Courses in other departments we could take*

1. Math and MCS

   General idea:

   If you want to work in the field of Probability Theory (Stochastic Anaysis or SDE, SPDE stuff), you should consider yourself an analyst. Take analysis classes of all levels, from Real/Complex Analysis to Functional, plus some classical PDEs.

   If you want to do research in Design Constructions, then you are a combinatorist. You'll need to learn all sort of "Discrete Mathematics", which includes but not limited to Combinatorics, Abstract Algebra, Number theory, Coding theory and Graph theory.

   Computer Programming and Linear Algebra are also useful classes to take.

   - MATH 414, Analysis II. 3 or 4 hours.

     Sequences and series of functions. Uniform convergence. Taylor's theorem. Topology of metric spaces, with emphasis on the real numbers. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MATH 313.

   - MATH 417. Complex Analysis with Applications. 3 or 4 hours. Complex numbers, analytic functions, complex integration, Taylor and Laurent series, residue calculus, branch cuts, conformal mapping, argument principle, Rouche's theorem, Poisson integral formula, analytic continuation. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade C or better in MATH 210.

   - MATH 419. Models in Applied Mathematics. 3 or 4 hours.

     Introduction to mathematical modeling; scaling, graphical methods, optimization, computer simulation, stability, differential equation models, elementary numerical methods, applications in biology, chemistry, engineering and physics. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MATH 220 and grade of C or better in MCS 260.

*Updated: January 18, 2016

- MATH 425. Linear Algebra II. 3 or 4 hours.

  Canonical forms of a linear transformation, inner product spaces, spectral theorem, principal axis theorem, quadratic forms, special topics such as linear programming. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MATH 320.

- MATH 533. Real Analysis I. 4 hours.

  Introduction to real analysis. Lebesgue measure and integration, differ entiation, L-p classes, abstract integration. Course Information: Prerequisite(s): MATH 411 or MATH 414 or the equivalent.

- MATH 535. Complex Analysis I. 4 hours.

  Analytic functions as mappings. Cauchy theory. Power Series. Partial fractions. Infinite products. Course Information: Prerequisite(s): MATH 411.

- MATH 539. Functional Analysis I. 4 hours.

  Topological vector spaces, Hilbert spaces, Hahn-Banach theorem, open mapping, uniform boundedness principle, linear operators in a Banach space, compact operators. Course Information: Prerequisite(s): MATH 533.

- MATH 541. Partial Differential Equations I. 4 hours.

  Theory of distributions; fundamental solutions of the heat equation, wave equation, and Laplace equation. Harmonic functions. Cauchy problem for the wave equation. Course Information: Prerequisite(s): MATH 417.

- MATH 576. Classical Methods of Partial Differential Equations. 4 hours.

  First and second order equations, method of characteristics, weak solutions, distributions, wave, Laplace, Poisson, heat equations, energy methods, regularity problems, Green functions, maximum principles, Sobolev spaces, imbedding theorems. Course Information: Prerequisite(s): MATH 410 and MATH 481 and MATH 533; or consent of instructor.

- MATH 584. Applied Stochastic Models. 4 hours.

  Applications of stochastic models in chemistry, physics, biology, queueing, filtering, and stochastic control, diffusion approximations, Brownian motion, stochastic calculus, stochastically perturbed dynamical systems, first passage times. Course Information: Prerequisite(s): MATH 417 and MATH 481 and STAT 401, or consent of the instructor.

- MATH 586. Computational Finance. 4 hours.

  Introduction to the mathematics of financial derivatives; options, asset price random walks, Black-Scholes model; partial differential techniques for option valuation, binomial models, numerical methods; exotic options, interest-rate derivatives. Course Information: Prerequisite(s): Grade of C or better in MATH 220 and grade of C or better in STAT 381; or consent of the instructor.

- MCS 401. Computer Algorithms I. 3 or 4 hours.

  Design and analysis of computer algorithms. Divide-and-conquer, dynamic programming, greedy method, backtracking. Algorithms for sorting, searching, graph computations, pattern matching, NP-complete problems. Course Information: Same as CS 401. 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MCS 360; or Grade of C or better in CS 202.

- MCS 421. Combinatorics. 3 or 4 hours.

  The pigeonhole principle, permutations and combinations, binomial coefficients, inclusion/exclusion principle, recurrence relations and generating functions, special counting sequences, Polya theory of counting. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MATH 215; and Grade of C or better in MATH 310 or Grade of C or better in MATH 320; or consent of the instructor.

- MCS 423. Graph Theory. 3 or 4 hours.

