. MATH 202B. Applied Algebra II (4) Second course algebra from a computer point of view. Groups, rings, linear algebra, rational and Jordan forms, single and hermizsa matrices, matrix decompositions, eigenvalues perturbation, group representations, symmetrical features, rapid Fourier transformation, commutative algebra, Grobner base, finitive fields. Prerequisites: MATH 202A or instructor's consent. MATH 202C. Applied Algebra III (4) Third course algebra from a computer point of view. Groups, rings, linear algebra, rational and Jordan forms, single and hermizsa matrices, matrix decompositions, eigenvalues perturbation, group representations, symmetrical features, rapid Fourier transformation, commutative algebra, Grobner base, finitive fields. Prerequisites: MATH 202B or instructor's consent. MATH 203A. Algebraic geometry I (4) Introduction to algebraic geometry. Topics of choice: varieties and their properties, shea ves and systems and their properties. It can be credited up to three times. Prerequisites: MATH 200C. Students who didn't buy math 200C can enroll with the teacher's consent. MATH 203B. Algebraic geometry II (4) Second course in algebraic geometry. Continuous exploration of varieties, sheens and systems, dividers and linear systems, differences, kohomology. It can be credited up to three times. Prerequisites: MATH 203A. Students who did not buy MATH 203A can enroll with the teacher's consent. MATH 203C. Algebraic geometry III (4) Third course in algebraic geometry. Continuous exploration of varieties, sheens and systems, dividers and linear systems, differences, kohomology, curves, and surfaces. It can be credited up to three times. Prerequisites: MATH 203B. Students who did not buy math 203B can enroll with the teacher's consent. MATH 204A. Number Theory I (4) First course in postgraduate number theory. Local fields: evaluations and metrics in fields; separate ranges of values and Dedekind ranges; additions; the theory of paralysis; the main statements of local classroom theory. Prerequisites: MATH 200C. Students who didn't buy math 200C can enroll with the teacher's consent. MATH 204B. Number Theory II (4) Second course in postgraduate number theory. Global fields: arithmetic properties and relationship with local fields; ideal class groups; groups of units; the theory of paralysis; adèles and idèles; the main statements of the global class in the field of theory. Prerequisites: MATH 204A. Students who did not buy MATH 204A can enroll with the teacher's consent. MATH 204C. Number Theory III (4) Third course in postgraduate number theory. Zet and L-functions; Dedekind zeta features; Artin L-functions; the formula for the class number and density item. Prerequisites: MATH 204B. Students who did not attend 204B can enroll with the consent of the instructor. MATH 205. Themes of number theory (4) Themes of algebraic and analytical number theory, such as: L-functions, sieve methods, modular forms, class field theory, p-adic L-functions and Iwasawa theory, elliptical curves and higher-dimensional abeliabeli varieties, Galois depictions and the Langlands program, p-adic kohomology theories, Berkovich spaces, etc. Can be taken to credit nine times. Prerequisites: graduate job. MATHS 206A. Themes in algebraic geometry (4) Introduction to different themes of Algebraic geometry. Topics to be drawn from current research, and include hodge theory, higher dimensional geometry, modular vector bundles, abelian varieties, deformation theory, intersection theory. Non-university students may ensy with the agreement of the lecturer. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. MATH 206B. More themes algebraic geometry (4) Continuous development of the theme algebraic geometry. Topics to be drawn from current research, and include hodge theory, higher dimensional geometry, modular vector bundles, abelian varieties, deformation theory, intersection theory. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 206A. Students who have not completed MATH 206A can enroll with the teacher's consent. MATH 207A. Topics algebra (4) Introduction to different topics algebra. In recent years, topics have included number theory, commutative algebra, non-commutative rings, homological algebra and Lie groups. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 208. Seminar in algebraic geometry (1) Various subjects in algebraic geometry. You can take your credit nine times. Prerequisites:

