Statistics and Analytics (STAN)

Mark Arnold
Program Director
301 Science Engineering Building
479-575-3351
Email: arnold@uark.edu

Statistics and Analytics Website (https://statistics-analytics.uark.edu/)

Degree Conferred:
M.S. (STANMS)

Graduate Certificate Offered:
Graduate Certificate in Statistics and Analytics (STANGC) (Nondegree)

Program Description: The Graduate Certificate and M.S. degree in Statistics and Analytics are cross-college interdisciplinary programs that build on the university’s current strengths in the Colleges of Arts and Sciences; Business; Education and Health Professions; and Engineering. Students may choose one of six concentrations: Statistics; Biological Analytics; Business Analytics; Operations Analytics; Computational Analytics; Educational Statistics & Psychometrics; or Quantitative Social Sciences.

Primary Areas of Faculty Research: Statistics and statistical analysis and design methodologies in business analytics, operations analytics, computational analytics, educational statistics and social science research.

Admission to the Master’s Program: In addition to the requirements of the Graduate School, applicants for admission to the M.S. program in Statistics and Analytics must submit a) three letters of recommendation from persons familiar with the applicant’s previous academic and professional performance and b) official test scores as specified for the applicant’s area of interest.

Requirements for the Master of Science (M.S.) Degree
Requirements for the master’s degree are fulfilled through one of seven concentrations. Students should also be aware of Graduate School requirements with regard to master’s degrees (http://catalog.uark.edu/graduatemcatalog/degreerequirements/#mastersdegreestext).

Requirements for Concentration in Biological Analytics
Undergraduate Deficiencies

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2554</td>
<td>Calculus I (ACTS Equivalency = MATH 2405)</td>
</tr>
<tr>
<td>MATH 3083</td>
<td>Linear Algebra</td>
</tr>
</tbody>
</table>

Core

Requirements include one course from each of these areas as approved by the student’s advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 5013</td>
<td>Advanced Special Topics in Computer Science or Computer Engineering (taken as introduction to cluster computing)</td>
</tr>
<tr>
<td>BIOL 5153</td>
<td>Practical Programming for Biologists</td>
</tr>
</tbody>
</table>

Choose from one of the following options:

- 9 additional hours of electives
- 3 hours of electives, 6 hours of thesis credit, and submission of an acceptable thesis

Written comprehensive exam (non-thesis) or defense of the thesis

Total Hours 30

Requirements for the Master of Science (M.S.) Degree
Requirements for the master’s degree are fulfilled through one of seven concentrations. Students should also be aware of Graduate School requirements with regard to master’s degrees (http://catalog.uark.edu/graduatemcatalog/degreerequirements/#mastersdegreestext).

Requirements for Concentration in Business Analytics

Undergraduate Deficiencies

<table>
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<th>Course</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>MATH 2554</td>
<td>Calculus I (ACTS Equivalency = MATH 2405)</td>
</tr>
</tbody>
</table>

Core

Requirements include one course from each of these areas as approved by the student’s advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISYS 5103</td>
<td>Data Analytics Fundamentals</td>
</tr>
<tr>
<td>ISYS 5833</td>
<td>Data Management Systems</td>
</tr>
<tr>
<td>ISYS 5843</td>
<td>Seminar in Business Intelligence and Knowledge Management</td>
</tr>
</tbody>
</table>

Choose one of the following options:

- 9 hours of electives
- 3 hours of electives and 6 hours of thesis credit and submission of an acceptable thesis.

Written comprehensive exam (non-thesis) or defense of the thesis.

Total Hours 30

Requirements for Concentration in Computational Analytics

Undergraduate Deficiencies

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2554</td>
<td>Calculus I (ACTS Equivalency = MATH 2405)</td>
</tr>
<tr>
<td>MATH 3083</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>CSCE 4133</td>
<td>Algorithms</td>
</tr>
</tbody>
</table>

Core

Requirements include one course from each of these areas as approved by the student’s advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 5523</td>
<td>Database Management Systems</td>
</tr>
</tbody>
</table>

Two of the following:

- Database Management Systems 3

Total Hours 6
Requirements for the Master of Science (M.S.) Degree
Requirements for the master's degree are fulfilled through one of seven concentrations. Students should also be aware of Graduate School requirements with regard to master's degrees (http://catalog.uark.edu/graduatecatalog/degreerequirements/#mastersdegreestext).

