

# **Annual Academic Assessment Report**

**(M.S., Ph.D. / Microelectronics – Photonics)**

**(M.S. Materials Science, M.S. Materials Engineering, Ph.D. Materials Science & Engineering)**

**2024 Calendar Year Report**

## **Program Goals**

- 1. Provide students with interdisciplinary education and training in engineering and science to meet the needs of emerging technology industries.**
- 2. Place students in interdisciplinary groups performing rigorous and challenging research to prepare them for careers in industrial research teams, national labs, and academic positions.**
- 3. Prepare students to be effective in technology management and one of three professional development pathways available to them at the UA: i) entrepreneurship, ii) professorate, or iii) operations management.**

## **Student Learning Outcomes**

- 1. Conduct independent investigations (M.S.) or define and explore new areas of research (Ph.D.) in an interdisciplinary environment. The outcome of their graduate education will be a better understanding of materials and their properties; processes for producing materials and modifying their properties; creation of devices and systems with features enabled by this manipulation of material properties; and the economics that affect successful introduction of these devices and systems into industry and society.**
- 2. Master knowledge, practices, and skills from traditional graduate level programs in Physics, Chemistry, Electrical Engineering, Chemical Engineering, Mechanical Engineering, Biological Engineering, and Biomedical Engineering, regardless of prior traditional educational background.**
- 3. Communicate effectively deep level knowledge of their work to persons well-versed in their field, detailed technical concepts to persons with strong technical backgrounds outside of their field, and general concepts and applications to the general public.**
- 4. Work efficiently in interdisciplinary team environments, fully supporting team goals through active membership or through team leadership as appropriate.**

- 5. Implement intellectual property management and research commercialization processes, encouraging migration of ideas from formulation to societal benefit during their professional careers.**
- 6. Execute duties found in entry-level professional positions with the operational skills equivalent to at least one year's experience in that position.**
- 7. Embrace the role of citizen-scientist in both their professional and societal communities, utilizing their sound ethical and analytical backgrounds, to lead the discussions that will be needed to balance what can be done with what should be done.**

#### **Process for Assessing each Student Learning Outcome**

- 1. Ph.D. Candidacy Exam Process (Direct): This process addresses the Ph.D. level knowledge portion of outcomes 1 and 2, communications requirements of outcome 3, IP and the commercialization aspects of outcome 5, and professional behaviors found in outcomes 6 and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported in June.**

The MicroEP / Materials Science and Engineering (MSEN) Ph.D. candidacy process consists of a formal written research proposal ~15 pages in length that is similar in nature to an NSF proposal. It is written in strong collaboration with the major professor and must be presented and approved by the student's Ph.D. committee at the end of the formative stage of the research definition but well before the student is deep into the execution stage of the research. It is designed to assure that the field of the research is well understood by the student, that the proposed research topic has sufficient depth and breadth to demonstrate Ph.D. level professional work, and that the research has a reasonable chance of completion within four years after being accepted as a Ph.D. student after completion of a MS degree.

#### **Data Collection and Analysis:**

Candidacy Research Proposal and Students Admitted to MSEN PhD Candidacy, 2024 Calendar Year

Number of Students Presenting Candidacy Research Proposal / Number Accepted = 8

Number of Students Admitted to Candidacy = 8

#### **Assessment:**

- The candidacy exam process continues to provide a good assessment of the student's capability to meet the requirements of PhD level research.

- The MicroEP/MSEN director and the student's dissertation committee reviews the candidacy research proposals and attends the research candidacy presentations. Constructive feedback is given to the students regarding strengths and areas for improvement as needed. If the students' faculty chair, dissertation committee, and/or the MicroEP/MSEN director feel that sufficient detail is not proposed/presented, the student will be asked to improve upon the proposal and present a second time (typically within 1 month of the first attempt). If the student does not reveal the necessary improvement, they will not be admitted as Ph.D. Candidates.
- Preparation for the exam is made during the initial two sequence of seminar classes, MSEN 58101, and 59101, as well as in the research proposal writing course, MSEN 63203. This includes, but is not limited to preparing a schedule for the exam in advance; notifying those potentially affected of the process; developing proficiency with a reference/citation manager; increasing familiarity with library and research resources available on campus; reviewing previous candidacy exam questions; drafting an outline of a response to an anticipated question; improving oral and written communication skills; and discussion of professional responses to input from evaluators.
- We anticipate making continual improvements to the training documents and templates as students and faculty feedback continue to guide the evolution of the MicroEP/MSEN candidacy exam process.