graduate job. Non-university students may ensy with the agreement of the lecturer. (S/U only.) MATH 209. Seminar number theory (1) Various topics of number theory. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 210A. Mathematical methods of physics and engineering (4) Complex variables with applications. Analytical features, Cauchy-theorem, Taylor and Laurent series, residual batch and contour integration techniques, analytical continuation, argument principle, conform mapping, potential theory, asymptotic expansions, method of most stiff descent. Prerequisites: MATH 20D-E-F, 140A/142A, or instructor's consent. MATH 210B. Mathematical methods of physics and engineering (4) Linear algebra and functional analysis. Vector spaces, ortonormal bases, linear operators and matrices, eigenvalues and diagonals, least squares approximate, infinite spaces, completeness, integrated equations, spectral theory, green green distributions, Fourier transformation. Prerequisites: MATH 210A or consent instructor. MATH 210C. Mathematical methods of physics and engineering (4) Calculus variations: Euler-Lagrange equations, Noether theorem. Fourier analysis of functions and distributions in multiple variables. Partial differential equations: Laplace, wave and heat equations; basic solutions (Green features); well caused problems. Prerequisites: MATH 210B or instructor's consent. (S) MATH 211. Seminar Algebra (1) Various topics algebra. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. You can take your credit nine times. (S/U grades only.) MATHEMATICS 212A. Introduction to Mathematical Biology I (4) Part One of the two-course introduction to the use of mathematical theory and techniques for analyzing biological problems. Topics include differential formulas, dynamic systems and probability theory, which are applied to biological problems arising from population dynamics, biochemical reactions, biological osciltors, gene regulation, molecular interactions and cell function. Can be coscheduled in MATH 112A. Recommended preparation: Probability theory and differential formulas. Prerequisites: graduate job. MATH 212B. Introduction to Mathematical Biology II (4) Part Two is a two-course introduction to the use of mathematical theory and techniques for analyzing biological problems. Topics include partial differential formulae and stochastic processes applied to biological problems, especially those that include spatial movement such as molecular diffusion, bacterial chemotaxis, tumor growth and biological samples. You may be scheduled with MATH 112B. Recommended preparation: Probability theory and stocastic processes. Prerequisites: MATH 212A and postgraduate position. MATH 214. Introduction to computational stoodistics (4) Topics include random number generators, variance reduction, Monte Carlo (including Markov Chain Monte Carlo) simulation, and numerical methods of stocastic differential formulas. Methods illustrate applications in biology, physics, and finances. You may be scheduled with MATH 114. Recommended preparation: Probability theory and basic computer programming. Prerequisites: graduate job. MATH 217. Topics applied to mathematics (4) In recent years, topics have also been applied to complex analysis, special functions, and asymptotic methods. With the consent of the adviser, it can be repeated on credit, as the themes vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 218. Seminar on biological systems mathematics (1) Various topics in biological systems mathematics. You can take your credit nine times. Prerequisites: graduate job. (Only S/U MATH 220A-B-C. Complex analysis (4-4-4) Complex numbers and functions. Functions. theorem and its applications, the calculation of residues, the expansion of analytical functions, the analytical continuation, conform mapping and the Riemann mapping lot, the harmonious functions. Dirichlet principle, Riemann surfaces. Prerequisites: MATH 140A-B or instructor's consent. MATH 221A. Topics in multiple complex variables (4) Introduction to different topics in multiple complex variables. In recent years, topics have included formal and convergent performance sequences, weierstrass preparation item, Cartan-Ruckert theorem, analytical sets, cartography theorem, holomorfat area, appropriate holomorf cartography, complex sokolds and modifications. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: MATH 200A and 220C. Students who have not completed MATH 200A and 220C can enroll with the teacher's consent. MATH 221B. More topics in multiple complex variables (4) Further develop a topic in multiple complex variables. Topics include formal and convergent performance series, Weierstrass preparation item, Cartan-Ruckert lot, analytical sets, mapping item, domain holomorphy, corresponding holomorphic mappings, complex multiples and modifications. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 221A. Students who have not completed MATH 221A can enroll with the teacher's consent. MATH 231A-B-C. Partial differentials (4-4-4) Existence and uniqueness item. Cauchy-Kowalewski theorem, first order systems. Hamilton-Jacobi theory, initial value problems with hyperbolic and parabolic systems, boundary value problems with elliptical systems. Green function, eigenvalue problems, perturbation theory. Prerequisites: MATH 210A-B or 240A-B-C or instructor's consent. MATH 237A. Topics in differential formulas (4) Introduction to different topics in differential formulas. In recent years, topics have included Riemannian geometry, Ricci flow and geometric evolution. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 237B. Other topics in differential formulas (4) Further develop a theme in differential formulas. Topics include Riemannian geometry, Ricci flow and geometric evolution. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 237A. Students who have not completed MATH 237A can enroll with the teacher's consent. MATH 240A-B-C. Real Analysis (4-4-4) Lebesgue integral and Lebesgue measure, Fubini theorem, functions of bound variations, Stieltjes integral, derivatives and indefinite integrals, L C spaces, equal continuous families, continuous functional general actions and integrations. Prerequisites: MATH 140A-B-C. MATHEMATICS 241A-B. Functional analysis (4-4) Metric spaces and contraction contraction item 10; closed graph item; a single border approach; Hahn-Banach theorem; the representation of continuous linear functional materials; conjugated space, weak topologies; extreme points; Krein-Milman theorem; fixed exact harvests; Rises convexity theorem; Banach algebra. Prerequisites: Math 240A-B-C or consent instructor. MATH 242. Fourier analysis topics (4) In recent years, topics have included Fourier analysis in Euclidean spaces, groups and symmetrical spaces. With the consent of the adviser, it can be repeated on credit, as the themes vary. Prerequisites: MATH 240C, students who have not completed MATH 240C can enroll with the consent of an instructor. MATH 243. Seminar in functional analysis (1) Different topics of functional analysis. You can take your credit nine times. Prerequisites: postgraduate permanence or instructor's consent. (S/U grades only.) MATH 245A. Convex analysis and optimization I (4) Convex kits and features, convex and affine hulls, relative internal, closure, and continuity, recession and existence of optimal solutions, saddle point and min-max theory, subgradients and subdifferentials. Recommended preparation: course in isolation algebra and real analysis. Prerequisites: graduate job. MATH 245B. Bulging analysis and optimization II (4) Optimal conditions, strong duality and primary function, conjugated functions, Fenchel duality theorem, dual derivatives and subgradients, subgradient methods, cutting plane methods. Prerequisites: MATH 245A or instructor's consent. MATH 245C. Convex Analysis and Optimization III (4) Convex optimization problems, linear matrix inequalities, second-order tone programming, semidefinite programming, sum of squares of polynomials, positive polynomials, distance geometry. Prerequisites: MATH 245B or instructor's consent. MATH 247A. Topics in Real Analysis (4) Introduction to different topics of real analysis. In recent years, topics have included Fourier analysis, distribution theory, martingale theory, operator theory. With the consent of the adviser, credit may be taken out six times. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 247B. More topics in Real Analysis (4) Continuous development of the theme of real analysis. Topics include Fourier analysis, distribution theory, martingale theory, operator theory. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 247A. Students who have not completed MATH 247A can enroll with the teacher's consent. MATH 248. Seminar on Real Analysis (1) Various topics for real analysis. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 250A-B-C. Differential (4-4-4) differential distributors, Sard theorems, tensor bundles, DeRham theorem, connections, geodesians, riemannimemems, curvature tensor and sectional curvature, completeness, completeness, Classes. Differential distributors that are submersible in euclidean space. Prerequisites: the instructor's consent. MATHEMATICS 251A-B-C. Lie Groups (4-4-4) Lie groups, Lie algebras, exponential map, subgroup subalgebra correspondence, adjoint group, universal paving algebra. Semi-simple lie groups, global decomposition, the structure theory of the Weyl group. Geometry and analysis in symmetrical spaces. Prerequisites: MATH 200 and 250 or the instructor's consent. MATH 256. Seminar lie groups and lie algebras (1) Various topics lie groups and lie algebras, including structure theory, representation theory, and applications. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 257A. Topics in differentialgeometry (4) Introduction to different topics of differentiation. In recent years, topics include Morze theory and general relativity. With the consent of the adviser, credit may be taken out six times. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 257B. Other topics in differentialgeometry (4) Further develop a topic in differentialgeometry. Topics include Morsine theory and general relativity. With the consent of the adviser, it may be credited three times. Prerequisites: MATH 257A. Students who have not completed MATH 257A can enroll with the teacher's consent. MATH 258. Seminar in differentialgeometry (1) Various topics in differentialgeometry. You can take your credit nine times. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 259A-B-C. Geometric physics (4-4-4) Sokas, differential forms, homology, deRham theorem. Riemannian geometry, harmonious shapes. Groups of lies and algebraks, bundle connections, homotomy series, Chern classes. Hamiltonian and continuum mechanics, electromagnetism, thermodynamics, special and general relativity, applications selected from Yang-Mills fields. Prerequisites: degree in mathematics, physics or engineering, or agreement of the instructor. MATH 260A. Mathematical logic I (4) Propositional calculus and first order logic. Item Proof, Model Theory, Sound, Completeness, and Compactness, Herbrand Theorem, Skolem-Lowenheim Theorem, Craig Interpolation. Prerequisites: postgraduate permanence or instructor's consent. MATH 260B. Mathematical logic II (4) Theory of calculation and recursive function theory, the thesis of the Church, predictability and dedecidability. Feasible predictability and complexity. Peas arithmetic and incomplete batch, non-standard models. Prerequisites: MATH 260A or consent instructor. MATH 261A. Probability combinatorial and algorithms (4) Introduction to the probability method. Combinatorial applications for linearity of expectation, second Method, Markov, Chebyschev, and azazuma inequalities, and local limit lemma. Introduction to theory random graphs. Prerequisites: postgraduate permanence or instructor's consent. MATH 261B. Probability comboricics and algorithms II (4) Introduction to probability algorithms. Game theorist techniques. Use the probability method for algorithm analysis. Markov chains and random walks. Applications are approximation algorithms, distributed algorithms, online and parallel algorithms. MATH 261A should be taken before MATH 261B. Prerequisites: MATH 261A. MATH 261C. Probabilistic Combinatorrics and Algorithms III (4) Special themes for probability combinatorics and probability algorithms. Random graphs. Spectral methods. Network algorithms and optimization. Statistical learning. MATH 261B should be taken before MATH 261C. Prerequisites: MATH 261B. MATH 262A. Topics of combinatorial mathematics (4) Introduction to various topics of combinatorial mathematics. In recent years, topics have included issues of listing, existence, construction and optimisation in terms of finate stocks. Recommended preparation: some knowledge of computer programming is desirable, but not necessary. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 262B. More topics combinatori mathematics (4) Continuous development of the theme combinatorial mathematics. Topics include enumeration, existence, construction and optimization problems in terms of finate stocks. Recommended preparation: some knowledge of computer programming is desirable, but not necessary. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 262A. Students who have not completed MATH 262A can enroll with the teacher's consent. MATH 264A-B-C. Combinatorrics (4-4-4) Themes section arranged sets, Mobius features, simplicial complexes and shell capability. Enumeration, formal performance sequence and formal languages, generating functions, partitions. Lagrange inversion, exponential structures, combinatorial species. Finilating operator methods, q-analogs, polya theory, Ramsey theory. The symmetric group representation theory, symmetric functions, and operations performed with Schur functions. MATH 267A. Themes of mathematical logic (4) Introduction to different themes of mathematical logic. Themes selected from recursion theory, model theory and set theory. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: postgraduate permanence or instructor's consent. Non-university students may ensy with the agreement of the lecturer. MATH 267B. More topics on mathematical logic (4) Continuous development of the theme mathematical logic. From recursion theory, model theory and set selected themes. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 267A or consent Students who have not completed MATH 267A can enroll with the teacher's consent. MATH 268. Seminar logic (1) Different topics of logic. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 269. Seminar Combinatorrics (1) Various topics combinatorial. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 270A. Numerical linear algebra (4) Error analysis of the numerical solution of problems of linear equations and smallest squares in incomplete cases of total rank and ranking. Error analysis of eigenvalue and numerical methods for each value problem. Iterative methods for large rare systems of linear equations. Prerequisites: postgraduate permanence or instructor's consent. MATH 270B. Numerical proximity and nonlinear equations (4) Iterative methods of nonlinear equation systems, Newton method. Unlimited and limited optimization. The Weierstrass lot, the best uniform approach, the least squares approximate, orthogonal polynomials. Polynomin interpolation, polynomal interpolation per piece, uniform approach per piece. Numerical differentiation: split differences, degree of accuracy. Numerical quadrature: interpolation quadrature, Richardson extrapolation, Romberg integration, Gauss quadrature, unique organic, adaptive quadrature. Prerequisites: MATH 270A or consent instructor. MATH 270C. Numerical normal differential formulas (4) Initial value problems (IVPs) and limit problems (BVPs) in standard differential formulas. Linear methods IVP: one- and multi-step methods, local mutilation failure, stability, convergence, accumulation of global error. Runge-Kutta (RK) Methods IVP: RK methods, predictor proofreading methods, rigid systems, error indicators, adaptive time-forwarder. Finitive difference, finitive volume, co-location, spectral and finitive element methods of BVP; and subsequent error analysis, stability, convergence, adaptability. Prerequisites: MATH 270B or instructor's consent. MATH 271A-B-C. Numeric optimization (4-4-4) Algorithms are formulated and analyzed for limited optimization. Optimal conditions; linear and quadratic programming; internal methods; methods of punishment and obstacle management; sequential second-degree programming methods. Prerequisites: the instructor's consent. MATH 272A. Numerical partial differential formulas I (4) Assessment of discretisation techniques for elliptical partial differentials in elliptical partial differentials, including finitate difference, finitate element and finitate volume methods. Lax-Milgram theorem and LBB stability. A priori error estimate. Mixed methods. Convection diffusion equations. Systems of elliptical PTE. Prerequisites: postgraduate permanence or instructor MATH 272B. Numerical partial differential formulas II (4) Assessment of techniques for solving partial differential formulas. Basic iterative iterative Preconditioned conjugated gradients. Multi-grid methods. Hierarchical methods. Domain decay. Non-linear PTE. Rare direct methods. Prerequisites: MATH 272A or instructor's consent. MATH 272C. Numerical partial differential formulas III (4) Time-dependent (parabolic and hyperbolic) PCAs. The method of the lines. Rigid systems for ODEs. Space-time fin fini-element methods. Adaptive mesh algorithms. Subsequent error estimation. Prerequisites: MATH 272B or instructor's consent. MATH 273A. Advanced Techniques in Computational Mathematics I (4) Models of physical systems, calculus variations, principle of the smallest action. Discretization techniques for variation problems, geometric integrators, advanced techniques for numerical discretization. Project-oriented; problems related to current interest in science, mathematics and engineering. Prerequisites: postgraduate permanence or instructor's consent. MATH 273B. Advanced Techniques in Computational Mathematics II (4) Nonlinear functional analysis for numerical treatment of nonlinear PDE. Numerical continuation methods, continuation of pseudo-length, gradient flow techniques and other advanced techniques in computational nonlinear PDE. Project-oriented; problems related to current interest in science, mathematics and engineering. Prerequisites: MATH 273A or instructor's consent. MATH 273C. Advanced Techniques in Computational Mathematics III (4) Adaptive numerical methods of all scales in one model, multi-level and multiphysical modeling framework, as well as other advanced techniques in computational multi-level/multiphysical