Requirements for Concentration in Educational Statistics and Psychometrics
Undergraduate Deficiencies
MATH 2554 Calculus I (ACTS Equivalency = MATH 2405)
MATH 3083 Linear Algebra
Core
Requirements include one course from each of these areas as approved by the student's advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design

Required Courses
ESRM 5013 Research Methods in Education 3
ESRM 6653 Measurement and Evaluation 3
ESRM 6753 Item Response Theory 3
Choose one of the following options:
9 hours of electives as approved by the student's advisory committee
3 hours of electives, 6 hours of thesis credit, and submission of an acceptable thesis
Written comprehensive exam (non-thesis) or defense of the thesis

Total Hours 30

Requirements for the Master of Science (M.S.) Degree
Requirements for the master's degree are fulfilled through one of seven concentrations. Students should also be aware of Graduate School requirements with regard to master's degrees (http://catalog.uark.edu/graduatecatalog/degreerequirements/#mastersdegreestext).

Requirements for Concentration in Quantitative Social Science
Undergraduate Deficiencies
MATH 2554 Calculus I (ACTS Equivalency = MATH 2405)
MATH 3083 Linear Algebra
STAT 3013 Introduction to Probability
Core
Requirements include one course from each of these areas as approved by the student's advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design.

Required Courses
ISYS 5723 Advanced Multivariate Analysis 3
ECON 5753 Forecasting 3
ECON 6623 Econometrics II 3
ECON 6633 Econometrics III 3
Choose one of the following options:
6 hours of electives to include two of the following: cost benefit analysis; GIS and spatial analysis; multilevel modeling; social network analysis
6 hours of thesis credit and submission of an acceptable thesis
Written comprehensive exam (non-thesis) or defense of the thesis

Total Hours 30

Requirements for the Master of Science (M.S.) Degree
Requirements for the master's degree are fulfilled through one of seven concentrations. Students should also be aware of Graduate School requirements with regard to master's degrees (http://catalog.uark.edu/graduatecatalog/degreerequirements/#mastersdegreestext).

Requirements for Concentration in Operations Analytics
Undergraduate Deficiencies
MATH 2554 Calculus I (ACTS Equivalency = MATH 2405)
MATH 3083 Linear Algebra
STAT 3013 Introduction to Probability
Core
Requirements include one course from each of these areas as approved by the student's advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design

Required Courses
INEG 5613 Introduction to Optimization Theory 3
INEG 5803 Simulation 3
One of the following:
ISYS 5843 Seminar in Business Intelligence and Knowledge Management
CSCE 5073 Data Mining
Choose one of the following options:
9 hours of electives
3 hours of electives, 6 hours of thesis credit and submission of an acceptable thesis
Written comprehensive exam (non-thesis) or defense of the thesis

Total Hours 30

Requirements for the Master of Science (M.S.) Degree
Requirements for the master's degree are fulfilled through one of seven concentrations. Students should also be aware of Graduate School requirements with regard to master's degrees (http://catalog.uark.edu/graduatecatalog/degreerequirements/#mastersdegreestext).

Requirements for Concentration in Statistics
Undergraduate Deficiencies
MATH 2564 Calculus II (ACTS Equivalency = MATH 2505)
MATH 3083 Linear Algebra
Core
Requirements include one course from each of these areas as approved by the student's advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design

Required Courses
MATH 2563 Introduction to Probability 3
MATH 3083 Linear Algebra

Total Hours 30
### CSCE 2014  Programming Foundations II

**Core**

Requirements include one course from each of these areas as approved by the student’s advisory committee: Statistical Methods, Regression Analysis, Multivariate Analysis, Experimental Design

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 5103</td>
<td>Introduction to Probability Theory</td>
<td>3</td>
</tr>
<tr>
<td>STAT 5113</td>
<td>Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>STAT 5333</td>
<td>Analysis of Categorical Responses</td>
<td>3</td>
</tr>
<tr>
<td>STAT 5443</td>
<td>Computational Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose one of the following options:

- 6 hours of electives
- 6 hours of thesis credit and submission of acceptable thesis

Written comprehensive exam (non-thesis) or defense of thesis

**Total Hours** 30

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### Graduate Certificate in Statistics and Analytics (STAN)

**Requirements for the Graduate Certificate in Statistics and Analytics:**

The Graduate Certificate requires 12 hours of courses as specified below.

Choose one of the following: 3-4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 5003</td>
<td>Statistical Methods &amp; STAT 5001L Statistics Methods Laboratory</td>
</tr>
<tr>
<td>ESRM 6403</td>
<td>Educational Statistics and Data Processing</td>
</tr>
<tr>
<td>ISYS 5503</td>
<td>Decision Support and Analytics</td>
</tr>
<tr>
<td>PLSC 5913</td>
<td>Research Methods in Political Science</td>
</tr>
<tr>
<td>PSYC 5133</td>
<td>Inferential Statistics for Psychology</td>
</tr>
<tr>
<td>SOCI 5013</td>
<td>Advanced Social Research</td>
</tr>
</tbody>
</table>

