

## Complete Delineation of Catalog Changes for Proposed:

New B.S. Major in Mathematics

Revised B.A. Major in Mathematics

Revised BT Major Mathematics: Secondary Teaching

Spring 2011

Description for Current Catalog	Description for Proposed Catalog
<p><b>Mathematics and Statistics</b>  <a href="#">Mathematics Major</a>  <a href="#">Mathematics Minor</a></p> <p><a href="#">Course Descriptions</a></p> <p>Gildemeister Hall, Room 322 (507-457-5370)  <a href="http://www.winona.edu/mathematics">www.winona.edu/mathematics</a>                      Brant Deppa (Chairperson)</p> <p><b>FACULTY</b>                      Susan Beseler, Assistant Professor; BS, Winona State University; ME, University of Wisconsin-La Crosse; 2005 –                      Gary Bunce, Professor; BS, North Dakota State University; MA, PhD, University of New Mexico; 1971 –                      Joyati Debnath, Professor; BSc, MS., Jadavpur University; MS, PhD, Iowa State University of Science and Technology; 1989 –                      Brant Deppa, Professor; BS, MS, University of Minnesota, Duluth; PhD, University of Minnesota-Twin Cities; 1992 –                      Jeffrey Draskoci-Johnson, Associate Professor; BA, Ohio Wesleyan University; MS, PhD, Ohio State University-Columbus; 1996 –                      Eric Errthum, Assistant Professor; BS, University of Iowa; PhD, University of Maryland; 2007 –                      Tisha Hooks, Assistant Professor; BS, University of Nebraska-Kearney; MS, PhD, University of Nebraska-Lincoln; 2006 –                      April Kerby, Assistant Professor; BS, BA, Alma College; MS, PhD, University of Nebraska–Lincoln, 2009 -                      Steven Leonhardi, Professor; BA, Concordia College, Moorhead (MN); MA, PhD, University of Wisconsin-Madison; 1996 –                      Christopher Malone, Associate Professor; BS,</p>	<p><b>Mathematics and Statistics</b>  <a href="#">Mathematics Major</a>  <a href="#">Mathematics Minor</a></p> <p><a href="#">Course Descriptions</a></p> <p>Gildemeister Hall, Room 322 (507-457-5370)  <a href="http://www.winona.edu/mathematics">www.winona.edu/mathematics</a>                      Brant Deppa (Chairperson)</p> <p><b>FACULTY</b>                      Susan Beseler, Assistant Professor; BS, Winona State University; ME, University of Wisconsin-La Crosse; 2005 –                      Gary Bunce, Professor; BS, North Dakota State University; MA, PhD, University of New Mexico; 1971 –                      Joyati Debnath, Professor; BSc, MS., Jadavpur University; MS, PhD, Iowa State University of Science and Technology; 1989 –                      Brant Deppa, Professor; BS, MS, University of Minnesota, Duluth; PhD, University of Minnesota-Twin Cities; 1992 –                      Jeffrey Draskoci-Johnson, Associate Professor; BA, Ohio Wesleyan University; MS, PhD, Ohio State University-Columbus; 1996 –                      Eric Errthum, Assistant Professor; BS, University of Iowa; PhD, University of Maryland; 2007 –                      Tisha Hooks, Assistant Professor; BS, University of Nebraska-Kearney; MS, PhD, University of Nebraska-Lincoln; 2006 –                      April Kerby, Assistant Professor; BS, BA, Alma College; MS, PhD, University of Nebraska–Lincoln, 2009 -                      Steven Leonhardi, Professor; BA, Concordia College, Moorhead (MN); MA, PhD, University of Wisconsin-Madison; 1996 –                      Christopher Malone, Associate Professor; BS,</p>

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<p>Winona State University; MS, PhD, Kansas State University; 2002 –  Felino G. Pascual, Professor; BS, Ateneo de Manila, Philippines; MSc, PhD, University of Minnesota-Twin Cities; 1992 –  Barry Peratt, Associate Professor; BS, Moravian College; MS, PhD, University of Delaware; 1996 –  Cheryl Quinn Nelson, Associate Professor; BA, Luther College; MS, Winona State University; 1986 –  Daniel Rand, Associate Professor; BS, Purdue University; MS, PhD, University of Minnesota-Twin Cities; 1998 –  Kenneth A. Suman, Professor; BS, MS, Clemson University; PhD, Pennsylvania State University; 1990 –  Aaron Wangberg, Assistant Professor; BA, Luther College; PhD, Oregon State University; 2007 –  Nicole Williams, Associate Professor; BS, University of Maine at Farmington; MS, PhD, Illinois State University; 2004 –</p>	<p>Winona State University; MS, PhD, Kansas State University; 2002 –  Felino G. Pascual, Professor; BS, Ateneo de Manila, Philippines; MSc, PhD, University of Minnesota-Twin Cities; 1992 –  Barry Peratt, Associate Professor; BS, Moravian College; MS, PhD, University of Delaware; 1996 –  Cheryl Quinn Nelson, Associate Professor; BA, Luther College; MS, Winona State University; 1986 –  Daniel Rand, Associate Professor; BS, Purdue University; MS, PhD, University of Minnesota-Twin Cities; 1998 –  Kenneth A. Suman, Professor; BS, MS, Clemson University; PhD, Pennsylvania State University; 1990 –  Aaron Wangberg, Assistant Professor; BA, Luther College; PhD, Oregon State University; 2007 –  Nicole Williams, Associate Professor; BS, University of Maine at Farmington; MS, PhD, Illinois State University; 2004 –</p>
<p><b>PURPOSE</b>  The Department of Mathematics and Statistics offers major programs in mathematics, mathematics education, and statistics. The department also offers minor programs in mathematics, statistics, and mathematics education (secondary teaching). These programs are designed around a common, required departmental core of courses, which allows students to change majors within the department or to coordinate double majors with relative ease during the first two years of coursework. The best choice of courses beyond the core depends upon career plans (industry, graduate school, professional school, teaching, government, finance, insurance, etc.), and students should consult with faculty advisors as early as possible. The mathematics major (BA Major - Mathematics) is specifically designed to support a wide range of student interests. Whether the goal is to complement coursework in another discipline, to obtain an education leading to a position in industry or in government, or to prepare for graduate work, students can choose elective coursework within the department to suit these</p>	<p><b>PURPOSE</b>  The Department of Mathematics and Statistics offers major programs in mathematics, mathematics education, and statistics. The department also offers minor programs in mathematics, statistics, and mathematics education (secondary teaching). These programs are designed around a common, required departmental core of courses, which allows students to change majors within the department or to coordinate double majors with relative ease during the first two years of coursework. The best choice of courses beyond the core depends upon career plans (industry, graduate school, professional school, teaching, government, finance, insurance, etc.), and students should consult with faculty advisors as early as possible. The <b>B.A.</b> mathematics major (BA Major - Mathematics) is specifically designed to support a wide range of student interests. Whether the goal is to complement coursework in another discipline, to obtain an education leading to a position in industry or in government, or to prepare for graduate work, students can choose elective coursework within the department to suit</p>

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<p>needs.</p> <p>The mathematics teaching major (BT Major - Mathematics Teaching) is designed to prepare students for a career in teaching mathematics (grades 5-12). In addition, students in the mathematics education program may choose to complete an additional major or minor program, which also grants licensure in those subjects. All these options may offer important advantages regarding employment.</p> <p>The statistics option (BS Major - Statistics) provides students with both a solid background in mathematics as well as experiences with statistical theories, techniques, and software. The statistics faculty members have experience in the application of statistics to diverse areas such as quality control, industrial experimental design, clinical trials, and the social sciences. Because statistics is applicable in a wide variety of fields, a minor or second major in statistics is a good choice for students majoring in fields such as the biological and earth sciences, business, economics, sociology, and psychology.</p> <p><b>CAREERS IN THE MATHEMATICAL SCIENCES</b></p> <p>There are opportunities for graduates with a mathematics major in industry as part of a development or research team and in government service. However, graduates who complete a double major including mathematics find themselves in significantly greater demand than if they had completed either major singly. The BA Major - Mathematics is specifically designed to address this employment trend.</p> <p>Current job placement for students with a mathematics teaching major remains strong, and projections indicate this will continue for the next decade. With a degree in mathematics education, career opportunities also exist within insurance</p>	<p>these needs.</p> <p>The B.S. mathematics major (BS Major – Mathematics) is designed to give a diverse, comprehensive and in-depth view of mathematics with the intention of preparing students who wish to enter a masters or Ph.D. program in mathematics after graduation.</p> <p>The mathematics teaching major (BT Major - Mathematics Teaching) is designed to prepare students for a career in teaching mathematics (grades 5-12). In addition, students in the mathematics education program may choose to complete an additional major or minor program, which also grants licensure in those subjects. All these options may offer important advantages regarding employment.</p> <p>The statistics option (BS Major - Statistics) provides students with both a solid background in mathematics as well as experiences with statistical theories, techniques, and software. The statistics faculty members have experience in the application of statistics to diverse areas such as quality control, industrial experimental design, clinical trials, and the social sciences. Because statistics is applicable in a wide variety of fields, a minor or second major in statistics is a good choice for students majoring in fields such as the biological and earth sciences, business, economics, sociology, and psychology.</p> <p><b>CAREERS IN THE MATHEMATICAL SCIENCES</b></p> <p>There are opportunities for graduates with a mathematics major in industry as part of a development or research team and in government service. However, graduates who complete a double major including mathematics find themselves in significantly greater demand than if they had completed either major singly. The BA Major - Mathematics is specifically designed to address this employment trend.</p> <p>Current job placement for students with a mathematics teaching major remains strong, and projections indicate this will continue for the next decade. With a degree in mathematics education, career opportunities also exist within insurance</p>

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<p>companies, other business and industry, government, and the armed services. With appropriate choices of elective courses, students who earn a BT Major-Mathematics: Secondary Teaching will be qualified for graduate studies in a number of fields including mathematics, statistics, actuarial science, mathematics education, educational psychology, and business.</p> <p>The job market for statistics majors is very solid with some projections indicating that the demand for statisticians will continue to increase. In statistics, opportunities for professional employment exist in industry, medical research, government agencies, and several areas of business. Students who earn a BS Major - Mathematics: Statistics Option can also find future careers in actuarial science, quality control, or biostatistics.</p> <ul style="list-style-type: none"> <li>• Actuarial Science. Actuaries use quantitative skills to analyze and plan for future financial situations. About two-thirds of all actuaries are employed in the insurance industry. Actuaries assess risk and make sure that the insurance company charges a fair price to assume that risk. An increasing number of actuaries work in consulting where they advise companies specializing in the areas of financial services, risk management, and health care. See page 155 for suggested electives.</li> <li>• Quality Assessment and Improvement. There is a great need today for a work force proficient in the principles and practices of quality improvement. In order to prepare for employment in this area, a student may pursue a major or minor with a statistics emphasis. Students pursuing any major who are interested in the area of quality control should consider preparing themselves for the ASQ (American Society for Quality) certification examinations. See page 155 for a list of courses that help students prepare for certification examinations.</li> <li>• Biostatistics. Biostatistics is a rapidly expanding field combining the disciplines of statistics, biology, and the health sciences. Biostatisticians work at major medical clinics, pharmaceutical companies, and universities performing clinical trials and analyzing health-related data. Students</li> </ul>	<p>companies, other business and industry, government, and the armed services. With appropriate choices of elective courses, students who earn a BT Major-Mathematics: Secondary Teaching will be qualified for graduate studies in a number of fields including mathematics, statistics, actuarial science, mathematics education, educational psychology, and business.</p> <p>The job market for statistics majors is very solid with some projections indicating that the demand for statisticians will continue to increase. In statistics, opportunities for professional employment exist in industry, medical research, government agencies, and several areas of business. Students who earn a BS Major - Mathematics: Statistics Option can also find future careers in actuarial science, quality control, or biostatistics.</p> <ul style="list-style-type: none"> <li>• Actuarial Science. Actuaries use quantitative skills to analyze and plan for future financial situations. About two-thirds of all actuaries are employed in the insurance industry. Actuaries assess risk and make sure that the insurance company charges a fair price to assume that risk. An increasing number of actuaries work in consulting where they advise companies specializing in the areas of financial services, risk management, and health care. See page 155 for suggested electives.</li> <li>• Quality Assessment and Improvement. There is a great need today for a work force proficient in the principles and practices of quality improvement. In order to prepare for employment in this area, a student may pursue a major or minor with a statistics emphasis. Students pursuing any major who are interested in the area of quality control should consider preparing themselves for the ASQ (American Society for Quality) certification examinations. See page 155 for a list of courses that help students prepare for certification examinations.</li> <li>• Biostatistics. Biostatistics is a rapidly expanding field combining the disciplines of statistics, biology, and the health sciences. Biostatisticians work at major medical clinics, pharmaceutical companies, and universities performing clinical trials and analyzing health-related data. Students</li> </ul>

