February 22, 2022

TO: Karl Scholz, Provost
William Karpus, Dean, Graduate School

FROM: David A. Noyce, Executive Associate Dean

RE: Review of the graduate programs in the Dept. of Materials Science & Engineering

At its February 17, 2022 meeting, the College of Engineering Academic Planning Council (APC) unanimously recommended for approval the attached review and self-study of the following degree programs in the Department of Materials Science & Engineering:

- MS named option “research”
- PhD
- Doctoral Minor

The review committee found the programs are meeting the prescribed student learning objectives and highlighted the successful merger and transition from two programs (Materials Science, Materials Engineering) into the current Materials Science & Engineering MS and PhD programs.

The review committee provided the following recommendations:

- Graduate funding: develop a funding mechanism for graduate students to allow the program to recruit high quality students as they apply instead of waiting for PI funds to be available and then admitting students
- Improve the communication with students on to how to report hostile and intimidating behavior and any other concerns
- Review the number of affiliates advising graduate students to determine if this is best for the students in the program
- Students expressed dissatisfaction with the training and staff availability at one of the shared facilities, which is an important resource for students. The College is addressing this concern.

On behalf of the College of Engineering, I accept the APC’s recommendation to approve this program review.

Attachments: Review Committee Report
Department Reply
Department Self-Study
cc: Jocelyn Milner, APIR
Karen Mittelstadt, APIR
Parmesh Ramanathan, Associate Dean, Graduate School
Jenna Alsteen, Graduate School
Kathy Prem, Assistant Dean for Graduate Affairs, College of Engineering
Izabela Szlufarska, Chair, Dept. of Materials Science & Engineering
Sara Hagen, Academic Planner, College of Engineering
Oguz Alagoz, Program Review Committee Chair
Review Committee Report for the MS and PhD degrees in Materials Science and Engineering

Date Submitted: 1/13/2022

Review Committee Chair and Members: Prof. Oguzhan Alagoz - ISyE (Chair), Prof. David Lynn - CBE, Prof. Mark Eriksson - Physics, and Prof. Kevin Black - Physics (GFEC Representative)

A. Review Context

The committee members reviewed the self-study document to formulate questions and follow up discussion topics with key people in the program. In addition to the email communications, the committee members had two separate meetings internally and conducted two separate interviews: 1. Meeting with faculty representatives from the program, 2. PhD students. In addition, the review committee members met to discuss the self-study report and the discussions with the program representatives and students as described in detail below.

1. Meeting with program faculty representatives: All four committee members met with Professor Don Stone, associate chair for graduate studies (started in September 2021) and Professor Paul Evans, who was the associate chair for graduate studies until August 2021, for an hour-long discussion on the program. Program representatives confirmed the history of the program including the transition from two separate PhD programs to a single merged PhD program and answered questions of the review team about the self-study report.

2. Meeting with graduate students: The committee asked Professors Stone and Evans to provide an anonymous list of the currently enrolled graduate students, in which they indicated the students’ sex, year of entrance into the program, advisor name, race/ethnicity, whether they are domestic or international. The committee then selected 10 students from this list and the MSE department invited these students to the meeting with the review committee. Three members of the committee then had a 50-minute meeting with 9 students. Professor David Lynn, a member of the review committee, was asked not to attend this meeting since he is currently an affiliate faculty member and the committee wanted to provide students an environment where they could freely share their opinions about the program. During this meeting, students have been told about the confidentiality of the discussions and their identities were not disclosed during the meeting. The committee first asked some questions including those related to the climate of the department, various policies/procedures related to the PhD education including admission, qualifying exam, courses, career placement. The students were also asked if they had any suggestions specific to these areas. After that, students were
asked to express any concerns/suggestions that they have for the betterment of the graduate program experience.

3. **Committee meetings:** In addition to the meetings with program representatives and students, committee members had an hour-long meeting among themselves before and after the meeting with program representatives and a 10-minute meeting after the meeting with the students. During these meetings, various aspects of the review report were discussed. Moreover, committee members have had several email communications related to the report.

The contents of this report are solely informed by the self-study report and meetings with the program representatives and graduate students.

There were no specific additional questions/issues to consider asked by the dean either verbally or in writing therefore this report only includes the evaluation of the MSE MS and PHD programs.

**B. Strengths and Weaknesses**

**Strengths:**

The department has many strengths and occupies an important place within the College of Engineering and on the Campus with respect to conducting, supporting, and providing leadership on materials-oriented research, training, and scholarship. The department has a strong set of nationally- and internationally-recognized core faculty conducting research in a variety of areas important to modern and future areas of materials research, and a large number of affiliate faculty who complement these strengths. The integration of affiliate faculty provides additional research and training opportunities for students, adds breadth and depth to the department’s research portfolio and visibility, and expands the impact of the department’s overall research and educational footprint on campus.

The department has successfully navigated a period of transition to merge degree tracks and programs to create a more uniform, cohesive, and streamlined organizational structure. This transition was well motivated, thoughtfully considered, and successfully executed in ways that eliminate past redundancies and confusion and clarify expectations to better serve both students and faculty associated with the program. Metrics and considerations related to this transition and its positive influence are well articulated in, and supported by, information presented in the self study.

The department has implemented new policies, strategies, and activities aimed at improving climate and diversity amongst students, and the overall impact of these ongoing efforts is reflected in an apparent and generally high level of satisfaction on these issues amongst graduate students interviewed for this report. The department provides high quality training and professional development opportunities for its students, and students continue to be well-placed after completion of their degrees.
Overall, the committee finds the department to be strong and healthy and well-positioned to continue to provide leadership and support for high-level materials research, training, and scholarship on campus and at the national and international levels.

**Weaknesses:**

The committee identified a few areas for possible improvement:

1) The current model of admissions to the program relies on matching students with an advisor at the time of admission to be able to ensure funding for the students upon arrival. This pre-matching has been noted to be favorable for the financial stability of the program but does strongly constrain the admissions process as students can only be admitted on the immediate availability of funds. If funding for just one or two fellowships were identified which could be used in conjunction with the small number of teaching assistantships availability it would be a major help in freeing up resources to allow more flexibility in admitting the strongest students to the program.

2) While meeting with the students there was a consensus that the vast majority of interactions with the faculty were positive and the students were overall very happy with the department and program. It was also noted and agreed by essentially all the students that there are a few faculty who they believe have ‘toxic’ behavior. When the students were asked if they knew how they could report and get guidance on how to solve these problems none of the students knew what they would do or who they should approach to resolve these issues.

3) Currently approximately 30% of the PhD students in the program are advised by affiliates. This may be non-optimal or indicate that some fraction of the students could be better served in other programs. A frank discussion about the pros and cons of this is encouraged within the department.

4) Students reported dissatisfaction with training and staff availability in the Nanoscale Imaging and Analysis Center (NIAC), which while not formally part of the department is housed in the same building and is an essential resource for Ph.D. dissertation research for many graduate students in the department.

**C. Advice and Recommendations**

1) If possible, resources should be found to ensure that the department can fund some students without the promise of funding from an advisor. One model that would be enabled by funds for one or two fellowships is to fund some students on RAs from day one and another set of students on fellowship for a month or two or a semester, until a good faculty advisor match is found. In this way, a small number of (one or two single-year-equivalent) fellowships could be leveraged into a support model for a much larger group of students to gain a chance to explore advisors in the first semester. There are many possible embodiments of this model.
2) Guidance should be provided to graduate students about how to report problems that arise in interactions with faculty or other department personnel. Such guidance can indicate who can be contacted, with what degree of confidentiality, and with what level of formality.

3) Consider the benefit/cost tradeoff with having 30% of PhD students advised by affiliate faculty. The committee notes that this balance arises from the long and strong history and development of materials research at UW-Madison. The committee recommends support for the department if a change in balance is found to be desirable.

4) Engage in a frank discussion with NIAC leadership and leadership of the umbrella unit within which it resides, the Wisconsin Centers for Nanotechnology. Determine how to meet student needs with respect to training and staff availability within the NIAC.

D. Conclusion

The committee concluded that the MSE department occupies an important place within the College and on the Campus. The program successfully managed the transition to merge various programs into MSE and created a uniform, cohesive, and streamlined organizational structure. The committee further agrees that the MSE graduate program has achieved its primary objectives and provides a high-quality education for the students therefore the committee recommends the continuation of the program. The committee identified a few opportunities for improvement including allocating resources to attract a higher quality of prospective students, training students on how to report any concerns related to the climate, improving the quality of the support services provided by centers such as NIAC to improve the research experience by the students.
Dean Robertson,

Thank you for forwarding the report of the committee that was asked to provide the 5-year review of the Materials Science and Engineering Graduate Program. We are grateful to the committee for their thorough, thoughtful, and supportive report.

