TO: Randy Smith, Vice Provost for Academic Programs

FROM: Graduate School Curriculum Services

DATE: **1/31/2024**

RE: Proposal to **Establish a Professional Master of Systems Engineering** in **The College of Engineering**

The **Department of Integrated Systems Engineering** in the **College of Engineering** is proposing a **Professional Master of Systems Engineering**.

The proposal was received by the Graduate School on **12/09/2024**. The combined GS/CAA subcommittee first reviewed the proposal on **1/09/2025** and requested revisions. The revised proposal was received on **1/24/2025.** It is supported for review by the Council on Academic Affairs.

From:	Furterer, Sandy
To:	Kwiek, Nicole; Herbert, Nikki
Cc:	Reed, Katie; Smith, Randy; Sutherland, Sue
Subject:	RE: CAA proposal: Proposal to Establish a Professional Master of Systems Engineering
Date:	Tuesday, March 18, 2025 10:48:56 PM
Attachments:	image002.png image003.png COE - Proposal to establish a Professional Master of Systems Engineering updated 3 18 25.pdf

All,
I made the requested revisions and attached the updated PDF.

- The course number for the Project Management for Engineers course is inconsistently listed. On page 6 of the proposal and page of 5 of the OSO MOU, it is listed as 6804.02; on page 12, it is listed as 6801. I am assuming that the latter is correct, but I recommend fixing that typo so as to minimize confusion as the proposal continues its path through the approval process. **Revised the course number for Project Management to 6801 on page 6, and in the table in the appendix.**

- The paragraph at the bottom of page 9 and at the top of 10 appear to be (somewhat) in duplication, and you may want to eliminate one. However, I don't know you arrived at "115 institutions" according to what is listed in Figure 2. (Also, the paragraph at the bottom of page 9 points to Figure 1 but should be listed as Figure 2). **Removed the duplicate paragraph, and changed 115 to 69 to match the figure. Revised Figure number to 2.**

THE OHIO STATE UNIVERSITY

Sandy Furterer, PhD, MBA
Professor of Practice
The Ohio State University
Dept. of Integrated Systems Engineering

Curriculum Director
Engineering Technology Program

1971 Neil Ave., Rm. 210 Baker Systems
Columbus, OH 43210
email: furterer.6@osu.edu

From: Kwiek, Nicole <kwiek.1@osu.edu>
Sent: Tuesday, March 18, 2025 4:17 PM
To: Herbert, Nikki <herbert.1865@osu.edu>; Furterer, Sandy <furterer.6@osu.edu>
Cc: Reed, Katie <reed.901@osu.edu>; Smith, Randy <smith.70@osu.edu>; Sutherland, Sue

<sutherland.43@osu.edu>
Subject: CAA proposal: Proposal to Establish a Professional Master of Systems Engineering

Hi Drs. Furterer and Herbert,
Happy Tuesday!

My name is Nicole Kwiek, and I am the chair of the CAA subcommittee leading the review of your MSE proposal. Thank you for submitting a nicely composed and well thought-out proposal!

I have 2 minor recommendations to address inconsistencies in your proposal and one question to consider for the meeting. For the latter, you don't need to answer this now – I just wanted to give you a heads up that the question is coming.

- The course number for the Project Management for Engineers course is inconsistently listed. On page 6 of the proposal and page of 5 of the OSO MOU, it is listed as 6804.02; on page 12, it is listed as 6801. I am assuming that the latter is correct, but I recommend fixing that typo so as to minimize confusion as the proposal continues its path through the approval process.

- The paragraph at the bottom of page 9 and at the top of 10 appear to be (somewhat) in duplication, and you may want to eliminate one. However, I don't know you arrived at "115 institutions" according to what is listed in Figure 2. (Also, the paragraph at the bottom of page 9 points to Figure 1 but should be listed as Figure 2).

You can make any corrections to the proposal (attached) and then send that revised copy back to Katie Reed (copied).

My question for tomorrow: how many institutions in Ohio offer a comparable MSE program (either as a distance- or non-distance offering)?

Thank you again, and I look forward to seeing you tomorrow!

Best,
Nicole

THE OHIO STATE UNIVERSITY

Nicole Cartwright Kwiek, PhD, FAPE
Senior Associate Dean for Academic Affairs and Educational Innovation
Clinical Professor of Pharmacy Education and Innovation
College of Pharmacy

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kwiek.1@osu.edu | pharmacy.osu.edu

Pronouns: she/her/hers

THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Department of Integrated Systems Engineering
210 Baker Systems
1971 Neil Avenue
Columbus, OH 43210-1271

January 16, 2025
Maria Miriti, PhD
Associate Dean of Academic Affairs Graduate School – The Ohio State University

RE: Minor Revisions to the Proposal for the Professional Master of Systems Engineering

Dear Dean Miriti,

Thank you for the feedback on the Professional Master of Systems Engineering proposal. I have made the following suggested revisions, along with a page number of where they can be found in the revised proposal.

1. Removed the Draft watermark from the PDF file. (Background draft watermark removed throughout)
2. Included a brief statement regarding the timeline for ensuring all courses are available online. (page 8)
3. Included admission eligibility requirements. (page 7)
4. Revised course numbers, adding .02 for new courses for the Professional Master of Systems Engineering. (Pages 6 to 11).

Should you have further recommendations or questions, please feel free to reach out to me via my OSU email, below.

THE OHIO STATE UNIVERSITY

Sandra Furterer

Sandy Furterer, PhD, MBA
Professor of Practice
The Ohio State University
Dept. of Integrated Systems Engineering

Curriculum Director
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614-292-6239 Phone
614-292-7852 Fax

ise.osu.edu

Vice Provost W. Randy Smith
Office of Academic Affairs
190 N Oval Mall
Columbus, OH 43210

Dear Vice Provost Smith,

This letter is in support of the proposed degree program, "Master of Systems Engineering (MSE)", led by Prof. Sandy Furterer. This is a professional degree program aimed at practicing engineers seeking to increase their systems engineering modeling, planning and decision-making skills. The proposed program will be offered fully online by the Department of Integrated Systems Engineering, the College of Engineering, and the John Glenn College of Public Affairs. The program is especially designed to serve the needs of engineers in business, industry, healthcare and government who are responsible for modeling, designing and deploying complex systems for the enterprise, products, services and system-of-systems. By offering the proposed MSE program, the Integrated Systems Engineering program will further strengthens its ties with key industries in the state of Ohio, and beyond.
I wholeheartedly support the offering of the proposed Master of Systems Engineering (MSE) program and am excited about the positive impact that it will have on the university, and on local and national industries.

