Conversion Questions & Feedback Form

Below are several questions pertaining to the conversion of the statistics program from quarters to semesters. Due to the change, we need to streamline our offerings because we cannot teach as many courses. Some of the items below we discussed in the spring. Many of the suggestions are mine and represent my thoughts on how to convert – some of these have not been discussed thoroughly in the Statistics Program Committee meeting and so feel free to disagree with any of the suggestions or offer alternative suggestions. This fall quarter, our department is going to try and finalize much of the conversion work before it moves to the next higher level early in the Winter Quarter 2010. Therefore decisions will need to be made rather quickly. The purpose of this form is to determine if some decisions can be made quickly with little discussion. The undergraduate and graduate course inventory proposal drafts (see below) will give indications of changes I am proposing.

- Mak has suggested we add a thesis option for the Master Degree in Applied Statistics. Students taking this option would not be required to take the comps (pros: better writing skills, experience reading research articles, added flexibility for students; cons: the thesis would need to be supervised by a faculty member and may create a bigger burden on faculty.).
  Yes ___
  No ___
  Other ___ comment:

  If yes, should we create a thesis research course (probably along the lines as an independent study)?
  Comment:

- Should we combine STT 264 and STT 265 into a single semester (4 credit hour) course? This may be out of our hands because the decision is being driven by the limited number of credit hours that biology students will take in our department.
  Yes ___
  No ___
  Other ___ comment:

- Should we eliminate STT 401/601 Nonparametric Methods and cover some of these topics in the methods course?
  Yes ___
  No ___
  Other ___ comment:

- Combine STT 646/647 (Statistical Methods for Engineers) into a single semester course. Based on discussions with CECS, it seems it will be difficult to get their students to take a 2-semester sequence from us.
  Yes ___
  No ___
  Other ___ comment:

- Should we combine STT 611 (Time Series) with STT 702 (Applied Stochastic Processes)?
  Yes ___
  No ___
  Other ___ comment:

(Another possibility is to develop a new course that covers time series and spatial statistics and spatial/temporal models. We currently do not cover any spatial statistics in our statistics courses.)

- Combine STT 761 (Theory of Linear Models) with STT 662 (Theory II)? Rationale: Allow graduate students to cover all the material on the comps during their first year. One possible problem is that undergraduates take STT 4620 and will therefore be taking a course with 700-level material under the old quarter system.
  Yes ___
  No ___
  Other ___ comment:

- Combine STT 667 (Methods II) with STT 669 (Intro to Experimental Design)? Rationale: Allow graduate students to cover all the material on the comps during their first year.
  Yes ___
  No ___
  Other ___ comment:

- Should we give a brief introduction to the generalized linear model and logistic regression in the methods course? Rationale: Logistic regression has become very widespread in use and this would guarantee that our students (undergraduates in particular) get exposure to this topic.
  Yes ___
  No ___
  Other ___

- Another possibility instead of combining STT 761 with Theory is to create a course where we combine STT 761 with STT 762 (Topics in Linear models). Doing this may require removing some of the theory of linear models material from the comps.
  Yes ___
  No ___
  Other ___ comment:

- Combine STT 624 (Quality Control) and STT 626 (Survival Analysis). Rationale: Under semesters we will have to offer fewer courses (2 semesters per year compared to 3 quarters per year) and consequently we may need to combine material from different classes into a single class.
  Yes ___
  No ___
  Other ___ comment:

- Combine STT 762 (Topics in Linear Models) with STT 740 (Categorical Data Analysis) and call the new course Generalized Linear Models – Rationale: STT 762 has been taught as a generalized linear models course for at least 15 years. Also, the categorical data analysis topics of logistic regression and log-linear models are a special case of generalized linear models.
  Yes ___
  No ___
  Other ___ comment:

- Add a new course STT 7720 Data Mining and Statistical Learning. Rationale: It would be good to update our curriculum to cover more modern topics and make our graduates more competitive in

the job market. The book "The Elements of Statistical Learning" would probably be an ideal text for this course. Should we make this course accessible to undergraduate seniors as well to give them more statistics course options? The material tends to be pretty high level. This course would incorporate material usually seen in our advanced regression course and our multivariate course which may no longer be offered regularly in the semester system.
Yes ___
No ___
Other: ___ comment:

- Add the topic finite mixture models to the Theory of Statistics II course.
  Yes ___
  No ___
  Other ___ comment:

- Should we change Sampling design from a 7000 to a 6000 level course so that it can be cross-listed as a 4000 level course which would allow undergraduates to take it? Also, put it in the summer rotation. Rationale: The mathematical level of sampling design does not have to be very high and this gives undergraduates more flexibility and exposure to ideas in sampling design.
  Yes ___
  No ___
  Other ___ comment:

- STT 464/664 - Computational Statistics: If we expand this from a 1-quarter course to a 1-semester course, then we may be able to add some additional topics related to computational statistics (see the Graduate Course Inventory below).
  Yes ___
  No ___
  Other ___ comment:

- Do we take STT 767 Applied Regression Analysis and STT 744 Applied Multivariate Analysis out of the course rotation? Several of the topics covered in these two classes can be incorporated into the data mining course. Can we incorporate MANOVA into the methods course?
  Yes ___
  No ___
  Other ___ comment:

- Currently STT 630 and STT 706 (and ES 706) are taught together. It probably does not make sense to continue to list these as three separate classes.
  Comment:

- STT 714 (ES 714) – I have discussed the possibility of team teaching this course with a biology professor who is introducing a biology statistics course in the Fall 2009 using R. The idea for the team taught course is to have environmental sciences PhD students bring in their own research data and discuss modeling strategies and analysis using R. This idea is still on the drawing board and it is not clear how "team" teaching would work out in terms of teaching loads.

Comment:

Statistics Undergraduate Course Inventory Proposal

Quarter System	Semester System
STT 160 Statistical Concepts (Credits: 5) An introduction to the fundamental ideas of statistics. Topics include descriptive statistics, probability, confidence intervals, and testing hypotheses, as well as the basic of Chi-square tests, regression and correlation, and analysis of variance. Prerequisite: MTH 126 or MTH 127 or WSU Math Level 4 0 or WSU Math Level 4T 0 or WSU Math Level 5 0 or WSU Math Level 6 0 or WSU Math Level 7 0 or WSU Math Level 8 0	**STT 1600 Statistical Concepts (Credits: 4)** An introduction to the fundamental ideas of statistics. Topics include descriptive statistics, probability, confidence intervals, and testing hypotheses, as well as the basic of Chi-square tests, regression and correlation, and analysis of variance. This course has a 1-hour/week lab that uses the Excel software. Prerequisite: MTH 1260 or WSU Math Level 4 0 or WSU Math Level 4T 0 or WSU Math Level 5 0 or WSU Math Level 6 0 or WSU Math Level 7 0 or WSU Math Level 8 0
STT 264 Elementary Statistics I (Credits: 4) Numerical and graphical methods for finding and summarizing important features of data. Principles of designing experiments for collecting data. Introduction to probability. Use of statistical computing package to apply methods and illustrate concepts. Prerequisite: MTH 126 or MTH 127 or WSU Math Level 4 0 or WSU Math Level 5 0 or WSU Math Level 4T 0 or WSU Math Level 6 0 or WSU Math Level 7 0 or WSU Math Level 8 0 **STT 265 Elementary Statistics II** (Credits: 4) Confidence intervals and hypothesis testing introduction. Applications to means, proportions, two-sample comparisons, contingency tables, linear regression, and analysis of variance. Use of statistical computing package to apply methods to data sets. Prerequisite: STT 264	**STT 2640 Elementary Statistics** Numerical and graphical methods for finding and summarizing important features of data. Principles of designing experiments for collecting data. Introduction to probability. Confidence intervals and hypothesis testing introduction. Applications to means, proportions, two-sample comparisons, contingency tables, linear regression, and analysis of variance. Use of statistical computing package to apply methods to data sets. Prerequisite: MTH 1260 or WSU Math Level 4 0 or WSU Math Level 5 0 or WSU Math Level 4T 0 or WSU Math Level 6 0 or WSU Math Level 7 0 or WSU Math Level 8 0
STT 342 Probability and Statistics for Middle School Teachers (Credits: 4) Probability and statistical methods applied to real problems. Scientific method of investigation. Data collection, organization, display, and analysis. Empirical and axiomatic probability, simulation, variation, sampling, expected values, and statistical inference. Probability and uncertainty. For early and middle childhood and mathematics education majors only. Prerequisite: MTH 128 or MTH 129 or MTH 243	Converting this will depend on feedback from Math Education faculty.