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<p>who earn a BS Major - Mathematics: Statistics Option are well-prepared for either an entry-level position or admission into a graduate school in biostatistics. See page 155 for suggested electives.</p> <p><b>HONORS IN MATHEMATICS AND STATISTICS</b> A departmental honors program is available to qualified majors in the Department of Mathematics and Statistics. Students completing the departmental honors program will graduate with honors in the Department of Mathematics and Statistics. Requirements of the departmental honors program include completing a thesis, which is reviewed by two departmental faculty readers, attending departmental colloquia and seminars, and presenting a summary of the thesis in a departmental seminar. For more details, contact the department chairperson.</p> <p><b>CREDIT BY EXAMINATION COURSES</b> A student may receive credit by examination for MATH 140, MATH 160 and MATH 165. A student is allowed only one attempt per course. A grade of "B" or higher is required on the examination to receive credit.</p> <p><b>ADVANCED PLACEMENT CREDIT</b> Students can receive credit for MATH 160, MATH 165 and STAT 110 or STAT 210 for high school courses taken through the Advanced Placement Program. Consult with the department chairperson for specific test score requirements.</p> <p><b>PASS/NO CREDIT (P/NC) COURSES</b> The pass/no credit option is available to non-majors unless otherwise noted. MATH 050 and STAT 492 must be taken for pass/no credit. Any other course not required nor elected for a major or minor may be taken on a pass/no credit basis. Except for internships and practica, students must take all courses in their major, minor, options, concentrations and licensures on a grade-only basis. Courses offered on a pass/no credit-only or grade-only basis are so designated in the course descriptions.</p> <p><b>PREREQUISITES</b></p>	<p>who earn a BS Major - Mathematics: Statistics Option are well-prepared for either an entry-level position or admission into a graduate school in biostatistics. See page 155 for suggested electives.</p> <p><b>HONORS IN MATHEMATICS AND STATISTICS</b> A departmental honors program is available to qualified majors in the Department of Mathematics and Statistics. Students completing the departmental honors program will graduate with honors in the Department of Mathematics and Statistics. Requirements of the departmental honors program include completing a thesis, which is reviewed by two departmental faculty readers, attending departmental colloquia and seminars, and presenting a summary of the thesis in a departmental seminar. For more details, contact the department chairperson.</p> <p><b>CREDIT BY EXAMINATION COURSES</b> A student may receive credit by examination for MATH 140, MATH 160 and MATH 165. A student is allowed only one attempt per course. A grade of "B" or higher is required on the examination to receive credit.</p> <p><b>ADVANCED PLACEMENT CREDIT</b> Students can receive credit for MATH 160, MATH 165 and STAT 110 or STAT 210 for high school courses taken through the Advanced Placement Program. Consult with the department chairperson for specific test score requirements.</p> <p><b>PASS/NO CREDIT (P/NC) COURSES</b> The pass/no credit option is available to non-majors unless otherwise noted. MATH 050 and STAT 492 must be taken for pass/no credit. Any other course not required nor elected for a major or minor may be taken on a pass/no credit basis. Except for internships and practica, students must take all courses in their major, minor, options, concentrations and licensures on a grade-only basis. Courses offered on a pass/no credit-only or grade-only basis are so designated in the course descriptions.</p> <p><b>PREREQUISITES</b></p>

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<p>The prerequisites for courses in the Department of Mathematics and Statistics must be met with a grade of “C” or better or by instructor permission.</p> <p><b>TRANSFER CREDIT</b> No credit will be given for a grade below a “C” for mathematics, mathematics education, or statistics courses taken at other institutions.</p> <p><b>UNIVERSITY STUDIES FLAG REQUIREMENTS</b> Students may use flag courses to satisfy both University Studies and major requirements. Flag courses will usually be in the student’s major or minor program. The Mathematics and Statistics Department offers the following flag courses in the University Studies Program:</p> <p><b>MATHEMATICS FLAG COURSES</b> Oral (I) MATH 410 History of Mathematics (3) MATH 430 Operations Research: Linear Programming (3) Math/Critical Analysis (O) MATH 220 Combinatorics and Graph Theory (3) MATH 260 Multivariable Calculus (4) MATH 270 Differential Equation <del>and Linear Algebra</del> (4) MATH 310 Number Theory (3) Writing (P) MATH 330 Advanced Calculus I (4) MATH 440 Abstract Algebra (4) <b>MATHEMATICS EDUCATION FLAG COURSES</b> Oral (I) MTED 420 Technology and Professional Development in the Secondary Schools (3) Math/Critical Analysis (O) MTED 125 Mathematics for Elementary Teachers (4) MTED 322 Modern Geometry (4) Writing (P) MTED 320 Teaching Mathematics in the Secondary Schools (3) <b>STATISTICS FLAG COURSES</b> Oral (I) STAT 415 Multivariate Analysis (3) STAT 425 Modern Methods of Data Analysis (3) Math/Critical Analysis (O) STAT 255 Data Management Using SAS (3)</p>	<p>The prerequisites for courses in the Department of Mathematics and Statistics must be met with a grade of “C” or better or by instructor permission.</p> <p><b>TRANSFER CREDIT</b> No credit will be given for a grade below a “C” for mathematics, mathematics education, or statistics courses taken at other institutions.</p> <p><b>UNIVERSITY STUDIES FLAG REQUIREMENTS</b> Students may use flag courses to satisfy both University Studies and major requirements. Flag courses will usually be in the student’s major or minor program. The Mathematics and Statistics Department offers the following flag courses in the University Studies Program:</p> <p><b>MATHEMATICS FLAG COURSES</b> Oral (I) MATH 410 History of Mathematics (3) MATH 430 Operations Research: Linear Programming (3) Math/Critical Analysis (O)  MATH 260 Multivariable Calculus (4) MATH 270 Differential Equations (3)  MATH 310 Number Theory (3) Writing (P) MATH 330 Advanced Calculus I (3) MATH 440 Abstract Algebra I (3) <b>MATHEMATICS EDUCATION FLAG COURSES</b> Oral (I) MTED 420 Technology and Professional Development in the Secondary Schools (3) Math/Critical Analysis (O) MTED 125 Mathematics for Elementary Teachers (4) MTED 322 Modern Geometry (4) Writing (P) MTED 320 Teaching Mathematics in the Secondary Schools (3) <b>STATISTICS FLAG COURSES</b> Oral (I) STAT 415 Multivariate Analysis (3) STAT 425 Modern Methods of Data Analysis (3) Math/Critical Analysis (O) STAT 255 Data Management Using SAS (3)</p>

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<p>STAT 320 Statistical Quality Control (3) Writing (P)</p> <p>STAT 450 Introduction to Mathematical Statistics I (3)</p> <p>STAT 460 Introduction to Mathematical Statistics II (3)</p> <p>Flag courses that can be used to satisfy mathematics and statistics major/minor requirements are identified in the lists of required courses and electives in this section.</p> <p>DEPARTMENTAL CORE (<del>25-26</del> S.H.) Techniques of Continuous Mathematics – MATH (12 S.H.) 160 Calculus I (4) 165 Calculus II (4) O 260 Multivariable Calculus (4) <del>Matrix Algebra and Applications – MATH (3-4 S.H.)</del> <del>130 Matrix Algebra (3) OR</del> <del>O 270 Differential Equations &amp; Linear Algebra (4)</del> Introduction to Theoretical and Discrete Mathematics – MATH (<del>7</del> S.H.)</p> <p>210 Foundations of Mathematics (4) <del>‡ 305 Probability (3)</del> Statistics – STAT (3 S.H.) 210 Statistics (3) OR 303 Introduction to Engineering Statistics (3) OR 305 Biometry (3) <del>‡ MATH 270 is required for the mathematics major.</del> <del>‡ With the academic advisor's approval, a different upper division MATH or STAT course may be substituted for the mathematics major.</del></p>	<p>STAT 320 Statistical Quality Control (3) Writing (P)</p> <p>STAT 450 Introduction to Mathematical Statistics I (3)</p> <p>STAT 460 Introduction to Mathematical Statistics II (3)</p> <p>Flag courses that can be used to satisfy mathematics and statistics major/minor requirements are identified in the lists of required courses and electives in this section.</p> <p><b>DEPARTMENTAL CORE (23 S.H.)</b> Techniques of Continuous Mathematics – MATH (12 S.H.) 160 Calculus I (4) 165 Calculus II (4) O 260 Multivariable Calculus (4)</p> <p>Introduction to Theoretical and Discrete Mathematics – MATH (<b>8</b> S.H.) <b>205 Linear Algebra (4)</b></p> <p>210 Foundations of Mathematics (4)</p> <p>Statistics – STAT (3 S.H.) 210 Statistics (3) OR 303 Introduction to Engineering Statistics (3) OR 305 Biometry (3)</p>

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<p><b>BA MAJOR - MATHEMATICS (MATH)</b>  <del>40</del> <b>41 S.H.</b> (Minor or Second Major Required)  The BA Mathematics Program provides students with instruction in the basic techniques, applications, and theories of mathematics. Consequently, all BA mathematics majors must complete the Departmental Core and <del>two</del> courses in advanced mathematical theory. Beyond this, students choose from electives, which are designed to complement another major or minor, prepare for future graduate work, or provide coursework that is specific to the needs of industry. Students must earn a grade of "C" or higher in all required departmental courses. Students currently majoring or planning to major in other disciplines are strongly urged to consider adding a major or minor in mathematics as a useful means of preparing for professional exams, such as the MCAT; as a way of creating an undergraduate program that sets the student apart from others in that discipline when competing for future employment; and as a way of increasing options for future graduate work.</p> <p><b>DEPARTMENTAL CORE (26 S.H.)</b>  <del>With the advisor's approval, students may use an additional elective course to substitute for MATH 305. Mathematics majors are required to take MATH 270 (Differential Equations and Linear Algebra).</del></p> <p>MATHEMATICS - MATH (<del>11</del> S.H.)</p> <p>O 330 Advanced Calculus I (4)  <del>340 Advanced Linear Algebra (3)</del>  O 440 Abstract Algebra (4)</p> <p>ELECTIVES (<del>3-4</del> S.H.)  One upper-division elective chosen from courses numbered MATH <del>310</del> and above or STAT 320 and above.</p> <p><b>DOUBLE MAJOR IN MATHEMATICS AND MATHEMATICS EDUCATION</b>  <del>A student will be classified as a major in both mathematics and mathematics education if the</del></p>	<p><b>BA MAJOR - MATHEMATICS (MATH)</b>  <b>41 S.H.</b> (Minor or Second Major Required)  The BA Mathematics Program provides students with instruction in the basic techniques, applications, and theories of mathematics. Consequently, all BA mathematics majors must complete the Departmental Core and <b>four</b> courses in advanced mathematical theory. Beyond this, students choose from electives, which are designed to complement another major or minor, prepare for future graduate work <b>in the sciences</b>, or provide coursework that is specific to the needs of industry. Students must earn a grade of "C" or higher in all required departmental courses. Students currently majoring or planning to major in other disciplines are strongly urged to consider adding a major or minor in mathematics as a useful means of preparing for professional exams, such as the MCAT; as a way of creating an undergraduate program that sets the student apart from others in that discipline when competing for future employment; and as a way of increasing options for future graduate work.</p> <p>DEPARTMENTAL CORE (<b>23 S.H.</b>)</p> <p>MATHEMATICS - MATH (<b>12 S.H.</b>)  <b>270 Differential Equations (3)</b>  OP 330 Advanced Calculus I (<b>3</b>)</p> <p>OP <b>440 Abstract Algebra I (3)</b>  <b>335 Advanced Calculus II (3) OR</b>  <b>445 Abstract Algebra II (3)</b></p> <p>MATH ELECTIVES (<b>6</b> S.H.)  Two upper-division electives chosen from courses numbered MATH <b>305</b> and above or STAT 320 and above. <b>At least 3 semester hours must be chosen from MATH courses.</b></p>