Sincerely,

Farhang Pourboghrat, Professor and Chair, Integrated Systems Engineering Department
Professor, Mechanical and Aerospace Engineering Department
210 Baker Systems, 1971 Neil Avenue
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THE OHIO STATE UNIVERSITY

College of Engineering

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September 3, 2024

Vice Provost W. Randy Smith
Office of Academic Affairs
190 N. Oval Mall
Columbus, OH 43210

Dear Vice Provost Smith,

On behalf of the College of Engineering, I am pleased to express my full support for the proposed online Professional Master of Systems Engineering (MSE) program. This innovative degree, to be offered collaboratively by the College of Engineering's Department of Integrated Systems Engineering and the John Glenn College of Public Affairs, represents an expansion of our online and professional education offerings designed to meet the needs of our industry partners and students.

The proposed MSE degree is meticulously crafted to serve practicing engineers across various sectors, including business, industry, healthcare, and government. These professionals, tasked with modeling, designing, and deploying complex systems, will find this program particularly relevant as it equips them with advanced skills to manage and optimize enterprise systems, products, services, and system-of-systems. The curriculum has been developed with a clear focus on working professionals, informed by the outcomes of a comprehensive Market Landscape Scan conducted by Ohio State Online.

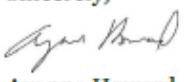
This program strengthens the ties between our Integrated Systems Engineering department and key industries in Ohio and extends our impact far beyond state borders. It positions the university as a leader in addressing the evolving demands of systems engineering nationally and globally.

The Department of Integrated Systems Engineering and the John Glenn College of Public Affairs have already provided letters of support for this program. The potential for this

program to make a lasting and positive impact on the university and the broader engineering community is significant.

I am proud to lend my wholehearted support, along with that of the College's Professional and Distance Education Programs, for the proposed Professional Master of Systems Engineering.

Sincerely,



Ayanna Howard, PhD
Dean, College of Engineering
Monte Ahuja Endowed Dean's Chair

Executive Summary

The proposed Master of Systems Engineering (MSE) degree is a professional program aimed at practicing engineers seeking to increase their systems engineering modeling, planning and decision making skills. MSE degrees are technically based programs that teach concepts, principles, tools and methods to model and manage systems engineering projects and programs in an engineering setting. These methods can be applied throughout any engineering discipline. Courses in the Master of Systems Engineering programs are designed to develop an understanding of how to manage and model complex systems, collaborate with teams of customers, stakeholders and all engineering disciplines to define and achieve systems requirements, and integrate the people, processes, and technology of complex systems. The MSE program is designed for working professionals and will be delivered completely online.

The Department of Integrated Systems Engineering (ISE) requests the approval and implementation of the proposed online professional Master of Systems Engineering (MSE) degree. It has already been unanimously approved by the Graduate Curriculum Committee in the ISE department. The appendices include: A) Course Descriptions; B) Letters of Support from the Dean of the College of Engineering, Dr. Ayanna Howard, and Robert T. Greenbaum, Professor, Glenn College of Public Affairs, C) The Masters in ISE Startup Plan; D) Access and Retention of underrepresented Groups; E) Assessment Plan; and F) Program Implementation.

I. Introduction and Overview

The College of Engineering (CoE) at The Ohio State University proposes a new professional master's degree in engineering.

a) Designation

The degree will be called the Master of Systems Engineering (MSE).

b) Rationale

The proposed degree is a professional degree at the post-baccalaureate level aimed at practicing engineers. It is not a research degree and thus the Master of Science degree is not appropriate. The title of Master of Systems Engineering is intended to convey both the technical aspects of an engineering degree and the equally important modeling and collaboration skills necessary to succeed in a complex systems domain.

The target audience for the MSE degree is engineers in business, industry, healthcare and government who have worked in the field for three to ten years who are responsible for modeling, designing and deploying complex systems for the enterprise, products, services and system-of-systems. More recent graduates will also be considered for the program based on their qualifications and experience, but the focus is on early to mid-career engineering professionals. Prospective students may be employed in either the public or private sectors (for profit or non- profit). They aspire to learn systems engineering skills that prepare them to be systems engineers and the integrator of systems in their organizations.

c) Purpose, Focus and Significance

Master of Systems Engineering degrees are technically based programs that teach methods to plan, model and deploy complex systems, projects and programs in an engineering setting for systems that focus on the enterprise, products, services and system-of-systems. MSE coursework typically includes topics such as systems engineering lifecycle management, modeling and simulation, model-based systems engineering, systems requirements engineering, decision analysis and advanced project management.

Based on the market analysis, Columbus has seen the highest number of unique job postings in the systems engineering occupations in the past 12 months compared to Cincinnati, which has seen the second highest number (followed by the Cleveland metro area). Columbus is a hotspot for jobs within the profiled occupations. The national average for an area the size of Columbus is 16,849 jobs, while there were 20,057 in Columbus in 2022.

The content for the Master of Systems Engineering degree will be provided by faculty in the College of Engineering and content area experts in the John Glenn College of Public Affairs. The delivery by distance education technology provides the ideal environment for working professionals.

Engineers who complete the MSE will be able to:

- Articulate what systems engineering (SE) is and explain the importance of maintaining SE rigor throughout a system's life cycle
- Comprehend and incorporate different concepts, principles, and tools of systems engineering in solving problems and developing balanced system solutions
- Establish collaboration among all organizational functional areas necessary for effective systems engineering application
- Apply critical thinking to execute the SE process in realistic scenarios and projects and to defend decisions and positions
- Synthesize the concepts and principles of system architecture and Model-Based Systems Engineering to apply to systems design and deployment.
- Apply the systems architecture and Model-Based Systems Engineering models to model different types of systems, including product, service, enterprise system and system-of-system.
- Apply the systems requirements engineering and analysis methods and deliverables to elicit, document, test and trace systems requirements for different types of systems, including product, service, enterprise system and system-of-systems.
- Describe key systems requirements engineering and analysis frameworks, and practices used in industry to elicit, document, test and trace systems requirements.

