EDUCATIONAL STATISTICS AND RESEARCH METHODS

Ph.D. in Educational Statistics and Research Methods

The Educational Statistics and Research Methods (ESRM) Ph.D. program is designed to equip graduates with comprehensive expertise for conducting advanced theoretical and applied research in quantitative statistical methods, psychometrics, educational psychology, and qualitative research methodologies. Recently, the program has expanded its scope significantly to integrate qualitative methods, fostering skills in qualitative inquiry, data collection, thematic analysis, and interpretive research frameworks. The primary learning objectives emphasize:

- Identifying, developing, and evaluating quantitative and qualitative research methods.
- Analyzing data using both quantitative and qualitative techniques and effectively communicating research findings.
- Critically reviewing and interpreting research literature.
- Collaborating efficiently with professional peers and stakeholders.

Graduates of this program are prepared to assume leadership roles in diverse professional environments, including academic institutions, educational agencies at the local, state, and national levels, research and policy organizations, and positions within business and industry sectors.

Assessment Criteria:

To ensure the ongoing effectiveness and relevance of the ESRM Ph.D. program, student competencies are regularly evaluated across the following areas:

1. Selecting appropriate research designs tailored to specific research inquiries.
2. Conducting statistical analyses effectively to test research hypotheses.
3. Demonstrating comprehensive understanding of the strengths, limitations, and appropriate uses of various statistical procedures.
4. Critically evaluating statistical analyses conducted by peers or within published studies.
5. Executing simulation studies to investigate and validate statistical procedures under diverse conditions.
6. Preparing and submitting research proposals and manuscripts for consideration by professional conferences and peer-reviewed journals.

7. Delivering clear, professional, and informative oral presentations of research findings.
8. Employing effective teaching strategies and methodologies in the instruction of statistical design and analytic techniques.

Effectiveness Evaluation:

The ESRM Ph.D. program is deeply committed to assessing and ensuring student success through systematic and rigorous data collection. The effectiveness evaluation incorporated extensive data from several critical performance indicators for this academic year. These include student-led research projects, candidacy examination outcomes, dissertation proposal quality, participation in professional conferences, published journal articles, successful grant applications, internship experiences, academic and professional awards, and job placement outcomes. This comprehensive evaluation framework supports a detailed appraisal of how effectively the program achieves its educational objectives and prepares students for professional advancement.

Assessment Information

Assessment Information (Academic Year 2024-2025)

Admissions:

- Two students were admitted to the ESRM Ph.D. program in Fall 2024.
- Two new students have been admitted and are scheduled to begin their studies in Fall 2025.

Current Enrollment:

- The program maintained a total enrollment of 13 active students this academic year.

Student Progression:

Graduation:

- One student successfully graduated in Fall 2024.
- Two students graduated in Spring 2025.
- One student is anticipated to graduate in the Summer of 2025.

Program Stages for Remaining Students:

- Two students admitted in Fall 2024 have successfully completed their first-year coursework and continue as full-time students, with one holding a departmental assistantship and the other funded through a private grant.
- Two students passed their comprehensive examinations in Spring 2025; one is a full-time student with a departmental assistantship, and the other is a part-time student employed as a research faculty member at UAMS.
- Two students (one full-time and one part-time) are scheduled to undertake their comprehensive examinations in Fall 2025.

Job placement:

- One recent graduate was appointed as an instructor at the College of Business, University of Arkansas, beginning in January 2025.
- All current part-time students hold professional positions in various sectors related to their expertise, including data management, psychometrics, and educational institutions. Specifically:
    - One serves as a research faculty member at UAMS.

- One is an assistant professor at Arkansas State University.
- Two are employed at UAMS as data managers and senior statisticians.
- One works as a statistician within a school district.
- One serves as a mathematics instructor at the University of Arkansas.

This structured assessment reflects the varied stages of academic and professional development within the ESRM Ph.D. program, demonstrating the program's capacity to support diverse academic and career trajectories.

Course-Based Data

The quality of course-based research projects and examinations, encompassing both in-class and take-home formats, serves as a critical measure for evaluating specific student learning outcomes. These outcomes include: (1) the identification of appropriate research designs, (2) proficiency in conducting statistical analyses, and (3) the ability to critically evaluate the strengths, weaknesses, and appropriateness of various statistical procedures.
Student performance was assessed utilizing a 5-point scale (ranging from 0 to 4). The scale categorizes mastery levels as follows: a score of 4 indicates a mastery level of 90% or higher, 3 corresponds to 80-89%, 2 represents 70-79%, 1 reflects 60-69%, and a score of 0 signifies performance below 60%. Scores were averaged across three primary knowledge domains, corresponding to relevant coursework provided during the 2024-2025 academic year. Detailed results are summarized in Table 1 and include:

1. Core Statistical Design Courses: Introduction to Statistics, Experimental Design, Multiple Regression, and Multivariate Analysis.
2. Measurement and Psychometrics: Measurement Theory and Item Response Theory.
3. Advanced Statistical Modeling: Structural Equation Modeling (SEM), Hierarchical Linear Modeling (HLM), Advanced Multivariate Statistics, and Advanced SEM.