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<p data-bbox="186 235 792 331"><del>student completes the Departmental Core and the required courses for a mathematics education major.</del></p> <p data-bbox="186 340 662 403">DOUBLE MAJOR IN MATHEMATICS AND STATISTICS</p> <p data-bbox="186 411 773 583">A student will be classified as a major in both mathematics and statistics if the student completes the Departmental Core and the required courses for a statistics major in addition to the following MATH courses:</p> <p data-bbox="186 592 574 621">330 Advanced Calculus I (4) AND</p> <p data-bbox="186 630 565 659">335 Advanced Calculus II (4) OR</p> <p data-bbox="186 667 618 697"><del>340 Advanced Linear Algebra (3) OR</del></p> <p data-bbox="186 705 477 735">440 Abstract Algebra (4)</p>	<p data-bbox="826 340 1299 403">DOUBLE MAJOR IN MATHEMATICS AND STATISTICS</p> <p data-bbox="826 411 1406 583">A student will be classified as a major in both mathematics (B.A.) and statistics if the student completes the Departmental Core and the required courses for a statistics major in addition to the following MATH courses:</p> <p data-bbox="826 592 1170 621">270 Differential Equations (3)</p> <p data-bbox="826 630 1208 659">330 Advanced Calculus I (3) AND</p> <p data-bbox="826 667 1187 697">440 Abstract Algebra I (3) AND</p> <p data-bbox="826 705 1198 735">335 Advanced Calculus II (3) OR</p> <p data-bbox="826 743 1133 772">445 Abstract Algebra II (4)</p>

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	<p><b>BS MAJOR – MATHEMATICS</b>  59-60 S.H. (No Minor Required)  The BS Mathematics Program provides students with an extended program in the techniques, applications, and theories of mathematics. Consequently, all BS mathematics majors must complete a significant amount of course work beyond the Departmental Core. These additional courses are designed to expose the student to a diverse range of mathematical topics, provide in-depth rigorous study in a focused area, and supply the experience of an independent project. The BS Mathematics major is designed to prepare students for graduate school in mathematics, but also is suitable to prepare them to enter other technical disciplines. Students must earn a grade of “C” or higher in all required departmental courses.</p> <p><b>DEPARTMENTAL CORE (23 S.H.)</b></p> <p><b>CONTINUOUS MATHEMATICS (6 S.H.)</b>  270 Differential Equations (3)  330 Advanced Calculus I (3)</p> <p><b>DISCRETE MATHEMATICS (6 S.H.)</b>  305 Probability† (3) OR  310 Number Theory (3)  440 Abstract Algebra I (3)</p> <p>† Students double-majoring with the BS – Statistics major are recommended to take MATH305</p> <p><b>IN-DEPTH TOPIC (3 S.H.)</b>  335 Advanced Calculus II (3) OR  445 Abstract Algebra II (3)</p> <p><b>INDEPENDENT PROJECT – MATH (3 S.H.)</b>  An independent project in mathematics is required for all students earning a B.S. in mathematics. The project will address a topic that is significantly beyond the standard undergraduate curriculum and will result in a product that is disseminated both orally and in written form. Such an experience will require students to complete a total of 3 S.H. of MATH490 (Independent Problems in Mathematics), possibly taken over the course of</p>

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<p><b>BT MAJOR - MATHEMATICS: SECONDARY TEACHING (PMTH)</b>  <b>53-54 S.H.</b> (No Minor Required)  (In the current catalog, this is listed as 54-55 S.H., but this is a typo. The current major adds to 53-54 S.H.)</p> <p>Note: When this catalog went to print, all Winona State University teacher education programs were being redesigned to reflect new licensure</p>	<p>several semesters, even if the experience includes an REU or an internship in mathematics. Students completing an independent project in another technical discipline may, in close consultation with their academic advisors, choose to substitute an additional MATH elective course (numbered MATH 310 or above) for this requirement.</p> <p><b>ELECTIVES - MATH (9 S.H.)</b>  Three upper-division electives chosen from courses numbered MATH 305 and above or STAT 320 and above. At least 3 semester hours must be chosen from List A and at least 3 semester hours from List B. (See course descriptions for schedule of offerings.)</p> <p><b>List A:</b>  315 Chaos Theory (3)  335 Advanced Calculus II (3)  340 Advanced Linear Algebra (3)  420 Numerical Analysis (4)</p> <p><b>List B:</b>  320 Theory of Functions of a Complex Variable (3)  430/435 Operations Research (3)  445 Abstract Algebra II (3)  450 Introduction to Topology (3)</p> <p><b>PROGRAMMING ELECTIVE (3-4 S.H.)</b>  CS234 Algorithms and Problem-Solving I (4)</p> <p><b>APPLICATIONS OF MATH ELECTIVES (6 S.H.)</b>  Two courses involving the applications of mathematics. Choose from BIOL 310, 312, CHEM 212 or above, CME 250 or above, CS 250, 341 or above, ECON 340, FIN 335, 360, 377, 390, HERS 403, PHYS 221 or above, STAT 320 or above</p> <p><b>BT MAJOR - MATHEMATICS: SECONDARY TEACHING (PMTH)</b>  <b>52 S.H.</b> (No Minor Required)</p> <p>Note: When this catalog went to print, all Winona State University teacher education programs were being redesigned to reflect new licensure</p>

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<p>requirements from the Minnesota Board of Teaching. Please contact your program advisor and refer to the Teacher Education Addendum (<a href="http://www.winona.edu/education/advising">www.winona.edu/education/advising</a>) for the latest information about program requirements whether you are (1) applying to a teacher education program, (2) currently enrolled in a teacher education program, or (3) expecting to graduate with a teacher education degree in 2010 or 2011.</p> <p>The mathematics teaching major prepares students for teaching mathematics in grades 5 to 12. This program is administered through the Department of Mathematics and Statistics and the College of Education. Therefore, majors must satisfy requirements of and be admitted to the College of Education in addition to satisfying the requirements of the Department of Mathematics and Statistics.</p> <p>The College of Education course requirements are described under "Additional Coursework" (page 155). Students interested in a mathematics teaching major should contact the Department of Mathematics and Statistics for an advisor.</p> <p><b>Student Teaching Requirements</b></p> <p>To receive departmental recommendation for student teaching, a student must:</p> <ol style="list-style-type: none"> <li>1. Complete all courses required for the major.</li> <li>2. Earn a grade of "C" or better and achieve a minimum 2.75 GPA in all MATH, MTED, and STAT courses required for the major.</li> <li>3. Meet the requirements of the College of Education. MTED 320 and MTED 420 must be completed prior to student teaching. <p><b>Additional Graduation Requirements</b></p> <p>For a checklist of the University's graduation requirements, see page 23.</p> <p>DEPARTMENTAL CORE (<del>25-26</del> S.H.)</p> <p>REQUIRED COURSES (<del>2</del> S.H.)</p> <p>Mathematics - MATH (<del>11</del> S.H.)</p> <p>O 310 Number Theory (3)</p> <p>P 330 Advanced Calculus I (<del>4</del>)</p> <p>P 440 Abstract Algebra (<del>4</del>)</p> <p>Mathematics Education - MTED (<del>11</del> S.H.)</p> <p><del>221 Middle School Methods in Mathematics (1)</del></p> <p>P 320 Teaching Mathematics in the Secondary</p> </li></ol>	<p>requirements from the Minnesota Board of Teaching. Please contact your program advisor and refer to the Teacher Education Addendum (<a href="http://www.winona.edu/education/advising">www.winona.edu/education/advising</a>) for the latest information about program requirements whether you are (1) applying to a teacher education program, (2) currently enrolled in a teacher education program, or (3) expecting to graduate with a teacher education degree in 2010 or 2011.</p> <p>The mathematics teaching major prepares students for teaching mathematics in grades 5 to 12. This program is administered through the Department of Mathematics and Statistics and the College of Education. Therefore, majors must satisfy requirements of and be admitted to the College of Education in addition to satisfying the requirements of the Department of Mathematics and Statistics.</p> <p>The College of Education course requirements are described under "Additional Coursework" (page 155). Students interested in a mathematics teaching major should contact the Department of Mathematics and Statistics for an advisor.</p> <p><b>Student Teaching Requirements</b></p> <p>To receive departmental recommendation for student teaching, a student must:</p> <ol style="list-style-type: none"> <li>1. Complete all courses required for the major.</li> <li>2. Earn a grade of "C" or better and achieve a minimum 2.75 GPA in all MATH, MTED, and STAT courses required for the major.</li> <li>3. Meet the requirements of the College of Education. MTED 320 and MTED 420 must be completed prior to student teaching. <p><b>Additional Graduation Requirements</b></p> <p>For a checklist of the University's graduation requirements, see page 23.</p> <p>DEPARTMENTAL CORE (23 S.H.)</p> <p>REQUIRED COURSES (25 S.H.)</p> <p>Mathematics - MATH (12 S.H.)</p> <p>305 Probability (3)</p> <p>O 310 Number Theory (3)</p> <p>P 330 Advanced Calculus I (3)</p> <p>P 440 Abstract Algebra I (3)</p> <p>Mathematics Education - MTED (13 S.H.)</p> <p>222 Teaching Mathematics in the Middle School (3)</p> </li></ol>

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<p>Schools (3)  O 322 Modern Geometry (4)  I 420 Technology and Professional Development in the Secondary Schools (3)  ELECTIVES (<del>6</del> S.H.)  In consultation with an advisor, students should choose <del>from courses numbered</del> MATH 310 and above, STAT 320 and above, or MTED 420 and above.</p> <p>ADDITIONAL COURSEWORK (38 S.H.)  Students in the Mathematics: Secondary Teaching major must also complete the Professional Education Sequence and the additional courses listed below:  Professional Education Sequence in the College of Education (32 S.H.)  * EFRT 305 Human Development and Learning (4)  EFRT 308 Human Relations and Student Diversity (3)  O EFRT 312 Instructional Planning and Assessment: Secondary (3) EDUC 429 Secondary Reading and Teaching Strategies (4)  P EFRT 449 Middle Level Philosophy, Organization and Interdisciplinary Planning (3)  P EFRT 459 The Professional Educator (3)  I EDST 465 Student Teaching (12-16)  Health, Exercise and Rehabilitative Sciences  HERS 204 Personal and Community Health (3)  (Also fulfills University Studies Basic Skills, Physical Development and Wellness requirement.  Special Education  * SPED 400 Education of Exceptional Children/Youth (3) (Also partially fulfills University Studies Arts &amp; Sciences  Core, Social Science requirement.  For more information about teacher education requirements, see "Teacher Education Programs" on page 214.</p> <p><b>BS MAJOR - MATHEMATICS: STATISTICS OPTION (MTST)</b>  <del>55</del>-56 S.H. (No Minor Required)  The BS Program in Statistics provides students with instruction in the basic techniques, applications, and theories of mathematics and statistics.  Students choosing statistics may complete a</p>	<p>P 320 Teaching Mathematics in the Secondary Schools (3)  O 322 Modern Geometry (4)  I 420 Technology and Professional Development in the Secondary Schools (3)  ELECTIVES (4 S.H.)  In consultation with an advisor, students should choose from: <b>MTED 201</b>, MATH 310 and above, STAT 320 and above, or MTED 420 and above.</p> <p>ADDITIONAL COURSEWORK (38 S.H.)  Students in the Mathematics: Secondary Teaching major must also complete the Professional Education Sequence and the additional courses listed below:  Professional Education Sequence in the College of Education (32 S.H.)  * EFRT 305 Human Development and Learning (4)  EFRT 308 Human Relations and Student Diversity (3)  O EFRT 312 Instructional Planning and Assessment: Secondary (3) EDUC 429 Secondary Reading and Teaching Strategies (4)  P EFRT 449 Middle Level Philosophy, Organization and Interdisciplinary Planning (3)  P EFRT 459 The Professional Educator (3)  I EDST 465 Student Teaching (12-16)  Health, Exercise and Rehabilitative Sciences  HERS 204 Personal and Community Health (3)  (Also fulfills University Studies Basic Skills, Physical Development and Wellness requirement.  Special Education  * SPED 400 Education of Exceptional Children/Youth (3) (Also partially fulfills University Studies Arts &amp; Sciences  Core, Social Science requirement.  For more information about teacher education requirements, see "Teacher Education Programs" on page 214.</p> <p><b>BS MAJOR - MATHEMATICS: STATISTICS OPTION (MTST)</b>  <b>56</b> S.H. (No Minor Required)  The BS Program in Statistics provides students with instruction in the basic techniques, applications, and theories of mathematics and statistics.  Students choosing statistics may complete a</p>

