Program Description

The Master of Arts program in Biostatistics and Data Science provides a learning experience focused on solid theoretical foundation and practical experience. Robust course offerings, active engagement in statistical consulting, and a capstone project create ample opportunities to develop essential analytical skills. Consulting projects ranging from the simplest statistical summaries to the most comp lex protocols and data collection schemes allow students to get experience of working with real data analysis projects from start to finish. This hands-on experience will enable students to synthesize the acquired knowledge and integrate various courses they have taken. In the process, students will create a portfolio which demonstrates competency in data analysis, statistical programming, consulting experience with non -statisticians, oral and written communication skills.

Admission Requirements

In addition to the general Graduate School admission requirements, this program has specific requirements:

- Any graduate of an accredited college or university with an undergraduate degree in mathematics, statistics, or related field with strong preparation in mathematics is eligible for admission.
- Prior coursework in calculus (including integrals, such as Calculus II), probability and/or statistics, linear/matrix algebr a, and computer programming experience.

Credits Required to Graduate

31 credits

Program Credit Requirements

The curriculum consists of eight required biostatistics courses which have been identified as an essential knowledge base for all students in the program. Also required, is an Ethics and Integrity in Science course. The capstone project course can be taken throughout multiple semesters but at least 3 credit hours are required for graduation. The program allows for students to choose two or more elective courses which best reflect their personal interests. Students may pursue the degree on a full- time or part -time basis.

Required Courses

BIOE 10222 Ethics and Integrity in Science. 1 credit.

BIOS 04221 Biomedical Applications and Consulting. 3 credits.
Prerequisites: 04231/04232 Statistical Models and Methods I & II
Theory of consulting, communication and statistical techniques most often used in consulting and biomedical applications, practical experience in the real consulting setting and writing statistical reports.

BIOS 04224 Biostatistical Computing. 3 credits.
Prerequisites: 04231 Statistical Models and Methods I or concurrent registration
This course will cover the details of manipulating and transforming data required for statistical analysis. Topics include reshaping the data from a per -case to a per -event within a case and vice- versa. It will also cover the techniques necessary to write f unctions and macros in both SAS and R for developing new/modified data analysis methods. How to use R packages and C/C++ codes in R will also be covered. The LaTeX document production system is also introduced.

BIOS 04231 Statistical Models and Methods I. 3 credits.
Prerequisite: Three semesters of calculus and one semester of linear algebra
This course will cover statistical techniques for basic statistics. Topics include one- sample/two - sample tests, analyses for count data and contingency tables, basic nonparametric methods including sign, rank -sum and signed -rank tests, simple linear regression model and inference, checking model assumptions, model diagnostics, correlation analysis, one- way analysis of variance, Kruskal- Wallis one- way ANOVA, simple logis tic regression, and weighted linear regression. SAS/R will be used throughout the course.

BIOS 04232 Statistical Models and Methods II. 3 credits.
Prerequisite: 04231 Statistical Models and Methods I
Factorial, nested, split -plot and repeated measures designs, multiple regression and variable selection, multiple comparisons, logistic regression, discriminant analysis, principal components and factor analysis, rates and proportions, introduction to survival analysis.

BIOS 04233 Introduction to Statistical and Machine Learning. 3 credits.
Prerequisite: 04232 Statistical Models and Methods II
This course will provide an introduction to statistical learning. Core topics include variable selection, penalized linear regression such as lasso, dimension reduction including principal component analysis, flexible regression techniques including kernel smoothing/smoothing splines/generalized additive models/regression trees, support vector machine, clustering, and random forests. Other1T.hi 0 1linesc4 (n)1 (d)-4 (o)-4 n5411u (S (a)4 (i1 (s)-2e1555(s)-2 (i7/ - (o)-5

fields with a deeper understanding of s tatistical methods (3) to promote inter -disciplinary collaboration atmosphere in class. Students are required to have a basic statistical training (i.e., elementary statistics courses, basic calculus, and linear algebra) and basic programming proficiency (

BIOS 04285 Introduction to Bayesian Analysis. 3 credits.
Prerequisites: 04231 Statistical Models and Methods I
This course introduces basic concepts and computational tools for Bayesian statistical

investigate a variety of health- related topics, and laboratory exercises will center on common health and medical geography research questions. Course projects will allow students to develop a deep understanding of the geographical nature of a health problem of their choosing and will incorporate both literature review and the analysis of geographical data.

PUCH 19229 Survey Research Methods. 3 credits.
Survey Research Methods is a graduate- level, 3 -credit hour course that introduces students to the broad concepts of survey design, conduct, and analysis. Students will gain a detailed and comprehensive understanding of questionnaire design, sampling, data collection, survey nonresponse, and analysis of survey data. The course will include lectures, reading assignments, class discussions, individual and group presentations, and exams.

CTSI 20151 Introduction to Epidemiology. 3 credits.
This course provides an introduction to the concepts, principles, and research methods specific to epidemiology. Students will learn about population health, how to select appropriate study designs for collecting evidence for medical practice, how to summarize evidence for medical practice and how to translate evidence into medical practice. By the end of the course, students should be able to apply the skills learned to assess the health of a population, describe determinants of health, and select an appropriate study design to evaluate population health.

** denotes course is offered at UW -Milwaukee