M E M O R A N D U M

TO: Deans and Chairs

FROM: Becky Bitter, Sr. Assistant Registrar

DATE: October 23, 2018

SUBJECT: Minor Change Bulletin No. 5

The courses listed below reflect the minor curricular changes approved by the catalog editor since approval of the last Minor Change Bulletin. The column to the far right indicates the date each change becomes effective.

Subject	Course Number	Revise Drop	Current	Proposed	Effective Date
ATH T	**440**	**Drop**	**Evaluation of Lower Extremity Injuries in Athletic Training** 3 Course Prerequisite: ATH T 370 with a C or better; ATH T 371 with a C or better; certified major in Athletic Training. In-depth study of the lower extremities including physical examination, injury recognition, treatment, taping, bracing, and rehabilitation. Typically offered Fall.	**--N/A--**	**8-19**
ATH T	**441**	**Drop**	**Evaluation of Upper Extremity Injuries in Athletic Training** 3 Course Prerequisite: ATH T 440 with a C or better; ATH T 445 with a C or better. In-depth study of the upper extremities including physical examination, injury recognition, treatment, taping, bracing, and rehabilitation. Typically offered Spring.	**--N/A--**	**8-19**
ATH T	**445**	**Drop**	**Therapeutic Modalities in Athletic Training** 3 Course Prerequisite: Certified major in Athletic Training. Advanced theory and techniques of modality use in athletic training. Typically offered Fall.	**--N/A--**	**8-19**
CE	**418 / 518**	**Revise**	**Hazardous ~~Waste Engineering~~** V 3-4 Course Prerequisite: CE 341 with a C or better; certified major in Civil Engineering.	**Hazardous Containment Pathway Analysis** V 3-4 Course Prerequisite: CE 341 with a C or better; certified major in Civil	**8-19**

			Hazardous waste properties, chemodynamics, and health effects; introduction to risk assessment and hazardous waste remediation. Credit not granted for both CE 418 and CE 518. Offered at 400 and 500 level. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	Engineering. Hazardous waste properties, chemodynamics, and health effects; introduction to risk assessment and hazardous waste remediation. Credit not granted for both CE 418 and CE 518. Offered at 400 and 500 level. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	
CPT S	**440 / 540**		**Artificial Intelligence** 3 Course Prerequisite: CPT S ~~122~~ with a C or better or CPT S ~~132~~ with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, or Software Engineering. An introduction to the field of artificial intelligence including heuristic search, knowledge representation, deduction, uncertainty reasoning, learning, and symbolic programming languages. Credit not granted for both CPT S 440 and CPT S 540. Offered at 400 and 500 level. Typically offered Fall.	**Artificial Intelligence** 3 Course Prerequisite: CPT S 223 with a C or better or CPT S 233 with a C or better; certified major in Computer Science, Computer Engineering, Electrical Engineering, or Software Engineering. An introduction to the field of artificial intelligence including heuristic search, knowledge representation, deduction, uncertainty reasoning, learning, and symbolic programming languages. Credit not granted for both CPT S 440 and CPT S 540. Offered at 400 and 500 level. Typically offered Fall.	**8-19**
CS	**458**	**Revise**	**Mobile Application Development** 3 Course Prerequisite: CS 360 with a C or better. Design and development of mobile applications; introduction to mobile application frameworks, including user interface, sensors, event handling, data management and network communication. Typically offered Spring.	**Mobile Application Development** 3 Course Prerequisite: CS 360 with a C or better or concurrent enrollment. Design and development of mobile applications; introduction to mobile application frameworks, including user interface, sensors, event handling, data management and network communication. Typically offered Spring.	**1-19**
CST M	**356**	**Revise**	**Earthwork and Equipment** 3 Course Prerequisite: ~~CE 322;~~ ~~e~~certified major in Construction Management, Construction Engineering, or Civil Engineering. Methods and procedures for site work, excavation, dewatering, building foundation and equipment,	**Earthwork and Equipment** 3 Course Prerequisite: Certified major in Construction Management, Construction Engineering, or Civil Engineering. Methods and procedures for site work, excavation, dewatering, building foundation and equipment, productivity, finance	**1-19**