II. Proposed Curriculum

The proposed curriculum is a minimum of 30 semester credit hour program. Students have the flexibility of taking the curriculum on a full or part time basis. Depending upon their term of enrollment, students may complete the degree in as little as one and a half years. All students must complete the degree within four years unless the Graduate Studies Committee (formed specifically for this program) grants an

extension. Students may be awarded up to three hours of credit for previous coursework completed elsewhere. The curriculum includes three components with course descriptions in **Appendix C.**

a) The Required Core (15 credit hours):

This integrated core includes engineering courses including topics such as systems engineering lifecycle, model-based systems engineering, systems requirements engineering, simulation and advanced project management. (* indicates existing online course materials available to be adapted to the program)

- ISE 5840.02 Systems Engineering Lifecycle Foundations *
- ISE 5842.02 Model-Based Systems Engineering*
- ISE 5844.02 Systems Requirements Engineering
- ISE 6300 Simulation for System Analytics and Decision-Making*
- ISE 6801 Project Management for Engineers*

b) Electives (12 credit hours)

The elective courses provide opportunities for students to enhance their system engineering skills in areas of Lean Six Sigma, systems thinking in engineering and design, cognitive systems engineering, decision analysis, human systems integration, project management and food systems, data analytics, and engineering ethics. Students select courses from the following to full-fill the electives portion of the curriculum:

- ISE 5110 – Design of Engineering Experiments*
- ISE 5700 - Introduction to Cognitive Systems Engineering*
- ISE 5745 - Human-Centered Machine Learning
- ISE 5760 – Visual Analytics and Sensemaking*
- ISE 5810 - Lean Sigma Foundations*
- ISE 5820 – Systems Thinking in Engineering and Design
- ISE 5830 - Decision Analysis
- ISE 5870 – Resilience Engineering
- PUBAFRS 5770 - Risk & Decision Analysis in Public Affairs*
- PUBAFRS 6050 Managing Public Sector Organization*
- PUBAFRS 7550 Contract Management*
- PUBAFRS 7600 Federal Policy and Administration*

c) Capstone Course (3 credit hours)

The capstone course is a culminating experience providing students the opportunity to solve real-world challenges by utilizing skills learned from all the MSE courses, while implementing the principles of systems engineering in an organization.

- ISE 6804.02 Capstone Project in Systems Engineering (3 credits)

d) Administrative Arrangements

The MSE degree will be administered by the College of Engineering through the Professional and Distance Education Programs Office. The MSE Graduate Studies

Committee (GSC) will be established within the College to coordinate the operation of the program.

a) Graduate Studies Committee (GSC)

The MSE Faculty Director will act as the chair of the MSE-GSC. The MSE-GSC will consist of these voting members: the MSE Faculty Director, one representative from the John Glenn College of Public Affairs, and two Engineering faculty who teach MSE courses, the College of Engineering Director of Professional and Distance Education Programs, and the ISE Graduate Program Coordinator. The MSE-GSC will include the PDEP Program Coordinator as a non-voting member.

b) Ohio State Online (OSO)

The proposed program will be developed in partnership with Ohio State Online.

c) Industry Advisory Board (IAB)

An Industry Advisory Board will be utilized and engaged for the MSE degree to help ensure the curriculum remains relevant to the needs of industry.

d) MSE Operations

The Director of Professional and Distance Education Programs (PDEP) in the College of Engineering will be responsible for the overall administration of the MSE degree and day-to-day operations.

e) Admission Eligibility Requirements

1. Applicants who have an undergraduate degree in engineering, engineering technology, mathematics, statistics, computer science, natural sciences, or other technically oriented majors from an accredited college or university. Applicants with non-engineering undergraduate degrees may be considered, depending upon the type of non-engineering degree and years of work experience.
2. Two years of work experience in a technical, engineering or analytical position.
3. Test Scores: A GRE score is not required.
4. During the admissions process, a recommendation to enroll in the Graduate Bridge Program (to qualify for admission to the MSysE degree) will be considered for the following student populations: international applicants, applicants with a degree from a non-ABET accredited institution, or applicants who have a GPA below 3.0 from the last undergraduate or advanced degree earned.
5. Official transcript to be sent from each college or university attended.
6. A 1 – 2 page Statement of Purpose describing your career and educational goals, and a current resume.

*f) **Online Course Development***

Faculty with expertise in the course areas will be developing the courses to teach them in an online delivery mode. The College of Engineering through the Professional and Distance Education Programs Office will provide funding for the faculty to develop the courses. For the elective courses, there are four online courses with established materials that will need to be adapted to the Carmen learning management system for an online course (asterisked above). There is one required new course that will need to be developed and put online into Carmen. There are 7 elective courses that have significant online course materials that may need to be slightly adapted for the program. There are 4 elective courses that have course materials that need to be developed in an online mode. All of the faculty have been identified and are willing to develop the coursework, most likely in Summer 2025.

IV. Evidence of Need

The College of Engineering conducted extensive research for the development of the MSE degree and has collected significant information and data providing evidence of need for the MSE degree (CoE Market Analysis for Systems Engineering jobs and programs).

*a) **Systems Engineering Job and Occupational Landscape***

Nationally, over the 12-month period of the market analysis (March 2022 to March 2023) the top standard occupations associated with the specialized occupation of "Systems Engineer" (from the proprietary Lightcast Occupation Taxonomy) based on job postings include:

- Computer Occupations, All Other (SOC 15-1299)
- Mechanical Engineers (SOC 17-2141)
- Aerospace Engineers (SOC 17-2011)
- Software Developers (SOC 15-1252)

According to a Job Postings by Location report using Lightcast, a web-based platform that brings together national educational data, industry and occupational reports, real-time job postings, and publicly available profile and CV (curriculum vitae) information, and to which OTDI (Office of Technology and Digital Innovation) subscribes, the 59,640 unique job postings in Ohio fell behind Washington (63,242) and just ahead of Arizona (54,878). Ohio had the 14th most unique postings over the 12-month period (March 2022 to March 2023).