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<p>statistics project under the supervision of a faculty member. This provides students the opportunity to work with a faculty member on a consulting project or research problem. For students planning to attend graduate school, the research project is recommended. Internship opportunities also exist for students in the statistics major. Recent graduates have completed internships at the Mayo Clinic, insurance companies, local industry, and non-profit organizations. Both consulting projects and internships are good choices for students seeking employment upon graduation. Students who are interested in business or industrial applications of statistics might consider the fields of actuarial science or quality control. Specific information about these two fields follows the required coursework for the statistics major. DEPARTMENTAL CORE (<del>25-26</del> S.H.)</p> <p><b>REQUIRED COURSES (<del>18</del> S.H.)</b></p> <p>Statistics – STAT  255 Data Management Using SAS (3) OR a CS course numbered 234 or above  360 Regression Analysis (3)  365 Experimental Design and Analysis (3)  P 450 Introduction to Mathematical Statistics I (3)  P 460 Introduction to Mathematical Statistics II (3)  Capstone Experience – STAT (3)  488 Statistics Projects (1-6) OR  492 Practicum in Statistics (3-6)  For each capstone experience, a project proposal must be developed in consultation with a faculty member. A written report is required for satisfactory completion of the capstone experience. The written report must summarize the work completed for the course. Students are expected to submit a poster and/or give an oral presentation at a forum approved by the designated faculty member.  ELECTIVES (12 S.H.)  In consultation with an advisor, students should choose 12 semester hours from MATH courses numbered 310 and above, STAT courses numbered 320 and above, CS courses numbered 234 and above, or FIN 335. Students may also choose other</p>	<p>statistics project under the supervision of a faculty member. This provides students the opportunity to work with a faculty member on a consulting project or research problem. For students planning to attend graduate school, the research project is recommended. Internship opportunities also exist for students in the statistics major. Recent graduates have completed internships at the Mayo Clinic, insurance companies, local industry, and non-profit organizations. Both consulting projects and internships are good choices for students seeking employment upon graduation. Students who are interested in business or industrial applications of statistics might consider the fields of actuarial science or quality control. Specific information about these two fields follows the required coursework for the statistics major. DEPARTMENTAL CORE (23 S.H.)</p> <p><b>REQUIRED COURSES (21 S.H.)</b>  <b>Mathematics – MATH</b>  <b>305 Probability (3)</b></p> <p>Statistics – STAT  255 Data Management Using SAS (3) OR a CS course numbered 234 or above  360 Regression Analysis (3)  365 Experimental Design and Analysis (3)  P 450 Introduction to Mathematical Statistics I (3)  P 460 Introduction to Mathematical Statistics II (3)  Capstone Experience – STAT (3)  488 Statistics Projects (1-6) OR  492 Practicum in Statistics (3-6)  For each capstone experience, a project proposal must be developed in consultation with a faculty member. A written report is required for satisfactory completion of the capstone experience. The written report must summarize the work completed for the course. Students are expected to submit a poster and/or give an oral presentation at a forum approved by the designated faculty member.  ELECTIVES (12 S.H.)  In consultation with an advisor, students should choose 12 semester hours from MATH courses numbered 310 and above, STAT courses numbered 320 and above, CS courses numbered 234 and above, or FIN 335. Students may also choose other</p>

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<p>classes with a significant mathematical/statistical component offered outside the department; however, the courses must be approved by the Department of Mathematics and Statistics. At least 6 semester hours must be chosen from STAT courses.</p> <p>Actuarial Science To become a certified actuary, candidates must pass a series of examinations that are administered by the Society of Actuaries (SOA). Some of the examinations can be successfully completed while the student is still in college. In fact, some companies only hire candidates who have successfully completed at least one of the examinations. WSU offers the following courses that will prepare students for the first exam on Probability (SOA Exam P1).</p> <ul style="list-style-type: none"> <li>• MATH 160, 165, 260, and 305</li> <li>• STAT 210 and 450</li> </ul> <p>Actuaries are also required to be certified in three key subject areas through their college coursework that are not covered on the SOA examinations. This certification is called Validation through Educational Experience (VEE). Subject areas and courses for VEE certification are listed below.</p> <ul style="list-style-type: none"> <li>• VEE Economics ECON 201 Principles of Microeconomics (3) ECON 202 Principles of Macroeconomics (3)</li> <li>• VEE Applied Statistical Methods STAT 360 Regression Analysis (3) FIN 335 Forecasting Methods (3)</li> <li>• VEE Corporate Finance FIN 360 Corporate Finance (3) FIN 377 Investments (3)</li> </ul> <p>Quality Assessment and Improvement Mathematics/Statistics majors who are interested in the area of quality assessment and improvement should consider preparing themselves for the ASQ (American Society for Quality) certification examinations. These examinations are nationally recognized and greatly enhance employment opportunities. The Department of Mathematics and Statistics offers the following courses to help students prepare for</p>	<p>classes with a significant mathematical/statistical component offered outside the department; however, the courses must be approved by the Department of Mathematics and Statistics. At least 6 semester hours must be chosen from STAT courses.</p> <p>Actuarial Science To become a certified actuary, candidates must pass a series of examinations that are administered by the Society of Actuaries (SOA). Some of the examinations can be successfully completed while the student is still in college. In fact, some companies only hire candidates who have successfully completed at least one of the examinations. WSU offers the following courses that will prepare students for the first exam on Probability (SOA Exam P1).</p> <ul style="list-style-type: none"> <li>• MATH 160, 165, 260, and 305</li> <li>• STAT 210 and 450</li> </ul> <p>Actuaries are also required to be certified in three key subject areas through their college coursework that are not covered on the SOA examinations. This certification is called Validation through Educational Experience (VEE). Subject areas and courses for VEE certification are listed below.</p> <ul style="list-style-type: none"> <li>• VEE Economics ECON 201 Principles of Microeconomics (3) ECON 202 Principles of Macroeconomics (3)</li> <li>• VEE Applied Statistical Methods STAT 360 Regression Analysis (3) FIN 335 Forecasting Methods (3)</li> <li>• VEE Corporate Finance FIN 360 Corporate Finance (3) FIN 377 Investments (3)</li> </ul> <p>Quality Assessment and Improvement Mathematics/Statistics majors who are interested in the area of quality assessment and improvement should consider preparing themselves for the ASQ (American Society for Quality) certification examinations. These examinations are nationally recognized and greatly enhance employment opportunities. The Department of Mathematics and Statistics offers the following courses to help students prepare for</p>

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<p>certification examinations: Quality Inspector: STAT 110 or 210 or 303, STAT 320</p> <p>Quality Technician: STAT 110 or 210 or 303, STAT 320</p> <p>Quality Auditor: STAT 110 or 210 or 303, STAT 320</p> <p>Software Quality Engineer: STAT 110 or 210 or 303, STAT 320</p> <p>Quality Improvement Associate: STAT 110 or 210 or 303, STAT 320, STAT 321</p> <p>Quality Engineer: STAT 110 or 210 or 303, STAT 320-321</p> <p>Six Sigma Black Belt/Green Belt: STAT 110 or 210 or 303, STAT 320-321</p> <p>Manager of Quality/ Organizational Excellence: STAT 110 or 210 or 303, STAT 320, STAT 350</p> <p>Reliability Engineer: MATH 140 or 160, STAT 210 or 303, STAT 320-321</p> <p>Biostatistics Students interested in biostatistics are advised to take courses in biology, computer science, health sciences, and statistics, such as: BIOL 310 Genetics HERS 403 Epidemiology CS 368 Introduction to Bioinformatics STAT 405 Biostatistics</p> <p>BA MINOR - MATHEMATICS (MATH) <del>22</del>-23 S.H. The Departmental Core (<del>minus MATH-305</del>) is the BA minor in mathematics.</p> <p><b>Middle School Mathematics Minor</b> This minor is designed for students completing a teaching major. The minor prepares students to</p>	<p>certification examinations: Quality Inspector: STAT 110 or 210 or 303, STAT 320</p> <p>Quality Technician: STAT 110 or 210 or 303, STAT 320</p> <p>Quality Auditor: STAT 110 or 210 or 303, STAT 320</p> <p>Software Quality Engineer: STAT 110 or 210 or 303, STAT 320</p> <p>Quality Improvement Associate: STAT 110 or 210 or 303, STAT 320, STAT 321</p> <p>Quality Engineer: STAT 110 or 210 or 303, STAT 320-321</p> <p>Six Sigma Black Belt/Green Belt: STAT 110 or 210 or 303, STAT 320-321</p> <p>Manager of Quality/ Organizational Excellence: STAT 110 or 210 or 303, STAT 320, STAT 350</p> <p>Reliability Engineer: MATH 140 or 160, STAT 210 or 303, STAT 320-321</p> <p>Biostatistics Students interested in biostatistics are advised to take courses in biology, computer science, health sciences, and statistics, such as: BIOL 310 Genetics HERS 403 Epidemiology CS 368 Introduction to Bioinformatics STAT 405 Biostatistics</p> <p><b>BA MINOR - MATHEMATICS (MATH)</b> 23 S.H. The Departmental Core is the BA minor in mathematics.</p> <p><b>Middle School Mathematics Minor</b> This minor is designed for students completing a teaching major. The minor prepares students to</p>

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<p>teach middle school mathematics. Students interested in a middle school mathematics teaching minor should contact the Department of Mathematics and Statistics for an advisor.</p> <p>UNIVERSITY STUDIES REQUIREMENTS INCLUDE: I. BASIC SKILLS MATH 115 College Algebra (4) or higher MATH course</p> <p>III. UNITY AND DIVERSITY MTED 201 Technology-Based Geometry and Probability for Elementary Teachers (4)</p> <p>LICENSE REQUIREMENTS (K-6 Major) MTED 125 Mathematics for Elementary Teachers (4) Prerequisite Basic Skills Mathematics Requirement</p> <p>Middle School Math Minor Requirements 18 S.H.</p> <p>MATH 130 Matrix Algebra (3) MATH 140 Applied Calculus (3) MTED 222 Teaching Mathematics in the Middle School (3) STAT 110 Fundamentals of Statistics (3) MTED 225 Numerical Reasoning for Middle School Teachers (3) EFRT 449 Middle Level Philosophy, Organization and Interdisciplinary Planning (3)</p> <p><b>BS MINOR - MATHEMATICS: EDUCATION OPTION (MTED)†</b> 26 S.H. REQUIRED COURSES (26 S.H.) Mathematics – MATH (15 S.H.) 130 Matrix Algebra (3) 160, 165 Calculus I, II (8) 210 Foundations of Mathematics (4) Mathematics Education – MTED (8 S.H.) 221 Middle School Methods in Mathematics (1) P 320 Teaching Mathematics in the Secondary Schools (3) O 322 Modern Geometry (4) Statistics – STAT (3 S.H.) 210 Statistics (3)</p>	<p>teach middle school mathematics. Students interested in a middle school mathematics teaching minor should contact the Department of Mathematics and Statistics for an advisor.</p> <p>UNIVERSITY STUDIES REQUIREMENTS INCLUDE: I. BASIC SKILLS MATH 115 College Algebra (4) or higher MATH course</p> <p>III. UNITY AND DIVERSITY MTED 201 Technology-Based Geometry and Probability for Elementary Teachers (4)</p> <p>LICENSE REQUIREMENTS (K-6 Major) MTED 125 Mathematics for Elementary Teachers (4) Prerequisite Basic Skills Mathematics Requirement</p> <p>Middle School Math Minor Requirements 18 S.H.</p> <p>MATH 130 Matrix Algebra (3) MATH 140 Applied Calculus (3) MTED 222 Teaching Mathematics in the Middle School (3) STAT 110 Fundamentals of Statistics (3) MTED 225 Numerical Reasoning for Middle School Teachers (3) EFRT 449 Middle Level Philosophy, Organization and Interdisciplinary Planning (3)</p> <p><b>BS MINOR – MATHEMATICS: EDUCATION OPTION (MTED)†</b> 26 S.H. REQUIRED COURSES (26 S.H.) Mathematics – MATH (15 S.H.) 130 Matrix Algebra (3) 160, 165 Calculus I, II (8) 210 Foundations of Mathematics (4) Mathematics Education – MTED (8 S.H.) 221 Middle School Methods in Mathematics (1) P 320 Teaching Mathematics in the Secondary Schools (3) O 322 Modern Geometry (4) Statistics – STAT (3 S.H.) 210 Statistics (3)</p>