Choose one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 5313</td>
<td>Regression Analysis</td>
</tr>
<tr>
<td>INEG 5393</td>
<td>Applied Regression Analysis for Engineers</td>
</tr>
<tr>
<td>PLSC 5943</td>
<td>Advanced Research Methods in Political Science</td>
</tr>
<tr>
<td>PSYC 5143</td>
<td>Advanced Descriptive Statistics for Psychology</td>
</tr>
<tr>
<td>SOCI 5313</td>
<td>Applied Data Analysis</td>
</tr>
</tbody>
</table>

Choose one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 5353</td>
<td>Methods of Multivariate Analysis</td>
</tr>
<tr>
<td>ISYS 5723</td>
<td>Advanced Multivariate Analysis</td>
</tr>
<tr>
<td>ESRM 6453</td>
<td>Applied Multivariate Statistics</td>
</tr>
</tbody>
</table>

Choose one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 4373</td>
<td>Experimental Design</td>
</tr>
<tr>
<td>INEG 5333</td>
<td>Design of Industrial Experiments</td>
</tr>
<tr>
<td>ESRM 6413</td>
<td>Experimental Design in Education</td>
</tr>
</tbody>
</table>

**Total Hours** 12

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### Graduate Faculty

**Aloysius, John, Ph.D. (Temple University), B.S. (University of Colombo, Sri Lanka), Professor, Department of Supply Chain Management, Oren Harris Chair in Logistics, 1995, 2017.**

**Arnold, Mark E., Ph.D., B.S. (Northern Illinois University), A.S. (Rock Valley College), Associate Professor, Department of Mathematical Sciences, 1993, 1999.**

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**Beaulieu, Jeremy M., Ph.D. (Yale University), M.S., B.S. (California Polytechnic State University), Associate Professor, Department of Biological Sciences, 2016, 2021.**

**Bridges, Ana Julia, Ph.D. (University of Rhode Island), M.S. (Illinois State University), B.S. (University of Illinois-Urbana-Champaign), Professor, Department of Psychological Science, 2007, 2019.**

**Cao, Chunhua, Ph.D. (University of South Florida-Tampa), Teaching Assistant Professor, Department of Rehabilitation, Human Resource and Communication Disorders, 2019.**

**Cassady, Richard, Ph.D., M.S.I.E., B.S.I.E. (Virginia Polytechnic Institute and State University), University Professor, Department of Industrial Engineering, 2000, 2019.**

**Chakraborty, Avishek, Ph.D. (Duke University), M.S., B.S. (Indian Statistical Institute), Associate Professor, Department of Mathematical Sciences, 2014, 2021.**

**Chima, Justin Robert, Ph.D., M.S.I.E., B.S.I.E. (University of Pittsburgh), Associate Professor, Department of Industrial Engineering, 2002, 2009.**

**Cothren, Jackson David, Ph.D., M.S. (The Ohio State University), B.S. (United States Air Force Academy), Professor, Department of Geosciences, 2004, 2020.**

**Covington, Matthew D., Ph.D. (University of California-Santa Cruz), B.A. (University of Arkansas), Associate Professor, Department of Geosciences, 2012, 2018.**

**Cronan, Timothy P., Ph.D. (Louisiana Tech University), M.S. (South Dakota State University), B.S. (University of Southwestern Louisiana), Professor, Department of Information Systems, M.D. Matthews Endowed Chair in Information Systems, 1979.**

**Douglas, Marius R., Ph.D., M.S., B.S. (University of Zurich), Professor, Department of Biological Sciences, Bruker Life Sciences Chair, 2012.**

**Douglas, Michael Edward, Ph.D. (University of Georgia), M.S., B.S. (University of Louisville), Professor, Department of Biological Sciences, 21st Century Chair in Global Change Biology, 2011.**

**Feng, Song, Ph.D., M.S. (Chinese Academy of Sciences), B.S. (Yunnan University), Associate Professor, Department of Geosciences, 2013, 2018.**

**Ferrier, Gary D., Ph.D. (University of North Carolina-Chapel Hill), B.A. (University of Wisconsin-Madison), Professor, Department of Economics, Lewis E. Epley Jr. Professorship in Economics, 1993, 2012.**

**Fitpatrick, Kevin M., Ph.D. (State University of New York at Albany), M.A. (University of South Carolina at Columbia), B.A. (Susquehanna University), University Professor, Department of Sociology and Criminology, Bernice Jones Chair in Community, 2005, 2014.**

**Freeze, Ron, Ph.D. (Arizona State University), M.B.A (University of Missouri-Kansas City), B.S. (General Motors Institute), Clinical Professor, Department of Information Systems, 2015, 2021.**

**Gaduh, Arya, Ph.D. (University of Southern California), M.Phil. (Cambridge University), B.A. (University of California-Berkeley), Associate Professor, Department of Economics, 2013, 2019.**