and WSU Math Level 5 0 or WSU Math Level 6 0 or WSU Math Level 7 0 or WSU Math Level 8 0	
STT 360 Applied Statistics I (Credits: 4) Introduction to probability, random variables and their expectations, some commonly used discrete and continuous distributions, concept of random sampling and sampling distributions. Use of computer software packages for simulating, summarizing, and displaying data. Prerequisite: MTH 229 and MTH 230	**STT 3600 Applied Statistics I** (Credits: 3) Introduction to probability, random variables and their expectations, some commonly used discrete and continuous distributions, concept of random sampling and sampling distributions. Use of computer software packages for simulating, summarizing, and displaying data. Prerequisite: MTH 2300 and MTH 2310?
STT 361 Applied Statistics II (Credits: 4) Introduction to statistics, standard statistical methods for estimation of parameters and hypothesis testing, introduction to regression analysis and analysis of variance techniques, exposure to data analysis using packaged computer programs. Prerequisite: STT 360	**STT 3610 Applied Statistics II** (Credits: 3) Introduction to statistics, standard statistical methods for estimation of parameters and hypothesis testing, introduction to regression analysis and analysis of variance techniques, exposure to data analysis using packaged computer programs. Prerequisite: STT 3600
STT 363 Engineering Statistics (Credits: 3) Introduction to probability, distributions, and statistical methods; using calculus to develop the necessary theory. Prerequisite: MTH 232	**STT 3630 Engineering Statistics** (Credits: 3) Introduction to probability, distributions, and statistical methods; using calculus to develop the necessary theory. Use of computer software package (e.g. Matlab) for statistical analysis. Prerequisite: MTH 2320?
STT 367 Introduction to SAS (Credits: 2) Introduction to the use of the Statistical Analysis System, a statistical computing package widely used in industry, government, and academia. Prerequisite: STT 265	Eliminate this course?
STT 386 Independent Reading in Statistics and Probability (Credits: 1 to 5) Topics vary.	**STT 3860 Independent Reading in Statistics and Probability** (Credits: 1 to 5) Topics vary.
STT 396 Topics in Statistics and Probability (Credits: 1 to 5) Titles vary. May be taken for letter grade or pass/unsatisfactory.	**STT 3960 Topics in Statistics and Probability** (Credits: 1 to 5) Titles vary. May be taken for letter grade or pass/unsatisfactory.
STT 401 Nonparametric Methods (Credits: 4) Distribution-free estimation and hypothesis testing procedures. Includes methods for use in one- and two-sample location and dispersion problems, nonparametric alternatives to ANOVA and regression, goodness-of-fit tests, measures of association, and tests for randomness. Prerequisite: STT 466	Eliminate this course?
STT 411 Applied Time Series (Credits: 4) Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, model identification,	**STT 4110 Applied Stochastic Processes and Time Series** (Credits: 3) Stationary processes, Markov chains, Poisson processes, pure birth process, queuing

parameter estimation, and forecasting. Statistical computing software packages are used. Prerequisite: STT 361 or STT 561 **STT 702 - Applied Stochastic Process** Stationary processes, Markov chains, Poisson processes, pure birth process, queuing processes, inventory problems, and traffic flow problems. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 661	processes, inventory problems, and traffic flow problems. Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, model identification, parameter estimation, and forecasting. Statistical computing software packages are used. Prerequisite: STT 3610
	STT 4210 - Sampling Design (Credits 4) Classical sampling designs including simple random sampling, stratified sampling, multi-stage sampling, cluster sampling, and systematic sampling; Using auxiliary information and ratio estimators; Unequal probability sampling, detectability and line transect methods; composite and ranked-set sampling. STT 4610
STT 424 Statistical Quality Control and Improvement (Credits: 4) Statistical process control for attributes and variables data: probability distributions, sampling plans, control charts, statistical control, process capability, process improvement, tolerance intervals, evolutionary operation, and applications. Prerequisite: STT 361 or STT 363 **STT 426 Survival Analysis** (Credits: 4) Censoring and truncation, survival and hazard functions, estimation and hypothesis tests, Cox proportional hazards model, diagnostics of the Cox model; state-of-the-art software for survival analysis models. Prerequisite: STT 361	**STT 4260 – Survival Analysis and Reliability** (4 credit hours) Statistical process control for attributes and variables data: probability distributions, sampling plans, control charts, statistical control, process capability, process improvement, tolerance intervals, evolutionary operation, and applications. Censoring and truncation, survival and hazard functions, estimation and hypothesis tests, Cox proportional hazards model; diagnostics of the Cox model; state-of-the-art software for survival analysis models. Prerequisite: STT 3610 or STT 3630
STT 428 Queuing Theory (Credits: 4) Stochastic concept of a queuing process is developed. Theories and applications of single and many server queues are presented. Emphasis on applications in engineering and computer science. Prerequisite: STT 360 or STT 363 Course Descriptions	Eliminate this course?