			productivity, finance and safety requirements. Typically offered Fall and Spring.	and safety requirements. Typically offered Fall and Spring.	
E M	**470 / 570**	**Revise**	**Six Sigma ~~Quality Management~~** 3 Quality management programs, quality assurance, statistical quality control concepts and product design reliability. Credit not granted for both E M 470 and 570. Offered at 400 and 500 level. Typically offered Fall.	**Systems Improvement: Integrating TOC, Lean, and Six Sigma** 3 Quality management programs, quality assurance, statistical quality control concepts and product design reliability. Credit not granted for both E M 470 and 570. Offered at 400 and 500 level. Typically offered Fall.	**1-19**
MATH	**220**	**Revise**	**Introductory Linear Algebra** 2 Course Prerequisite: MATH 171 or concurrent enrollment. ~~Elementary~~ linear ~~algebra with geometric applications~~. Credit not normally granted for more than one of MATH 220 and 230. Typically offered Fall, Spring, and Summer.	**Introductory Linear Algebra** 2 Course Prerequisite: MATH 171 or concurrent enrollment. Solving linear systems, matrices, determinants, subspaces, eigenvalues, orthogonality. Credit not normally granted for more than one of MATH 220 and 230. Typically offered Fall, Spring, and Summer.	**8-19**
MATH	**416 / 516**	**Revise**	**Simulation ~~Methods~~** 3 Course Prerequisite: ~~STAT 360;~~ CPT S 121, CPT S 251, or MATH 300. ~~Model formulation and simulation in business, industry, and government; simulation languages; analysis of simulation output; applications~~. Credit not granted for both MATH 416 and MATH 516. Required preparation must include probability and statistics and programming experience. Offered at 400 and 500 level. Typically offered Fall.	**Numerical Simulations for Probabilistic Models** 3 Course Prerequisite: CPT S 121, CPT S 251, or MATH 300; STAT 360. Efficient generation of random variables; statistical analysis and validation techniques; variance reduction; Markov Chain Monte Carlo methods; applications include complex systems, financial models, and Bayesian computation. Credit not granted for both MATH 416 and MATH 516. Required preparation must include probability and statistics and programming experience. Offered at 400 and 500 level. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**420**	**Revise**	**Linear Algebra** 3 Course Prerequisite: MATH 220 with a C or better, or MATH 230 with a C or better; MATH 301 with a C or better. ~~Advanced topics in linear algebra including similarity~~ transformations, ~~canonical forms,~~	**Linear Algebra** 3 Course Prerequisite: MATH 220 with a C or better, or MATH 230 with a C or better; MATH 301 with a C or better. Vector spaces, linear transformations, diagonalizability, normal matrices, inner product	**8-19**