**2. Curriculum and career advising each semester at pre-registration (Indirect): This process addresses outcomes 2, 4, and 6. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

This formal advising process gives an opportunity to discuss with the students such things as their academic performance in the prior semester, how they are working with their professor and their research group members, and what is affecting their ability to make satisfactory progress on their research. All students are advised by Interim Director Dr. Morgan Ware and co-advised by their major professor.

**Data Collection and Analysis:**

100% of students were advised for Spring 2024.

100% of students were advised for Fall 2024.

**Assessment:**

The advising process is helpful to the program director to get to know the students better and to track the progress of the students, or address issues, toward completing their degree requirements. It is also used as a time to check milestones including their research document (3-5 page description

of their intended research initially signed by their committee and updated each semester by the student and approved by their major professor), committee form, title form, annual reviews, and reminders of dates for their candidacy research proposal (if Ph.D. students).

**3. Small Group Student Meetings (peer assessment and mentoring) (Indirect): This process addresses outcomes 3, 4, 6, and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

These peer mentoring groups are led by senior MicroEP/MSEN students, and participation is required for all MicroEP/MSEN students during their first two years in the program. The groups are required to meet four times per semester in conjunction with the students' professional practice seminar courses. However, they typically end up meeting an additional two to four times each fall and spring semester and focus on how to effectively communicate with other students that are not already familiar with the work. In this way, they practice communicating with young professionals unfamiliar with their field and have an opportunity to discuss operational problems with their peers and receive feedback on their way of handling the problems. They are also taught the use of MS Project and 3-min / 12-min presentation formats that are modeled after federal program project update procedures.

**Data Collection and Analysis:**

Spring 2024:

22 first and second year students in four Small Group Teams met four times.

Attendance (excluding illness, conference travel, and candidacy) = 100%.

Fall 2024:

26 first and second year students in five Small Group Teams met four times.

Attendance (excluding illness, conference travel, and candidacy) = 100%.

**Assessment:**

The Small Group Leaders teach the students to use MS Project to map out their key project as a graduate student – meeting the requirements to get their graduate degree. Each student's MS Project file must be updated and submitted to MicroEP/MSEN management once in the fall semester and once in the spring semester. The students' completed MS Project summary of their graduate program path is included as an appendix in their thesis/dissertation.

The students also prepare, and practice presenting their research to their small group team and are coached by their small group leader. Each small group rotates presenting their research at monthly Research Communication Seminars (four per semester) to all MicroEP/MSEN students. This practice

improves the student's public speaking skills and prepares them for conference presentations, oral defense of candidacy exams, defense of their thesis/dissertation, and becoming effective communicators throughout their careers.

- 4. Use of Microsoft Project software (Indirect): This software usage addresses outcomes 4 and 6. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

One large predictor of professional success is the ability to plan your work such that you have no downtime during the day. All students in their first two years must use Microsoft Project software for their research planning to help them learn the time management and project management practices they will need in their early careers.

#### **Data Collection and Analysis:**

All MicroEP/MSEN graduate students learn the use of Microsoft Project in their Small Group teams (see Student Learning Outcomes Process #3). Except for their first full month in the program, students in their first two years in the program are required to submit their updated MS Project plan each semester to MicroEP/MSEN program management. This submission is part of their grade for the Operations Management seminar grades.

#### **Assessment:**

This methodology is fully integrated into the MicroEP/MSEN graduate program and helps the students understand what is needed to complete their graduate degree (and helps drive conversations with their major advisor or MicroEP/MSEN program director when it is not). The students include their completed MS Project plan summary as an appendix in their thesis or dissertation. Program alumni and employers alike frequently provide feedback regarding how this skill clearly and positively distinguishes MicroEP/MSEN graduates from most new hires from other STEM graduate degree programs.

- 5. Research Communications Seminars (Indirect): This process addresses outcomes 3, 4, 6, and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

Monthly seminars are held to update the students on the MicroEP/MSEN announcements, news, events, and recognition. Students in the first two years of the MicroEP/MSEN program also present their research to their peers at these seminars. These two-hour and 30 min seminars are held the first Monday evening of each month during the spring and fall semester. Attendance is required for all MS students in their first four semesters and all PhD students in their first five semesters

### **Data Collection and Analysis:**

Spring 2024:

Four research communication seminars were held.