STT 430 Biostatistics (Credits: 4) The statistical methods suitable for analysis of data arising in biological and related studies. Estimation and hypothesis testing are reviewed. Methods include one and two sample tests, simple and multiple regression, and analysis of variance. Prerequisite: STT 265	**STT 4300 Biostatistics** (Credits: 3) The statistical methods suitable for analysis of data arising in biological, medical and related studies. Estimation and hypothesis testing are reviewed. Methods include one and two sample tests, simple and multiple regression, and analysis of variance. Prerequisite: STT 2640
STT 461 Theory of Statistics I (Credits: 4) Probability, random variables, density and distribution functions, expectation, moment generating functions, special discrete and continuous distributions; joint, marginal and conditional distributions; independence, properties of expected values, functions of random variables. Prerequisite: STT 360 and MTH 232	**STT 4610 Theory of Statistics I** (Credits: 4) Probability, random variables, density and distribution functions, expectation, moment generating functions, special discrete and continuous distributions; joint, marginal and conditional distributions; independence, properties of expected values, functions of random variables, order statistics, transformations, limiting distributions, convergence in distribution, central limit theorem, statistics and sampling distributions. Prerequisite: STT 3600 and MTH 2320?
STT 462 Theory of Statistics II (Credits: 4) Limiting distributions, central limit theorem, statistics and sampling distribution point estimation, properties of estimators, sufficiency and completeness, interval estimation, hypothesis testing, most powerful and UMP tests, likelihood ration tests. Prerequisite: STT 361 and STT 461 **STT 761 - Theory of Linear Models** Concepts of matrix algebra and the multivariate normal distribution are developed in order to study the general linear model of full rank. Some applications of regression are covered. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 662 and MTH 253	**STT 4620 Theory of Statistics II** (Credits: 4) Point estimation, properties of estimators, sufficiency and completeness, single parameter interval estimation, hypothesis testing, most powerful and UMP tests, likelihood ratio tests, maximum likelihood estimation (mle) and computational approaches to determine mle's. The multivariate normal distribution, random vectors and covariance matrices; linear and quadratic forms. The general linear model, Cochran-Fisher theorem. Hypothesis testing and confidence regions for a vector of parameters. Finite mixture models and the EM algorithm. Prerequisite: STT 3610 and STT 4610
STT 464 Computational Statistics (Credits: 4) Bootstrapping is a computing-intensive method of data analysis by computing distributions. The method, including permutation tests, can be adapted easily to many classical problems. Software used for the course includes SPLUS and	**STT 4640 Computational Statistics** (Credits: 4) Random number generation and Monte Carlo methods. The bootstrap and permutation tests. Numerical methods for optimization related to maximum likelihood estimation and nonlinear regression models. Software used for the course

Mathematica. Prerequisite: STT 360 with minimum grade of B and STT 361 with minimum grade of B	includes SPLUS or R and Mathematica. Prerequisite: STT 3600 with minimum grade of B and STT 3610 with minimum grade of B
STT 466 Statistical Methods I (Credits: 4) Classical statistical techniques for analysis and interpretation of research data including the use of statistical software packages. Includes descriptive statistics, one-and-two-sample inferences, regression and correlation analysis. Prerequisite: MTH 253 or MTH 255 and STT 265 or STT 361.	**STT 4660 Statistical Methods I** (Credits: 4) Simple linear regression and correlation analysis. Concepts of matrix algebra, the matrix approach for regression and multiple regression. The general linear model. An introduction to generalized linear models and logistic regression. Statistical software packages will be used. Prerequisite: MTH 255? and STT 2660 or STT 3610
STT 467 Statistical Methods II (Credits: 4) Continuation of STT 466. Includes analysis of variance, multiple comparisons, analysis of covariance, contingency table analysis, goodness of fit tests. Prerequisite: STT 466 **STT 469 Introduction to Experimental Design** (Credits: 4) Randomization, replication, blocking factorial design. Block designs; multi-factor experiments; fixed-, random- and mixed-effects models; repeated measures; nested factors; split-plot designs; confounding and fractions for 2**k factorial experiments. Statistical software used extensively. Prerequisite: STT 467	**STT 4670 Statistical Methods II** (Credits: 4) Continuation of STT 6660. Randomization and replication. One and two-way analysis of variance, multiple comparisons, analysis of covariance. Multi-factor experiments. Non-parametric methods. Block designs. Mixed- and random-effects models, including repeated measures. Nested factors; split-plot designs; confounding and fractions for 2**k factorial experiments. Prerequisite: STT 4660
STT 486 Independent Reading in Statistics and Probability (Credits: 1 to 5) Independent study in statistics and probability.	**STT 4860 Independent Reading in Statistics and Probability** (Credits: 1 to 5) Independent study in statistics and probability.
STT 492 Undergraduate Statistics Seminar (Credits: 3) Detailed study of a single statistical topic or problem in practice of statistics chosen by student with approval of the instructor. The student will present the results of study in an expository paper. Seminars/Independent study. Limited to 10 students. Mathematics majors with statistics option only. Prerequisite: STT 462 and STT 467	**STT 4920 Undergraduate Statistics Seminar** (Credits: 2???) Detailed study of a single statistical topic or problem in practice of statistics chosen by student with approval of the instructor. The student will present the results of study in an expository paper. Seminars/Independent study. Limited to 10 students. Mathematics majors with statistics option only. Prerequisite: STT 4620 and STT 4670
STT 496 Topics in Statistics and Probability (Credits: 1 to 5) Topics in statistics and probability.	**STT 4960 Topics in Statistics and Probability** (Credits: 1 to 5) Topics in statistics and probability.