modeling. Project-oriented; problems related to current interest in science, mathematics and engineering. Prerequisites: MATH 273B or instructor's consent. MATH 274. Numerical methods for physical modelling (4) (linked to math 174) Floating point arithmetic, direct and iterative solution of linear equations, iterative solution of nonlinear equations, optimization, proximity theory, interpolation, quadrature, numerical methods for initial and limit problems in normal differential equations. Students do not receive credit for both math 174 and phys 105, AMES 153 or 154. (Students cannot receive credits for math 174 if MATH 170A, B, or C has already done so.) Graduate students will complete an additional task/exam. Prerequisites: MATH 20D or 21D, and either MATH 20F or MATH 31AH, or consent instructor. MATH 275. Numerical methods for partial differential formulae (4) (MATH 175) Mathematical background for working with partial differential equations. Finiable difference, finimate element and other numerical methods for the solution of elliptical, parabolic and hyperbolic partial differential formulas. (Formerly MATH 172; students are not granted credit math 175/275 MATH 172.) Graduate students will do an extra paper, project, or presentation, with an instructor. Prerequisites: MATH 174 or MATH 274 or consent instructor. MATH 276. Numerical analysis in multi-level biology (4) (cross-classified with BENG 276/CHEM 276.) It introduces mathematical tools to simulate biological processes on multiple scales. Numerical methods for common and partial differentials (deterministic and stusistic) and parallel calculation and visualization methods. Practical use of computers emphasized, students apply numerical methods to each project. Prerequisites: the instructor's consent. MATH 277A. Topics of computational and applied mathematics (4) Introduction to the various subjects of computational and applied mathematics. In recent years, the themes have included applied functional analysis and proximity theory; numerical treatment of nonlinear partial differential formulae; and geometric numerical integration for differential formulas. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 278A. Seminar on computational and applied mathematics (1) Various subjects of computational and applied mathematics. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. (S/U only.) MATH 278B. Seminar on mathematical physics / PDE (1) Various subjects of mathematical physics and partial differential equations. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 278C. Seminar optimization (1) Various topics for optimization and applications. You can take your credit nine times. Prerequisites: graduate job. (S/U only.) MATH 279. Projects in computer and applied mathematics (4) (matches MATH 179.) Mathematical models of physical systems resulting from science and engineering, good models and well-posed, numerical and other approximation techniques, solution algorithms for linear and nonlinear approximation problems, scientific visualizations, scientific software design and engineering, project-oriented. Graduate students will do an extra paper, project, or presentation to an instructor. Prerequisites: MATH 174, or MATH 274, or the instructor's consent. MATH 280A. Probability Theory I (4) This is the first course in a three-course series of probability theory. Topics included in the order include the measure-theorist basics of probability theory, independence, the law of big numbers, the convergence of distribution, the Central Limit theorem, conditional expectation, martingale, Markov processes, and Brownian movement. Recommended preparation: real-world analysis according to MATH 140A-B is highly recommended. Prerequisites: graduate job. MATH Probability Theory II (4) This second course is a series in probability theory. Topics included in the order include the measure-theorist basics of probability theory, independence, the law of big numbers, the convergence of distribution, the Central Limit theorem, conditional expectation, martingale, Markov processes, and Brownian movement. Prerequisites: MATH 280A. MATH 280C. Probability Theory III (4) This third course is a three-course series of probability theory. Topics included in the order include the measure-theorist basics of probability theory, independence, the law of big numbers, the convergence of distribution, the Central Limit theorem, conditional expectation, martingale, Markov processes, and Brownian movement. Prerequisites: MATH 280B. MATH 281A. Mathematical statistics (4) Statistical models, sufficiency, efficiency, optimal estimation, minimum squares and maximum probability, high sample