The committee praises the service that the Graduate Program provides for its students, the high level of commitment by faculty and staff to student outcomes, and the accomplishments of the participating students, faculty, and staff.

The report also raises four points listed as weaknesses. The program regards these as identifying areas where additional activities by the program can have a positive impact. These were discussed by the MS&E faculty in the January 18, 2022 faculty meeting. The points and the planned response by the program are:

1) The committee received feedback from students about lab culture issues associated with the working environment in particular research groups. Specific concerns were associated with working environments that were identified as hostile by students. In addition, students interviewed by the committee were not clear about how to respond to situations in which they were observing hostile behavior.

   The MS&E department discussed this important concern about environment in the January 18 faculty meeting and will continue to do so in future meetings. We will address this concern by educating students and faculty about hostile behavior. Specific steps include: 1) university-led training on hostile and intimidating behavior for all graduate faculty and graduate students in MS&E; 2) input from graduate students on their experiences with hostile and intimidating behavior; 3) discussion in faculty meetings and planned future efforts to educate faculty about their leadership responsibilities; 4) further emphasizing this topic in the MS&E 900 seminar course; 5) a periodic email notice of resources that are available to students; and 6) the adoption of a statement of the Department’s values. We have reached out to Kathy Prem, Jason Jankowski, and Chris Brace in the CoE. They have offered their help and have directed us to Tricia Droes at the University HR level.

2) The committee recognized that the recruiting strategy currently employed by the MS&E PhD process makes recruiting more challenging. Specifically, the committee notes that the admissions process involves

February 7, 2022

Ian Robertson
Dean
College of Engineering
University of Wisconsin, Madison
a simultaneous requirement of an offer of research financial support associated with a specific faculty
member’s group.

The MS&E program would like to thank the committee for summarizing this concern and
bringing it up. Ultimately the program faces a mismatch between the competing requirements to
plan responsibly for financial support of PhD students on one hand and the desire to bring
outstanding students in and to encourage them to find a match with faculty research groups. The
program is seeking opportunities for further financial support for first-year students, as suggested
by the committee. One approach would be to enlist alumni in industry and members of the
departmental industrial advisory board to help us develop annual fellowships for graduate
students.

3) The committee notes that 30% of the students are advised outside the program.

The MS&E faculty view the diversity of fields and research areas involved in the graduate
program as highly positive. Materials science and engineering is a central discipline and materials
expertise can enable projects in a range of disciplines with students educated in areas that are core
to the discipline. We anticipate that over the upcoming years, membership by outside affiliates
will shrink slightly (the current size being part legacy from the earlier Materials Science
Program). However, we hope the program will continue to maintain an interdisciplinary flavor,
given the breadth of materials-related research across campus.

4) The committee reported that the students are not satisfied with the level of support for training in the
Nanoscale Imaging and Analysis Center (NIAC).

These concerns are being passed along to the NIAC management. The MS&E graduate program
will continue to monitor the student satisfaction with instrumentation issues by polling students.

The program would like once again to thank the committee for their efforts. The faculty are looking
forward to the continued contribution to the education of students and to scientific innovation.

Sincerely,

Donald Stone
MS&E Associate Chair for Graduate Studies

Izabela Szlufarska
MS&E Chair
October 1, 2021

Dean Ian Robertson
College of Engineering
University of Wisconsin – Madison

Dear Dean Robertson,

I have attached a detailed self-study of the MS&E graduate program, assembled in response to the request in your May 28, 2020 memo. The study summarizes the program’s accomplishments since its implementation in 2016 and discusses its ongoing goals. The format and scope of the study follow the Graduate School’s detailed guidelines for program review. The self-study was led and coordinated by Prof. Paul Evans.

The self-study process has already been a valuable exercise in reflecting on our graduate education efforts and, more generally, on the future impact of the program. The program’s faculty participants look forward to the remaining elements of the program review initiated in your memo.

Sincerely,

Izabela Szlufarska
Chair, Department of Materials Science and Engineering
Harvey D. Spangler Professor of Engineering
Self-Study:

Materials Science and Engineering PhD and MS Degrees

Department of Materials Science and Engineering, College of Engineering, University of Wisconsin-Madison.

Submitted October 1, 2021

Primary Contacts:

Prof. Izabela Szlufarska, Chair, Materials Science and Engineering, szlufarska@wisc.edu
Prof. Donald Stone, Associate Chair for Graduate Study (appointment started September, 2021), Materials Science and Engineering, stone@engr.wisc.edu
Prof. Paul Evans, Associate Chair for Graduate Study (appointment ended September, 2021), Materials Science and Engineering, pgevans@wisc.edu
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Introduction: Goals of Self Study

The MS-Research and PhD degree programs and PhD minor program in Materials Science and Engineering (MS&E) were implemented in 2016. This document summarizes the achievements of these programs in the past 5 years, describes their current state, and discusses important recently implemented initiatives and challenges and directions for future development. The information considered in the self study includes the academic goals of the programs, the assessment of those goals, and the experience of the students. The key aspects of the student experience that are discussed here are academic preparation, advising, climate, and career development. The programs’ efforts to recruit and to retain diverse faculty and student participants are also discussed. A summary at the end of the document describes the strengths of the program and areas in which there are opportunities for future improvement. Other components of this self-study follow the organization suggested in the UW-Madison Graduate School’s guidelines for program review.¹ This study was reviewed and endorsed at the September 21, 2021 meeting of the Material Science and Engineering faculty.

This self study does not discuss the coursework only named-option MS in Nanomaterials and Nanoengineering, which was implemented in 2018. That MS program is in the process of being renamed to MS Materials Engineering and restructured to have one curricular pathway in Nanomaterials and Nanoengineering and another curricular pathway in Engineering Materials and Processes.

The MS&E MS-research, PhD, and PhD minor programs were implemented in 2016 through the evolution and merger of preceding programs in Materials Science and Materials Engineering. The memos in Appendix 1 were issued in April and December 2015 by the University Academic Planning Committee (UAPC) and the Dean of the Graduate School. These memos describe the details of the implementation of the MS&E program and the transition of students to it from the preceding programs. The key steps in the initial implementation of the MS&E programs were (i) the discontinuation of admissions to the Materials Science and Materials Engineering programs in Spring 2016 and (ii) the formal closing of all enrollment in the preceding programs in 2019. The 2019 deadline allowed students to complete their degrees if they chose to continue with the curriculum (i.e. Materials Science or Materials Engineering) under which they had originally enrolled. The data presented here includes students who continued in the Materials Science or Materials Engineering curricula to the completion of their degrees as well as the new MS&E programs.

A. Response to Previous Recommendations

The MS&E MS-research, PhD, and PhD minor programs have not been reviewed by the Graduate School since their implementation in 2016. There are thus no formal previous review recommendations. The program has, however, acted on guidance received at the time of the implementation from the Graduate Faculty Executive Committee (GFEC) and the Graduate School Dean. The combined memo providing this guidance is included in Appendix 2. The commitments requested in the GFEC memo concerned important details of the transition to a single materials graduate program. The specific instructions, and the responses of the MS&E program, are listed here:

1) “Retaining the interdisciplinary strength of the Materials Science program and the integrity of the materials engineering discipline;”

The MS&E program has incorporated these two goals into its activities by implementing degree requirements that simultaneously ensure a rigorous preparation in materials fundamentals and sufficient flexibility to enable interdisciplinary research. These requirements were developed by a committee including MS&E department tenure-home faculty and affiliate faculty with other tenure home departments. The degree requirements are discussed in detail in section B, below.

2) “Integration of Materials Science faculty into the Materials Engineering Department as faculty affiliates;”

Materials Science faculty were incorporated as faculty affiliates of the Department of Materials Science and Engineering upon the implementation of the Materials Science and Engineering graduate degree programs. Additional affiliates have been added since the merger. The disciplinary distribution and involvement of the affiliate faculty are discussed in sections B and E, below.

3) “The establishment of a shared admission process, qualifying exam structure, preliminary exam structure, and core courses that will become the Materials Science and Engineering program’s core requirements.”

The MS&E program established admission processes, defined (and subsequently refined) a qualifying exam structure, and selected core courses. These and other key requirements are discussed in section B.1, below.

Additional requests were also listed in in the memo from the GFEC in Appendix 2:

4) Renaming and discontinuation these existing doctoral minors

5) Clarification of degree plans of then-enrolled students entering the program.

Both of these requests were fulfilled at the time of the implementation of the MS&E graduate program.