Statistics Graduate Course Inventory Proposal

Quarter System	Semester System
STT 520 - Biostatistics for Health Professionals Introduction to the basic principles and applications of statistical methods as they are applied to data arising in the health professions. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Programs: Public Health - MPH Must be enrolled in one of the following Levels: Graduate	**STT 5200 - Biostatistics for Health Professionals** Introduction to the basic principles and applications of statistical methods as they are applied to data arising in the health professions. Credit Hours: : 3.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Programs: Public Health - MPH Must be enrolled in one of the following Levels: Graduate
STT 560 - Applied Statistics I Introduces probability, random variables and their expectations, some commonly used discrete and continuous distributions, concept of random sampling and sampling distributions. Uses computer software packages for simulating, summarizing, and displaying data. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: MTH 229 and MTH 230	**STT 5600 - Applied Statistics I** Introduces probability, random variables and their expectations, some commonly used discrete and continuous distributions, concept of random sampling and sampling distributions. Uses computer software packages for simulating, summarizing, and displaying data. Credit Hours: : 3.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: MTH 2300 and MTH 2310?
STT 561 - Applied Statistics II Introduces statistics, standard statistical methods for estimation of parameters and hypothesis testing, regression analysis and analysis of variance techniques, and exposure to data analysis using packaged computer programs. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 560	**STT 5610 - Applied Statistics II** Introduces statistics, standard statistical methods for estimation of parameters and hypothesis testing, regression analysis and analysis of variance techniques, and exposure to data analysis using packaged computer programs. Credit Hours: : 3.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 5600
STT 567 Introduction to SAS (Credits: 2) Introduction to the use of the Statistical Analysis System, a statistical computing package widely used in industry, government, and academia. Prerequisite: STT 265	Eliminate this course?

STT 568 - Design of Sample Surveys Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate	Eliminate this course?
STT 586 - Independent Reading in Statistics and Probability Independent reading in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 586 - Independent Reading in Statistics and Probability** Independent reading in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate
STT 596 - Topics in Statistics and Probability May be taken for letter grade or pass/unsatisfactory. Titles vary. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 5960 - Topics in Statistics and Probability** May be taken for letter grade or pass/unsatisfactory. Titles vary. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate
STT 591 - Advanced Statistical Methods for Nursing Research Coverage of concepts, principles, interpretation and practical rules of thumb for advanced statistical methods used in nursing research. Credit Hours: : 0.500 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Majors: Nursing	**STT 5910 - Advanced Statistical Methods for Nursing Research** Coverage of concepts, principles, interpretation and practical rules of thumb for advanced statistical methods used in nursing research. Credit Hours: : 0.500? Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Majors: Nursing
STT 601 Nonparametric Methods (Credits: 4) Distribution-free estimation and hypothesis testing procedures. Includes methods for use in one- and two-sample location and dispersion problems, nonparametric alternatives to ANOVA and regression, goodness-of-fit tests, measures of association, and tests for randomness. Prerequisite: STT 666	Eliminate this course? Introduce some nonparametric methods in the methods course.
STT 611 - Applied Time Series Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, model identification, parameter estimation, and forecasting.	**STT 6110 Applied Stochastic Processes and Time Series** Stationary processes, Markov chains, Poisson processes, pure birth process, queuing processes, inventory problems, and traffic flow

Statistical computing software packages are used. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 361 or STT 561 **STT 702 - Applied Stochastic Process** Stationary processes, Markov chains, Poisson processes, pure birth process, queuing processes, inventory problems, and traffic flow problems. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 661	problems. Stochastic models for discrete time series in the time-domain, moving average processes, autoregressive processes, model identification, parameter estimation, and forecasting. Statistical computing software packages are used. Credit Hours: 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 3610 or STT 5610
STT 624 - Statistical Quality Control and Improvement Statistical process control for attributes and variables data: probability distributions, sampling plans, control charts, statistical control, process capability, process improvement, tolerance intervals, evolutionary operation, and applications. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 361 or STT 363 **STT 626 - Survival Analysis** Censoring and truncation, survival and hazard functions, estimation and hypothesis tests, Cox proportional hazards model; diagnostics of the Cox model; state-of-the-art software for survival analysis models. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 6260 – Survival Analysis and Reliability** Statistical process control for attributes and variables data: probability distributions, sampling plans, control charts, statistical control, process capability, process improvement, tolerance intervals, evolutionary operation, and applications. Censoring and truncation, survival and hazard functions, estimation and hypothesis tests, Cox proportional hazards model; diagnostics of the Cox model; state-of-the-art software for survival analysis models. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 3610 or STT 3630