Based on the market analysis, Columbus has seen the highest number of unique job postings in the systems engineering occupations in the past 12 months compared to Cincinnati, which has seen the second highest number (followed by the Cleveland metro area). Columbus is a hotspot for jobs within the profiled occupations. The national average for an area the size of Columbus is 16,849 jobs, while there were

20,057 in Columbus in 2022, shown in Figure 1

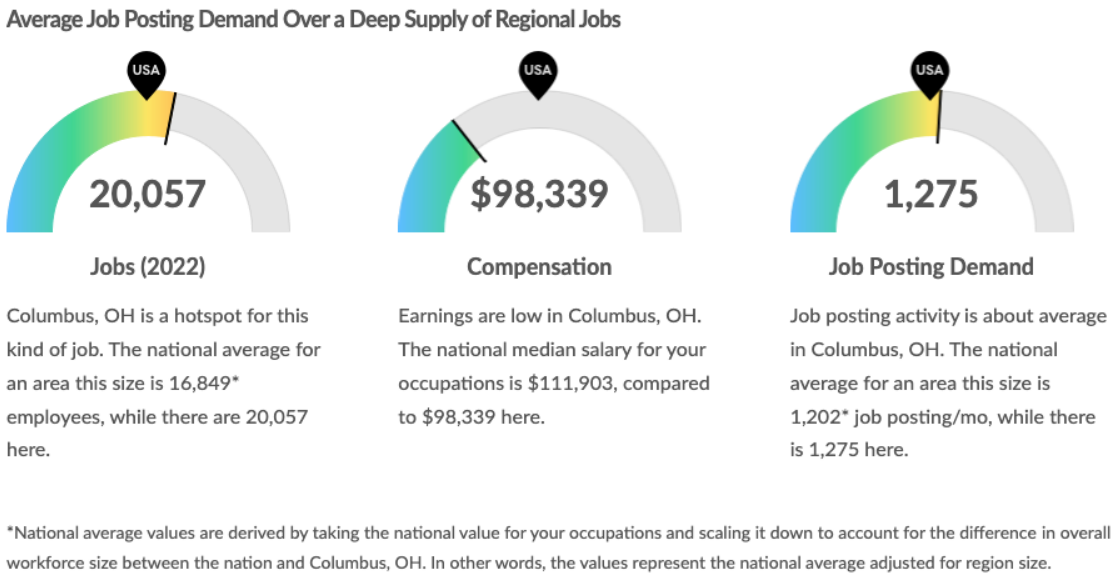


Figure 1 Number of jobs in Columbus compared to the adjusted national average; also included are compensation and job posting demand metrics.

Projections show profiled occupation growth in Ohio over the next 10 years. **Ohio occupational growth is slightly below the adjusted national average growth rate.** Unfortunately, compensation in Ohio does not keep up with the national rates for those with these jobs in other states. The national median salary within these occupations is $111,903 compared to Ohio's median salary of $95,339.

Between March 2022 and March 2023, the top companies hiring for these profiled occupations in Ohio include JPMorgan Chase, Deloitte, and General Electric. Columbus had the greatest number of unique job postings at 9,524, followed by Cincinnati and Cleveland. Information from Lightcast calls out Ohio employers with the greatest number of unique job postings within the past 12 months.

Based upon a 2021 U.S. Department of Education and National Center for Education Statistics data, 69 institutions reported 2,186 master's degree completions in 2021. Thirty-three (33) of the 69 institutions reporting completions had programs that were classified as "distance offered". A distance offered program is defined as a "program for which all the required coursework is able to be completed via distance education courses." It is worth noting that although 48% of institutions classified their programs as "distance offered" they accounted for 67% of all completions in 2021 (Figure 2).

Program Overview

	Completions (2021)	% Completions	Institutions (2021)	% Institutions
All Programs	2,186	100%	69	100%
Distance Offered Programs	1,455	67%	33	48%
Non-Distance Offered Programs	731	33%	36	52%

Figure 2 Program Completions

The institution reporting the most online master's degree completions was the Naval Postgraduate School with 211 completions from their various systems engineering master's programs. The Naval Postgraduate School currently offers three resident master's degrees and five distance learning master's degrees. Programs that could be mapped to the profiled CIP code and counting toward the 211 distance completions in 2021 include: a Master of Science in Systems Engineering, a Master of Science in Aviation Systems Engineering, or a Master of Science in Systems Engineering Management, among others. As of 2021, the Naval Postgraduate School maintained a share of 9.7% of the total degree-completion market and a 14.5% share of the distance-degree completion market. It should be noted that students eligible to attend the Naval Postgraduate School include: U.S. Military students, international students, Department of Defense civilian employees, and a limited number of defense contractors.

John Hopkins University reported the second most online master's degree completions in this CIP code and students eligible for their programs are not limited to specific U.S. Military personnel. Johns Hopkins reported 202 completions in 2021 and experience a 37.4% growth in completions from the previous year. Programs that could be mapped to the profiled CIP code and counting toward the 202 distance completions in 2021 include: a Master of Systems Engineering, a Master of Space Systems Engineering, a Master of Healthcare Systems Engineering, among others. As of 2021, Johns Hopkins maintained a share of 9.2% of the total degree-completion market and a 13.9% share of the distance-degree completion market.

The Master of Science in Systems Engineering at Johns Hopkins requires the completion of 30 credits. 21 of those credits are required core courses and nine are elective courses based in a specific focus area. Focus areas listed on their website include: Cybersecurity, Human Systems, Modeling and Simulation, Project Management, Software Systems. The program is positioned as being able to "keep

engineers and scientists on the leading edge of all aspects of analysis, design, integration, production, and operation of modern systems."

V. Prospective Enrollment and Student Demand

a) Demand

Based on our marketing data we believe the MSE program will quickly enroll 10-20 students in the first year and grow to 30-50 students afterwards.

b) Access and Retention of underrepresented Groups

Details in ***Appendix D.***

VI. Available Resources and Additional Costs

The MSE degree program will use current faculty already teaching in the ISE program, but will need to augment some areas with lecturers. Administrative support for the degree will be provided by the existing Professional and Distance Education Programs office in the college. The only additional costs required for the MSE will be compensation to faculty for development time when converting their courses into the online format.

VII. Assessment Plan

The MSE administration will continuously assess all of the program's activities. This will be accomplished in several ways. Details in ***Appendix E.***

Proposal Contact Information

Nikki Herbert
Interim Director
Professional & Distance Education Programs
Herbert.1865@osu.edu

Dr. Sandy Furterer
Professor of Practice
Integrated Systems Engineering
Furterer.6@osu.edu

VIII. Program Implementation

The MSE program implementation plan is included in the ***Appendix F.***

Appendix A Course Descriptions

Required Core (15 hours)

ISE 5840.02 Systems Engineering Lifecycle Foundations *

Course Description:

This course introduces the essential principles, processes, and practices associated with the application of Systems Engineering tools to the system life-cycle. Emphasis will focus on defining the problem to be solved, establishing the initial system architectures and requirements, design, verification and validation, along with the inter-disciplinary nature of systems. For Professional Masters SE.