			~~bilinear forms~~. Typically offered Fall.	spaces, orthogonality, orthogonal projections, least-squares, SVD. Typically offered Fall.	
MATH	**440 / 540**	**Revise**	**Applied Mathematics I** 3 Course Prerequisite: MATH 315. ~~P~~artial differential equations; Fourier series ~~and integrals~~; Bessel functions; ~~calculus of variations; vector calculus; applications~~. Credit not granted for both MATH 440 and MATH 540. Required preparation must include differential equations. Offered at 400 and 500 level. Typically offered Fall, Spring, and Summer.	**Applied Mathematics I: PDEs** 3 Course Prerequisite: MATH 315. Applied partial differential equations; Fourier series; Bessel functions and Legendre polynomials as harmonics for disks and balls; Laplace, heat, and wave equations; separation of variables and D'Alambert's formula. Credit not granted for both MATH 440 and MATH 540. Required preparation must include differential equations. Offered at 400 and 500 level. Typically offered Fall, Spring, and Summer. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**441 / 541**	**Revise**	**Applied Mathematics II** 3 Course Prerequisite: MATH 315. Complex ~~variable theory including analytic functions, infinite series, residues, and conformal mapping; Laplace transforms; applications~~. Credit not granted for both MATH 441 and MATH 541. Required preparation must include differential equations. Offered at 400 and 500 level. Typically offered Spring.	**Applied Mathematics II: Complex Variables** 3 Course Prerequisite: MATH 315. Complex numbers and complex-valued functions of one complex variable; analytic functions and Cauchy-Riemann equations; differentiation and contour integration; Cauchy integral theorem; Taylor and Laurent series; residues; conformal mapping; applications to potential theory. Credit not granted for both MATH 441 and MATH 541. Required preparation must include differential equations. Offered at 400 and 500 level. Typically offered Spring. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**486 / 586**	**Revise**	**Mathematical ~~Modeling~~ in ~~the~~ Natural Science** 3 Course Prerequisite: MATH 315. ~~Development of~~ mathematical model~~s for solutions of problems in the physical and life sciences~~. Credit not granted for both MATH 486 and MATH 586. Required preparation must include differential equations.	**Mathematical Methods in Natural Sciences** 3 Course Prerequisite: MATH 315. Introduction to mathematical modeling of natural processes; methods include dimensional and scaling analysis, perturbation theory, field theory of continuum mechanics, calculus of variations, and Markov chains; applications to	**8-19**

			Offered at 400 and 500 level. Typically offered Fall.	physics, chemistry, biology, and engineering. Credit not granted for both MATH 486 and MATH 586. Required preparation must include differential equations. Offered at 400 and 500 level. Typically offered Even Years - Fall. Cooperative: Open to UI degree-seeking students.	
MATH	**503**	**Revise**	**Complex Analysis** 3 Course Prerequisite: MATH 501. Analytic functions, complex integration, Taylor and Laurent series, conformal mapping, Riemann surfaces and analytic continuation. ~~Typically offered Fall.~~ Cooperative: Open to UI degree-seeking students.	**Complex Analysis** 3 Course Prerequisite: MATH 501. Analytic functions, complex integration, Taylor and Laurent series, conformal mapping, Riemann surfaces and analytic continuation. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**508**	**Revise**	~~**Topics in Applied Analysis**~~ 3 Advanced treatment of applications using techniques from fundamental analysis, convexity, analytic function theory, asymptotics, and differential equations. ~~Typically offered Spring.~~	**Advanced Mathematical Methods for Physics and Engineering** 3 Advanced treatment of applications using techniques from fundamental analysis, convexity, analytic function theory, asymptotics, and differential equations. Cooperative: Open to UI degree-seekeing students.	**8-19**
MATH	**511**	**Revise**	**Advanced Linear Algebra** 3 ~~Vector spaces, inner products, unitary equivalence, similarity, Jordan forms,~~ normality, ~~spectral theory, singular value decomposition, norms and~~ inequalities. Required preparation must include advanced linear algebra. Typically offered Spring.	**Advanced Linear Algebra** 3 Spectral theory, Schur's theorem, normality, Jordan canonical forms, hermitian matrices, variational inequalities, matrix norms, eigenvalue localization, matrix perturbation theory. Required preparation must include second level undergraduate linear algebra. Typically offered Spring. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**543**	**Revise**	~~**Approximation Theory**~~ 3 ~~Univariate polynomial and rational approximation techniques; approximation using splines and~~ wavelets~~; selected topics in multivariate approximation; algorithms for approximation~~. Required	**Stable Numerical Methods Using Orthogonality** 3 Computational methods for stabilizing difficult and ill-posed differential and integral equations problems by using systems of functions and regularization techniques; applications to forward and inverse	**8-19**