This assessment includes data from 11 records. The overall mean performance across the considered 11 course records was 4.00, as presented in Table 1.

Table 1.
Average ESRM Ph.D. Student Performance for Learning Objectives 1, 2, and 3.

Learning Objectives	*N*	Average	Min.	Max.
1. Core Statistical Design Courses[a]	2	4.00	-	4.00
2. Measurement and Psychometrics[b]	6	4.00	-	4.00
3. Advanced Statistical Designs[c]	3	4.00	-	4.00

Note: [a]it includes four courses; [b]it includes one course; [b]it includes three courses.

Active Research, Internships, and Awards:

A summary of research presentations, articles, grants, internships, and fellowships is provided in Table 2.

Publications:
Many ESRM students collaborate closely with faculty members. Three manuscripts were published in the 2024-2025 academic year, and one additional manuscript is currently under review.

Presentations:
Doctoral students actively engaged in research activities, with six students contributing to 19 national and international conference presentations.

Internships:
One student successfully applied for and was awarded an American Board of Internal Medicine (ABIM), Research & Innovation summer internship for the summer of 2025.

Table 2.
Student Research Proposals, Manuscripts, Grants, and Internships

Learning Objectives 6 and 7	Number
Research Presentations	19
Journal Articles (published or in press)	3
Manuscript under review	1
Internships	1
Fellowships[a]	2
Award	1

Training Others and Collaborating with Professionals in Other Fields:

Teaching and Tutoring Experience:

Doctoral students in our program acquire significant pedagogical experience through both formal course instruction and tutoring roles within the statistics laboratory. Specifically, one graduate assistant, who previously taught AP Statistics at the high school level, currently teaches undergraduate sections of ESRM 24003: Statistics in Nursing.

Tutoring Services:

Three graduate assistants provide instructional support and individual tutoring services for undergraduate and graduate courses in the dedicated computer/statistics lab, enhancing student comprehension and application of statistical methods.

Consulting Center:

During the 2024-2025 academic year, two graduate assistants collaborated closely with ESRM faculty within the research consulting center. This center offers statistical consultation services to assist faculty and graduate students in the College of Education and Health Professions (COEHP) with research projects, grant proposals, and scholarly publications.

Assistantships and Grant-Funded Projects

Two ESRM graduate assistants actively participated in externally funded research projects during the 2024-2025 academic year, furthering their practical experience and contributing to significant grant-funded research initiatives.

Table 3

Assistantship	Number
Departmental Graduate Assistant:	3
Funded by Grant:	2

Appendix

ESRM Student Publications (student name in bold)

Published

1. **Asamoah, N.A.**, Turner, R.C., Lo, W.-J., Crawford, B.C., Jozkowski, K.J., & McClelland, S. (2025). Evaluating item response format and content using partial credit trees in scale development. *Journal of Survey Statistics and Methodology, 13*(2), 280-305.
2. **Edeh, E.,** Liang, X., & Cao, C. (2025). Probing beyond: The impact of model size and prior informativeness on Bayesian SEM fit indices. *Behavior Research Methods*, *57*(4), 108. https://doi.org/10.3758/s13428-025-02609-2
3. **Edeh, E.,** & Buzick, H. (2025). Exploring universal text-to-speech use in assessment among student sub-populations. *Applied Measurement in Education*. Advance online publication.

Revise and Resubmit

1. **Asamoah, N. A., Crawford, B. C., Turner, R. C., & Jozkowski, K. J.** (2025). English- and Spanish-speaking U.S. adults' perceptions of the most common reasons for abortion: A study of open-ended data before and after Dobbs v. Jackson. Manuscript under review for publication in *Reproductive Health*.