ISE 5842.02 Model-Based Systems Engineering*

Course Description:

This course will provide an understanding of the essential concepts, practices, and applications of System Architecture, and how Systems Engineering models can be used to design and deploy a system. The students will be able to apply systems architecture and Model-Based Systems Engineering (MBSE) to model the different types of systems. For the Professional Masters Program in Systems Engr.

ISE 5844.02 Systems Requirements Engineering

Course Description:

This course will provide an understanding of the essential concepts, practices, and applications of requirements engineering and analysis used to elicit and model systems requirements. Course includes how to apply requirements engineering to elicit requirements for different types of systems. This course is for Professional Masters Program in Systems Engineering.

ISE 6300 - Simulation for System Analytics and Decision-Making*

Course Description:

Students learn how to collect data and perform input analysis, model systems using discrete-event simulation, and inform system design decision-making through defensible output analysis.

ISE 6801 Project Management for Engineers*

Course Description:

Provides foundational and advanced project management education in an interactive online learning environment as part of the Master of Global Engineering Leadership program.

ISE 6804.02 Capstone Project in Systems Engineering (3 credits)

Course Description:

The capstone course is a culminating experience providing students the opportunity to solve real-world challenges by utilizing skills learned from the MSE courses, while implementing the principles of systems engineering in an organization. This course is for Professional Masters Program in Systems Engineering.

Electives (12 credit hours)

ISE 5110 – Design of Engineering Experiments*

Course Description:

Plan and analyze experiments relevant to system design. Also, students will learn regression and alternative approaches for on-hand data analysis

ISE 5700 - Introduction to Cognitive Systems Engineering

Course Description:

Human-centered design of consumer products, web sites and complex sociotechnical systems. Topics include human-computer interaction and the design of decision support and distributed work systems.

ISE 5745 - Human-Centered Machine Learning

Course Description:

Design and analysis of ML for human users. Topics include: introductory machine learning; interactive ML; ethics in AI; human-agent interaction; human-subject research. Students not familiar with Python should enroll in an introductory python course as a pre- or co-requisite.

ISE 5760 – Visual Analytics and Sense Making*

Course Description:

Students learn about information visualization techniques that help people analyze massive amounts of digital data to combat overload and aid sensemaking with applications in retail and financial decision making, logistics, information systems, manufacturing, healthcare, energy and smart grids, cybersecurity and social networks.
Prereq: Jr, Sr, or Grad standing. Not open to students with credit for 773.01.

ISE 5810 - Lean Sigma Foundations*

Course Description:

Comprehensive foundation course that is required to complete Green and Black Belt Certification.

ISE 5820 – Systems Thinking in Engineering and Design

Course Description:

Concepts and heuristics in systems thinking and complex systems analysis and how these concepts apply to engineering and design projects.
Prereq: Sr or Grad standing, or permission of instructor. Not open to students with credit for 688.

ISE 5830 - Decision Analysis

Course Description:

Introduction to decision analysis, modern utility theory and risk modeling, Bayesian inference, value of information, multiattribute decision modeling, and application to engineering decisions under uncertainty.

ISE5870 – Resilience Engineering

Course Description:

Provides a comprehensive treatment of Resilience Engineering tools to measure, manage, and design complex systems to be resilient in the face of surprising disrupting events. Prereq: Sr or Grad standing, or permission of instructor.

PUBAFRS 5770 - Risk & Decision Analysis in Public Affairs*

Course Description:

Today, more than ever, managers are required to make decisions in turbulent and uncertain environments. Intended for advanced undergraduates and graduate students, this course will provide a comprehensive assessment of theories and tools for decision-making in the face of risk and uncertainty. It will provide a rigorous treatment of current issues and approaches in risk analysis through both qualitative and quantitative lenses. The methodological focus of the course will be on analytical approaches and modeling methodologies to improve and enhance decision-making in the face of uncertainty. While the course focuses on issues of relevance to the public and non-profit sectors, the tools, theories and approaches learned are widely applicable to other applications and sectors. This course builds upon students' prior academic preparation in case study analysis, statistics or econometrics, and data analysis using software packages.

PUBAFRS 6050 Managing Public Sector Organization*

Course Description:

This course provides an introduction to public management, with a focus on the environment, structure and design of the organizations that public managers run. We will build from a foundation in organizational theory and consider management challenges facing organizations that carry out public purposes. We will focus on traditional public sector organizations, government funded bureaus and agencies that deliver public services directly to citizens but will also consider other organizations that operate in the public sector (e.g. nonprofits, private firms under contract). Taken together, our examination of the environment and structure of public organizations will help you diagnose the management challenges and opportunities in managing a public sector organization.

PUBAFRS 7550 Contract Management*

Course Description:

Upon completion of the course, students should understand that public officials have the responsibility to ethically acquire goods and services at the local, state and federal levels to meet the public's needs in a cost-effective manner. This requires an understanding of basic procurement principles, legal authorities, socio-economic considerations, and various procurement methods available to accomplish these responsibilities. This course provides students with practical knowledge regarding contracting for goods and services, techniques to ensure successful outcomes, and a perspective on public procurement policy and issues, providing students an understanding of the government procurement process from both the government and private industry perspectives.

PUBAFRS 7600 Federal Policy and Administration*

Course Description:

This course will provide a unique opportunity to explore U.S. federal policy and administration in the nation's capital. Students will be exposed to a range of issues that are among the most salient to understanding the complexities of the federal government. Students will further develop their foundational knowledge of institutions, including the roles of the president, Congress, and the courts in the formulation and execution of federal policy in relation to the federal bureaucracy. Students will analyze the implementation process and how work is managed in third-party governance, federalism, and the regulatory regime.

This course is designed as a graduate seminar and requires significant reading and preparation. Students will apply knowledge, use analytical tools, and research various subjects relating to the federal policy and administration. Students will systematically analyze current events while also learning practical tools such as writing effective decision memoranda for senior leadership. Students are asked to be forward leaning in identifying an issue of importance at their internship site.