			preparation must include numerical analysis. ~~Typically offered Spring.~~ Cooperative: Open to UI degree-seeking students.	problems; techniques include the use of wavelets and orthogonal polynomials. Required preparation must include numerical analysis. Cooperative: Open to UI degree-seeking students.	
MATH	**545**	**Revise**	**Numerical Analysis of ~~Evolution Equations~~** 3 ~~Discretization and n~~umerical solution of partial differential equations ~~of evolution; stability, consistency, and convergence; shocks;~~ conservation of forms. Required preparation must include numerical analysis. Typically offered ~~Fall and~~ Spring.	**Numerical Analysis of Parabolic and Hyperbolic PDEs** 3 Numerical solutions of parabolic and hyperbolic partial differential equations with emphasis on finite difference methods; topics include: finite difference; stability, consistency, and convergence; shocks; conservation of forms. Required preparation must include numerical analysis. Typically offered Odd Years - Spring. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**546**	**Revise**	**Numerical Analysis of Elliptic PDEs** 3 ~~Methods of discretizing~~ elliptic partial differential equations ~~and solving the resulting systems of equations~~; error analysis. Required preparation must include numerical analysis. Typically offered Fall. Cooperative: Open to UI degree-seeking students.	**Numerical Analysis of Elliptic PDEs** 3 Numerical solutions of elliptic partial differential equations with emphasis on finite element methods; finite difference; error analysis. Required preparation must include numerical analysis. Typically offered Even Years - Fall. Cooperative: Open to UI degree-seeking students.	**8-19**
MATH	**564**	**Revise**	**Nonlinear Optimization ~~I~~** 3 ~~Theory and algorithms for unconstrained nonlinear optimization problems, including line search, trust region, conjugate gradient, Newton and quasi-Newton~~ methods. Required preparation must include advanced multivariate calculus, and a programming language. Recommended preparation: ~~MATH 464, 544~~. Typically offered Fall.	**Convex and Nonlinear Optimization** 3 Convex sets and functions; operations preserving convexity; linear, quadratic, and conic optimization; duality theory; unconstrained smooth optimization; interior point methods. Required preparation must include advanced multivariate calculus, and a programming language. Recommended preparation: Knowledge in linear optimization and numerical linear algebra. Typically offered Odd Years - Fall. Cooperative: Open to UI degree-seeking students.	**8-19**

MATH	**565**	**Revise**	**~~Nonlinear~~ Optimization ~~II~~** 3 ~~Course Prerequisite: MATH 564.~~ ~~Theory and algorithms for constrained linear and nonlinear optimization including interior point, quadratic programming, penalty, barrier and augmented Lagrangian methods~~. Typically offered Spring.	**Nonsmooth Analysis and Optimization with Applications** 3 Extended real-valued functions; continuity and convexity; subgradient, conjugate functions and optimality condition; alternating minimization; projected subgradient methods; alternating direction methods of multipliers; applications in statistical learning. Required preparation must include real analysis and command of a programming language. Typically offered Even Years - Spring. Cooperative: Open to UI degree-seeking students.	**8-19**
STAT	**544**	**Revise**	**Applied Stochastic Processes** 3 ~~Poisson and Markov processes; queuing theory; auto-covariance; stationarity; power spectra; harmonic analysis; linear mean-square predictions~~. Recommended preparation: One 3-hour 400-level STAT or Applied Probability course. Typically offered Spring. Cooperative: Open to UI degree-seeking students.	**Applied Stochastic Processes** 3 Foundations of continuous time stochastic processes: Kolmogorov forward/backward equations, master equation; general introduction to stochastic calculus and stochastic differential equations; applications. Recommended preparation: One 3-hour 400-level STAT or Applied Probability course. Typically offered Odd Years - Spring. Cooperative: Open to UI degree-seeking students.	**8-19**
WOMEN ST	**406**	**Revise**	**Women and Work In Global Contexts** 3 ~~Course Prerequisite: Junior standing.~~ An interdisciplinary approach to women's labor in global contexts that analyzes differences among women as well as possible shared interests.	**Women and Work In Global Contexts** 3 An interdisciplinary approach to women's labor in global contexts that analyzes differences among women as well as possible shared interests.	**1-19**