**Gauch, Susan E., Ph.D. (University of North Carolina at Chapel Hill), M.Sc., B.Sc. (Queen’s University, Canada), Professor, Department of Computer Science and Computer Engineering, 2007.**

**Gbur, Edward E., Ph.D., M.S. (The Ohio State University), B.S. (Saint Francis University), Professor, Department of Crop, Soil and Environmental Sciences, 1987, 1998.**

**Gu, Jingping, Ph.D. (Texas A&M University), M.A. (Peking University), B.A. (Renmin University of China, Beijing), Associate Professor, Department of Economics, 2008, 2014.**

**Harris, Casey Taggart, Ph.D., M.A. (Pennsylvania State University), B.S. (Texas A&M University), Associate Professor, Department of Sociology and Criminology, 2011, 2017.**
Johnson, Jon, Ph.D. (Indiana University at Bloomington), M.B.A., B.S. (University of Arkansas), Professor, Department of Strategic, Entrepreneurship and Venture Innovation, Walton College Professorship in Sustainability, 1996, 2007.

Levine, William H., Ph.D., M.S. (State University of New York at Binghamton), B.S. (DePaul University), Associate Professor, Department of Psychological Science, 2001, 2007.

Lo, Wen-Juo, Ph.D., M.A. (Arizona State University), B.S. (SooChow University), Associate Professor, Department of Rehabilitation, Human Resource and Communication Disorders, 2008, 2014.

Mauromoustakos, Andy, Ph.D., M.S. (Oklahoma State University), B.S. (Oral Roberts University), Professor, Department of Crop, Soil and Environmental Sciences, 1989, 2002.

Mitchell, Joshua Lee, Ph.D. (Southern Illinois University), M.P.A., B.S. (Murray State University), Associate Professor, Department of Political Science, 2010, 2019.

Mullins, Jeff, Ph.D., M.A., B.S. (University of Arkansas), Assistant Professor, Department of Information Systems, 2006, 2018.

Naithani, Kusum, Ph.D. (University of Wyoming), M.Sc. (G.B. Pant University of Agriculture and Technology-India), B.Sc. (University of Lucknow-India), Associate Professor, Department of Biological Sciences, 2014, 2021.

Parnell, Gregory S., Ph.D. (Stanford University), M.S. (University of Southern California), M.E.I.S.E. (University of Florida), B.S. (University of New York at Buffalo), Professor of Practice, Department of Industrial Engineering, 2013.

Petris, Giovanni, Ph.D., M.S. (Duke University), B.S. (Universita degli Studi di Milano, Italy), Professor, Department of Mathematical Sciences, 1999, 2015.


Rainwater, Chase E., Ph.D. (University of Florida), B.S.I.E. (University of Arkansas), Professor, Department of Industrial Engineering, 2009, 2021.

Rossetti, Manuel D., Ph.D., P.E., M.S.I.E. (The Ohio State University), B.S.I.E. (University of Cincinnati), University Professor, Department of Industrial Engineering, 1999, 2022.


Song, Geoboo, Ph.D. (University of Oklahoma), B.A. (Korea University), B.A. (Hanyang University), Associate Professor, Department of Political Science, 2012, 2019.

Stenken, Julie A., Ph.D. (University of Kansas), B.S. (University of Akron), Professor, Department of Chemistry and Biochemistry, 21st Century Chair of Proteomics, 2007.

Sykes, Tracy Ann, Ph.D. (University of Arkansas), B.S. (University of Maryland-College Park), Associate Professor, Department of Information Systems, 2011, 2016.

Turner, Ronna L., Ph.D. (University of Illinois-Urbana-Champaign), M.S.E. (Missouri State University), B.S.E. (Southwest Missouri State University), Professor, Department of Curriculum and Instruction, 1997, 2018.

Wu, Xintao, Ph.D. (George Mason University), M.E. (Chinese Academy of Space Technology), B.S. (University of Science and Technology of China), Professor, Department of Computer Science and Computer Engineering, Charles D. Morgan/Acxiom Graduate Research Chair, 2014, 2019.

Yang, Song, Ph.D., M.S. (University of Minnesota-Twin Cities), M.A. (Nankai University, China), B.A. (Branch College of Nankai, China), Professor, Department of Sociology and Criminology, 2002, 2016.

Zhang, Qingyang, Ph.D. (Northwestern University), M.S. (Loyola University--Chicago), B.S. (Beijing Normal University), Assistant Professor, Department of Mathematical Sciences, 2015.

Zhang, Shengfan, Ph.D., M.I.E. (North Carolina State University), B.M. (Fudan University, Shanghai), Associate Professor, Department of Industrial Engineering, John L. Imhoff Chair in Industrial Engineering, 2011, 2020.