Appendix B Letter of Support

- **Robert T. Greenbaum, Professor, The Glenn College of Public Affairs**

THE OHIO STATE UNIVERSITY

John Glenn College of Public Affairs

Robert T. Greenbaum
Associate Dean for Curriculum

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August 22, 2024

Randy Smith
Vice Provost-Academic Programs
4112 University Square South
15 E 15th Ave
Columbus, OH 43210

Dear Randy:

I am pleased to endorse the proposed Master of Systems Engineering (MSE) degree. This professional online degree will help fill a void by offering practicing engineers modeling, planning, and decision-making skills. The MSE program will provide students with the knowledge and skills necessary to manage and model complex systems, collaborate with teams of customers, stakeholders, and all engineering disciplines to define and achieve systems requirements and integrate the people, processes, and technology of complex systems.

Further, the Glenn College is prepared to provide space in four of its online classes for MSE students choosing those courses as electives in the MSE program.

The Glenn College of Public Affairs provides its full support for this proposed degree.

Sincerely,

Robert T. Greenbaum
Professor

Appendix C - Masters in ISE Startup Plan

Project		Project Team
Degree	Professional Master's Degree in Integrated Systems Engineering	Nikki Herbert
When:	Start Date: June 2024 Target Completion Date: August 2025	Sandy Furterer

			2025															
Item Title	**Item Details**	**Status**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Comments**
Program Approval	Prepare proposal for CCAA	Plan																Include letters of support from dept chair, GSC, Dean, and industry if possible
		Complete																
	CCAA	Plan																Requires about 2 months
		Complete																
	Grad School /Grad Council Approval	Plan																Requires about 2-3 months, depends upon when CCAA approves
		Complete																
	CAA / OAA approval	Plan																After Grad Council and Grad School approve
		Complete																
	University Senate approval	Plan																Need meeting dates when published
		Complete																
	Board of Trustees	Plan																Need meeting dates when published
		Complete																
	CCGS submission and statewide review	Plan													6 wk comments			Proposal is sent to the state/CCGS after BOT approval
		Complete																
	CCGS presentation and comment period	Plan																Need meeting dates when published
		Complete																
Ohio State Online	Finish MOU between OSO and college	Plan																Must be signed before CAA will approve
		Complete																
	State authorization	Plan																OSO will take care of this
		Complete																
	Develop timeline for course development	Plan																OSO will begin course development after MOU is signed
		Complete																
Tuition	Differential tuition fee request/will be same as other online PMD's	Plan																Provide information to Bobby S to get approval in this FY cycle
		Complete																
Grad Studies Committee	Form committee and members	Plan																TBD
		Complete																
	Determine chair for GSC	Plan																TBD
		Complete																
	Establish policies and procedures/admission's	Plan																TBD
		Complete																
Fiscal	Determine operating budget	Plan																
		Complete																
	Fiscal Impact Statement for CCSG submission	Plan																
		Complete																
Engineering Courses	Course approval for new courses	Plan																
		Complete																
	DL request approvals for change in delivery of any courses	Plan																
		Complete																
Item Title	**Item Details**	**Status**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Comments**
Marketing	Develop marketing plan	Plan																
		Complete																

Appendix D - Access and Retention of Underrepresented Groups

Outreach plans will be developed to reach underrepresented groups within the target student groups:

- Ohio State undergraduates in particular from engineering and public affairs
- State of Ohio graduates of colleges and universities in engineering, public affairs, Department of Defense (Palace Acquire program at Wright Patterson Airforce Base; AFRL in particular)
- Outreach to Society of Women Engineers (SWE)
- Outreach to Institute of Industrial & Systems Engineers (IISE)
- Outreach to Society of Professional Hispanic Engineers (SHPE)
- Outreach to National Society of Black Engineers (NSBE)

Retention of underrepresented groups will be enhanced by the program administration and advisors meeting with, coaching and advising the students in the program to identify any academic or personal issues that could negatively impact their successful completion of the program.

Appendix E - Assessment Plan

The success of the Master of Systems Engineering will be assessed by the MSE-GSC annually based on the following metrics:

1) Enrollment - number of students enrolled in the program
2) Admissions – Percent of students accepted into the program based on applications
3) Graduations – Percent of students that graduate from the program based on those enrolled
4) Underrepresented groups – Percent of students in underrepresented groups accepted, enrolled and graduated
5) Alumni surveys regarding their application of educational outcomes
6) Course surveys to assess quality of education experience within courses and delivery of course materials

Appendix F – Program Implementation

Program Implementation

1. How students will be informed of the program

   There will be multiple ways to inform the students of the program:

   - Undergraduate students in the College of Engineering, and Glenn College of Public Affairs
   - Existing social media and outreach by OSU marketing
   - Outreach by the College of Engineering and Glenn College of Public Affairs for existing students
   - Outreach by Ohio State Online and CoE Professional & Distance Education Programs

2. Describe how students will be advised regarding the opportunities and challenges associated with the option?

   The Director of the CoE Professional & Distance Education, the ISE Graduate Advisor and the ISE MSE Faculty Director will advise students regarding the program

3. Describe how the success of the program will be assessed? See Appendix E for Assessment criteria.

4. Specific actions and any corollary issues (positive and negative) that will arise from implementation. Frequently addressed issues include but are not limited to the following:

a) How the proposal will affect specific groups/constituencies (faculty, graduate/undergraduate students, staff, alumni, accrediting organizations, etc)?

The program can enhance undergraduate students' career opportunities by enhancing skills in systems engineering career paths in DoD, Healthcare systems, and public and community-based organizations.

b) What programmatic changes will take place internally?

An ISE MSE Faculty Director will be assigned by the ISE Department Chair to collaborate with the MSE Graduate Committee.

Existing faculty will develop and instruct the courses paid by the CoE Professional & Distance Education, additional faculty will not be anticipated.

c) How the program will affect students, faculty, and staff outside the proposing unit?

Students who take the program outside of the CoE will enhance their career opportunities is the systems engineering career paths.

d) Does the content of the proposal overlap in scope or substance with the interests of other units?

The program content of the proposal does not overlap in scope or substance with the interests of other units.

e) A summary of the adequacy and availability of resources including but not limited to fiscal impact statements, commitments of funding from any sources, and memoranda of understanding between collaborating units.

MOU's will be developed between collaborating units: CoE, ISE and Glenn College of Public Affairs.