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<p>†The state of Minnesota no longer issues teaching licenses for Bachelor of Science minors. However, this minor may provide the opportunity to teach mathematics outside the state of Minnesota.</p> <p>BS MINOR - MATHEMATICS: STATISTICS OPTION (MTST) 21-23 S.H.</p> <p>Either teaching or non-teaching degree candidates may take the BS minor in statistics option; however, this is not a certifiable minor for teaching.</p> <p>REQUIRED COURSES (15-17 S.H.) Mathematics (6-8 S.H.) <del>MATH 130 Matrix Algebra (3) OR</del> <del>O MATH 270 Differential Equations and Linear Algebra (4)</del> MATH 140 Applied Calculus (3) OR MATH 155 Modeling Using Calculus (3) OR MATH 160 Calculus I (4) Statistics (3 S.H.) STAT 110 Fundamentals of Statistics (3) OR STAT 210 Statistics (3) OR STAT 303 Introduction to Engineering Statistics (3) OR STAT 305 Biometry (3) OR O BUSA 220 Business Statistics (3) OR O PSY 231 Statistics (3) Two of the following six courses (6 S.H.): STAT 350 Design of Samples and Surveys (3) STAT 355 Nonparametric Statistics (3) STAT 360 Regression Analysis (3) STAT 365 Experimental Design and Analysis (3) OR STAT 321 Industrial Design of Experiments I (3) I STAT 415 Multivariate Analysis (3) I STAT 425 Modern Methods of Data Analysis (3) ELECTIVES (6 S.H.) Select 6 S.H. from Group I and Group II (At most, 3 S.H. from Group II.) Group I - Statistics O MATH 305 Probability (3) ‡ STAT 321 Industrial Design of Experiments I (3) ‡ STAT 350 Design of Sample and Surveys (3) ‡ STAT 355 Nonparametric Statistics (3)</p>	<p>†The state of Minnesota no longer issues teaching licenses for Bachelor of Science minors. However, this minor may provide the opportunity to teach mathematics outside the state of Minnesota.</p> <p><b>BS MINOR - MATHEMATICS: STATISTICS OPTION (MTST)</b> 21-23 S.H.</p> <p>Either teaching or non-teaching degree candidates may take the BS minor in statistics option; however, this is not a certifiable minor for teaching.</p> <p>REQUIRED COURSES (15-17 S.H.) Mathematics (7-8 S.H.) <b>MATH 205 Linear Algebra (4)</b></p> <p>MATH 140 Applied Calculus (3) OR MATH 155 Modeling Using Calculus (3) OR MATH 160 Calculus I (4) Statistics (3 S.H.) STAT 110 Fundamentals of Statistics (3) OR STAT 210 Statistics (3) OR STAT 303 Introduction to Engineering Statistics (3) OR STAT 305 Biometry (3) OR O BUSA 220 Business Statistics (3) OR O PSY 231 Statistics (3) Two of the following six courses (6 S.H.): STAT 350 Design of Samples and Surveys (3) STAT 355 Nonparametric Statistics (3) STAT 360 Regression Analysis (3) STAT 365 Experimental Design and Analysis (3) OR STAT 321 Industrial Design of Experiments I (3) I STAT 415 Multivariate Analysis (3) I STAT 425 Modern Methods of Data Analysis (3) ELECTIVES (6 S.H.) Select 6 S.H. from Group I and Group II (At most, 3 S.H. from Group II.) Group I - Statistics O MATH 305 Probability (3) ‡ STAT 321 Industrial Design of Experiments I (3) ‡ STAT 350 Design of Sample and Surveys (3) ‡ STAT 355 Nonparametric Statistics (3)</p>

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<p>‡ STAT 360 Regression Analysis (3)  ‡ STAT 365 Experimental Design and Analysis (3)  STAT 370 Statistical Consulting (3)  STAT 405 Biostatistics (3)  ‡I STAT 415 Multivariate Analysis (3)  ‡I STAT 425 Modern Methods of Data Analysis (3)  P STAT 450 Mathematical Statistics I (3)  P STAT 460 Mathematical Statistics II (3)  ‡ Can be used as an elective course if not used as a required course  Group II - Application Areas  Select up to 3 S.H. from the following courses:  Biology - BIOL 310 (3), 312 (3)  Computer Science - CS 231 (3), 234 (3), 298 (3)  Economics - ECON 304 (3), 450 (3)  Finance - FIN 335 (3), 360 (3), 423 (3)  Health, Exercise and Rehabilitative Sciences - HERS 403 (3)  Marketing - MKTG 334 (3)  Mathematics - MATH 340 (3), 420 (3), 430 (3), 435 (3)  Nursing - NURS 375 (3)  Physics - PHYS 345 (3)  Political Science - POLS 410 (3)  Psychology - PSY 308 (3), 350 (3)  Sociology - SOC 376 (3)  Statistics - STAT 255 (3), 289 (1-3), 290 (1-4), 310 (3), 320 (3), 321 (3), 322 (3), 440 (3), 488 (1-6), 489 (1-3), 490 (1-4)</p>	<p>‡ STAT 360 Regression Analysis (3)  ‡ STAT 365 Experimental Design and Analysis (3)  STAT 370 Statistical Consulting (3)  STAT 405 Biostatistics (3)  ‡I STAT 415 Multivariate Analysis (3)  ‡I STAT 425 Modern Methods of Data Analysis (3)  P STAT 450 Mathematical Statistics I (3)  P STAT 460 Mathematical Statistics II (3)  ‡ Can be used as an elective course if not used as a required course  Group II - Application Areas  Select up to 3 S.H. from the following courses:  Biology - BIOL 310 (3), 312 (3)  Computer Science - CS 231 (3), 234 (3), 298 (3)  Economics - ECON 304 (3), 450 (3)  Finance - FIN 335 (3), 360 (3), 423 (3)  Health, Exercise and Rehabilitative Sciences - HERS 403 (3)  Marketing - MKTG 334 (3)  Mathematics - MATH 340 (3), 420 (3), 430 (3), 435 (3)  Nursing - NURS 375 (3)  Physics - PHYS 345 (3)  Political Science - POLS 410 (3)  Psychology - PSY 308 (3), 350 (3)  Sociology - SOC 376 (3)  Statistics - STAT 255 (3), 289 (1-3), 290 (1-4), 310 (3), 320 (3), 321 (3), 322 (3), 440 (3), 488 (1-6), 489 (1-3), 490 (1-4)</p>
<p><b>COURSE DESCRIPTIONS</b>  All courses are offered every semester unless a different frequency is indicated.  <b>MATHEMATICS - MATH</b>  <b>050 - Intermediate Algebra (3 S.H.)</b>  A review of pre-algebra and intermediate algebra topics designed to prepare the student for college-level mathematics. MATH 050 is a non-degree credit course and will not count toward meeting minimum total credit requirements for graduation. P/NC only.  <b>100 - Survey of Mathematics (3 S.H.)</b>  Study of networking, probability, statistical inference, and logic designed to illustrate the connection between contemporary mathematics and modern society. Grade only. Prerequisite: Qualifying score on the mathematics placement</p>	<p><b>COURSE DESCRIPTIONS</b>  All courses are offered every semester unless a different frequency is indicated.  <b>MATHEMATICS - MATH</b>  <b>050 - Intermediate Algebra (3 S.H.)</b>  A review of pre-algebra and intermediate algebra topics designed to prepare the student for college-level mathematics. MATH 050 is a non-degree credit course and will not count toward meeting minimum total credit requirements for graduation. P/NC only.  <b>100 - Survey of Mathematics (3 S.H.)</b>  Study of networking, probability, statistical inference, and logic designed to illustrate the connection between contemporary mathematics and modern society. Grade only. Prerequisite: Qualifying score on the mathematics placement</p>

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<p>exam or MATH 050. Note: This course fulfills certain Board of Teaching (BOT) requirements for education majors.</p> <p><b>110 - Finite Mathematics (3 S.H.)</b> Applications of matrices, linear programming, probability, and the mathematics of finance to real-life problems. This course provides the non-calculus mathematics background necessary for students in business, management, and social sciences. Prerequisite: Qualifying score on the mathematics placement exam or MATH 050.</p> <p><b>112 - Modeling with Functions for Business (3 S.H.)</b> This course will help students learn both algebraic skills and problem-solving skills. Topics include the algebraic and symbolic manipulation of linear functions, quadratic functions, exponential and logarithmic functions, trigonometric functions, polynomial and rational functions, inverses and compositions of functions, transformations of functions and their graphs, and applications. In addition, the course emphasizes problem-solving skills including unit analysis; changing representations (graphical, tabular, formulaic, and verbal) of data; comparison of solutions with intuition; and analysis of various solution methods. Prerequisite: MATH 050 or mathematics placement.</p> <p><b>115 – College Algebra (4 S.H.)</b> This course will give students a rigorous preparation in algebra. Topics include review of basic algebraic concepts; functions and graphs; polynomial, radical, rational, exponential and logarithmic functions; equations, inequalities, systems of equations and inequalities; and applications. Prerequisite: MATH 050 or mathematics placement.</p> <p><b>120 - Precalculus (4 S.H.)</b> A study of topics designed to give students the skills necessary for successful completion of calculus. Equation solving, graphing, functions, and trigonometry are some of the main topics covered. Prerequisite: Qualifying score on the mathematics placement exam or MATH 115.</p> <p><b>130 - Matrix Algebra (3 S.H.)</b> An introduction to matrix algebra and elementary vector spaces with an emphasis on computation.</p>	<p>exam or MATH 050. Note: This course fulfills certain Board of Teaching (BOT) requirements for education majors.</p> <p><b>110 - Finite Mathematics (3 S.H.)</b> Applications of matrices, linear programming, probability, and the mathematics of finance to real-life problems. This course provides the non-calculus mathematics background necessary for students in business, management, and social sciences. Prerequisite: Qualifying score on the mathematics placement exam or MATH 050.</p> <p><b>112 - Modeling with Functions for Business (3 S.H.)</b> This course will help students learn both algebraic skills and problem-solving skills. Topics include the algebraic and symbolic manipulation of linear functions, quadratic functions, exponential and logarithmic functions, trigonometric functions, polynomial and rational functions, inverses and compositions of functions, transformations of functions and their graphs, and applications. In addition, the course emphasizes problem-solving skills including unit analysis; changing representations (graphical, tabular, formulaic, and verbal) of data; comparison of solutions with intuition; and analysis of various solution methods. Prerequisite: MATH 050 or mathematics placement.</p> <p><b>115 – College Algebra (4 S.H.)</b> This course will give students a rigorous preparation in algebra. Topics include review of basic algebraic concepts; functions and graphs; polynomial, radical, rational, exponential and logarithmic functions; equations, inequalities, systems of equations and inequalities; and applications. Prerequisite: MATH 050 or mathematics placement.</p> <p><b>120 - Precalculus (4 S.H.)</b> A study of topics designed to give students the skills necessary for successful completion of calculus. Equation solving, graphing, functions, and trigonometry are some of the main topics covered. Prerequisite: Qualifying score on the mathematics placement exam or MATH 115.</p> <p><b>130 - Matrix Algebra (3 S.H.)</b> An introduction to matrix algebra and elementary vector spaces with an emphasis on computation.</p>