theory. Prerequisites: advanced calculus and basic probabilistic theory or consent instructor. MATH 281B. Mathematical statistics (4) Hypothesis testing and confecting intervals, one-pattern and two-pattern problems. Bayes theory, statistical decision theory, linear models and regression. Prerequisites: advanced calculus and basic probabilistic theory or consent instructor. MATH 281C. Mathematical statistics (4) Non-parametric: tests, regression, density estimation, bootstrap and jackknife. Introduction to statistical computing using S plus. Prerequisites: advanced calculus and basic probabilistic theory or consent instructor. MATH 282A. Statistics used I (4) General theory of linear models with applications for regression analysis. Ordinary and generalized the smallest squares are valuers and their properties. Hypothesis test, including variance analysis and continuation intervals. Completion of courses in linear algebra and basic statistics is recommended before enrollment. Prerequisites: postgraduate permanence or instructor's consent. (S/U is allowed.) MATH 282B. Statistics used II (4) Diagnostics, outlier detection, robust regression. Variable selection, spinal regression, lasso. Generallinear models, including logistical regression. Data analysis of statistical software R. Students who have not taken MATH 282A can enroll with the consent of an instructor. Prerequisites: MATH 282A or instructor's consent. (S/U is allowed.) MATH 283. Statistical methods of bioinformatics (4) This course covers materials related to the analysis of modern genomic data; sequence analysis, gene expression/functional genomic analysis, and gene mapping/applied population genetics. The course focuses on statistical modelling and conclusions issues, not database mining techniques. Prerequisites: a year's calculus, a statistical course or a Consent. MATH 284. Survival analysis (4) Survival analysis is important in many areas of applications biomedicine, economics, engineering. Censorship deals with the analysis of event data. This course discusses concepts and theories about survival data and censorship, comparing survival distributions, regression of proportionate hazards, non-parametric tests, competing risk models and fragile models. The focus is on the semiparametric conclusion, and the material is drawn from the latest literature. Prerequisites: MATH 282A or instructor's consent. MATH 285. Stocastic processes (4) Elements of stocastic processes, Markov chains, hidden Markov models, martingás, browni movement, gaussi processes. Recommended preparation: completion of university probability theory (equivalent to MATH 180A) is highly recommended. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 286. Stocastic differential formulas (4) Continuous martingale theory overview. Stochastic integration with continuous semimartingales. Existence and uniqueness theory for stocastic differentials. Strong Markov real estate. Selected applications. Prerequisites: MATH 280A-B or instructor's consent. MATH 287A. Time series analysis (4) Discussing finiable parameter scheme in Gauss and non-Gauss environments. Estimating finiable parameter scheme. Stationary processes and their spectral representation. Spectral estimate. Students who did not buy MATH 282A can enroll with the teacher's consent. Prerequisites: MATH 282A or instructor's consent. MATH 287B. Multivariate Analysis (4) Bivariate and more general multivariate normal distribution. Examination of tests based on Hotelling's T2. The main components, canonical correlations and factor analysis, as well as some competing non-parametric methods, such as cluster analysis. Students who did not buy MATH 282A can enroll with the teacher's consent. Prerequisites: MATH 282A or instructor's consent. MATH 287C. Advanced Time Series Analysis (4) Nonparametric function (spectrum, density, regression) estimation from time series data. Nonlinear time series models (threshold AR, ARCH, GARCH, etc.). Non-parametric forms of ARMA and GARCH. Multi-variable timelines. Students who did not buy MATH 287A can enroll with the teacher's consent. Prerequisites: MATH 287A or instructor's consent. MATH 287D. Statistical learning (4) Topics include regression methods: (penalized) linear regression and kernel smoothing; classification methods: logistical regression and support vector machines; model selection; and mathematical tools and concepts useful for theoretical results like VC dimension, concentration of action, and empirical processes. Students who did not buy MATH 282A can enroll with the teacher's consent. Prerequisites: MATH 282A or instructor's consent. Math Seminar on probability and statistics (1) Various topics of probability and Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATHEMATICS 289A. Topics of probability and statistics (4) Introduction to the various topics of probability and statistics. In recent years, topics have included Markov processes, martingale theory, stocastic processes, stationary and Gauss processes, ergodic theory. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 289B. More topics on probability and statistics (4) Continuous improvement of the theme of probability and statistics. Topics include Markov processes, martingale theory, stocastic processes, stationary and gaussian processes, ergodic theory. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 289A. Students who have not completed MATH 289A can enroll with the teacher's consent. MATH 289C. Analysis and conclusion of exploratory data (4) Introduction to different quantitative methods and statistical techniques for analysing data, in particular big data. A quick overview of the probability of topics for processing, analyzing, and displaying data using statistical language R. Other topics include basic conclusion, sampling, hypothesis testing, bootstrap methods, and regression and diagnostics. It offers conceptual explanations of techniques and the possibilities of testing, implementing and practical practice in real and simulated data. Recommended preparation: knowledge of linear algebra and mathematical statistics is highly recommended. Prerequisites: graduate job. MATH 290A-B-C. Topology (4-4-4) Point set topology, including separation axioms, compactness, connectedness. Algebraic topology, including the basic group, consisting of spaces, homology and kohomology. Homotopia or applications will take a long time, as time permits. Prerequisites: MATH 100A-B-C and MATH 140A-B-C. MATH 291A. Topics in topology (4) Introduction to different topics topology. In recent years, topics have included general kohomology theory, spectral sequences, K-theory, homotophy theory. With the consent of the adviser, credit can be requested six times, as the topics vary. Prerequisites: graduate job. Non-university students may ensy with the agreement of the lecturer. MATH 291B. More topics in the topology (4) Continuous development of the theme of the topology. Topics include general kohomology theory, spectral sequences, K-theory, homotophy theory. With the advisor's consent, it can be credited three times as the topics vary. Prerequisites: MATH 291A. Students who have not completed MATH 291A are enroll. MATH 292. Seminar topology (1) Various topics topology. You can take your credit nine times. Prerequisites: postgraduate permanence or instructor's consent. (S/U only.) MATH 294. Mathematics of Finance (4) Introduction Introduction mathematics of financial models. Hedging, pricing by arbitrage. Discrete and continuous stocastic models. Martingales. Brownian movement, stocastic calculus. Black-Scholes model, adaptation to dividend-paying stocks, currencies and coupon-paying bonds, the interest rate market, foreign exchange models. Prerequisites: MATH 180A (or equivalent probability course) or instructor's consent. MATH 295. Special topics in mathematics (1-4) A variety of topics and current research results on mathematics will be presented to staff members and students under faculty management. MATH 296. Graduate Student Colloquium (1) A variety of advanced topics and current research on mathematics will be presented in faculty of department. (S/U grades only.) You can take the credit six times. Prerequisites: graduate job. MATH 297. Mathematics Graduate Research Internship (2-4) Is an enrichment program that provides work experience for public/private sector employers and researchers. Under the supervision of the faculty i. counsellor, students have math consulting services. Prerequisites: the instructor's consent. MATH 299. Reading and Research (1-12) Independent study and research for doctoral dissertation. One to three credits are awarded for independent study (reading) and one to nine for research. Prerequisites: the instructor's consent. (S/U is allowed.) MATH 500. Teaching assistant training (2 or 4) A course in which teaching assistants help to learn appropriate teaching methods through faculty-led debates, preparation and classification of exams and other written exercises, academic integrity and student interactions. The number of credits depends on the number of hours spent on teaching assistant tasks. Loans may be made no more than nine times, up to a maximum of thirty-six units. I have to have a parallel teaching assistant meeting in math. Prerequisites: the advisor's consent. (S/U grades only.) only.)