**MATHEMATICAL STATISTICS (MTHSTAT)**

**MTHSTAT 194 First-Year Seminar:**
3 cr. Undergraduate.
Specific topics are announced in the Schedule of Classes each time the class is offered.
Prerequisites: none.
Course Rules: Open only to freshman. Students may earn cr in just one L&S First-Year Sem (course numbers 192, 193, 194).
General Education Requirements: NS
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 199 Independent Study**
1-3 cr. Undergraduate.
For further information, consult dept chair.
Prerequisites: 2.5 gpa; writ cons instr, dept chair & asst dean for SAS.
Course Rules: May be retaken to 6 cr max.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 215 Elementary Statistical Analysis**
3 cr. Undergraduate.
Elementary probability theory; descriptive statistics; sampling distributions; basic problems of statistical inference including estimation; tests of statistical hypothesis in both one- and two- sample cases.
Prerequisites: satisfaction of Quantitative Literacy Part A GER.
General Education Requirements: QLB, NS
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 216 Introduction to Statistical Computing and Data Science**
3 cr. Undergraduate.
Introduction to hands-on data analysis, performed on large, complex and realistic data sets, using a scientific programming language like R.
Prerequisites: MTHSTAT 215(P), BUS ADM 210(P), ECON 210(P), or PSYCH 210(P), or cons instr.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 278 Discrete Probability and Statistics for Elementary Education Majors**
3 cr. Undergraduate.
Random experiments; histograms; sample spaces; equally likely outcomes for random experiments; permutations; combinations; binomial, geometric, hypergeometric distributions; expectation; conditional probabilities; max likelihood estimation & inference.
Prerequisites: grade of C or better in Math 176(P) or cons instr.
Course Rules: Math 278 and MthStat 278 are jointly offered; they count as repeats of one another.
Last Taught: Fall 2016, Fall 2009, Fall 2008, Fall 2007.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 299 Ad Hoc:**
1-6 cr. Undergraduate.
Course created expressly for offering in a specified enrollment period. Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add'l sem.
Prerequisites: none; add'l prereqs may be assigned to specific topic.
Course Rules: May be retaken w/chg in topic.
Last Taught: Summer 2004.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 361 Introduction to Mathematical Statistics I**
3 cr. Undergraduate/Graduate.
Probability spaces; discrete and continuous, univariate and multivariate distributions; moments; independence, random sampling, sampling distributions; normal and related distributions; point and interval estimation.
Prerequisites: jr st; Math 233(P).
Course Rules: Not recom for grad students in math, or students not planning to take MthStat 362.
Last Taught: Spring 2019, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 361G Introduction to Mathematical Statistics I**
3 cr. Undergraduate/Graduate.
Probability spaces; discrete and continuous, univariate and multivariate distributions; moments; independence, random sampling, sampling distributions; normal and related distributions; point and interval estimation.
Prerequisites: jr st; Math 233(P).
Course Rules: Not recom for grad students in math, or students not planning to take MthStat 362.
Last Taught: Spring 2019, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 362 Introduction to Mathematical Statistics II**
3 cr. Undergraduate/Graduate.
Testing statistical hypothesis; linear hypothesis; regression; analysis of variance and experimental designs; distribution-free methods; sequential methods.
Prerequisites: jr st; MthStat 361(P).
Course Rules: Not recom for grad students in math.
Last Taught: Spring 2019, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 362G Introduction to Mathematical Statistics II**
3 cr. Undergraduate/Graduate.
Testing statistical hypothesis; linear hypothesis; regression; analysis of variance and experimental designs; distribution-free methods; sequential methods.
Prerequisites: jr st; MthStat 361(P).
Course Rules: Not recom for grad students in math.
Last Taught: Spring 2019, Fall 2018.
Current Offerings: https://catalog.uwm.edu/course-search/

**MTHSTAT 461 Data Analysis and Graphing Using SAS-I**
2 cr. Undergraduate.
Introduction to SAS language programming. Procedures for handling raw data, SAS data, and parametric and nonparametric univariate data analysis; procedures for graphical display. Offered first half of sem.
Prerequisites: MthStat 215(P), 362(P), 465(P), 467(P), Bus Adm 210(P), or Econ 210(P).
Course Rules: Does not count toward math sci major.
Current Offerings: https://catalog.uwm.edu/course-search/
MTHSTAT 462 Data Analysis and Graphing Using SAS-II
2 cr. Undergraduate/Graduate.