The transition in the total enrollment to the MS&E graduate from the preceding programs is illustrated in Fig. 1. The total enrollment in the new MS&E program continued at the high level of the successful previous programs, while providing the benefits described in the graduate school memos. Fig. 1 also shows that the new program proved to be popular with students. An initial steep decline in Materials Science and Materials Engineering enrollment resulted from students opting into the new MS&E program. In general, only students close to graduation opted to stay in their original programs.
The number of degrees awarded in the MS&E programs similarly exhibits a trend consistent with a successful transition. The number of degrees awarded per since 2010-2011 in the preceding programs and in the MS&E program is shown in Fig. 2.

B. Overview of the Program

This overview presents the mission and goals of the MS&E graduate programs, the unique context of the field of materials science and engineering within the University’s research enterprise, and the program’s accomplishments, goals, and challenges. Subsections summarize the requirements of the program’s degrees, the relationship between the research and coursework-only MS programs in MS&E, and the governance of the MS&E grad program.

The mission of the MS&E graduate programs is to educate graduate students in the fundamental principles of materials research, to enable students to conduct and to disseminate original materials research, and to prepare them for fulfilling careers after graduation. The MS&E graduate program is structured to support these goals. In pursuing these goals, the MS&E graduate program fits with the strategic plan of the Department of Materials Science and Engineering, the College of Engineering, and the University.

The field of material science and engineering underpins research in a variety of adjacent scientific fields and has a vast array of applications and societal impact. The adjacent fields range from biomedical engineering to physics, with impact in societal priorities spanning from human health, energy security, and reduced environmental impact. The field of materials research is thus unusually interdisciplinary in both its scientific underpinnings and its potential impact. The MS&E graduate program enables students to contribute to impactful research in all of these areas by
providing a fundamental materials education and by incorporating affiliate faculty with distinct and complementary expertise.

The involvement of a large, diverse, and active group of faculty affiliates is a key strength of the MS&E program. Affiliates benefit from participation in the program by being able to recruit and supervise MS&E graduate students. This set of students often complements the skills available in graduate student applicants in the affiliates' home departments. Often MS&E students provide expertise that complements students from other programs and increases the productivity and impact of materials research across campus. As of September, 2021, the MS&E department includes affiliates from 12 departments outside of MS&E, including faculty in COE, CALS, L&S, and SoHE. The broad and active participation of affiliates is a distinctive feature of the MS&E graduate program, reflecting the interdisciplinary nature of materials research. A full list of affiliates appears in Appendix 3. The program’s ongoing commitment to the participation of affiliated faculty is reflected in the recruitment of new affiliates and the consistent renewal of participating affiliate faculty with enthusiastic support of MS&E tenure-home faculty. Three further affiliates are joining the program in the 2021-2022 academic year, following unanimous approval of their requests for affiliate status at the September 21, 2021 MS&E faculty meeting.

The MS&E department offers the research MS degree (formally a named-option program requiring a thesis), a research doctorate, an MS with a named option in Nanomaterials and Nanoengineering, and a PhD minor. This document focuses on the research MS, PhD, and PhD minor. The MS with named option in Nanomaterials and Nanoengineering will be separately reviewed in 2025. The relationship of the nanomaterials MS and the MS in research and PhD is discussed in section B.2, below.

*Highlights of Accomplishments:* The MS&E PhD and MS research programs have had a series of accomplishments in their first 5 years. Most importantly, the program prepares students for productive and fulfilling careers by providing them with the fundamental skills of science and engineering. Students publish creative impactful research, often in the most prestigious journals in their fields including in *Nature, Science,* and many important specialist journals. Students gain valuable professional experience in research and in associated skills in organizing, planning, and developing collaborations. The accomplishments of the students have been recognized with competitive fellowships and awards, including from the National Science Foundation, Department of Energy, the Wisconsin Distinguished Graduate Fellowship, and private foundations. The career achievements of students after graduation have included transitions to positions in academia, industry, and national laboratories. The range of industrial positions has included large companies, for example in the semiconductor, materials processing, and polymer sectors, to small and medium companies and entrepreneurial activities. Informal discussions with graduating students indicate that the strong fundamental preparation provided by the program and the independence and interdisciplinarity emphasized in their research are highly valued by employers. In academia, several graduates have started tenure-track appointments and have gone on to academic recognition in their own right, including through CAREER and PECASE awards.

The key organizational accomplishments of the program’s first first five years begin with the implementation of the MS&E degree programs. The programs include equitable and meaningful course and exam requirements. Beyond the formal course requirements, the MS&E graduate program has instituted several initiatives to improve the climate for students and to emphasize diversity in student recruiting. These initiatives include discontinuing (as a trial program for now, pending formal evaluation by the program in Spring 2022) the use of the GRE in admissions, and increased formal
training in implicit bias, sexual harassment, and hostile and intimidating behavior. More detail about these initiatives appears in the following sections.

B.1 Degree Requirements and Outcomes

The MS&E PhD and MS-Research degrees have a rigorous and widely applicable curriculum preparing students for materials research. The key components of the curriculum are: (i) coursework balancing MS&E fundamentals with flexibility, (ii) a qualifying exam taken at the start of the third semester of enrollment, (iii) a preliminary exam taken before the start of the sixth semester, and (iv) the final thesis defense. The MS curriculum includes the coursework and MS thesis defense requirements but omits the qualifying exam and preliminary exam.

A summary of the MS and PhD curricula is provided in Appendix 4. The full set of requirements is listed in the Guide entry for the MS and PhD programs, which is available at https://guide.wisc.edu/.

The PhD degree has the following approved learning outcomes:²

1. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and social sciences to help frame problems critical to the future of their discipline.
2. Conduct original research.
3. Demonstrate an ability to create new knowledge and communicate it to their peers.
4. Foster ethical and professional conduct.

The approved learning outcomes for the MS degree are:³

1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and solve advanced engineering problems.
3. Demonstrate creative, independent problem solving skills.
4. Apply the latest scientific and technological advancements, advanced techniques, and modern engineering tools to these problems.
5. Recognize and apply principles of ethical and professional conduct.

The PhD minor does not have separately listed learning outcomes.

The curricula for the MS and PhD degrees both include a two-semester required seminar class, MS&E 900, which consists of a series of activities and presentations introducing the components of the MS&E graduate program and topics relevant to professional conduct and professional preparation. The topics of presentations in MS&E 900 in the 2019-2020 academic year are listed in Appendix 5. Note that MS&E 900 also requires attendance of a separate weekly research seminar with in-depth research presentations by materials researchers from industry, academia, and national laboratories.

The MS&E degree requirements have strictly enforced deadlines for the completion of degree milestones. The timing of these milestones and the actions taken to encourage completion are shown

² The PhD degree learning outcomes are available at:
https://guide.wisc.edu/graduate/materials-science-engineering/materials-science-engineering-phd/#learningoutcomestext

³ The MS degree learning outcomes are available at:
https://guide.wisc.edu/graduate/materials-science-engineering/materials-science-engineering-ms/#learningoutcomestext
in Table 1. Note that flexibility in the completion deadlines is available on an individual basis when specific challenges arise.

The implementation of a deadline for the preliminary exam has been particularly beneficial to student progress. Previously, in the absence of a deadline, students would often complete the preliminary exam a short time before the PhD thesis defense. In some cases, the interval between the prelim and PhD defense was as short as 6 to 12 months. Requiring the preliminary exam before enrollment in the sixth semester allows students to have increased interaction with the members of the thesis committee and to gain valuable feedback while there is still time to adjust their research activities. The program also provides incentives to the students to complete the preliminary exam by awarding the MS degree after successful completion of the prelim and by increasing stipend support after the preliminary exam is completed.

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Stated Requirement</th>
<th>Completion Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifying exam</td>
<td>Before October 1 of (Fall start) or March 1 (Spring start) of third semester</td>
<td>Enrollment hold for 4th semester for students who have not attempted the qualifying exam.</td>
</tr>
<tr>
<td>Preliminary exam/MS thesis defense</td>
<td>During 5th semester of enrollment</td>
<td>Enrollment hold for 6th semester without formal request for extension and approval of for Graduate Study.</td>
</tr>
<tr>
<td>Thesis defense</td>
<td>Planned for end of 5th year.</td>
<td>Discussions with advisors and case-by-case mentoring for students taking longer than 6 years.</td>
</tr>
</tbody>
</table>

Table 1. Milestones and compliance plans for MS&E degree requirements.

B.2 Relationship between Research MS and PhD Programs and Named Option MS in Nanomaterials and Nanoengineering

In addition to the research MS and PhD programs, the Department of Materials Science and Engineering offers a named option MS in Nanomaterials and Nanoengineering. This MS-Nano program is a coursework-only degree that is designed to be completed within 12-16 months. Students in the MS-Nano program are not by any Assistantships or University-awarded fellowships. The MS-Nano students rarely transfer to the MS-research or PhD programs. The admissions of the MS-Nano program are separately administered from research programs.