ESRM Student Presentations (student name in bold)

1. **Asamoah, N. A.,** Turner, R. C., Lo, W., Crawford, B. C., & Jozkowski, K. J. (2025). *A differential item functioning analysis of gendered vs. inclusive language in surveys* [Conference presentation]. Annual meeting of the American Association for Public Opinion Research, St. Louis, MO, United States.
2. **Asamoah, N. A.,** & Turner, R. C. (2025). *Effect size impacts on DIF detection: Item-focused vs. Rasch trees* [Conference presentation]. Annual meeting of the National Council on Measurement in Education, Denver, CO, United States.
3. Perryman, K., Robinson, S., **Asamoah, N. A.,** Chintakunta, S., & Gaskill, R. (2024). *Incorporating psychophysiological measures during child-centered play therapy* [Conference presentation]. Annual conference of the Association for Play Therapy, Atlanta, GA, United States.
4. **Asamoah, N. A.,** & Turner, R. C. (2024). *Simple to complex: The item-focused tree approach for uniform/nonuniform and balanced/unbalanced DIF* [Conference presentation]. Annual convention of the American Psychological Association, Seattle, WA, United States.
5. Turner, R. C., & **Asamoah, N. A.** (2024). *Group-specific detection rates when using tree-based differential item functioning methods* [Conference presentation]. International Meeting of the Psychometric Society, Prague, Czech Republic.

6. **Bonge, N.** (2025). *Impact of item locations on parameter recovery with the GGUM* [Oral presentation]. International Meeting of the Psychometric Society, Minneapolis, MN, United States.
7. **Bonge, N.** (2025). *The R > E phenomenon and the distance-difficulty hypothesis: Modeling response time in attitudinal data* [Poster presentation]. Annual meeting of the American Educational Research Association, Denver, CO, United States.
8. **Bonge, N.** (2025). *Modeling response time: The F > C phenomenon and the distance-difficulty hypothesis* [Poster presentation]. Annual meeting of the National Council for Measurement in Education, Denver, CO, United States.
9. **Chen, J.,** Liang, X., & Zhang, J. (2025). *Regularization for variable selection in multidimensional factor and network models*. Presented at the annual meeting of the American Educational Research Association, Denver, CO.
10. **Chen, J.,** Liang, X., & Zhang, J. (2024). *Comparing item selection in regularized factor analysis and network models*. Presented at the International Meeting of the Psychometric Society, Prague, Czech Republic.
11. **Chen, J.,** Lo, W.-J., & Li, J. (2024). *Accuracy of ESEM and CFA for assessing complex measurement models*. Presented at the annual convention of the American Psychological Association, Seattle, WA.
12. Liang, X., Zhang, J., & **Chen, J**. (2024). *Variable selection via regularized psychometric factor and network models in multidimensional context*. Presented at the annual meeting of the International Society for Data Science and Analytics, Vienna, Austria.
13. **Li, J.**, Liang, X., Zhang, J. (2025). *Rank factor score in factor analysis* [Conference presentation]. Annual meeting of the American Educational Research Association, Denver, CO, United States.
14. **Cunningham, M. M.** (2025). *Innovative leadership practices: Women as catalysts for curricular and pedagogical transformation* [Conference presentation]. Arkansas Council for Women in Higher Education Annual Conference, Russellville, AR, United States.
15. **Cunningham, M. M.** (2025). *The intersection of identity and leadership: Navigating gender, race, and power dynamics in higher education* [Conference presentation]. Arkansas Council for Women in Higher Education Annual Conference, Russellville, AR, United States.
16. **Myers, A. J.** (2025, July). *Using recency to improve scoring in longitudinal assessments* [Paper presentation]. International Meeting of the Psychometric Society, Minneapolis, MN, United States.
17. **Myers, A. J.** (2024, October). *An illustration of longitudinal maintenance of certification assessment scoring methods* [Paper presentation]. Annual meeting of the American Board of Medical Specialties, Chicago, IL, United States.
18. Lo, W.-J., **Tettey-Tawiah, H. K., Asamoah, N. A.,** Turner, R. C., Crawford, B. L., & Jozkowski, K. N. (2025, May). *Exploring measurement effects of survey mode on the equivalence of attitudinal responses: An experimental study on Yes/No options for legal abortion questions* [Poster presentation]. Annual Conference of the American Association for Public Opinion Research (AAPOR), St. Louis, MO, United States.

19. **Tettey-Tawiah, H. K.,** Lo, W.-J**., Asamoah, N. A**., Turner, R. C., Crawford, B. L., & Jozkowski, K. N. (2025, May). *Exploring measurement effects on attitudinal surveys regarding legal abortion: An experimental study of phone and web responses using a 5-point Likert scale* [Conference presentation]. Annual Conference of the American Association for Public Opinion Research (AAPOR), St. Louis, MO, United States.

ESRM Student Fellowships:

Nana Amma Asamoah	Distinguished Doctoral Fellowship (DDF),	2020-2024
Ethen Harris	Doctoral Academy Fellowship (DAF),	2021-2024

ESRM Student Internship:

Nicole Bonge, American Board of Internal Medicine (ABIM), Research & Innovation, summer 2025