Prerequisites: STT 561	
STT 628 - Queueing Theory The stochastic concept of a queueing process is developed. The theory and applications of single and many server queues are presented. Particular emphasis is placed on application in engineering and computer science. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 360 or STT 363	Eliminate this course?
STT 630 - Biostatistics Statistical methods suitable for analysis of data arising in biological and related studies. Estimation and hypothesis testing are reviewed. Methods include one and two sample tests, simple and multiple regression, and analysis of variance. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate May not be enrolled in one of the following Majors: Mathematics Applied Statistics Prerequisites: STT 265 **STT 706 - Intro to Statistical Modeling for Environmental Data** Introduction to sampling schemes, exploratory data analysis, probability distributions, and statistical methods for environmental data. Confidence, prediction and tolerance intervals. Introduction to linear models, simulation and risk assessment, and stochastic processes. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites:	**STT 6300 - Biostatistics** Statistical methods suitable for analysis of data arising in biological, medical and related studies. Estimation and hypothesis testing are reviewed. Methods include one and two sample tests, simple and multiple regression, and analysis of variance. Credit Hours: : 3.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate May not be enrolled in one of the following Majors: Mathematics Applied Statistics Prerequisites: STT 2640

STT 561	
STT 646 - Statistical Methods for Engineers I Classical statistical techniques for analysis and interpretation of research data, with extensive use of statistical software. Includes review of basic statistics. Simple, multiple, and polynomial regression, and single factor analysis of variance are covered. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 361 or STT 561 **STT 647 - Statistical Methods for Engineers II** Continuation of STT 646. Analysis of variance, techniques for interpretation of research data, with extensive use of statistical software. Includes factoral experiments, fixed and random effects, crossed and nested factors, and repeated measures. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 646 or STT 466 or STT 666	**STT 6460 - Statistical Methods for Engineers** Classical statistical techniques for analysis and interpretation of research data, with extensive use of statistical software. Includes review of basic statistics. Simple, multiple, and polynomial regression. Analysis of variance, techniques for interpretation of research data, with extensive use of statistical software. Includes factorial experiments, fixed and random effects, crossed and nested factors, and repeated measures. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 361 or STT 561
STT 661 - Theory of Statistics I Probability, random variables, density and distribution functions, expectation, moment generating functions, special discrete and continuous distributions; joint, marginal and conditional distributions; independence, properties of expected values, functions of random variables. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: MTH 232	**STT 6610 - Theory of Statistics I** Probability, random variables, density and distribution functions, expectation, moment generating functions, special discrete and continuous distributions; joint, marginal and conditional distributions; independence, properties of expected values, functions of random variables, order statistics, transformations, limiting distributions, convergence in distribution, central limit theorem, statistics and sampling distributions. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: MTH 232

STT 662 - Theory of Statistics II Limiting distributions, central limit theorem, statistics and sampling distributions, point estimation, properties of estimators, sufficiency and completeness, interval estimation, hypothesis testing, most powerful and UMP tests, likelihood ratio tests. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 661 **STT 761 - Theory of Linear Models** Concepts of matrix algebra and the multivariate normal distribution are developed in order to study the general linear model of full rank. Some applications of regression are covered. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 662 and MTH 253	**STT 6620 - Theory of Statistics II** Point estimation, properties of estimators, sufficiency and completeness, single parameter interval estimation, hypothesis testing, most powerful and UMP tests, likelihood ratio tests, maximum likelihood estimation (mle) and computational approaches to determine mle's. The multivariate normal distribution, random vectors and covariance matrices; linear and quadratic forms. The general linear model, Cochran-Fisher theorem. Hypothesis testing and confidence regions for a vector of parameters. Finite mixture models and the EM algorithm. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6610
STT 664 - Computational Statistics Bootstrapping is a computing-intensive method of data analysis by computing distributions. The method, including permutation tests, can be easily adapted to many classical problems. Software used for the course includes SPLUS and Mathematica. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate May not be enrolled in one of the following Majors: Mathematics Applied Statistics Prerequisites: STT 560 and STT 561	**STT 6640 - Computational Statistics** Random number generation and Monte Carlo methods. The bootstrap and permutation tests. Numerical methods for optimization related to maximum likelihood estimation and nonlinear regression models. Software used for the course includes SPLUS or R and Mathematica. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate May not be enrolled in one of the following Majors:
STT 666 - Statistical Methods I Classical statistical techniques for analysis and	**STT 6660 - Statistical Methods I** Simple linear regression and correlation analysis.