Memorandum of Understanding

Online Program

Between

Master of Systems Engineering
College of Engineering
The Ohio State University

And

Ohio State Online
The Ohio State University

Purpose

The purpose of this Memorandum of Understanding (MOU) is to acknowledge that **Master of Systems Engineering** has met or exceeded the modality substantive change threshold—making the program an online (ONL) program or is a new online (ONL) program for the university and will meet the requirements for an online program in partnership with Ohio State Online. This MOU also is to acknowledge any legacy online (ONL) program(s) listed will enter partnership with Ohio State Online via the service model described.

Term of MOU

This MOU will become effective upon obtaining all necessary signatures and will remain in effect for the life of the program.

Services Provided for Program Launch

As an online (ONL) program this program will receive Ohio State Online support, such as market research, student acquisition of online (ONL) program students, ongoing online (ONL) program student support, online (ONL) program and course design and development, and state authorization and licensure research and disclosures (if applicable). Per OAA funding guidelines for new online programs, there may be a separate funding request to support the start-up of these services until the revenue attribution is recognized via the Ohio State budget model.

Based on pre-approval planning conversations, this program may leverage the following Ohio State Online services:

Online Enrollment Services: Generating and finding quality prospective online (ONL) program students, selling prospective students on the online (ONL) program and Ohio State, helping re-enroll online (ONL) program students each term to help them reach graduation, and supporting the college to achieve steady-state revenue streams.

Online Instruction Services: Reviewing and recommending evidence-based online (ONL) program curricular design to best meet and support the intended audience and enrollment goals; providing and encouraging online (ONL) program instructor professional learning opportunities; and partnering with instructors for initial online (ONL) program course design, development, and ongoing course updates.

Ohio State Online and college program relationship contacts listed below will have ongoing check-ins and strategy sessions to evolve online (ONL) program services and programs to achieve shared goals. Service activities will be aligned for the online (ONL) program during these meetings.

Table of Program Relationship Contacts

Units	College / Department / Campus	Ohio State Online
Organization Oversight	Ayanna Howard, Dean	Jason Lemon, Dean
Administrative Oversight	- Farhang Pourboghrat, Chair, Integrated Systems Engineering Department - David Tomasko, Associate Dean for Academic Programs	- Rob Griffiths, AVP, Online Learning and Innovation - Brandi Bittner, AVP, Online Enrollment
Program Oversight	Sandy Furterer, Professor of Practice	- Rob Griffiths, AVP, Online Learning and Innovation - Brandi Bittner, AVP, Online Enrollment
Course Oversight	- Sandy Furterer, Professor of Practice - Nikki Herbert, PDEP [interim]	Assigned OSO program / course design director, assigned Instructional Designer
Student Support Oversight	Nikki Herbert, PDEP [interim]	Assigned Reenrollment Team
Marketing/Recruiting Oversight	Nikki Herbert, PDEP [interim]	Assigned Marketing Manager and Recruiting lead
Fiscal Oversight	Bobby Srivastava, Chief Administration Officer	Jon Rucker, Director Online Financial Strategy and Analysis

Signatories

By signing this MOU, all groups agree to be active partners and to abide by this agreement:

Sandy Furterer, Program Director	DocuSigned by: Sandy Furterer 9C9692EE989...	Date: 01/30/2025
Farhang Pourboghrat, Department Chair	DocuSigned by: Farhang Pourboghrat 82FD42AE11D941C...	Date: 01/30/2025
Bobby Srivastava, College Fiscal Officer	DocuSigned by: Bobby P. Srivastava 59EEBEEC7A6E404...	Date: 01/30/2025
David Tomasko, Curricular Associate Dean	DocuSigned by: David Lane Tomasko 3B8D0B6B2DEC453...	Date: 01/31/2025
Ayanna Howard, Dean	DocuSigned by: Ayanna Howard 94DF9F40DE4843B...	Date: 01/31/2025
Jason Lemon, Vice Provost and Dean of Online Learning	DocuSigned by: Jason Edward Lemon 9C19184E034F41C...	Date: 02/02/2025

Online Program Attributes

Program Working Title:	Master of Systems Engineering
Anticipated CAA approval date for ONL modality:	SP25
Anticipated ODHE approval date for ONL modality:	SU25

Program level:	☐ Associate	☐ Undergraduate	☐ Graduate	☒ Professional

Approval type:	☒ New program	☐ Change of delivery	☐ Certificate Type:	☐ Stackable	☐ Other

If applicable, will the program continue to offer an on-ground version? (Note, notification to CAA and Ohio State Online will be necessary if an approved program modality is no longer offered.)	☐ Yes	☒ No
Percentage of courses offered online for this program?	100%	
If other, please explain:		

Anticipated term for first enrollment intake:	SP26
(Note, marketing and recruitment will begin about 6 months prior to first enrollment term.)	

Will this program have a differential fee structure?	X Yes	No
If yes, please explain justification: The differential fee request will be made so that the tuition for this degree is the same as other online professional master's degrees in the college and to enable us to cover operating expenses.		
Note, submissions are due in December for Senate Fiscal review—Financial Planning and Analysis and Student Fee Review Committee review is necessary for differentiated tuition. Once Senate Fiscal Committee recommendations are finalized, the request goes to the President and Provost for review and then for the official Board of Trustees approval.		

Total credit hours for program:	30

Does this program have mandatory onsite training components? (e.g., practicum, residency, or internship)	☐ Yes	☒ No
If yes, please explain:		

Does this program have any non-mandatory onsite training components? (e.g., orientation)	☐ Yes	☒ No
If yes, please explain:		

Online Program Courses

The online program course delivery strategy at launch is outlined in the table below.

Note: the information in the first row of the table is included only to provide an example of how the information should be formatted.