An important positive effect of the MS-Nano program on the MS-Research and PhD programs is that the larger number of early graduate students has allowed higher graduate enrollment in coursework programs, including a larger cohort in the MS&E 900 seminar class.

B.3 Program Governance

Since its implementation in 2016, the program has been led by a tenure-home faculty member in MS&E. The program’s leader serves simultaneously as the program’s Director of Graduate Study and as the MS&E Associate Chair for Graduate Study. Since 2016, the MS&E Associate Chairs for Graduate Study have been: Profs. Paul Voyles (2016), Paul Evans (2016-2017, and 2018-2021), Xudong Wang (2017-2018), and Donald Stone (2021-). The leadership of the program transitioned to
Prof. Donald Stone on September 1, 2021. The work of the Associate Chair for Graduate Study is supported by the MS&E Graduate Affairs Committee, by a graduate admissions committee, and through ad-hoc participation of MS&E faculty in specific advisory roles. The participation of a large number of MS&E faculty members in the graduate program has enabled smooth leadership transitions.

Affiliate faculty participate in the administration of the program through membership on graduate faculty committees, by participating in the qualifying exam, and through services on the admissions committee. The admissions committee also awards the programs’ Turnbull Awards and selects the MS&E programs’ nominees for external awards and fellowships, including the Wisconsin Distinguished Graduate Fellowship. The program is in the process of updating guidelines for affiliate participation in governance decisions to reduce the administrative burden on affiliate faculty.

The interaction between the program’s faculty leadership and the enrolled graduate students is facilitated by the MS&E Graduate Student Advisory Committee (GSAC). Members of the GSAC are nominated and elected annually by the enrolled students. The GSAC provides input on program initiatives, feedback on the experience of graduate students, and leads social and professional activities for students. A small annual budget is provided by the program to finance the activities developed by the GSAC.

C. Program Assessment and Evaluation

The assessment plan for the MS&E graduate programs was established at the time of the implementation of the graduate program in 2016. The development of the assessment plan was guided by the graduate school’s assessment plan template and resources available at https://provost.wisc.edu/inside-assessment/.

The assessment plan for the MS&E programs includes a more specific set of learning goals than the outcomes listed in the guide and in section B. The more specific goals allow the feedback provided by the assessment process to be used more effectively. The MS&E program will be updating both sets of goals during the 2021-2022 academic year. With this self-assessment complete, the PhD assessment plan will be updated to evaluate the same outcomes listed in the Guide. The MS goals will be updated as part of the planned revision of the coursework-only MS programs.

The goals considered for PhD assessment were:

1. Demonstrate an extraordinary, deep understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
4. Recognize and apply principles of ethical and professional conduct.
5. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and/or social sciences to help frame problems critical to the future of their discipline.
6. Demonstrate an ability to conduct original research and communicate it to their peers.

The goals considered for MS assessment are:

1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.

3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to solve these problems.

4. Recognize and apply principles of ethical and professional conduct.

These goals are designed to assess different components of the MS&E curriculum. The map connecting the goals of the program to the curriculum is shown in Table 2. A similar mapping applies to the components of the MS program.

The PhD graduate program assessment is conducted at the time of the PhD dissertation. Each PhD final defense committee reviews the student's written dissertation and final defense presentation and completes the learning goals checklist at the conclusion of the defense. The evaluation is conducted during the committee's private deliberations and is in general not shared with the student. The evaluation at the time of the PhD defense provides a direct assessment of the learning outcomes.

There are several steps in the administration of the assessment: The MS&E graduate program coordinator, a member of the staff, reminds the faculty members serving on the final defense committees to complete the learning goals checklist. The student's Ph.D. advisor is responsible for ensuring that the final defense committee completes the learning goals checklist. The completed checklists are submitted to the department graduate program assessment coordinator (GPAC) – a role filled by a faculty member appointed by the department chair. In practice the GPAC has been the Associate Chair for Graduate Study. The GPAC compiles and summarizes the department's learning goals assessment data on an annual basis. The results are compiled in aggregate form over the course of the year and are reviewed annually.

The assessment of each learning outcome is collected using a grading rubric that evaluates the student's using the following options: “student has exceeded goal,” “student has met goal,” and “student has not met goal.” An example of the annual assessment data is given in Appendix 6, which show the 2017-2018 assessment data for the MS and PhD degrees.

<table>
<thead>
<tr>
<th>Degree Program Required Courses or Experiences</th>
<th>Learning Goal #1</th>
<th>Learning Goal #2</th>
<th>Learning Goal #3</th>
<th>Learning Goal #4</th>
<th>Learning Goal #5</th>
<th>Learning Goal #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D. depth requirement (coursework)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ph.D. breadth requirement (coursework)</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research (890,990) credits</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Qualifying milestone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Prelim exam (includes oral presentation)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dissertation document (written)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Dissertation defense (oral presentation)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Table 2. Map between the learning goals of the PhD MS&E assessment and the components of the MS&E PhD curriculum.

A summary of the responses for all available years is also shown in Appendix 6. The assessment data shows that the program faculty overwhelmingly evaluate the program as meeting the goals established above. All of the students are assessed as either exceeding or meeting each of the goals.
The assessment activities for the 2019-2020 year included a reflection on the effects of the COVID-19 pandemic response on the graduate program and in particular on the progress of graduate students. Key observations from that activity included that there was a disproportionate effect on graduate recruiting, particularly in recruiting and starting international graduate students.

The MS&E graduate program has not attempted to respond to the assessment of PhD-level goals because the first cohorts of graduate students who have completed the entire curriculum of the MS&E program since its implementation are just beginning to graduate. The assessment data collected to date serves as a baseline for the comparison with curriculum implemented in 2016.

The assessment of the impact of COVID led to several responses. The program has encouraged faculty to increase the frequency of regular check-ins on student well-being. The impact on international students was clearly very high and has been mitigated in part by allowing delayed starts of admitted students. The response to the need for increased support for international students also resulted in increased flexibility in the normal first-year activities of the PhD program. Three PhD students started the program remotely in 2020-2021 while supported by research assistantships. All were productive in both coursework and research and have arrived in Madison to start the second year of the PhD program.

D. Recruiting, Admissions, and Enrollment

The MS&E graduate program has extensive and highly coordinated efforts in recruiting, admitting, and enrolling graduate students. This section reviews activities in those areas and emphasizes areas of strength and potential improvement. The MS&E program has also established goals and activities to increase the diversity of the pool of applicants and the cohort of enrolled students. These goals, and further planned activities, are described in section K, below.

D.1. Recruiting

The MS&E grad programs have continuously sought to recruit a diverse and highly talented group of graduate students. The recruiting activities start with active engagement of students before their formal application. The MS&E program engages with prospective applicants through faculty participation and presentations at Research Experience for Undergraduate (REU) programs, workshops and open houses, and direct outreach to students at specific institutions. Recent examples of these activities include a visit to Coe College (Cedar Rapids, IA) in early Spring 2020, virtual information sessions at Penn State and the University of Puerto Rico-Mayaguez (UPRM) in Fall 2020, and continuous engagement with student visitors. The recruiting activities with UPRM build on connections established through the NSF-sponsored Partnership for Research and Education in Materials grant and also reinforce a long-standing UW-Madison/UPRM relationship. The MS&E program participates in applicant outreach activities such as the Department of Energy virtual graduate school fair July, 2021 and UW-Madison virtual grad school fairs in 2020 and 2021. Among REU programs, the SURE REU program in the College of Engineering has been a particularly valuable means of engaging prospective students and has resulted in recruiting multiple current MS&E program students from underrepresented groups.

The January-March period each year is particularly important for students being recruited to start in the Fall semester. The MS&E program actively recruits students who have been favorably reviewed by the admissions committee. The admissions evaluation itself is described in detail in the next section. Approximately 30 of the most favorably reviewed applicants are invited to an open-house event held either virtually (as in Spring 2021) or in person (as in previous years). The activities of the open house include meetings with faculty and students, panel discussions of graduate
student-life topics, and research presentations. International students are invited to a shorter virtual event with many of the same activities. The goal of the recruiting process is to initiate and to solidify connections between students and advisors that lead to offers of financial support. Formal admission to the program is available only when accompanied by an offer of financial support from a faculty member. The program offers approximately two one-year Herb Fellowships, which are used annually to provide support for the first year of students being recruited by the program. These fellowships are allocated to enable program faculty to make offers to promising students, with an emphasis on those rated most favorably by the admissions committee and students from underrepresented groups.

Also during the January-March interval, faculty participants in the program individually personally contact all of the qualified applicants from underrepresented groups in order to match them with potential faculty advisors. In cases where multiple advisors are of interest to the prospective student the program has facilitated collaborative offers to ensure that the student is comfortable with coming to UW-Madison. The Engineering Graduate Engineering Research Scholars (GERS) program has been extremely valuable as a mechanism for recruiting students and in providing a cohort of students from similar backgrounds that persists through the duration of the students’ study. Prof. Jason Kawasaki serves as the MS&E representative on the GERS advisory board and coordinates recommendations for support through the GERS program. The MS&E PhD program has recruited 6 GERS students in the past 5 years.