interpretation of research data including the use of statistical software packages. Includes descriptive statistics, one- and two-sample inferences, regression and correlation analysis. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: (MTH 253 or MTH 355) and (STT 266 or STT 361)	Concepts of matrix algebra, the matrix approach for regression and multiple regression. The general linear model. An introduction to generalized linear models and logistic regression. Statistical software packages will be used. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: (MTH 255?) and STT 2660 or STT 3610
STT 667 - Statistical Methods II Continuation of STT 666. Includes analysis of variance, multiple comparisons, analysis of covariance, contingency table analysis, goodness of fit tests. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 666 **STT 669 - Introduction to Experimental Design** Randomization, replication, blocking, factoral design. Block designs; multi-factor experiements; fixed-, random-, and mixed-effects models; repeated measures; nested factors; split-plot designs; confounding and fractions for 2**k factorial experiments. Statistical software used extensively. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 667	**STT 6670 - Statistical Methods II** Continuation of STT 6660. Randomization and replication. One and two-way analysis of variance, multiple comparisons, analysis of covariance. Multi-factor experiments. Non-parametric methods. Block designs. Mixed- and random-effects models, including repeated measures. Nested factors; split-plot designs; confounding and fractions for 2**k factorial experiments. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6660
STT 686 - Independent Reading in Statistics and Probability Independent reading in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels:	**STT 6860 - Independent Reading in Statistics and Probability** Independent reading in statistics and probability. Credit Hours: : 1.000 to 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels:

Graduate	Graduate
STT 696 - Topics in Statistics and Probability Topics in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 6960 - Topics in Statistics and Probability** Topics in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate
STT 714 - Statistical Modeling for Environmental Data (Cross listed as ES 714). Statistical techniques for the modeling and analysis of spatial and time-series environmental data, including spatio-temporal analysis, using appropriate software. Applications and case studies. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: ES 706 or STT 706 or STT 667	**STT 7140 - Statistical Modeling for Environmental Data**. Statistical techniques for the modeling and analysis of environmental data including advanced regression techniques, generalized linear models, and random effects. Also modeling of spatial and time-series environmental data, including spatio-temporal analysis, using appropriate software. Applications and case studies. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: ES 6300?? or STT 6670
STT 721 - Sampling Design Applications of sampling theory and basic methods of sampling selection. Simple random sampling, systematic sampling, sampling with probability proportionate to unit size, use of auxiliary estimators, and Warner's procedure. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 661	**STT 6210 - Sampling Design** Classical sampling designs including simple random sampling, stratified sampling, multi-stage sampling, cluster sampling, and systematic sampling; Using auxiliary information and ratio estimators; Unequal probability sampling, detectability and line transect methods; composite and ranked-set sampling. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 661
STT 762 - Topics in Linear Models Computing techniques and applications of the general linear model. Correlation and regression are emphasized. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels:	**STT 7620 – Generalized Linear Models** The generalized linear model. Logistic and Poisson regression, multinomial responses, log-linear models and contingency tables. Maximum likelihood estimation. Model selection, diagnostics, association graphs, and collapsibility, repeated measures categorical response models. Computer software is used to analyze the data

Graduate Prerequisites: STT 761 **STT 740 - Categorical Data Analysis** Standard techniques for analyzing and describing two-dimensional contingency tables. Logistic regression models and loglinear models developed for data structures involving categorical response variables, including model selection procedures, diagnostics, association graphs, and collapsibility. SAS procedures used for analysis of data sets. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 662 and STT 666	sets. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6620 and STT 6660
STT 744 - Applied Multivariate Analysis Matrix theory, multivariate distributions, likelihood ratio tests, MANOVA, covariance structure analysis, and classification techniques. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 667 and MTH 232	**STT 7440 - Applied Multivariate Analysis** Matrix theory, multivariate distributions, likelihood ratio tests, MANOVA, covariance structure analysis, and classification techniques. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 667 and MTH 232
STT 767 - Applied Regression Analysis Multiple linear regression with introduction to more complicated models, including nonlinear models and up-to-date computing techniques. Completion of a mathematical statistics course or permission of instructor. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 666	**STT 7670 - Applied Regression Analysis** Multiple linear regression with introduction to more complicated models, including nonlinear models and up-to-date computing techniques. Completion of a mathematical statistics course or permission of instructor. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6660