Continuation of MthStat 461. Procedures GLM, LIFEREG, LIFETEST, LOGISTIC, PROBIT and advanced GRAPHING. Offered second half of sem.
Prerequisites: jr st; MthStat 461(P) or cons instr.
Course Rules: U cr does not count toward math sci major.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 462G Data Analysis and Graphing Using SAS-II
2 cr. Undergraduate/Graduate.
Continuation of MthStat 461. Procedures GLM, LIFEREG, LIFETEST, LOGISTIC, PROBIT and advanced GRAPHING. Offered second half of sem.
Prerequisites: jr st; MthStat 461(P) or cons instr.
Course Rules: U cr does not count toward math sci major.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 465 Introductory Mathematical Statistics for Social Sciences and Education
3 cr. Undergraduate/Graduate.
Probability distributions; parameter estimation and confidence intervals; hypothesis testing; applications.
Prerequisites: jr st; Math 211(P) or 232(P).
Course Rules: Not open for cr to students w/cr in MthStat 467, 362, or for grad cr in math. Not open for cr toward major in math except in School of Education.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 465G Introductory Mathematical Statistics for Social Sciences and Education
3 cr. Undergraduate/Graduate.
Probability distributions; parameter estimation and confidence intervals; hypothesis testing; applications.
Prerequisites: jr st; Math 211(P) or 232(P).
Course Rules: Not open for cr to students w/cr in MthStat 467, 362, or for grad cr in math. Not open for cr toward major in math except in School of Education.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 467 Introductory Statistics for Physical Sciences and Engineering Students
3 cr. Undergraduate/Graduate.
Concepts of probability and statistics; probability distributions of engineering applications; sampling distributions; hypothesis testing, parameter estimation; experimental design; regression analysis.
Prerequisites: jr st; Math 233(P).
Course Rules: Not open for cr for Math majors or students with cr in MthStat 362 or 465.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 467G Introductory Statistics for Physical Sciences and Engineering Students
3 cr. Undergraduate/Graduate.
Concepts of probability and statistics; probability distributions of engineering applications; sampling distributions; hypothesis testing, parameter estimation; experimental design; regression analysis.
Prerequisites: jr st; Math 233(P).
Course Rules: Not open for cr for Math majors or students with cr in MthStat 362 or 465.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 469 Biostatistics
3 cr. Undergraduate/Graduate.
Simple distributions, estimation and hypothesis testing, simple regression, analysis of variance, nonparametric methods in biology. Demography and vital statistics and bioassay and clinical trials.
Prerequisites: jr st; an elementary stats course.
Course Rules: Not allowed as part of core curric for Math majors. Not open for cr to students with cr in MthStat 569 & not open for grad cr in Math.
Last Taught: Fall 1987, Fall 1986.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 469G Biostatistics
3 cr. Undergraduate/Graduate.
Simple distributions, estimation and hypothesis testing, simple regression, analysis of variance, nonparametric methods in biology. Demography and vital statistics and bioassay and clinical trials.
Prerequisites: jr st; an elementary stats course.
Course Rules: Not allowed as part of core curric for Math majors. Not open for cr to students with cr in MthStat 569 & not open for grad cr in Math.
Last Taught: Fall 1987, Fall 1986.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 489 Internship in Mathematical Statistics, Upper Division
1-6 cr. Undergraduate.
Application of advanced principles of mathematical statistics in a business, organizational, educational, governmental, or other appropriate setting.
Prerequisites: jr st; 6 cr 300-level or above in Math or MthStat; 2.5 gpa in the major; cons supervising faculty member.
Course Rules: One cr earned for academic work based on 40 hrs in internship. May be retaken to 6 cr max.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 499 Ad Hoc:
1-6 cr. Undergraduate.
Course created expressly for offering in a specified enrollment period. Requires only dept & assoc dean approval. In exceptional circumstances, can be offered in one add'l sem.
Prerequisites: jr st; add'l prereqs may be assigned to specific topic.
Course Rules: May be retaken w/chg in topic.
Current Offerings: https://catalog.uwm.edu/course-search/
MTHSTAT 562 Design of Experiments
3 cr. Undergraduate/Graduate.
Latin squares; incomplete block designs; factorial experiments; confounding; partial confounding; split-plot experiments; fractional replication.
Prerequisites: jr st; MthStat 362(P); Math 234(P) or 240(P).