Attendance of MS students in their first three semesters = 100%\*.

Attendance of PhD students in their first five semesters = 100%\*.

Fall 2024:

Four research communication seminars were held.

Attendance of MS students in their first three semesters = 100%\*.

Attendance of PhD students in their first five semesters = 100%\*.

\* Students who miss a seminar are required to attend a thesis or dissertation defense or other technical seminar authorized by the MSEN 5611/6611 course instructor (Dr. Morgan Ware).

### **Assessment:**

Students in the four Small Groups give two types of presentations – a 3-minute (elevator pitch) presentation and a 12-minute conference-style presentation. This gives them valuable experience in learning how to present their research at the level appropriate for their audience. The group leaders implemented an evaluation procedure for 12 minute and 3-minute presentations. All students who are present, submit short online evaluations for each presentation, which are subsequently shared (anonymously) with the presenter, and used for discussion and growth. This is in addition to the normal in-person Q&A and discussion.

- 6. Small Group Leader meetings (Indirect): This process addresses outcomes 4, 6, and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

Senior MicroEP/MSEN students that lead these small groups experience their first taste of administrative responsibility, performance assessment and feedback, and management team discussions as they find common issues of concern from the different Small Groups. They have the responsibility to not only assess and prioritize common issues and the responsibility to propose and help implement program changes needed to address the issues. These '25 meetings were facilitated by Interim Director Dr. Ware.

**Data Collection and Analysis:**

MicroEP/MSEN program management met with Small Group Leaders in January and August to share best practices, discuss and implement new initiatives among the students, and gain support among these student leaders to affect these changes. In addition to teaching soft skills in these small group meetings, community service is also advocated. Service initiatives for 2024 included a clean-up of our adopted section of the Razorback Regional Greenway Trail in Spring and Fall. Approximately 10 MicroEP/MSEN students and faculty volunteered to participate in the events, and they were followed by lunch.

**Assessment:**

The Small Group Team concept is working as intended giving senior MicroEP/MSEN students an opportunity to develop their leadership skills and more direct access to the program management to explore and implement new initiatives to help other students in the program with their professional and academic development.

- 7. Annual student academic reviews (Indirect): This process addresses outcomes 1, 2, 3, 4, and 6. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

An annual review process was established by the Graduate School several years ago that is designed to tell the students if they are doing satisfactory research and making academic progress toward their degree, or if they are not. The MicroEP/MSEN grad program expanded the feedback forms significantly to allow the major professor to separately address the quantity and quality of a student's work in many different performance attributes including academic progress, interaction with professor, interaction with other students, laboratory work, research documentation, thesis/dissertation progress, and research planning. The student fills out a self-assessment and then brings that document with him/her to the meeting with the major professor, which gives the student practice in how to align their self-assessment of their work to their direct supervisor's assessment. All review forms are then reviewed by the director and/or the associate director to both create a program wide composite view and to identify any students that need further program level performance review before the forms are forwarded to the Graduate School.

**Data Collection and Analysis:**

Annual student academic reviews were received from 53 students in 2024. 100% were eventually received.

**Assessment:**

The annual student academic review serves its intended purpose of identifying academic performance issues as well as differences in academic performance perception between the student and their major professor. These differences can facilitate useful discussion during the review meeting.

The level of participation in this process remains high (100% in 2024, 100% in 2023, 100% in 2022, 93% in 2021, 95% in 2020, and 90% in 2019).

- 8. Formal Exit Interviews with all graduates (Indirect): This process addresses all outcomes. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

While the MicroEP/MSEN program receives student feedback through many channels, as a result of feedback from external reviewers during the first program review a formal exit interview policy was implemented and a script was created to help guide the interview. Associate Director Dr. Julia Kohanek performs these exit interviews; then the forms are scanned and stored in both electronic forms.

**Data Collection and Analysis:**

Exit interviews were conducted by Dr. Kohanek with 2 of 7 students who graduated from the program during the 2024 calendar year. Participating in the exit interview has now been formalized as a requirement after final sign-off of the student. The 5 students who were not interviewed graduated during the director's changeover.