STT 764 - Topics in Experimental Design Continuation of STT 669. Topics from incomplete block designs, blocked and fractional asymmetric factorial designs, mixture experiments, split-plot designs, response surface methods, parameter design, hierarchical designs, variance components, mixed models. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 669	**STT 764 - Topics in Experimental Design** Continuation of STT 6670. Topics from incomplete block designs, blocked and fractional asymmetric factorial designs, mixture experiments, split-plot designs, response surface methods, parameter design, hierarchical designs, variance components, mixed models. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6670
	STT 7720?? Data Mining and Statistical Learning *(new course)* Advanced topics in regression analysis, high dimensional data analysis including principal component analysis and independent component analysis. Classification and regression trees (CART) and random forests, clustering. Credit Hours: : 4.000 Levels: Graduate Schedule Types: Lecture Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6610 and STT 6660
STT 786 - Independent Reading in Statistics and Probability Independent reading in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 7860 - Independent Reading in Statistics and Probability** Independent reading in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate
STT 791 - Statistical Consulting Consultation with graduate students and faculty on statistical problems arising from research projects. Credit Hours: : 3.000 TO 4.000 Levels: Graduate Schedule Types: Seminar Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 662 and STT 667	**STT 7910 - Statistical Consulting** Consultation with graduate students and faculty on statistical problems arising from research projects. Credit Hours: : 3.000 TO 4.000 Levels: Graduate Schedule Types: Seminar Restrictions: Must be enrolled in one of the following Levels: Graduate Prerequisites: STT 6620 and STT 6670

STT 796 - Topics in Statistics and Probability Topics in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 7960 - Topics in Statistics and Probability** Topics in statistics and probability. Credit Hours: : 1.000 TO 5.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate
STT 899 - Graduate Research Supervised thesis research. Credit Hours: : 1.000 TO 18.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate	**STT 8990 - Graduate Research** Supervised thesis research. Credit Hours: : 1.000 TO 18.000 Levels: Graduate Schedule Types: Independent Study Restrictions: Must be enrolled in one of the following Levels: Graduate

Academic Program Quarter to Semester Conversion

College	**Science and Mathematics**
Department	**Mathematics & Statistics**
Degree, Major Program	**Statistics**
Minor Program	
Certificate Program	

Quarter System	
General Education (62-66 hours)	
Department Requirements (61 hours)	
Required Courses	**Hours**
MTH 231 Calculus III	5
MTH 232 Calculus IV	5
MTH 255 Linear Algebra	3
MTH 280 Intro to Proof (WI)	3
MTH 355 Advanced Linear Algebra	3
STT 360 Applied Statistics I	4
STT 361 Applied Statistics II	4
STT 461 Theory of Statistics I	4
STT 462 Theory of Statistics II	4
STT 466 Statistical Methods I	4
STT 467 Statistical Methods II	4
STT 492 Statistics Seminar (WI)	3
Department Electives (At least 15 hours, at least 2 400-level, at least one must be a STT class)	
List all dept. courses here	

Semester System	
General Education (??? Hours)	
Department Requirements (??? Hours)	
Required Courses	**Hours**
MTH 2320	4
MTH 3?? One semester of linear algebra	3 or 4
MTH 280? Intro to Proof	3?
STT 3600 Applied Statistics I	3
STT 3601 Applied Statistics II	3
STT 4610 Theory of Statistics I	4
STT 4620 Theory of Statistics II	4
STT 4660 Statistical Methods I	4
STT 4670 Statistical Methods II	4
ST 4920 Statistics Seminar (WI)	2 or 3?
Department Electives (At least one must be a 4000 level statistics course)	
STT 4110 Applied Stochastic Processes and Time Series	3

Related Course Requirements (24 hours)	
CS 141 Programming I	4
CS 142 Programming II or CS 240 Computer Sci I	4
Cognate Area – *With your advisor's approval, select at least 16 hours in any area in which statistics may be applied (of which, at least 9 hrs. must be at 300-level or above).*	
General Electives (32-36 hours)	

STT 4260 Survival Analysis and Reliability	4
STT 4640 Computational Statistics	4
Related Course Requirements (???)	
Programming I	?
Programming II or Computer Sci I	?
Cognate Area – *With your advisor's approval, select at least 11?? hours in any area in which statistics may be applied (of which, at least 7?? hrs. must be at 3000-level or above).*	
General Electives (24-27 hours)	

Tentative Statistics Graduate Course Planning Schedule

Fall Semester

Number	Title	Offerings
STT 6610	Theory I	Every Fall
STT 6660	Methods I	Every Fall
STT 6260	Survival Analysis and Reliability	Every Fall
STT 6300	Biostatistics	Every Spring
STT 6460	Statistical Methods for Engineers	Every Fall
STT 7620	Generalized Linear Models	Every Fall

Spring Semester

Number	Title	Offerings
STT 6620	Theory II	Every Spring
STT 6670	Methods II	Every Spring
STT 6640	Computational Statistics	Every Spring
STT 7720	Data Mining and Statistical Learning	Every Spring
STT 7140	Statistical Modeling for Environmental Data	Every Spring

Summer Terms

Number	Title	Offerings
STT 6110	Applied Stochastic Processes and Time Series	Every other summer
STT 6210	Sampling Design	Every other summer