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<p>Prerequisite: MATH 120.</p> <p><b>140 - Applied Calculus (3 S.H.)</b> An intuitive approach to calculus for students in business, management, or the social sciences. Emphasis throughout is to enhance students' understanding of how mathematics is used in real-world applications. Prerequisite: Qualifying score on the mathematics placement exam, MATH 112, MATH 115, or MATH 120.</p> <p><b>150 - Modeling Using Precalculus and Statistics, 155 - Modeling Using Calculus (3 S.H. Each)</b> A two-semester sequence designed for earth- and life-science majors to develop their algebraic, trigonometric, statistical, and calculus skills through modeling applications. Prerequisite for MATH 150: Qualifying score on the mathematics placement exam or MATH 115. Prerequisite for MATH 155: MATH 150.</p> <p>160, 165 - Calculus I, II (4 S.H. Each) Differential and integral calculus of functions of a single variable. Two semesters in sequence. Prerequisite: Qualifying score on the mathematics placement exam or MATH 120.</p> <p><b>161 - Calculus Companion I: Skills for Success (1 S.H.)</b> A course that reinforces students' algebraic and trigonometric skills in the context of Calculus I. Intended to be taken concurrently with the instructor's Calculus I course; students' abilities with algebra and trigonometry are improved upon as they are needed in the calculus. Prerequisite: Concurrent enrollment in instructor's section of MATH 160 or instructor's permission.</p> <p><b>166 - Calculus Companion II: Toward Your Continued Success (1 S.H.)</b> Provides students with increased ability with topics of Calculus I as these are required in the development of Calculus II. Instruction is given in applying the methods of calculus to new material as introduced in the second semester of calculus. Prerequisite: Concurrent enrollment in instructor's section of MATH 165 or instructor's permission.</p>	<p>Prerequisite: MATH 120.</p> <p><b>140 - Applied Calculus (3 S.H.)</b> An intuitive approach to calculus for students in business, management, or the social sciences. Emphasis throughout is to enhance students' understanding of how mathematics is used in real-world applications. Prerequisite: Qualifying score on the mathematics placement exam, MATH 112, MATH 115, or MATH 120.</p> <p><b>150 - Modeling Using Precalculus and Statistics, 155 - Modeling Using Calculus (3 S.H. Each)</b> A two-semester sequence designed for earth- and life-science majors to develop their algebraic, trigonometric, statistical, and calculus skills through modeling applications. Prerequisite for MATH 150: Qualifying score on the mathematics placement exam or MATH 115. Prerequisite for MATH 155: MATH 150.</p> <p><b>160, 165 - Calculus I, II (4 S.H. Each)</b> Differential and integral calculus of functions of a single variable. Two semesters in sequence. Prerequisite for MATH 160: Qualifying score on the mathematics placement exam or MATH 120. Prerequisite for MATH 165: Qualifying score on the mathematics placement exam or MATH 160.</p> <p><b>161 - Calculus Companion I: Skills for Success (1 S.H.)</b> A course that reinforces students' algebraic and trigonometric skills in the context of Calculus I. Intended to be taken concurrently with the instructor's Calculus I course; students' abilities with algebra and trigonometry are improved upon as they are needed in the calculus. Prerequisite: Concurrent enrollment in instructor's section of MATH 160 or instructor's permission.</p> <p><b>166 - Calculus Companion II: Toward Your Continued Success (1 S.H.)</b> Provides students with increased ability with topics of Calculus I as these are required in the development of Calculus II. Instruction is given in applying the methods of calculus to new material as introduced in the second semester of calculus. Prerequisite: Concurrent enrollment in instructor's section of MATH 165 or instructor's permission.</p> <p><b>205 – Linear Algebra (4 S.H.)</b> An introduction to the topics in linear algebra. Topics include: Systems of Linear Equations, Matrix</p>

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<p><b>210 - Foundations of Mathematics (4 S.H.)</b> Introductory discrete mathematics including symbolic logic, elementary number theory, sequences, sets, relations, functions, and recursion. Valid and invalid argument forms are studied, and direct and indirect methods of proof are introduced. Prerequisite: <del>MATH 160</del>.</p> <p><b>260 - Multivariable Calculus (4 S.H.)</b> Multivariable functions and vector functions are studied as the concepts of differential and integral calculus are generalized to surfaces and higher dimensions. Topics include vectors, parametric equations, cylindrical and spherical coordinates, partial and directional derivatives, multiple integrals, line and surface integrals, and the theorems of Green, Gauss, and Stokes. Prerequisite: MATH 165.</p> <p><b>270 - Differential Equations <del>and Linear Algebra</del> (4 S.H.)</b> Solution techniques for ordinary differential equations including boundary/initial value problems and systems of first-order equations. Topics include linear homogeneous and non-homogeneous differential equations <del>and</del> the Laplace transform. <del>Methods of linear algebra are studied as they apply to the solution of differential equations.</del> Prerequisite: MATH 165.</p> <p><b>280 - Special Topics (1-3 S.H.)</b> Exposure to lower-division mathematical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>305 – Probability (3 S.H)</b> Introduction to basic ideas and fundamental laws of probability. Topics include an introduction to combinatorics, probability axioms, conditional probability, discrete random variables, common</p>	<p><b>Algebra, Determinants, Vectors and Vector Spaces, Linear Transformations, Eigenvalues and Eigenvectors. Prerequisite: MATH 160</b></p> <p><b>210 - Foundations of Mathematics (4 S.H.)</b> Introductory discrete mathematics including symbolic logic, elementary number theory, sequences, sets, relations, functions, and recursion. Valid and invalid argument forms are studied, and direct and indirect methods of proof are introduced. Prerequisite: <b>MATH 165</b>.</p> <p><b>260 - Multivariable Calculus (4 S.H.)</b> Multivariable functions and vector functions are studied as the concepts of differential and integral calculus are generalized to surfaces and higher dimensions. Topics include vectors, parametric equations, cylindrical and spherical coordinates, partial and directional derivatives, multiple integrals, line and surface integrals, and the theorems of Green, Gauss, and Stokes. Prerequisite: MATH 165.</p> <p><b>270 - Differential Equations (3 S.H.)</b> Solution techniques for ordinary differential equations including boundary/initial value problems and systems of first-order equations. Topics include linear homogeneous and non-homogeneous differential equations, <b>the Laplace transform, and systems of differential equations.</b> Prerequisite: MATH 165 and either MATH 205 OR concurrent enrollment in MATH 271.</p> <p><b>271 – Linear Algebra for Differential Equations (1 S.H.)</b> <b>Methods of linear algebra are studied as they apply to the solutions of differential equations.</b> Topics include systems of linear equations and eigenvalue analysis. Prerequisite: Concurrent enrollment in instructor’s section of MATH 270 or instructor’s permission.</p> <p><b>280 - Special Topics (1-3 S.H.)</b> Exposure to lower-division mathematical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>305 – Probability (3 S.H)</b> Introduction to basic ideas and fundamental laws of probability. Topics include an introduction to combinatorics, probability axioms, conditional probability, discrete random variables, common</p>

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<p>discrete distributions, expectation, generating functions, limit theorems, and continuous random variables. Prerequisites: MATH 160 and MATH 210, or instructor's permission.</p> <p><b>310 - Number Theory (3 S.H.)</b> A study of primes, divisibility, congruences, number-theoretic functions, and diophantine equations. Prerequisites: MATH 165 and MATH 210. Offered spring semester.</p> <p><b>315 - Chaos Theory (3 S.H.)</b> An introduction to chaos theory and fractal geometry. Topics will include bifurcations, Julia sets, the Mandelbrot set, fractal geometry, iterated function systems, and a survey of the applications of this theory to a variety of disciplines. Prerequisite: MATH 160. Offered spring semester.</p> <p><b>320 - Theory of Functions of a Complex Variable (3 S.H.)</b> The calculus of functions of a complex variable including differentiability, analyticity, and integration. Additional topics include the residue theorem. Prerequisites: <del>MATH 210</del> and MATH 260. Offered <del>on-demand</del>.</p> <p><b>330, <del>335</del> - Advanced Calculus I, II (4 S.H. <del>Each</del>)</b> A systematic approach to the theory of differential and integral calculus for functions and transformations in several variables. Prerequisites: MATH 210 and MATH 260.</p> <p><b>340 - Advanced Linear Algebra (3 S.H.)</b> A continuation of MATH <del>130</del> with emphasis on more general vector spaces. Additional topics include linear transformations, inner product spaces, eigen-systems, diagonalization of matrices, and canonical forms. Prerequisites: MATH 210 and <del>either</del> MATH <del>130</del> or <del>MATH 270</del>, or instructor's permission. Strongly recommended: Completion of MATH 165 prior to enrollment. Offered spring semester.</p>	<p>discrete distributions, expectation, generating functions, limit theorems, and continuous random variables. Prerequisites: MATH 160 and MATH 210, or instructor's permission.</p> <p><b>310 - Number Theory (3 S.H.)</b> A study of primes, divisibility, congruences, number-theoretic functions, and diophantine equations. Prerequisites: MATH 165 and MATH 210. Offered spring semester.</p> <p><b>315 - Chaos Theory (3 S.H.)</b> An introduction to chaos theory and fractal geometry. Topics will include bifurcations, Julia sets, the Mandelbrot set, fractal geometry, iterated function systems, and a survey of the applications of this theory to a variety of disciplines. Prerequisite: MATH 160. Offered periodically spring semesters of even numbered years (e.g. Spring 2012, Spring 2014, etc.).</p> <p><b>320 - Theory of Functions of a Complex Variable (3 S.H.)</b> The calculus of functions of a complex variable including differentiability, analyticity, and integration. Additional topics include the residue theorem. Prerequisites: MATH 260. Offered fall semesters of even numbered years (e.g. Fall 2012, Fall 2014, etc.).</p> <p><b>330 - Advanced Calculus I (3 S.H.)</b> A systematic approach to the theory of differential and integral calculus for functions and transformations in several variables. Prerequisites: MATH 210 and MATH 260. Offered every Fall semester.</p> <p><b>335 - Advanced Calculus II (3 S.H.)</b> A continuation of topics from Advanced Calculus I. Prerequisites: MATH 330. Offered spring semesters of even numbered years (e.g. Spring 2012, Spring 2014, etc.).</p> <p><b>340 - Advanced Linear Algebra (3 S.H.)</b> A continuation of MATH <del>205</del> with emphasis on more general vector spaces. Additional topics include linear transformations, inner product spaces, eigen-systems, diagonalization of matrices, and canonical forms. Prerequisites: MATH 210 and MATH <del>205</del>, or instructor's permission. Strongly recommended: Completion of MATH 165 prior to enrollment. Offered periodically spring semesters of even numbered years (e.g. Spring 2012, Spring</p>

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<p><b>410 - History of Mathematics (3 S.H.)</b> General view of the historical development of the elementary branches of mathematics. Prerequisites: MATH 160 and MATH 210. <del>Offered spring semester.</del></p> <p><b>420 - Numerical Analysis (4 S.H.)</b> Numerical solution of equations, numerical interpolation, differentiation, and integration, numerical linear algebra, numerical solution of differential equations with analysis and use of algorithms and related software. Prerequisites: CS 231 or CS 234 and MATH 260. Offered <del>alternate</del> fall semesters.</p> <p><b>430 - Operations Research: Linear Programming (3 S.H.)</b> An introduction to linear programming, including the simplex method. Other topics chosen from duality, sensitivity analysis, and the transportation and assignment problems. Prerequisite: One calculus course. Recommended: One linear algebra course. Offered alternate <del>fall</del> semesters.</p> <p><b>435 - Operations Research: Modeling (3 S.H.)</b> This course emphasizes mathematical model building: problem identification and model construction. Topics chosen from among network flow analysis, nonlinear mathematical programming, queuing theory, simulation, integer programming, and Markov chains. Prerequisite: One calculus course. Recommended: One course in probability and statistics and more than one course in calculus. Offered <del>on-demand</del>.</p> <p><b>440 - Abstract Algebra (4 S.H.)</b> Axiomatic development of groups, rings, and fields. Prerequisite: MATH 210. Offered fall semester.</p> <p><b>450 - Introduction to Topology (3 S.H.)</b></p>	<p>2014, etc.).</p> <p><b>410 - History of Mathematics (3 S.H.)</b> General view of the historical development of the elementary branches of mathematics. Prerequisites: MATH 160 and MATH 210. Offered on demand.</p> <p><b>420 - Numerical Analysis (4 S.H.)</b> Numerical solution of equations, numerical interpolation, differentiation, and integration, numerical linear algebra, numerical solution of differential equations with analysis and use of algorithms and related software. Prerequisites: CS 231 or CS 234 and MATH 260. Offered fall semesters of odd numbered years (e.g. Fall 2011, Fall 2013, etc.).</p> <p><b>430 - Operations Research: Linear Programming (3 S.H.)</b> An introduction to linear programming, including the simplex method. Other topics chosen from duality, sensitivity analysis, and the transportation and assignment problems. Prerequisite: One calculus course. Recommended: One linear algebra course. Offered periodically spring semesters of odd numbered years (e.g. Spring 2013, Spring 2015, etc.).</p> <p><b>435 - Operations Research: Modeling (3 S.H.)</b> This course emphasizes mathematical model building: problem identification and model construction. Topics chosen from among network flow analysis, nonlinear mathematical programming, queuing theory, simulation, integer programming, and Markov chains. Prerequisite: One calculus course. Recommended: One course in probability and statistics and more than one course in calculus. Offered periodically spring semesters of odd numbered years (e.g. Spring 2013, Spring 2015, etc.).</p> <p><b>440 - Abstract Algebra I (3 S.H.)</b> Axiomatic development of groups, rings, and fields. Prerequisite: MATH 210. Recommended: MATH 310. Offered every fall semester.</p> <p><b>445 - Abstract Algebra II (3 S.H.)</b> A continuation of the topics in Abstract Algebra I. Prerequisite: MATH440. Offered spring semesters of odd numbered years (e.g. Spring 2013, Spring 2015, etc.).</p> <p><b>450 - Introduction to Topology (3 S.H.)</b></p>