**Assessment:**

The students generally reflect positively on the unique and interdisciplinary nature of the MicroEP/MSEN program. Students appreciated belonging to a cohort and participating in the community culture of the program, e.g., the summer camp, seminars, presentations to peers and service activities. Students also provided positive comments regarding the entrepreneurial and business development aspects of the MicroEP/MSEN program. Students appreciate becoming familiar with organizational tools, e.g., Microsoft Project, that increase their productivity, Microsoft PowerPoint, to improve their presentation quality, and the courses that utilize those tools to aid in the development of communication skills that are critical to their success. Many students report on getting positions in the microelectronics industry. Some students comment on the difficulty of obtaining jobs specific to the "Microelectronics-Photonics" disciplinary areas, the majority of which consist of international students, which has partly prompted and been remedied by its evolution into the MSEN Graduate Program. Specific to MicroEP/MSEN, students suggested providing a framework that supports incoming and matriculating students in meeting all requirements of the program, graduate school, and university on the way to graduation. Most of the criticisms are associated with individual students' personnel experiences on campus, with some departments,



some faculty, and/or one or more of the educational tools utilized for particular courses that did not sit well with them. These criticisms are few and far between and typically are unique cases that do not point to systemic or MicroEP/MSEN-wide problem areas. For example, one student commented on the lack of value in the required Design for Experiments course due to it being less relevant to those conducting theoretical (modeling/simulation) studies. A frequent comment that is received and understandable in many cases is regarding how demanding faculty are of their RA/GAs. There were mixed comments on the value of the University Career Center regarding aiding in determining career direction and/or opportunity, resume assistance, etc.; or they did not use the Career Center in that capacity. Many comments on how much they like the Northwest Arkansas academic and entrepreneurial environment, especially those that have had experience as interns and/or employees of one of the local high-tech startups and/or small businesses in the area.

**9. M.S. and early-stage Ph.D. Research Document (Direct): This process addresses outcomes 1 and 3. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

All early stage MicroEP/MSEN students are required to create a research description document to both help them fully understand their proposed research and to assist in communicating the goals and limits of their proposed research with their committee members. It is updated each semester with progress made and current issues hampering progress. When a Ph.D. student completes the Ph.D. Candidacy Research Proposal, this document is no longer required.

**Data Collection and Analysis:**

In 2024, Associate director Dr. Julia Kohanek met with incoming graduate students to introduce the research document, describe its purpose as a tool to establish goals and expectations, guide research activities, and provide continuous feedback regarding research results. Each section of the research document was discussed in detail. Dr. Kohanek provided feedback and guidance by email in completing the review as well as establishing and communicating their research direction.

Research documents were received from 43 of 44 MS and PhD students in Spring 24, 39 of 40 MS and PhD students in Fall 24.

**Assessment:**

The initial research document drafts were reviewed by Dr. Kohanek and the student's major advisor. Once all suggested edits are implemented, the document is approved and signed by the student's major professor, committee, and a member of the MicroEP/MSEN management team. Subsequent updates, submitted each Fall and Spring semester, are reviewed and signed by the major professor and the MicroEP/MSEN management team. This helps document the student's progress on their intended research – through completion for MS students and, for PhD students, until the candidacy research proposal is approved by their committee. Occasionally, students with research documents

due are going through committee changes and/or are still defining the scope of their research project. In those cases, we do not report receiving completed research documents for that semester from those students in limbo. This typically applies to a couple of newer students and/or students changing their research path, advisor, or program.

**10. Research Commercialization course MEPH 53803 (Indirect): This course addresses outcomes 3, 4, 5, and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

This course, taught by Dr. Silke Spiesshoefer Spring '25. This is a core requirement of the MSEN M.S. and Ph.D. curricula, and leads the student teams through the full process of commercialization of research (via a mock Phase 2 SBIR/STTR structured proposal and commercialization pitch presentation). It is a team-based course that requires the development of a commercialization plan for on-campus related research and extensive presentations on that work to the class. Three to four teams are created from at least four students and each team will focus on a Phase 2 product development and commercialization proposal (emulating the Phase 2 SBIR/STTR requirements).

**Data Collection and Analysis:**

Research Commercialization (MEPH 53803) was not offered during Spring '22 – Spring '24 due to insufficient enrollment. It will be offered again in Spring '25 with enough ready for the course to make up at least three to four teams.

**Assessment:**

The course gives students exposure to the entrepreneurial process of commercializing research. This helps prepare the students for the MicroEP/MSEN PhD written candidacy exam as well as providing insight into the research commercialization process for those who may consider an entrepreneurial career path. Several local entrepreneurial ventures have been started by graduates of the MicroEP/MSEN program.