  Basic concepts of graph theory including Eulerian and hamiltonian cycles, trees, colorings, connectivity, shortest paths, minimum spanning trees, network flows, bipartite matching, planar graphs. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MATH 215; and Grade of C or better in MATH 310 or Grade of C or better in MATH 320; or consent of the instructor.

- MCS 471. Numerical Analysis. 3 or 4 hours.

  Introduction to numerical analysis; floating point arithmetic, computational linear algebra, iterative solution to nonlinear equations, interpolation, numerical integration, numerical solution of ODEs, computer subroutine packages. Course Information: 3 undergraduate hours. 4 graduate hours. Prerequisite(s): Grade of C or better in MCS 275 or grade of C or better in CS 102 or grade of C or better in CS 108; or consent of instructor.

- MCS 472. Introduction to Industrial Math and Computation. 3 or 4 hours.

  Technical writing and oral presentations in preparation for industrial projects. Topics include quality control, operations research, cost-benefit analysis, differential equations, using scientific software. Course Information: Extensive computer use required. Prerequisite(s): Grade of C or better in MCS 471 or consent of the instructor. Recommended background: Designed for students with a desire to explore mathematics via practical field work.

- MCS 501. Computer Algorithms II. 4 hours.

  Continuation of MCS 401 (same as CS 401). Advanced topics in algorithms. Lower bounds. Union-find problems. Fast Fourier transform. Complexity of arithmetic, polynomial, and matrix calculations. Approximation algorithms. Parallel algorithms. Course Information: Same as CS 501. Prerequisite(s): MCS 401 or CS 401.

- MCS 507. Mathematical, Statistical and Scientific Software. 4 hours.

  The design, analysis, and use of mathematical, statistical, and scientific software. Course Information: Prerequisite(s): Grade of B or better in MCS 360 or the equivalent or consent of instructor.

Please consult with Prof. Cheng Ouyang, or any faculty members from our department for further information.

2. Educational Psychology

   Prof. George Karabatsos (http://georgek.people.uic.edu/) from department of educational psychology has research interests overlapping with ours. Students who are interested in Bayesian nonparametric and parametric mixture models, density estimation, statistical decision-theory, model selection, or order-restricted statistical inference, etc., could consider courses given by Prof. Karabatsos.

   - EPSY 512. Hierarchical Linear Models. 4 hours.

     Parametric and semiparametric approaches to hierarchical linear modeling, for the analysis of continuous and categorical multivariate data. These approaches extend on classical linear regression analysis. Course Information: Extensive computer use required. Prerequisite(s): EPSY 546 or EPSY 547 or EPSY 563; and graduate or professional standing; or consent of the instructor or equivalent.
   - EPSY 514. Non-Parametric Modeling. 4 hours.

     Contemporary nonparametric and semiparametric models that make minimal assumptions about the data-generating process, in order to permit more accurate conclusions in data analysis. Course Information: Prerequisite(s): ED 501 and EPSY 503 or the equivalent; and appropriate score on the department placement test.

   Please consult with Prof. George Karabatsos, Prof. Ryan Martin, or any faculty members from our department for further information.

3. Finance

Students who are interested in finance, accounting, or economics could consider courses given in the Finance department. Here are some recommendations.

- FIN 500. Introduction to Corporate Finance. 4 hours.

  Theory of corporate finance: goal of the firm, time value of money, investment decisions (under certainty and uncertainty), net present value, capital markets, and corporate financing decisions. Course Information: Prerequisite(s): Credit or concurrent registration in ACTG 500.

- FIN 510. Investments. 4 hours.

  Theory and practice of investment analysis. Topics included are the institutional organization of security markets, and fundamental principles of asset valuation with application to specific securities. Course Information: Prerequisite(s): FIN 500.

- FIN 516. Theory and Structure of Options and Futures Markets. 4 hours.

  History and institutional structure of options and futures markets. Uses of futures and options for arbitrage, speculation and hedging by financial and portfolio managers of domestic and multinational organizations. Course Information: Prerequisite(s): FIN 510.

- FIN 570. Quantitative Methods in Finance. 4 hours. Statistical and optimization techniques for portfolio management, risk management, proprietary trading, securities regulation and market making. Course Information: Prerequisite(s): Consent of the instructor.

Please consult with Prof. Jie Yang, Prof. Jing Wang, or any faculty members from our department for further information.

4. Biostatistics and public health related

   For students who are interested in clinical trials, biomedical sciences, or pharmacological analysis. Also a popular choice for minor sequence.