Last Taught: Fall 2008, Fall 2006.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 562G Design of Experiments
3 cr. Undergraduate/Graduate.
Latin squares; incomplete block designs; factorial experiments; confounding; partial confounding; split-plot experiments; fractional replication.
Prerequisites: jr st; MthStat 362(P); Math 234(P) or 240(P).
Last Taught: Fall 2008, Fall 2006.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 563 Regression Analysis
3 cr. Undergraduate/Graduate.
Straight line, polynomial and multiple regression; multiple and partial correlation; testing hypotheses in regression; residual analysis.
Prerequisites: jr st; MthStat 467(P) or 362(P).
Last Taught: Fall 2018, Fall 2017.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 563G Regression Analysis
3 cr. Undergraduate/Graduate.
Straight line, polynomial and multiple regression; multiple and partial correlation; testing hypotheses in regression; residual analysis.
Prerequisites: jr st; MthStat 467(P) or 362(P).
Last Taught: Fall 2018, Fall 2017.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 564 Time Series Analysis
3 cr. Undergraduate/Graduate.
Autocorrelation; spectral density; linear models; forecasting; model identification and estimation.
Prerequisites: jr st; MthStat 362(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 564G Time Series Analysis
3 cr. Undergraduate/Graduate.
Autocorrelation; spectral density; linear models; forecasting; model identification and estimation.
Prerequisites: jr st; MthStat 362(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 565 Nonparametric Statistics
3 cr. Undergraduate/Graduate.
Sign, rank and permutation tests; tests of randomness and independence; methods for discrete data and zeroes and ties; power and efficiency of nonparametric tests.
Prerequisites: jr st; MthStat 362(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 565G Nonparametric Statistics
3 cr. Undergraduate/Graduate.
Sign, rank and permutation tests; tests of randomness and independence; methods for discrete data and zeroes and ties; power and efficiency of nonparametric tests.
Prerequisites: jr st; MthStat 362(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 566 Computational Statistics
3 cr. Undergraduate/Graduate.
Basics of programming and optimization techniques; resampling, bootstrap, and Monte Carlo methods; design and analysis of simulation studies.
Prerequisites: jr st; MthStat 362(P) or cons instr.
Last Taught: Fall 2018, Fall 2017.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 566G Computational Statistics
3 cr. Undergraduate/Graduate.
Basics of programming and optimization techniques; resampling, bootstrap, and Monte Carlo methods; design and analysis of simulation studies.
Prerequisites: jr st; MthStat 362(P) or cons instr.
Last Taught: Fall 2018, Fall 2017.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 568 Multivariate Statistical Analysis
3 cr. Undergraduate/Graduate.
Multivariate normal distribution; Wishart distribution; Hotelling's T2; multivariate normal distribution; multivariate analysis of variance; classification problems.
Prerequisites: jr st; MthStat 362(P); Math 234(P) or 240(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 568G Multivariate Statistical Analysis
3 cr. Undergraduate/Graduate.
Multivariate normal distribution; Wishart distribution; Hotelling's T2; multivariate normal distribution; multivariate analysis of variance; classification problems.
Prerequisites: jr st; MthStat 362(P); Math 234(P) or 240(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 591 Introduction to Actuarial Practice
1 cr. Undergraduate.
Professional topics such as healthcare, pensions, life insurance, property and casualty, reinsurance, and regulation.
Prerequisites: ACTSCI 290(P).
Course Rules: May be retaken for cr once. Counts as repeat of MTHSTAT 591.
Last Taught: Fall 2018, Fall 2017, Fall 2016, Fall 2015.
Current Offerings: https://catalog.uwm.edu/course-search/
MTHSTAT 592 Actuarial Science Laboratory I: Probability, Finance, and Economics
1 cr. Undergraduate.
Fundamental probability tools for quantitatively assessing risk integrated with economic and financial concepts; application of tools to actuarial problems; introduction to insurance and risk management.
Prerequisites: C or better in MthStat 361(P) or cons instr.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 593 Actuarial Workshop I
1 cr. Undergraduate.
Fundamental interest theory tools integrated with economic and financial concepts; financial mathematics; financial instruments; calculating present and accumulated values for various streams of cash flow.
Prerequisites: C or better in ACTSCI 391(P) or consent of instructor.
Course Rules: Counts as a repeat of MTHSTAT 593.
Last Taught: Fall 2018, Fall 2017, Fall 2016, Fall 2015.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 596 Actuarial Statistics I: Fitting of Loss Models
3 cr. Undergraduate.