Course Code and Name	Current Delivery Mode(s)* (how course has been offered previously: in person, hybrid, distance learning, N/A - new course)	Core or Elective	Asynchronous or Synchronous or Both	First Term and Session (if applicable) this Course will be Offered as part of this Online Program	Other terms and sessions (if applicable) this course be offered (None, AU25, SP25, SU25)
ISE 5840.02 Systems Engineering Lifecycle Foundations	New course	Core	Asynchronous	SP 26	SP and AU
ISE 5842.02 Model-Based Systems Engineering	New course	Core	Asynchronous	AU 26	SP and AU
ISE 5844.02 Systems Requirements Engineering	New course	Core	Asynchronous	SP 26	SP and AU
ISE 6300 Simulation for System Analytics and Decision-Making	In person	Core	Asynchronous	SP 26	SP and AU
ISE 6801 Project Management for Engineers	In person and online in MEM	Core	Asynchronous	SP 26	SP and AU
ISE 6804.02 Capstone Project in Systems Engineering	New course	Core	Asynchronous	SP 27	SP
ISE 5110 – Design of Engineering Experiments	In person and online in MEM	Elective	Asynchronous	SP 26	SP

ISE 5700 - Introduction to Cognitive Systems Engineering	In person and online	Elective	Asynchronous	SP 26	SP
ISE 5745 - Human-Centered Machine Learning	In person	Elective	Asynchronous	AU 26	AU
ISE 5760 – Visual Analytics and Sensemaking	In person and online	Elective	Asynchronous	AU26	AU
ISE 5810 - Lean Sigma Foundations	In person and online in MEM	Elective	Asynchronous	AU 26	AU and SP
ISE 5820 – Systems Thinking in Engineering and Design	In person	Elective	Asynchronous	AU 26	AU
ISE 5830 - Decision Analysis	In person	Elective	Asynchronous	AU 26	AU
ISE 5870 – Resilience Engineering	In person	Elective	Asynchronous	AU 26	AU and SP
PUBAFRS 5770 - Risk & Decision Analysis in Public Affairs	Online	Elective	Asynchronous	AU 26	AU and SP
PUBAFRS 6050 Managing Public Sector Organization	Online	Elective	Asynchronous	AU 26	AU
PUBAFRS 7550 Contract Management	Online	Elective	Asynchronous	AU 26	AU
PUBAFRS 7600 Federal Policy and Administration	Online	Elective	Asynchronous	AU 26	AU and SP

State Authorization / Disclosure

Ohio State Online will support necessary steps for state authorization approvals and notifications, and the program will abide by state laws and disclosure requirements, for items selected yes.		
Will this program enroll students located outside Ohio?	X Yes	☐ No
Does this program potentially lead to a professional license or certification in any state?	☐ Yes	X No
Will this program conduct on-ground supervised field experiences such as clinicals, practicums, student teaching or internships?	☐ Yes	X No

Certificate Of Completion

Envelope Id: A80EC700-BCA5-4C3E-8FEC-5B68F67873F7
Status: Completed
Subject: Complete with Docusign: Master of Systems Engineering OSO MOU
Source Envelope:
Document Pages: 7
Signatures: 6
Certificate Pages: 3
Initials: 0
AutoNav: Enabled
EnvelopeId Stamping: Enabled
Time Zone: (UTC-05:00) Eastern Time (US & Canada)

Envelope Originator:
Jonathan Mark Rucker
1050 Carmack Rd
Columbus, OH 43210
rucker.78@osu.edu
IP Address: 128.146.238.57

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Status: Original
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Signer Events	Signature	Timestamp
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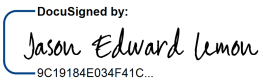
Electronic Record and Signature Disclosure: Not Offered via DocuSign		
Farhang Pourboghrat pourboghrat.2@osu.edu Professor The Ohio State University Security Level: Email, Account Authentication (None)	DocuSigned by: Farhang Pourboghrat 82FD42AE11D941C... Signature Adoption: Pre-selected Style Using IP Address: 131.241.49.124	Sent: 1/30/2025 9:47:51 AM Viewed: 1/30/2025 10:30:34 AM Signed: 1/30/2025 10:31:24 AM
Electronic Record and Signature Disclosure: Not Offered via DocuSign		
Bobby P. Srivastava srivastava.85@osu.edu Chief Administrative Officer x Security Level: Email, Account Authentication (None)	DocuSigned by: Bobby P. Srivastava 59EEBEEC7A8E404... Signature Adoption: Pre-selected Style Using IP Address: 128.146.189.99 Signed using mobile	Sent: 1/30/2025 10:31:25 AM Viewed: 1/30/2025 10:32:19 AM Signed: 1/30/2025 10:32:36 AM
Electronic Record and Signature Disclosure: Not Offered via DocuSign		
David Lane Tomasko tomasko.1@osu.edu Associate Dean, Engineering The Ohio State University Security Level: Email, Account Authentication (None)	DocuSigned by: David Lane Tomasko 3B8D0B6B2DEC453... Signature Adoption: Pre-selected Style Using IP Address: 107.205.33.130	Sent: 1/30/2025 10:32:38 AM Viewed: 1/31/2025 11:09:51 AM Signed: 1/31/2025 11:11:23 AM
Electronic Record and Signature Disclosure: Not Offered via DocuSign		

Signer Events	Signature	Timestamp
Ayanna Howard howard.1727@osu.edu Dean of Engineering The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	DocuSigned by:  94DF9F40DE4843B... Signature Adoption: Pre-selected Style Using IP Address: 24.142.147.68	Sent: 1/31/2025 11:11:25 AM Viewed: 1/31/2025 5:08:21 PM Signed: 1/31/2025 5:08:42 PM
Jason Edward Lemon lemon.297@osu.edu Vice Provost and Dean The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	DocuSigned by:  9C19184E034F41C... Signature Adoption: Pre-selected Style Using IP Address: 216.196.140.175	Sent: 1/31/2025 5:08:44 PM Viewed: 2/2/2025 1:20:48 PM Signed: 2/2/2025 1:21:01 PM

In Person Signer Events	Signature	Timestamp

Editor Delivery Events	Status	Timestamp

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Intermediary Delivery Events	Status	Timestamp

Certified Delivery Events	Status	Timestamp

Carbon Copy Events	Status	Timestamp
Jonathan Mark Rucker rucker.78@osu.edu Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:03 PM Resent: 2/2/2025 1:21:14 PM
Brandi N Bittner bittner.102@osu.edu Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:04 PM
Robert Peter Griffiths griffiths.44@osu.edu The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:05 PM Viewed: 2/2/2025 1:32:05 PM
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Jennifer L Simmons simmons.232@osu.edu df The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:07 PM
Jacob Harris Bane bane.17@osu.edu The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:08 PM Viewed: 2/3/2025 10:12:52 AM
Kathryn Marie Reed reed.901@osu.edu The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:09 PM Viewed: 2/3/2025 11:14:03 AM
Lisa N Delaney delaney.177@osu.edu The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:10 PM
Maria N. Miriti miriti.1@osu.edu The Ohio State University Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	COPIED	Sent: 2/2/2025 1:21:11 PM Viewed: 2/3/2025 8:36:03 AM

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
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Completed	Security Checked	2/2/2025 1:21:11 PM

Payment Events	Status	Timestamps