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<p>A study of indexed families of sets, mappings, diagrams, continuity, neighborhoods, limit points, open and closed sets. Prerequisites: MATH 165 and MATH 210. Offered <del>on demand</del>.</p> <p><b>460 - Real Analysis (3 S.H.)</b> Measurable sets, measurable functions, and the theory and methods of Lebesgue integration. Additional topics at the instructor's discretion, e.g., summability, L theory of Fourier series, orthogonal expansions in L, famous theorems of analysis. Prerequisite: MATH 330. Offered on demand.</p> <p><b>470 - Math Projects (1-4 S.H.)</b> Practical experience in working on real problems or research under the supervision of a faculty member. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>480 - Special Topics (1-3 S.H.)</b> Exposure to mathematical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>490 - Independent Problems in Mathematics (1-4 S.H.)</b> An opportunity to continue study of selected topics. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>MATHEMATICS EDUCATION - MTED</b></p> <p><b>125 - Mathematics for Elementary Teachers (4 S.H.)</b> The study of concepts and properties of operations essential to mathematics in the elementary and middle school grades. Prerequisite: Completion of basic skills mathematics (MATH) requirement.</p> <p><b>201 - Technology-Based Geometry and Probability for Elementary Teachers (4 S.H.)</b> The study of geometry using technology and probability topics essential to mathematics in the elementary and middle school grades. Prerequisite: MTED 125.</p> <p><b>222 - Middle School Methods in Mathematics (3 S.H.)</b> Organization and methods of teaching mathematics in the middle school, including a 10-hour field experience. Prerequisite: MTED 201.</p> <p><b>225 - Numerical Reasoning for Middle School Teachers (3 S.H.)</b></p>	<p>A study of indexed families of sets, mappings, diagrams, continuity, neighborhoods, limit points, open and closed sets. Prerequisites: MATH 165 and MATH 210. Offered <b>periodically spring semesters of odd numbered years (e.g. Spring 2013, Spring 2015, etc.)</b>.</p> <p><b>460 - Real Analysis (3 S.H.)</b> Measurable sets, measurable functions, and the theory and methods of Lebesgue integration. Additional topics at the instructor's discretion, e.g., summability, L theory of Fourier series, orthogonal expansions in L, famous theorems of analysis. Prerequisite: MATH 330. Offered on demand.</p> <p><b>470 - Math Projects (1-4 S.H.)</b> Practical experience in working on real problems or research under the supervision of a faculty member. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>480 - Special Topics (1-3 S.H.)</b> Exposure to mathematical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>490 - Independent Problems in Mathematics (1-4 S.H.)</b> An opportunity to continue study of selected topics. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>MATHEMATICS EDUCATION - MTED</b></p> <p><b>125 - Mathematics for Elementary Teachers (4 S.H.)</b> The study of concepts and properties of operations essential to mathematics in the elementary and middle school grades. Prerequisite: Completion of basic skills mathematics (MATH) requirement.</p> <p><b>201 - Technology-Based Geometry and Probability for Elementary Teachers (4 S.H.)</b> The study of geometry using technology and probability topics essential to mathematics in the elementary and middle school grades. Prerequisite: MTED 125.</p> <p><b>222 - Middle School Methods in Mathematics (3 S.H.)</b> Organization and methods of teaching mathematics in the middle school, including a 10-hour field experience. Prerequisite: MTED 201.</p> <p><b>225 - Numerical Reasoning for Middle School Teachers (3 S.H.)</b></p>

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<p>This course gives the middle school mathematics teacher a deeper understanding of number systems (integers, rational numbers, real numbers) and number theory. Physical materials, models, technology and middle school curricula will be used to explore fundamental properties of number systems, to model algorithms, and to explore number theory topics. Prerequisite: MTED 125.</p> <p><b>289 - Special Topics (1-3 S.H.)</b> Exposure to lower-division mathematics education topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>290 - Independent Problems in Mathematics Education (1-3 S.H.)</b> An opportunity to study selected lower-division topics in mathematics education. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>320 - Teaching Mathematics in the Secondary Schools (3 S.H.)</b> This course is designed to inform the prospective secondary mathematics teacher about current trends and issues in the teaching of mathematics. It also focuses on instructional techniques and development of appropriate materials for the classroom. The course includes a 30-hour field experience component at the secondary level. Prerequisites: MATH 165, MATH 210, and MTED 222. Offered fall semester.</p> <p><b>322 - Modern Geometry (4 S.H.)</b> This course is designed to give the prospective teacher of secondary school geometry an exposure to the concepts of non-Euclidean geometries, their relation to, and their impact on secondary school geometry. Teaching methodology and related items will be incorporated throughout the course. Prerequisites: MATH 165 and MATH 210. Offered spring semester.</p> <p><b>420 - Technology and Professional Development in the Secondary Schools (3 S.H.)</b> This course incorporates the use of technology in the teaching of mathematics, research in mathematics education, and professional development as a teacher of mathematics. Students are required to make a public presentation and attend a professional meeting. Prerequisites: MTED 320 and MTED 322. Offered fall semester.</p>	<p>This course gives the middle school mathematics teacher a deeper understanding of number systems (integers, rational numbers, real numbers) and number theory. Physical materials, models, technology and middle school curricula will be used to explore fundamental properties of number systems, to model algorithms, and to explore number theory topics. Prerequisite: MTED 125.</p> <p><b>289 - Special Topics (1-3 S.H.)</b> Exposure to lower-division mathematics education topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>290 - Independent Problems in Mathematics Education (1-3 S.H.)</b> An opportunity to study selected lower-division topics in mathematics education. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>320 - Teaching Mathematics in the Secondary Schools (3 S.H.)</b> This course is designed to inform the prospective secondary mathematics teacher about current trends and issues in the teaching of mathematics. It also focuses on instructional techniques and development of appropriate materials for the classroom. The course includes a 30-hour field experience component at the secondary level. Prerequisites: MATH 165, MATH 210, and MTED 222. Offered fall semester.</p> <p><b>322 - Modern Geometry (4 S.H.)</b> This course is designed to give the prospective teacher of secondary school geometry an exposure to the concepts of non-Euclidean geometries, their relation to, and their impact on secondary school geometry. Teaching methodology and related items will be incorporated throughout the course. Prerequisites: MATH 165 and MATH 210. Offered spring semester.</p> <p><b>420 - Technology and Professional Development in the Secondary Schools (3 S.H.)</b> This course incorporates the use of technology in the teaching of mathematics, research in mathematics education, and professional development as a teacher of mathematics. Students are required to make a public presentation and attend a professional meeting. Prerequisites: MTED 320 and MTED 322. Offered fall semester.</p>

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<p><b>489 - Special Topics (1-3 S.H.)</b> Exposure to mathematics education topics not included in other courses. Prerequisite: Determined by topics.</p> <p><b>490 - Independent Problems in Mathematics Education (1-4 S.H.)</b> An opportunity to continue study of selected topics in mathematics education. Prerequisite: Instructor's permission.</p> <p><b>STATISTICS - STAT</b></p> <p><b>110 - Fundamentals of Statistics (3 S.H.)</b> Introductory statistics with emphasis on applications. Note: Students in certain majors should take STAT 210 instead of STAT 110. Prerequisite: Qualifying score on the mathematics placement exam or MATH 050.</p> <p><b>210 - Statistics (3 S.H.)</b> First course in statistics for students with a strong mathematics background. Prerequisites: MATH 140 or MATH 160.</p> <p><b>250 - Actuarial Exam Preparation (2 S.H.)</b> This is an independent study course designed to help students with actuarial exam preparation. Students enrolled in this course are required to take the appropriate exam at the date nearest completion of this course. Course cannot be applied toward fulfilling major or minor program requirements. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>255 - Data Management Using SAS (3 S.H.)</b> An introduction to the statistical package SAS. The course will focus on DATA step programming and selected basic PROC routines, with an introduction to SAS/GRAPH if time permits. Prerequisite: STAT 110 or equivalent. Offered spring semester.</p> <p><b>289 - Special Topics (1-3 S.H.)</b> Exposure to lower-division statistical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>290 - Independent Problems in Statistics (1-4 S.H.)</b> Exposure to statistical topics not included in other courses. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>303 - Introduction to Engineering Statistics (3 S.H.)</b> Introduction to statistics and quality control concepts and techniques. Topics include graphical</p>	<p><b>489 - Special Topics (1-3 S.H.)</b> Exposure to mathematics education topics not included in other courses. Prerequisite: Determined by topics.</p> <p><b>490 - Independent Problems in Mathematics Education (1-4 S.H.)</b> An opportunity to continue study of selected topics in mathematics education. Prerequisite: Instructor's permission.</p> <p><b>STATISTICS - STAT</b></p> <p><b>110 - Fundamentals of Statistics (3 S.H.)</b> Introductory statistics with emphasis on applications. Note: Students in certain majors should take STAT 210 instead of STAT 110. Prerequisite: Qualifying score on the mathematics placement exam or MATH 050.</p> <p><b>210 - Statistics (3 S.H.)</b> First course in statistics for students with a strong mathematics background. Prerequisites: MATH 140 or MATH 160.</p> <p><b>250 - Actuarial Exam Preparation (2 S.H.)</b> This is an independent study course designed to help students with actuarial exam preparation. Students enrolled in this course are required to take the appropriate exam at the date nearest completion of this course. Course cannot be applied toward fulfilling major or minor program requirements. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>255 - Data Management Using SAS (3 S.H.)</b> An introduction to the statistical package SAS. The course will focus on DATA step programming and selected basic PROC routines, with an introduction to SAS/GRAPH if time permits. Prerequisite: STAT 110 or equivalent. Offered spring semester.</p> <p><b>289 - Special Topics (1-3 S.H.)</b> Exposure to lower-division statistical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>290 - Independent Problems in Statistics (1-4 S.H.)</b> Exposure to statistical topics not included in other courses. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>303 - Introduction to Engineering Statistics (3 S.H.)</b> Introduction to statistics and quality control concepts and techniques. Topics include graphical</p>