Students not enrolling after admissions have reported enrolling in other top MS&E programs. The top reported destinations for students admitted, but not enrolling at UW-Madison were Cornell University (US News and World Report 2022 Materials Engineering Grad. Program ranking #8, tied), Northwestern University (#2), University of Michigan (#8, tied), Penn State (#11), UCSB (#4), and Stanford (#5). The UW-Madison MS&E graduate program is ranked #15 in this list. The high ranking of the competitors indicates that the MS&E graduate program is not routinely losing admitted students to less-accomplished lower-ranked graduate programs.

D.2. Admissions

The admissions committee consists of faculty participants in the program. For the 2020-2021 recruiting cycle the members of the admission committee were Profs. Jiamian Hu, John Perepeko, Dawei Feng, and Yonfeng Zhang. Prof. Zhang is an affiliate faculty member in MS&E, with a tenure-home appointment in Engineering Physics. The admissions committee chair was Prof. Jiamian Hu. The admissions committee meets annually in the Fall semester to discuss criteria for admissions. Formal guidelines for admission are issued by the Associate Chair for Graduate Study and the admissions committee chair at the beginning of each admissions cycle. The admissions criteria place a very high positive value on achievement in fundamental math and science courses and activities that indicate interest in research activities. The admissions committee takes into account that access to research activities and advanced courses may differ among students applying for admission from different backgrounds and evaluates students accordingly.

The program conducts two admissions cycles annually, for Spring semester and Fall semester starts. Among the two cycles the number of applications for Fall starts is much larger. The Spring-semester start cycle is valuable, however, in providing flexibility for students returning to graduate school following work in industry and to students who have completed their undergraduate degrees in the Fall.

The admissions committee places applications in three categories: encouraged for matching with faculty research groups, eligible for admission without further review upon faculty request, and not
recommended for admission. Formal admission is offered only when students receive a research assistantship offer, or another offer of research financial support.

Figure 3 shows application statistics for the MS&E program and the combined statistics for the combined preceding programs. The statistics indicate that there has been a continued high level of applicant interest in advanced degrees in Materials Science and Engineering. The apparent decrease in applications starting in 2017 arises from the double-counting of students who applied to both of the preceding doctoral programs.

The applicant pool includes very highly qualified candidates. The results of the admissions evaluation reflect the quality of this pool of candidates. In the applications for admission for Fall 2021, 59% of the applicants (102 of 172) were evaluated by the admissions committee as having a background and capabilities that would allow them to complete the PhD program successfully. The recruitment effort focused on the most promising of these applicants, focusing particularly on the match with faculty research efforts and on increasing the diversity of the program.

The MS&E grad programs have started a study for the 2020-2021 and 2021-2022 admissions cycles that suspends the requirement that students submit Graduate Record Examination (GRE) scores with their applications. The suspension of the GRE requirement was motivated because there is increasing evidence that GRE scores are not predictive of success in graduate school. There is further evidence that requiring the GRE has a disproportionate negative effect on applicants from underrepresented groups. A 2020 review of the use of the GRE by MS&E admissions committee chair Prof. Jiamian Hu found that GREs are no longer required for prestigious fellowships (NSF, NDSEG, and Hertz Foundation, for example). Similarly, an increasing number of peer MS&E programs do not require GRE scores. The response to the COVID pandemic has made the timing of this evaluation of the GRE requirement particularly good because of pandemic-related difficulties in administering the exam.

Figure 3. Numbers of applicants, admissions, and enrollments for MS&E PhD and MS research programs. The data include the MS&E program since 2016 and the preceding Materials Science and Materials Engineering programs. Retrieved from tableau.wisconsin.edu August 19, 2021.

A formal evaluation of whether to return to requiring the GRE will be conducted in Spring 2022 for the Spring 2023 and Fall 2023 admissions cycle. Initial insight is, however, available into the
impact of the GRE requirement based on recruiting during the Spring 2021 and Fall 2021 cycles. A review of the admissions committee’s work shows that there is no correlation between whether a student has provided a GRE score and a subsequent favorable admissions review of that student. The fraction of domestic students (those applying from institutions inside the US) who provided GREs was 45% among students reviewed favorably and 46% among those not reviewed favorably. The fractions for international students (applying from outside the US) were similar: 46% of favorably reviewed applicants provided GREs and 45% of unfavorably reviewed applicants provided GREs. The first-year performance in coursework and research of students admitted in 2020-2021 will be included in the planned 2022 evaluation of the GRE requirement.

D.3. Enrollment

The total number of students enrolled in the MS&E graduate programs and the preceding programs in the years 2000 to 2020 is shown in Fig. 1. The current enrollment is below the 10-year average. At least part of this decrease is due to the lower-than-expected number of enrollments in Fall 2020 due to the COVID pandemic. At least four students postponed enrollment at that time because of pandemic-related visa issues. The program is, however, investigating other potential reasons for the decrease in enrollment from 2018 to 2020.

The recent decrease in enrollment numbers may reflect a broader trend with respect to difficulties making compelling offers to admitted graduate students in the context of funding guarantees and the associated need to immediately become associated with a specific research advisor. If the suspected decrease in enrollment is confirmed then the program will not be able to meet the needs of program faculty in teaching and research. A discussion of the strategies the program is considering in response to this issue appears in section K, below.

We note that, according to enrollment numbers from tableau.wisconsin.edu, several other PhD programs in the College of Engineering are either at or slightly below their long-term averages. An exception is the Mechanical Engineering program which has grown significantly. The MS&E program is consulting with ME faculty to determine what strategies ME has used to accomplish this enrollment increase and whether similar strategies can be applied in MS&E.

The program currently has 6 students who are part of the COE GERS program. Since 2016 the MS&E graduate program has graduated 7 students with PhDs and 1 with a terminal MS through the GERS program.
The total number of students enrolled in the MS&E PhD minor is small in comparison with the MS&E PhD degree enrollment. As shown in Fig. 4, however, there has been steadily increasing interest in MS&E minor. Recently revised formal guidelines for seeking minors to clarify that credit from previous degrees or outside institutions cannot be used to satisfy MS&E minor requirements. The increasing number of students receiving the MS&E minor indicates that there is increasing awareness of the program, of the relevance of materials research, and the availability of relevant MS&E classes.

E. Advising and Student Support

Students in the MS&E PhD and MS-Research programs are normally advised by a faculty member who also serves as the supervisor of the student’s thesis research. MS&E program graduate students can be advised by MS&E tenure-home faculty or by MS&E affiliate faculty. There is no difference between the roles and requirements of the advisors between MS&E tenure home and affiliate faculty. The list of current MS&E affiliate faculty, their tenure-home departments, and the dates of their affiliation with the program appears in Appendix 3. The MS&E program has a large number of faculty who act as research mentors and advisors, with 40 faculty members advising at least one student in 2019-2020 and a similar number active in previous years.

In rare cases students are formally advised by a faculty member who substitutes for a previous advisor while the student completes the degree. This substitution has occurred, for example, when a transition to emeritus status has resulted in faculty members being formally unable to serve as advisors during the final part of the completion of the PhD.

E.1. Establishing and Maintaining Advising Relationships

The student-advisor relationship is critically important. The program nurtures this relationship by requiring several specific activities. There are regular milestones for progress towards the degree, as summarized in Table 1. Students receive guidance about how to develop advising relationships and perform associated required activities during the MS&E 900 seminar. The program has also instituted a formal expectations document for MS&E grad program participants. The expectations document is in Appendix 7 and the process used to develop it is described in section F.2.

The program’s goals are to ensure that students work closely with faculty members and receive consistent and regular feedback about their work and their progress. The feedback is given in regular meetings with faculty, through grades in research courses, at the qualifying and preliminary exams, and through the College of Engineering’s GOAALS process.

Students may choose to transfer between advisors for one of several reasons. The MS&E program adopted a procedure in May 2021 to identify the reasons for transfers, to monitor trends that could indicate problems in the research culture of participating research groups, and to guide student financial support during the transfer process. This procedure is given in Appendix 8. The key aspects of the transition process are the identification of any climate issues within the program and the assurance of continuous financial support for the student. The process in Appendix 8 includes guidelines for interviews with the transitioning student and lists potential sources of financial support.
E.2. Communication of Program Information

The formal mechanism for communicating the requirements of the MS&E graduate programs is through publication in the UW-Madison Graduate School Guide (https://guide.wisc.edu). Guide entries for the MS&E graduate programs were systematically revised in May, 2019 and are periodically updated to reflect changes in requirements.