Statistical modeling of insurance data. Model specification, fitting and validation. Measures of confidence for model-based decisions.
Prerequisites: jr st; B- or better in each Math 234(P) and MthStat 362(P); CompSci 151(P) or 201(P); or cons instr.
Last Taught: Fall 2017, Fall 2015, Fall 2013, Fall 2011.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 596G Actuarial Statistics I: Fitting of Loss Models
3 cr. Undergraduate.
Statistical modeling of insurance data. Model specification, fitting and validation. Measures of confidence for model-based decisions.
Prerequisites: jr st; B- or better in each Math 234(P) and MthStat 362(P); CompSci 151(P) or 201(P); or cons instr.
Last Taught: Fall 2017, Fall 2015, Fall 2013, Fall 2011.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 597 Actuarial Statistics II
3 cr. Undergraduate/Graduate.
Credibility theory, ratemaking, and reserving.
Prerequisites: jr st; Math 234(P); MTHSTAT 362(P).
Course Rules: Counts as a repeat of MTHSTAT 597.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 597G Actuarial Statistics II
3 cr. Undergraduate/Graduate.
Credibility theory, ratemaking, and reserving.
Prerequisites: jr st; Math 234(P); MTHSTAT 362(P).
Course Rules: Counts as a repeat of MTHSTAT 597.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 691 Actuarial Models I: Life Contingencies
3 cr. Undergraduate/Graduate.
Modeling and valuation of cash flows dependent on death, survival and other random events. Survival models for single and multiple risks. Life insurances and annuities.
Prerequisites: jr st; B- or better in each Math 571(P) and Math 311(P); or cons instr.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 691G Actuarial Models I: Life Contingencies
3 cr. Undergraduate/Graduate.
Modeling and valuation of cash flows dependent on death, survival and other random events. Survival models for single and multiple risks. Life insurances and annuities.
Prerequisites: jr st; Math 571(P) & MthStat 596(P); or cons instr.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 692 Investment Mathematics II
3 cr. Undergraduate.
Mathematical models in finance and economics, corporate finance.
Prerequisites: jr st; MTHSTAT 361(P); ACTSCI 391(P).
Course Rules: Counts as repeat of MTHSTAT 692.
Last Taught: Fall 2018, Fall 2016, Fall 2014, Fall 2012.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 692G Investment Mathematics II
3 cr. Undergraduate.
Mathematical models in finance and economics, corporate finance.
Prerequisites: jr st; MTHSTAT 361(P); ACTSCI 391(P).
Course Rules: Counts as repeat of MTHSTAT 692.
Last Taught: Fall 2018, Fall 2016, Fall 2014, Fall 2012.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 761 Mathematical Statistics I
3 cr. Graduate.
Probability and distribution theory; point and interval estimation; testing hypotheses; large sample inference; nonparametric inference; sequential analysis.
Prerequisites: grad st; Math 522(C) or 622(C).
Last Taught: Fall 2018, Fall 2017, Fall 2016, Fall 2015.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 762 Mathematical Statistics II
3 cr. Graduate.
Continuation of MthStat 761.
Prerequisites: grad st; MthStat 761(P).
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 769C Actuarial Risk Theory
3 cr. Graduate.
Risk models; premium principles; reinsurance contracts; ruin theory; ordering of risks; bonus-malus systems; IBNR techniques.
Prerequisites: grad st; Math 571(P) & MthStat 596(P), or cons inst
Last Taught: Fall 2017, Fall 2015, Fall 2013, Fall 2011.
Current Offerings: https://catalog.uwm.edu/course-search/

MTHSTAT 863 Hypothesis Testing
3 cr. Graduate.
Exponential families; uniformly most-powerful tests; least favorable priors; unbiased tests; invariant tests; applications to exponential families and the general linear hypothesis.
Prerequisites: grad st; MthStat 762(P).
Current Offerings: https://catalog.uwm.edu/course-search/
MTHSTAT 869 Advanced Topics in Mathematical Statistics:
3 cr. Graduate.
Specific topics and any additional prerequisites will be announced in the
Timetable each time the course is offered.
Prerequisites: grad st; MthStat 762(P).
Course Rules: Retakable w/chg in topic to 9 cr max.
Last Taught: Spring 2019, Fall 2018, Spring 2017, Fall 2016.
Current Offerings: https://catalog.uwm.edu/course-search/