   Also, this is from Raymond –"Dr Reda runs one of the research centers at the Hines VA and brings his experience to the class his teaches on Clinical trials. It really gives a person a good feel for what the real life issues are in clinical trials. It is the non math stuff that is the most important for us. I would have to say, of all of the courses from West campus that I have taken, BSTT 506 and EPID 403 are the most useful I have taken as far as communicating with medical types."

   - BSTT 506. Design of Clinical Trials. 3 hours.

     Rationale for clinical trials, blinding, ethical issues, methods of randomization, crossover trials, power and sample size calculations, data management, protocol deviation, data analysis, interim analysis. Course Information: Previously listed as BSTT 430. Prerequisite(s): BSTT 400 and BSTT 401.

   - BSTT 535. Categorical Data Analysis. 3 hours.

     Contingency tables and their tests, measures of association, stratified analysis, logistic regression, generalized linear model, Poisson regression, log-linear model, matched data, marginal homogeneity, ordinal data. Course Information: Previously listed as BSTT 511. Prerequisite(s): Grade of B or better in BSTT 525; and STAT 411, or consent of the instructor.

   - BSTT 536. Survival Analysis. 3 hours.

     Concepts of lifetime or survival distributions, especially with censored data; nonparametric estimation of the survival function; rank tests; proportional hazards regression models; parametric models. Course Information: Previously listed as BSTT 512. Prerequisite(s): Grade of B or better in BSTT 525 and Grade of B or better in STAT 411, or consent of the instructor.

   - BSTT 537. Longitudinal Data Analysis. 4 hours.

     Application and theory of models for longitudinal data analysis for both continuous and categorical response data, including use of statistical software for these methods. Course Information: Previously listed as BSTT 513. Prerequisite(s): Grade of B or better in STAT 411 and Grade of B or better in BSTT 525, or consent of the instructor.

   - PCOL 430. Principles of Toxicology. 2 hours.

     Examines the toxic effects of drugs and chemicals on organ systems. Lectures emphasize basic principles, effects on specific organ systems, major classes of toxic chemicals, and specialized topics such as forensic and industrial toxicology. Course Information: Same as BPS 430. Credit is not given for PCOL 430 if the student has credit for EOHS 457.

- PCOL 560. Graduate Pharmacology. 3 hours.

  General principles of molecular mechanisms of drug action in selected areas of pharmacology such as factors altering pharmacokinetics and pharmacodynamics. Mechanisms of cardiovascular and pulmonary disease and cancer will be focused. Course Information: Recommended background: GCLS 501 and GCLS 502 and GCLS 503. Class Schedule Information: To be properly registered, students must enroll in one Lecture-Discussion and one Discussion.

- BHIS 509. Informatics for the Clinical Investigator. 3 hours.

  This course provides the foundation of requisite knowledge of computer and healthcare information sciences for the clinical investigator. Course Information: Extensive computer use required. Taught only online. A UIC netid is required. Prerequisite(s): Consent of the instructor.

- EPID 403. Introduction to Epidemiology: Principles and Methods. 3 hours.

  Introduction to descriptive and analytic epidemiology, and determinants of health and disease in populations. Measures of occurrence, association and statistical testing will be addressed, along with study designs, bias and confounding. Course Information: Prerequisite(s): Credit or concurrent registration in BSTT 400 and graduate or professional standing; or consent of the instructor.

- HPA 522. Public Health Research Design and Methods. 3 hours.

  Graduate level quantitative research methods course. Utilizes social science research methods with an emphasis on experimental and quasi-experimental research designs in the study of methodologically sound public health research investigations. Course Information: Prerequisite(s): BSTT 400.

- HPA 512. Ethics in Clinical Research. 1 hour.

  Survey of key ethical issues involved in conducting research with human subjects, including informed consent, confidentiality, access and equity. Course Information: Extensive computer use required. Requires completion of an online course in human subjects research, to be supplemented by classroom discussion of the topics raised in that course and others. Prerequisite(s): Approval of the department.

Please consult with Prof. Min Yang, or any faculty members from our department for further information.

5. Ecology

   For students who are interested in ecology.

   - BIOS 533. Analyzing Ecological Data: Philosophies, Approaches, and Techniques. 4 hours.

     Differing philosophies of study design and data analysis in ecological research. Emphasis on the use of the R language for statistical computing to implement a suite of techniques for analyzing univariate and multivariate data. Course Information: Extensive computer use required. Recommended background: An introductory course (undergraduate or graduate) in classical frequentist (NHST) statistics and basic knowledge of R statistical computing language.

   Please consult with Prof. David Wise (Biological Sciences), or any faculty members from our department for further information.

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