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<p>techniques, descriptive statistics, probability distributions, hypothesis testing, control charts, process capability studies, and additional topics in total quality management. Note: Credit will not be given for both STAT 210 and STAT 303. Prerequisite: MATH 160. Offered fall semester.</p> <p><b>305 - Biometry (3 S.H.)</b> An introductory course of statistical applications to the biological sciences. Data reduction, sampling, techniques of estimation, hypothesis testing, and model verification procedures are included. Diversity indices, techniques of species sampling, and other specific biometric methods will be covered. Prerequisite: MATH 120, MATH 150, or instructor's permission. Note: MATH 305 cannot be used as a MATH or STAT elective for mathematics, mathematics education, or statistics majors.</p> <p><b>310 - Intermediate Statistics (3 S.H.)</b> A second course in statistics covering regression, measures of association, and analysis of variance. Interpretation of computer output and applications will be emphasized throughout. Prerequisites: STAT 110, STAT 210, STAT 303, STAT 305, PSY 231 or equivalent. Credit will not be given for STAT 310 if the student has completed STAT 360 or STAT 365.</p> <p><b>320 - Statistical Quality Control (3 S.H.)</b> An introduction to the basic philosophy of quality control and statistical tools used in quality control. Tools to include control charts, Ishikawa fishbone charts, Pareto charts, histograms, stem-and-leaf plots, and dot plots. There will be industrial case studies and tours of local industries (when available). Prerequisite: An introductory statistics course (preferably STAT 210). Offered alternate fall semesters.</p> <p><b>321 - Industrial Design of Experiments I (3 S.H.)</b> An introduction to applications of statistical methods used by industrial researchers to aid in the solution of certain types of industrial problems. Methods to include analysis of means, analysis of variance, factorial designs, fractional factorial (screening) designs. There will be industrial case studies and actual (hands-on) experience at local industries (when available). Prerequisite: An introductory statistics course</p>	<p>techniques, descriptive statistics, probability distributions, hypothesis testing, control charts, process capability studies, and additional topics in total quality management. Note: Credit will not be given for both STAT 210 and STAT 303. Prerequisite: MATH 160. Offered fall semester.</p> <p><b>305 - Biometry (3 S.H.)</b> An introductory course of statistical applications to the biological sciences. Data reduction, sampling, techniques of estimation, hypothesis testing, and model verification procedures are included. Diversity indices, techniques of species sampling, and other specific biometric methods will be covered. Prerequisite: MATH 120, MATH 150, or instructor's permission. Note: MATH 305 cannot be used as a MATH or STAT elective for mathematics, mathematics education, or statistics majors.</p> <p><b>310 - Intermediate Statistics (3 S.H.)</b> A second course in statistics covering regression, measures of association, and analysis of variance. Interpretation of computer output and applications will be emphasized throughout. Prerequisites: STAT 110, STAT 210, STAT 303, STAT 305, PSY 231 or equivalent. Credit will not be given for STAT 310 if the student has completed STAT 360 or STAT 365.</p> <p><b>320 - Statistical Quality Control (3 S.H.)</b> An introduction to the basic philosophy of quality control and statistical tools used in quality control. Tools to include control charts, Ishikawa fishbone charts, Pareto charts, histograms, stem-and-leaf plots, and dot plots. There will be industrial case studies and tours of local industries (when available). Prerequisite: An introductory statistics course (preferably STAT 210). Offered alternate fall semesters.</p> <p><b>321 - Industrial Design of Experiments I (3 S.H.)</b> An introduction to applications of statistical methods used by industrial researchers to aid in the solution of certain types of industrial problems. Methods to include analysis of means, analysis of variance, factorial designs, fractional factorial (screening) designs. There will be industrial case studies and actual (hands-on) experience at local industries (when available). Prerequisite: An introductory statistics course</p>

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<p>(preferably STAT 210 or STAT 303). Offered spring semester.</p> <p><b>322 - Industrial Design of Experiments II (3 S.H.)</b> A second course in experimental design methods in industry. Topics may include empirical model building, review of factorial and fractional factorial designs, process improvement with steepest ascent, analysis of response surfaces, experimental designs for fitting response surfaces, Taguchi's robust parameter designs, experiments with mixtures. Prerequisite: STAT 321 or instructor's permission. Offered on demand.</p> <p><b>350 - Design of Samples and Surveys (3 S.H.)</b> Practical problems of surveys. Design of optimal surveys. Questionnaire design. Practical problems of sampling. Design of optimal sampling procedures. Adapting standard statistical techniques to specialized sampling design. Prerequisite: An introductory statistics course (preferably STAT 210). Offered fall semester.</p> <p><b>355 - Nonparametric Statistics (3 S.H.)</b> Statistical methods based on runs, the empirical distribution function and ranks. Topics will include one and two sample tests, ANOVA, goodness of fit tests, rank regression, correlation, and confidence intervals. Both applications and theory emphasized. Prerequisite: STAT 110 or STAT 210. Offered on demand.</p> <p><b>360 - Regression Analysis (3 S.H.)</b> Simple linear regression, multiple regression, hypothesis testing, analysis of residuals, stepwise regression. Interpretation of computer output will be emphasized. Prerequisite: An introductory statistics course (preferably STAT 210 or STAT 305). Completion of or concurrent enrollment in <del>MATH 130 or MATH 270</del> is recommended. Offered fall semester.</p> <p><b>365 - Experimental Design and Analysis (3 S.H.)</b> One-way Analysis of Variance, planned comparisons, post-hoc procedures, two- and three-way Analysis of Variance, experimental design, Analysis of Covariance. Interpretation of computer output will be emphasized. Prerequisite: An introductory statistics course (preferably STAT 210 or STAT 305). Completion of, or concurrent enrollment in <del>MATH 130 or MATH 270</del>, is recommended; completion of STAT 360 is also</p>	<p>(preferably STAT 210 or STAT 303). Offered spring semester.</p> <p><b>322 - Industrial Design of Experiments II (3 S.H.)</b> A second course in experimental design methods in industry. Topics may include empirical model building, review of factorial and fractional factorial designs, process improvement with steepest ascent, analysis of response surfaces, experimental designs for fitting response surfaces, Taguchi's robust parameter designs, experiments with mixtures. Prerequisite: STAT 321 or instructor's permission. Offered on demand.</p> <p><b>350 - Design of Samples and Surveys (3 S.H.)</b> Practical problems of surveys. Design of optimal surveys. Questionnaire design. Practical problems of sampling. Design of optimal sampling procedures. Adapting standard statistical techniques to specialized sampling design. Prerequisite: An introductory statistics course (preferably STAT 210). Offered fall semester.</p> <p><b>355 - Nonparametric Statistics (3 S.H.)</b> Statistical methods based on runs, the empirical distribution function and ranks. Topics will include one and two sample tests, ANOVA, goodness of fit tests, rank regression, correlation, and confidence intervals. Both applications and theory emphasized. Prerequisite: STAT 110 or STAT 210. Offered on demand.</p> <p><b>360 - Regression Analysis (3 S.H.)</b> Simple linear regression, multiple regression, hypothesis testing, analysis of residuals, stepwise regression. Interpretation of computer output will be emphasized. Prerequisite: An introductory statistics course (preferably STAT 210 or STAT 305). Completion of or concurrent enrollment in MATH 205 is recommended. Offered fall semester.</p> <p><b>365 - Experimental Design and Analysis (3 S.H.)</b> One-way Analysis of Variance, planned comparisons, post-hoc procedures, two- and three-way Analysis of Variance, experimental design, Analysis of Covariance. Interpretation of computer output will be emphasized. Prerequisite: An introductory statistics course (preferably STAT 210 or STAT 305). Completion of, or concurrent enrollment in MATH 205, is recommended; completion of STAT 360 is also recommended.</p>

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<p>recommended. Offered spring semester.</p> <p><b>370 - Statistical Consulting (3 S.H.)</b>            In this course, the student will gain an understanding of the nature of applied consulting and the scientific philosophies and skills required to be successful as a statistical consultant. This course will continue to develop the oral and written communication skills that are necessary for communicating technical statistical content with non-statisticians. Students will provide statistical consulting service to the University community when projects are available.            Prerequisite: STAT 360 or STAT 365. Offered fall semesters.</p> <p><b>405 - Biostatistics (3 S.H.)</b>            This course will give students an overview of Biostatistics. The topics to be covered include contingency tables analysis, relative risk, odds ratios, partial association, Cochran-Mantel-Haenszel methods, two-way ANOVA, interactions, repeated measures, logistic regression, Poisson regression, Kaplan-Meier methods, and Cox proportional hazards models. Parametric methods and various nonparametric alternatives will be discussed. Prerequisite: An introductory statistics course (preferably STAT 210 or STAT 305). Offered alternate fall semesters.</p> <p><b>415 - Multivariate Analysis (3 S.H.)</b>            Statistical analysis of multivariate data. Topics will include preparation of data for analysis, selection of techniques appropriate to research questions, measures of association for continuous and discrete variables, Hotelling's T, MANOVA, MANCOVA, discriminant analysis, principal component and factor analysis. This is a computer-oriented course with emphasis on application.            Prerequisites: MATH <del>130</del> or MATH 270, STAT 360, or instructor's permission. Offered alternate spring semesters.</p> <p><b>425 - Modern Methods of Data Analysis (3 S.H.)</b>            An introduction to the use of the computer as a powerful tool in data analysis. Topics will include statistical graphics, advanced regression techniques, curve fitting and smoothing, generalized additive models, CART, multivariate techniques, cross-validation and the bootstrap. Additional topics that may be covered are random</p>	<p>Offered spring semester.</p> <p><b>370 - Statistical Consulting (3 S.H.)</b>            In this course, the student will gain an understanding of the nature of applied consulting and the scientific philosophies and skills required to be successful as a statistical consultant. This course will continue to develop the oral and written communication skills that are necessary for communicating technical statistical content with non-statisticians. Students will provide statistical consulting service to the University community when projects are available.            Prerequisite: STAT 360 or STAT 365. Offered fall semesters.</p> <p><b>405 - Biostatistics (3 S.H.)</b>            This course will give students an overview of Biostatistics. The topics to be covered include contingency tables analysis, relative risk, odds ratios, partial association, Cochran-Mantel-Haenszel methods, two-way ANOVA, interactions, repeated measures, logistic regression, Poisson regression, Kaplan-Meier methods, and Cox proportional hazards models. Parametric methods and various nonparametric alternatives will be discussed. Prerequisite: An introductory statistics course (preferably STAT 210 or STAT 305). Offered alternate fall semesters.</p> <p><b>415 - Multivariate Analysis (3 S.H.)</b>            Statistical analysis of multivariate data. Topics will include preparation of data for analysis, selection of techniques appropriate to research questions, measures of association for continuous and discrete variables, Hotelling's T, MANOVA, MANCOVA, discriminant analysis, principal component and factor analysis. This is a computer-oriented course with emphasis on application.            Prerequisites: MATH 205, STAT 360, or instructor's permission. Offered alternate spring semesters.</p> <p><b>425 - Modern Methods of Data Analysis (3 S.H.)</b>            An introduction to the use of the computer as a powerful tool in data analysis. Topics will include statistical graphics, advanced regression techniques, curve fitting and smoothing, generalized additive models, CART, multivariate techniques, cross-validation and the bootstrap. Additional topics that may be covered are random</p>

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<p>number generation and Monte Carlo simulation methods. Prerequisites: MATH 165 and STAT 360. Offered alternate spring semesters.</p> <p><b>440 - Epidemiology (3 S.H.)</b> A general introduction to the concepts and methods of epidemiology as they are applied in a variety of disease situations. Topics include modeling the disease process in a population; retrospective, prospective, and observational studies; rates, ratios, and data interpretation; and evaluation of epidemiological information. Prerequisite: An introductory statistics course. Offered on demand.</p> <p><b>450, 460 - Introduction to Mathematical Statistics I, II (3 S.H. Each)</b> A mathematical approach to probability and statistics. Prerequisites: MATH 260 and completion of or concurrent enrollment in MATH 220. Offered yearly as a fall/spring sequence.</p> <p><b>488 - Statistics Projects (1-6 S.H.)</b> Practical experience working on real problems under the supervision of a faculty member experienced in statistics. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>489 - Special Topics (1-3 S.H.)</b> Exposure to statistical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>490 - Independent Problems in Statistics (1-4 S.H.)</b> An opportunity for continued study of selected topics. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>492 - Practicum in Statistics (3-6 S.H.)</b> Provides the student with experience and training in statistical techniques. The student will work a minimum of 100 hours (3 credits) or a minimum of 200 hours (6 credits) on a job utilizing statistics. Prerequisite: Instructor's permission. P/NC only. Offered on demand.</p>	<p>number generation and Monte Carlo simulation methods. Prerequisites: MATH 165 and STAT 360. Offered alternate spring semesters.</p> <p><b>440 - Epidemiology (3 S.H.)</b> A general introduction to the concepts and methods of epidemiology as they are applied in a variety of disease situations. Topics include modeling the disease process in a population; retrospective, prospective, and observational studies; rates, ratios, and data interpretation; and evaluation of epidemiological information. Prerequisite: An introductory statistics course. Offered on demand.</p> <p><b>450, 460 - Introduction to Mathematical Statistics I, II (3 S.H. Each)</b> A mathematical approach to probability and statistics. Prerequisites: MATH 260 and completion of or concurrent enrollment in MATH 220. Offered yearly as a fall/spring sequence.</p> <p><b>488 - Statistics Projects (1-6 S.H.)</b> Practical experience working on real problems under the supervision of a faculty member experienced in statistics. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>489 - Special Topics (1-3 S.H.)</b> Exposure to statistical topics not included in other courses. Prerequisite: Determined by topics. Offered on demand.</p> <p><b>490 - Independent Problems in Statistics (1-4 S.H.)</b> An opportunity for continued study of selected topics. Prerequisite: Instructor's permission. Offered on demand.</p> <p><b>492 - Practicum in Statistics (3-6 S.H.)</b> Provides the student with experience and training in statistical techniques. The student will work a minimum of 100 hours (3 credits) or a minimum of 200 hours (6 credits) on a job utilizing statistics. Prerequisite: Instructor's permission. P/NC only. Offered on demand.</p>