**11. Operations Management seminar courses MSEN 58101/59101/68101/69101 and Materials Engineering Design (and Proposal Writing) MSEN 63203 (Indirect): This five semester course sequence addresses outcomes 6 and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

This is a required core course sequence for every MicroEP/MSEN student and is designed to introduce aspects of management of a technical group in a high-tech workplace.

**Data Collection and Analysis:**

MSEN 58101 (Operations Mgmt: Infrastructure Management) Fall/Spring 2024: 6 students enrolled.

MSEN 59101 (Operations Mgmt: Personnel Management) Fall/Spring 2024: 11 students enrolled.

MSEN 68101 (Operations Mgmt: Management&Leadership I) Fall 2024: 16 students enrolled.

MSEN 69101 (Operations Mgmt: Management&Leadership II) Spring 2025: 16 students enrolled.

MSEN 63203 (Materials Engineering Design (and Proposal Writing)) Fall 2024: 17 students enrolled.

**Assessment:**

The operations management seminars, taught by Director Matthew Leftwich and Interim Director Morgan Ware (Spring '24 and Fall '24), provide students in the interdisciplinary MicroEP/MSEN graduate program with an insight into organizational, personnel, and management topics and issues typically encountered in the corporate world which most STEM graduates receive no, or little, exposure to until they make the sudden and rather dramatic change to an engineer or scientist hired into industry. These seminars help prepare the graduates for this transition and improve the likelihood of making a favorable impression as they start their new careers. A portion of the seminars is also allocated to improving the students' resumes using resources brought in from the UA Career Development Center. The students also present the MS Project plan, 3-min/12-min presentations, and Research Quad Charts for completing their degree requirements as a means of 'best practices' sharing.

The Materials Engineering Design (and Proposal Writing) course is taught by Director Leftwich. The course introduces factors that affect proposal success in both the academic and industrial arenas; demonstrates different approaches to writing successful proposals; and introduces students to the legal responsibilities and ramifications of proposal management. As part of the MicroEP-to-MSEN transition, the course has been modified to include a system-level design aspect, and an additional credit hour (3 hr vs. 2 hr) has been designated for the revised course.

**12. Ethics course MSEN 58201 (Indirect): This course addresses outcome 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

This is a required core course, taught by Professor Ken Vickers, for every MicroEP/MSEN student, and is designed to prepare MicroEP/MSEN graduates with discussions of alternative actions that may be taken in many typical ethically uncomfortable positions that may arise in the technology workplace.

**Data Collection and Analysis:**

Approximately 11 MSEN graduate students MSEN 58201 – Ethics for Scientist and Engineers – in summer 2024.

**Assessment:**

In this class, the students learn about famous examples of unethical practices and decisions which led to engineering catastrophes such as the Challenger disaster, about understanding what plagiarism is and how to avoid it, and about appropriate and ethical authorship of research papers.

**13. M.S. Thesis preparation and defense (Direct): This process addresses outcomes 1, 2, 3, and 5. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

The M.S. thesis work and documentation demonstrates both a student's skills and knowledge and is often the first major professional work done by the student where he/she has the responsibility to both guide the work and overcome whatever obstacles arise. We see this as the demonstration vehicle of the student demonstrating through achievement that they are now professionals. The MicroEP/MSEN program requires all Ph.D. path students that enter the MicroEP/MSEN program after the B.S. degree to complete a thesis-based M.S. MicroEP/MSEN degree before being admitted as a Ph.D. student. The thesis is first used to assess a student's capability for independent work and analysis and then used as a career guidance tool. In this sense the M.S. thesis is part of the Ph.D. candidacy process as well.

**Data Collection and Analysis:**

Spring 2024 – 1 MATEMS and 1 MATSMS

Summer 2024 – 0

Fall 2024 – 2 MATEMS

**Assessment:**

Non-thesis graduates are now required to take the PhD candidacy exam as a course, MEPH 53903 Product Development Process. The course is a demonstration of the student's technical and management knowledge integration by creating a commercially viable product development process to meet a new societal need, with the technical solution based on micro to nanoscale technology. The final grade is based upon a detailed written report and oral presentation to a faculty panel.

Students who plan to enter the technical marketplace after MS completion, or who may already be working in industry, may find the professional path MS most beneficial as it requires independent graduate level research in collaboration with an external technical organization.