The dissemination of requirements and advising guidelines is highly important. The program disseminates the expectations document shown in Appendix 7 and has a requirement that all students have (and describe in writing) a meeting with their faculty advisors during the first semester. The MS&E graduate program ensures that all students are aware of the program’s expectations. The expectations are presented to faculty and students in multiple forums and formats.

1) The expectations document is circulated to all graduate students and faculty annually at the start of each academic year and to students starting in Fall and Spring semesters, before their arrival.

2) A presentation on mentor/mentee relationship has been incorporated into the MSE 900 seminar, starting in Fall 2020. All first-year graduate students are required to take MSE 900. The course includes a required assignment that documents that the mentor and mentee have discussed and agreed to expectations.

3) Mentors are educated about expectations in several ways: (i) a written document, (ii) a presentation in the MS&E faculty retreat at the beginning of the Fall 2021 semester (reaching mostly MS&E tenure-home faculty), and (iii) in an email communication to all MS&E graduate faculty (i.e. MS&E tenure-home and MS&E affiliate faculty), also at the beginning of the Fall 2021 semester.

The MS&E graduate student handbook is available on the MS&E department homepage. The handbook is updated when there are changes to policies and procedures that are not documented in the Guide. The most recent update was in August, 2021. The topics covered in the handbook include exam procedures and guidelines, the use of credit from previous degrees to satisfy the requirements, and the timing and enforcement of the degree requirements.

E.3. Monitoring Student Progress

The progress of students through the formal requirements of the MS&E degree programs is monitored by the MS&E graduate program coordinator. The key milestones are listed in Table 1, above. This programmatic progress, in terms for example of milestones such as the qualifying and preliminary exams, is relatively straightforward to enforce. In general, the timing of the milestones is encouraged by clear and consistent announcements of impending deadlines, followed by case-by-case follow-ups with specific cases in which there are delays.

The professional and research progress of students is monitored and tracked by each student’s faculty advisor. The program also encourages the thesis committee to be involved in each student’s development. This group is established for the administration of the preliminary exam during the third year of the program and often continues to interact with the student between the completion of the prelim and the thesis defense. The program also encourages committee members to provide early insight into potential climate issues that may affect the student’s progress. There is also often complete or nearly complete overlap of faculty membership of the PhD thesis defense committee and the preliminary exam. When issues with progress arise, the advisor, committee, and Associate Chair for Graduate Study become involved to identify problems and potential solutions.

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5 The handbook is available through a link on this webpage: [https://www.engr.wisc.edu/department/materials-science-engineering/academics/ms-phd/](https://www.engr.wisc.edu/department/materials-science-engineering/academics/ms-phd/)
F. Program Community and Climate

The MS&E graduate program strives to develop and to maintain a positive, creative, and thoughtful climate for all students. The exit interviews and other data below show that this goal is in general being met - but that continuous improvement is possible. With this in mind, several initiatives have already been implemented. Two of these initiatives are described in more detail below (i) an emphasis on professional preparation in respect to climate issues and (ii) development of an expectations document for faculty and students.

New students are welcomed to campus in a series of events that establish a productive and respectful climate. The events consist of a welcome and orientation meeting before the start of the Fall semester, a celebration of awards to MS&E graduate students, and a panel discussion led by the program’s Graduate Student Advisory Committee in the MS&E 900 seminar. MS&E 900 is a required class and is thus an important way to introduce important climate issues to students. The forum provided by MS&E 900 is an important component of the two climate initiatives described below.

Beyond the two initiatives described below, the program employs donor-generated financial resources to promote a positive climate. Two donor-supported funds provide the program with ways to recognize student achievements and to address unforeseen financial needs. The program annually awards Turnbull Awards for outstanding achievement in research and societal impact. The graduate students have been very happy to find that their achievements are recognized by the program. The Chuang Fund, supported by a generous donation, provides scholarships on the order of $500 to students in cases of financial hardship. The Chuang fund has been particularly valuable because financial need is often difficult for students to express. Recent examples of the use of this fund have included helping to replace a laptop computer and help with the financial complications of the transition from the monthly to biweekly pay schedule.

A final component of this section describes initiatives to increase participation in the graduate program by members of underrepresented groups.

F.1. Professional Preparation for a Climate of Respect and Inclusion

The MS&E program includes formally required professional preparation in issues affecting the climate within the program. The MS&E 900 seminar is a formal graduation requirement of all of the MS&E graduate degrees. The components of MS&E 900 include presentations and activities in implicit bias, research ethics, safety, mental health, and other related issues.

The MS&E 900 presentations on these topics have been very generously developed and delivered by campus-level experts in these issues. The topics are well-received by the students and their feedback is used to identify topic areas in which additional presentations would be beneficial.

The MS&E program has contributed to the drafting of the COE graduate student family leave policy and has enthusiastically supported its implementation. Among the key provisions of the leave policy are a continuation of financial support and an extension of academic requirements including exams. The full text of the leave policy is available at: https://working. engr. wis. edu/policies-for-faculty-and-staff/.

F.2. Climate Study and Response: Development of Expectations Document

During her term as MS&E Department Chair, Prof. Susan Babcock met a broad cross-section of the program’s MS-research and PhD graduate students in a series of visits to individual faculty research groups. These visits were conducted in Fall 2019. Prof. Babcock’s observations provided
important insight into the graduate students’ perception of the climate within the program. Several students felt that a discussion of what constitutes reasonable expectations at the department level would be a constructive exercise. Students in one particular group commented that they are quite isolated as a group and do not know if what is being expected of them is normal or typical of other groups. This concern was in one case formulated as a question: “How do we know if our group’s expectations align with others? Is my experience the typical experience?” Students generally, but not across the board, felt it would be useful to have both department and group expectations written down.

A summary of Prof. Babcock’s study was shared with MS&E graduate faculty and was discussed at an MS&E faculty meeting on March 24, 2020. The meetings conducted by Prof. Babcock clearly revealed widespread, serious interest among the students in the general issues associated with expectations at the research-group and program level, assessments and other feedback regarding research progress, and climate more generally. The MS&E GSAC was consulted about expectations, mentoring, and procedures on March 3, 2020. As described above, GSAC is composed of program graduate students and serves as a liaison between graduate students and the program faculty. It also is serving as an advisory group on issues including climate, student recruiting, and graduate student well-being.

In addition to the highly specific study conducted by Prof. Babcock, more general insight into the climate within the MS&E program is available from surveys administered by the UW-Madison Graduate School. Key points of the survey data are summarized in Tables 3 and 4. The survey data indicate that the program is perceived by the students to be positive with a very high fraction of students responding “strongly agree” or “agree” to climate survey questions. The rate of favorable responses by MS&E students is higher (though with reduced statistical significance) than the aggregate of similarly favorable responses by students in other COE programs. The survey data indicates that areas of intellectual and social climate were perceived slightly less positively than other topics, indicating areas for future action.

<table>
<thead>
<tr>
<th>Prompt</th>
<th>MS&amp;E PhD Program Reponse (number of respondents=17)</th>
<th>Other COE PhD Programs (number of respondents=110)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree or Agree</td>
<td>Strongly Agree or Agree</td>
</tr>
<tr>
<td>The intellectual climate of my program is positive and the open expression of ideas is valued</td>
<td>88%</td>
<td>85%</td>
</tr>
<tr>
<td>Students in my program are treated equally, fairly, and with respect by faculty advisors</td>
<td>94%</td>
<td>85%</td>
</tr>
<tr>
<td>The social climate of my program is inclusive and welcoming</td>
<td>94%</td>
<td>83%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree or Agree</th>
<th>Strongly Agree or Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students in my program are treated with respect by faculty</td>
<td>96%</td>
<td>92%</td>
</tr>
<tr>
<td>Students in my program are collegial</td>
<td>92%</td>
<td>88%</td>
</tr>
<tr>
<td>The intellectual climate of my program is positive</td>
<td>91%</td>
<td>90%</td>
</tr>
<tr>
<td>The social climate of my program is positive</td>
<td>90%</td>
<td>79%</td>
</tr>
</tbody>
</table>

Table 4. Responses to representative climate questions in the UW-Madison Climate Survey. Retrieved from tableau.wisconsin.edu August 19, 2021.

The results of the discussions following Prof. Babcock’s study and the review of the survey data informed the program’s next steps and led to the drafting expectations document. Feedback on a draft expectations plan was solicited from CoE Assistant Dean for Graduate Study Christopher Brace and has been incorporated into the plan. The expectations were developed with input and feedback from the CoE administration, discussion with students, and review by the faculty. The resulting plan was formally adopted in May 2021. The expectations of participants in the MS&E graduate program appear in Appendix 7.

F.3. Increasing Participation of Members of Underrepresented Groups

The program actively seeks to increase participation of members of underrepresented groups. Efforts and initiatives aimed at increasing diverse participation at the student level are described in the recruiting discussion in section D.1 above. The program seeks to increase the diversity of faculty and staff participation by actively recruiting faculty members in departments other than MS&E to become affiliated with the MS&E grad program. The list of affiliates in Appendix 6 includes the date of participation.

More generally, the MS&E grad program seeks to demonstrate the diversity of the MS&E workforce and to establish long-term interactions that benefit students and faculty research programs. The MS&E grad program has emphasized the use of the MS&E weekly seminar slot to highlight the achievements of early-career women scientists. Recent (and upcoming) examples include Dr. Lauren Garten (now an Assistant Professor at Georgia Tech.), Dr. Leora Dresselhaus-Cooper (now an Assistant Professor at Stanford), Dr. Ruth Schlitz (SageGlass, Inc.), and Prof. Nicole Benedek (Cornell Univ.).

Future initiatives to increase equity and diversity are described in section K, below.

G. Degree Completion and Time to Degree

The MS&E grad program was implemented in 2016. The first cohort of students is now close to completing the Materials Science and Engineering curriculum, rather than beginning under one of the preceding programs’ curricula. The cohorts for which full data on completion rates and meaningful time-to-degree information exist predate the implementation of the new program. The discussion here draws on data from students entering in approximately 2015. The impact on the completion of changes associated with the transition to the MS&E program curriculum is thus not yet known.

The mean completion times for the MS&E PhD and for peer institutions are available from tableau.wisconsin.edu. The mean completion time for the MS&E PhD program is 5.9 years. The
American Association of Universities (AAU) average for peer MS&E programs is 5.2 years. The time to degree for the UW-Madison graduate school as a whole is 6.2 years. The variation in time-to-degree for the PhD and MS degrees is shown as a function of gender and demographic group in Fig. 5. Note that Fig. 5 includes times-to-degree from 2019-2020, for which there is incomplete data and unreliably short completion times. Omitting the 2019-2020 data, female students complete their PhDs and MS degrees in approximately the same times as male students. The year-to-year variation is significant and includes at least one year in which the completion time is faster for women than men. On average, in the time period shown in Fig. 6, women finish the MS&E PhD program in 5.7 years and men in 5.3 years. Again omitting the 2019-2020 data, masters degrees are completed by women in 2.8 years and by men in 2.9 years.

Students of targeted minority status complete PhD programs and MS programs in longer timeframes than students of non-targeted minority status. The statistics for targeted minority students however have significantly higher uncertainty because of the smaller total number of students who are members of targeted minority students. Students from targeted minority groups receive their PhDs in an average of 6.5 years, while non-targeted students do this in 5.4 years. Masters degrees are completed by students from targeted minority groups in 3.1 years. Students not from targeted minority groups complete the MS in an average of 2.7 years.

The program’s response to the small differences in degree completion times has been to monitor the completion of degrees by students from underrepresented groups and to ensure that students are neither unnecessarily delayed in degree completion nor rushed.

![Figure 5. Time-to-degree in the PhD and MS degrees as a function of gender and demographic group.](image)
Figure 7. PhD completion rates by cohort for (a) UW-Madison MS&E program, (b) other UW COE programs, and (c) Association of American Universities peer programs.

The fractions of students who have completed PhD degrees, not enrolled, and still enrolled are shown as a function of cohort year in Fig. 6. The cohort year in this context labels a specific cohort of students (e.g. those entering in 2017-2018). The statistics are shown (a) for students in the MS&E PhD program, (b) for students in other UW COE PhD programs, and (c) AAU peer MS&E programs. The UW-Madison completion rate increases in years 4, 5, and 6 and is then approximately constant for later years. The mean of the annual UW-Madison completion rate after 6 years is 72%, indicating that 72% of the UW Madison MS&E students have completed their degrees by the start of year 7. The means for other COE PhD programs and for AAU peers are 67% and 71% respectively. The MS&E PhD program completion rate is thus in-line with its peers and slightly higher than other similar UW-Madison PhD programs.

The MS&E graduate program has, since its implementation in 2016, emphasized programmatic requirements that encourage students to complete their degrees successfully and to do so in an appropriate amount of time. The formal exam milestones listed in Table 1 encourage timely completion of the degree and allow issues to be addressed before they result in serious delays to graduation.

As was discussed at the start of this section, the time-to-degree and completion metrics are indicators that emerge only as cohorts of students complete their PhDs. Between this review and the
planned following review the program will continue to monitor these metrics to measure the effectiveness of the progress guidelines.

H. Career Services and Post-Graduation Outcomes

H.1. Student Career Outcomes

Graduates of the MS&E program find employment in a variety of sectors. There is widespread industry interest in recruiting MS&E graduate program students. For example, of the 210 total employers listed on the UW Madison Engineering Career services list for MS&E degree holders, 64 indicate interest in MS&E PhD graduates. In addition to industry, students are actively recruited for postdoctoral research positions at national laboratories and in academia.

H.2. Career Resources

MS&E graduate program students connect with employment opportunities in several ways. Students completing their PhD often begin their job search 6 to 12 months before finishing their degrees. Students are often informally recruited through the professional networks of faculty advisors and through connections with previous graduates. In general, these opportunities are distributed to the group of MS&E students as each opportunity arises. MS&E graduate students also participate in the programs of the UW’s Engineering Career Services.

H.3. Interest in Employment Resources Indicated in Exit Survey Data

Additional insight into the transition to employment after the MS&E graduate programs is available through the UW Graduate School’s exit survey. Key points of the exit survey are summarized in Table 5. The fraction of students who rated “assistance in finding employment” either excellent or very good is much smaller than the fraction of similarly positive ratings for the overall program quality and the quality of academic advising and guidance. The exit survey data in Table 5 thus indicates that there is an opportunity to improve the job-search experience of MS&E graduate students. It is interesting to note that a similar pattern also exists in the other COE graduate programs.

In response to the survey data in Table 5, the MS&E program is implementing several initiatives. These are: (i) pointing students towards Graduate School resources in preparing for a wide range of career options and (ii) inviting recent MS&E program graduates in various specific fields to participate in round-tables to develop professional development and the transition to careers, and (iii) encouraging faculty to share career opportunity inquiries from students more widely with the students. The career panels are being developed jointly for undergrad and graduate students by Profs. Jason Kawasaki and Dan Rhodes and are beginning in Fall 2021.

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<th>Question</th>
<th>MS&amp;E PhD Program Responses (number of respondents=81)</th>
<th>Other COE PhD Programs (number of respondents=490)</th>
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<tr>
<td>Overall program quality</td>
<td>Excellent or Very Good 84%</td>
<td>Excellent or Very Good 82%</td>
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*Engineering Career Services Employer Recruitment List for Materials Science and Engineering.

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<th>Quality of academic advising and guidance</th>
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<th>77%</th>
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<tr>
<td>Assistance in finding employment</td>
<td>60%</td>
<td>60%</td>
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I. Funding

I.1. Funding for MS-Research and PhD Students

Funding is guaranteed for students seeking the PhD. The duration of the funding guarantee is 5 years for PhD students and 3 years for students entering with an MS. Formal admission is offered only when a funding plan has been developed. In general, the funding plan includes an offer of a research assistantship from a faculty member. Other funding strategies include fellowship offers, the use of the program’s Herb Fellowships, or external fellowships awarded to the student. The program does not use teaching assistantships to recruit first year graduate students.

The primary appointments of MS&E graduate students are shown in Fig. 7. In the most recent reported semester, Fall 2020, 75% of the MS&E research graduate students were supported as Research Assistantships (RAs). A smaller fraction were supported as Fellows, Teaching Assistants (TAs), or through other mechanisms. The program is not aware of any students who lacked financial support or who were self-supported.

![Primary Appointment by Degree Level](image)

Figure 7. Primary appointments of MS&E PhD and MS-research students, including previous Materials Science and Materials Engineering programs.

Graduate student appointments as RAs and TAs follow the rates listed in Appendix 9. In addition to RA support, students have attracted external funding support, including recently through NSF Graduate Research Fellowships and Fellowships from DOE, foundations, and other funding agencies. Students are encouraged to apply to fellowship programs for which they are eligible during...
their first year in the MS&E program. The MS&E program also benefits significantly from the financial support provided for students in the GERS program.

J. Professional Development and Breadth

The MS&E program emphasizes professional development in areas relevant to careers in science and engineering and beyond. These activities include modules within formal coursework, research seminars, a series of activities in the required MS&E 900 course, and support for travel and professional engagement. In addition to the activities formally supported or designed by the MS&E graduate program, students take advantage of professional preparation through teaching programs, internships at national laboratories or in industry, and opportunities offered through professional societies. Students often make use of national and international research facilities such as synchrotron light sources and nanofabrication centers, including in both short and long term scientific visits. The graduation requirements for the PhD emphasize academic breadth through the minor requirement described in section B.1, above.