The research may be submitted in the form of a traditional MS six-hour research topic and thesis or may instead be in the form of two three-hour independent research efforts resulting in written reports with the clarity, style, analysis, and conclusions expected of a journal paper submission

**14. Ph.D. Dissertation preparation and defense (Direct): This process addresses outcomes 1, 2, 3, 4, 5, and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

A student completing a Ph.D. dissertation has a responsibility to have created a new field of investigation, performed a meaningful investigation, performed analysis to tie current work to prior theory, examined the societal and commercial potential of their work, and found a way to communicate deep level knowledge in an understandable fashion to their committee and public.

**Data Collection and Analysis:**

Spring 2024 – 1 PhD graduate.

Summer 2024 – 4 PhD graduates.

Fall 2024 – 2 PhD graduates.

**Assessment:**

N/A.

**15. Industrial Advisory Board (IAB) (Indirect): This board meets annually and addresses outcomes 2, 3, and 7. Assessment of the report year will begin on January 15<sup>th</sup> of the following year and results will be reported by June.**

The IAB is comprised of proven professionals in companies that have a strong interest in the MicroEP/MSEN fields of research, including several early graduates from the MicroEP program. During its annual meeting it reviews program attributes and gives feedback on proposed changes, as well as having the authority to propose changes to the program from their own intuitions or observations. During the annual meeting, selected students present their research in progress to the IAB and discuss the societal implications of their work with this group of outside professionals. The meeting was conducted over the entire day on October 25, 2024.

**Data Collection and Analysis:**

The Industrial Advisory Board meeting was held October 25, 2024 with board members from industry attending plus previous MicroEP program directors, Prof. Ken Vickers and Dr. Rick Wise. Six students

participated in the 3-min thesis contest held from 9:40am to 10:30am. And 5 more students presented posters at the evening reception.

Dr. Morgan Ware gave the MSEN graduate program update.

#### **Assessment:**

The Industrial Advisory Board continues to provide a valued service to the MicroEP/MSEN graduate program in assessing the academic coursework, research, and processes used to prepare the students to compete and contribute in high-tech industry. The board members provide the program with good contacts to industry and serve as role models for the students.

Key feedback from the IAB for consideration by the MSEN Management team:

1. Recommended considering micro certificate in MSEN via 2x concentrated classes on a given subject
2. From the IAB's understanding, the new Director decision is pending a reorganization decision and leaves a little uncertainty for the future of the program. The director's position will depend on if the graduate school makes MSEN a department, with a faculty member as the head position, and a graduate coordinator as an analog to the previous director position.
3. The following is information gathered from the round table discussion with the students. Students shared that there were no issues with admissions or finding a professor.

#### **From breakout meeting with students**

4. The student roundtable (~ 12 students) yielded excellent questions and discussion. Feedback on admissions and professors were positive. Students shared they are not getting exposed to external fellowship opportunities. They have enthusiastic/favorable opinions on the Operations Management Seminars and would like more. Only 4 out of about 22 students raised their hands about having engaged with MSEN/MicroEP alumni to get a job. An action was suggested to compile a list of URLs on the MSEN website for internships.

#### **From breakout meeting with faculty**

5. In the faculty roundtable (~10 faculty) there was a discussion about the need to change how the program is presented/integrated to undergraduates. Faculty members also said that MSEN students exhibit better soft skills, indicating that the operations seminar works! There was some concern over the low number of domestic students. Faculty advocated for alumni seminar series to give a talk and engage with students. Lastly there was concern over the class load required for PhD students, which detracts from research to complete their dissertation.

## **16. Timeline for Data Collection and Analysis**

<b>Collection, Analysis, and Reporting of Assessment Data (Program Director)</b>	<b>Aug 24</b>
<b>Document Key Findings</b>	<b>Aug 24</b>

### **Use of Results**

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|---|----------------|
| - <b>Actions for MSEN Management Team Approval</b>            | <b>Sept 15</b> |
| - <b>Actions for MSEN Graduate Studies Committee Approval</b> | <b>Oct 1</b>   |
| - <b>Actions for MSEN Graduate Faculty Approval</b>           | <b>Oct 15</b>  |
| - <b>Program review with Industrial Advisory Board</b>        | <b>Nov 14</b>  |

In addition to the actions taken by these groups in response to the Academic Assessment report, other issues will be addressed as appropriate in a timely manner.