J.1. Science and Engineering Professional Development

The activities within formal MS&E courses include the development of presentations and writing assignments resembling scientific manuscripts and proposals. The MS&E program requires (as part of the MS&E 900 class) attendance at the weekly Materials Science and Engineering research seminar. Topics of the MS&E 900 class also emphasize professional preparation through research writing, peer review, and research ethics. For more specialized professional development topics, for example the use of individual development plans, students are altered to the UW Graduate School’s seminars and programs. The usefulness of individual development plans (IDPs) is discussed in the MS&E 900 introductory class and recommended to the students. The MS&E graduate program does not currently require or monitor the use of IDPs.

MS&E graduate students have participated in more specialized programs on campus. Several students have completed the Morgridge Entrepreneurial Bootcamp and participated in the WARF Ambassador program. Similarly, graduate students have participated as student/postdoc members of the Executive Committee of the Materials Research Science and Engineering Center (MRSEC).

Beyond campus, MS&E graduate students have participated in internship programs that support extended scientific visits to collaborators at other institutions. Specific examples include the support through the NSF INTERN supplement and DOE lab internships through the DOE’s Office of Science Graduate Student Research (SCGSR) fellowship program. A small but apparently increasing number of PhD students are pursuing short few-month industrial internships during pauses in the research part of their programs. Recent examples of these internship programs have included work at Madison-area startup companies and at Seagate in Minneapolis. The internships have not been discouraged by the program but are discussed carefully with each student to remind them of the possibility that the time taken to participate in the internship period could delay the completion of their degree.

Students are encouraged to participate in professional society meetings and at workshops. In general, travel to these meetings is supported by the advisor’s external research support. Additional travel support has been obtained from the UW Grad School travel program, from research centers such as the MRSEC for participating students, and through travel awards from professional societies such as the Material Research Society and the American Physical Society.
J.2. Professional Development in Teaching

MS&E graduate students seeking professional development in teaching are encouraged to pursue appointments as Teaching Assistants. These TA positions are often in the MS&E department in laboratory or lecture classes. Students supervised by affiliated faculty can also obtain teaching experience through TA positions in their advisors’ tenure-home departments. There is, however, no formal requirement to serve as a TA.

TAs working with courses in the MS&E Department complete a series of required training activities coordinated by the Collaborative for Engineering Education and Teaching Effectiveness (CEETE), listed here: [https://ceete.engr.wisc.edu/ta-training](https://ceete.engr.wisc.edu/ta-training). A key activity supervised through CEETE is the New Educator Orientation (NEO) program, which prepares TAs to use effective teaching strategies and familiarizes them with educational technologies. The CEETE program includes the Graduate Assistant Equity Workshop focusing on diversity and equity issues.

Beyond the TA-training activities, students interested in further developing their teaching capabilities are encouraged to participate in the broader suite of educational development activities on campus. The Center for the Integration of Research, Teaching, and Learning (CIRTL) Network, Delta Program, and the UW-Madison REACH initiative offer a range of programs and courses that have prepared MS&E graduate students for teaching activities.

A specific recent example highlights how students can integrate the development of teaching capabilities into their PhD programs. Franklin Hobbs was appointed in August, 2021 as a teaching assistant professor in the MS&E department. Prof. Hobbs received his PhD in 2021 from the MS&E graduate program. As a graduate student, Prof. Hobbs served as a TA multiple times, a total of 8 semesters and 1 summer, culminating in independent instruction for a section of the MS&E 350 introductory course. Prof. Hobbs participated in a Delta Program internship and certificate program and developed active-learning course materials in partnership with REACH. In his words these activities were “incredibly helpful for learning about course design, philosophy, and TA training.” Hobbs also benefited from informal mentorship from MS&E program faculty when serving as a TA, which allowed a degree of creative freedom to explore teaching strategies while supplying a fallback from the supervising faculty member.

K. Conclusion: Overall Analysis of the Self-Study and the State of the Program

The MS&E graduate programs have had several achievements since their implementation in 2016. These successes include:

(i) Maintaining and expanding the interdisciplinarity of the program and enabling materials research activities in programs in multiple departments and colleges.
(ii) Providing students with the preparation in science, engineering, and professional skills required to progress into productive careers.
(iii) Promoting an inclusive and welcoming climate and articulating expectations for students and faculty participating in the program.
(iv) Contributing to the solution of societal problems through impactful science and engineering research.
(v) Implementing robust organizational procedures that allow tracking of student progress and the early identification of potential problems.
In addition, and perhaps most importantly, the program has served as a means to promote impactful materials research and to provide the means for talented students, faculty, and staff to solve important problems in science and engineering.

K.1. Challenges

The program has also identified several important challenges facing it in the future. The challenges considered to be most important are:

(i) **Apparent decline in the number of enrolled PhD students.** The enrollment data in Fig. 1 indicates that there could be an emerging trend to lower enrollment in the PhD program. The magnitude and origins of this decrease are not yet clear, in part because of the impact of the COVID pandemic on the number of students starting in 2020. If the trend continues, however, the impact of the decrease could result in challenges in both teaching and research. Already anecdotally, there have been some challenges in filling available RA and TA positions, indicating that some needs in faculty research and teaching are not being met by the current admission/recruiting process.

(ii) **Timely financial first-year support for students.** The MS&E graduate program relies largely on financial support for students through RA positions supported by external resources. There is a mismatch between the timing of the recruiting cycle and the awarding of the funds by sponsors. The program faces the continuing challenge of matching first-year students with financial support. In part this issue may be responsible for the potential decrease in enrollment discussed in challenge (i).

(iii) **Assistance with career planning.** The exit survey data discussed in section H.3 indicates that there is a perception among graduate students that more can be done to prepare them for their post-PhD careers. The program has not identified significant issues in the actual transition from PhD to career and has found that students are successful in moving on to meaningful positions after graduation. Making students more aware of career planning and making the process as smooth as possible, however, are important opportunities.

The program’s planned responses to these challenges are outlined in the following Goals section.

K.1. Goals

The goals of the program include specific responses to the challenges discussed in the previous section, ongoing commitments to the study and evolution of the degree requirements, and the identification of emerging challenges.

(i) **Increasing the diversity of the MS&E graduate student population.** The MS&E program aims to continue to develop relationships with external institutions, including those serving significant populations of students from underrepresented groups, in order to increase the diversity of the PhD applicant pool. In 2022 the program will study the impact of the suspension of the GRE requirement for applications, weighing the impact on underrepresented groups, and evaluate whether to discontinue that requirement permanently. The program is also continuing to promote an early and financially well supported connection between applicants from diverse backgrounds and faculty research groups, leading to prompt offers of financial support and smoothing the post-application recruitment process.

(ii) **Educating students and faculty about issues in diversity, equity, and inclusion.** The program aims to increase awareness of climate and diversity issues through several activities. These include the development of a MS&E department-level statement on diversity and the inclusion of faculty, staff, and students in a department-level DEI interest group.

(iii) **Continuing emphasis on the fundamentals of materials research.** The program seeks to use the assessments described in section D and feedback from faculty and students to provide feedback
on potential improvements to the format of the qualifying exam and the selection of required and elective courses.

(iv) Continuing activities to promote appropriate time to degree for MS and PhD graduates. The MS&E program is continuing to track the progress of students to ensure that students are completing their degrees in a way that is both timely and simultaneously consistent with the program’s view that students should not feel undue pressure or to be rushed to graduate with incomplete professional preparation.

(v) Support for first-year graduate students. The program is planning a study of mechanisms for first-year student recruiting. The goal is to improve the timing and strength of offers for financial support while continuing to be consistent with the 5-year funding commitment.

(vi) Assistance with career development. The MS&E program will seek to improve the level of students’ comfort with post-PhD career planning by inviting grad students to alumni panels organized by program faculty members, by Kawasaki and Rhodes, providing increased connection to grad school and college career resources, and by sharing the continuing connections between faculty and alumni with current students.
Appendix 1: UAPC and Graduate School Memos Approving Implementation of MS&E Graduate Program

Date: May 4, 2015

To: Stephen Kolison, Associate Vice President for Academic Affairs, University of Wisconsin System Administration (via afpp@uwsa.edu)

From: Sarah C. Mangelsdorf, Provost and Vice Chancellor for Academic Affairs

RE: April 2015 Academic Program Changes:

Reorganizing and merging of graduate programs in Materials Science and Materials Engineering

I am writing to inform you of recently approved changes to our academic structures and programs. The proposal for these changes has been approved by the appropriate governance bodies, including the University Academic Planning Council, and I send this notice to you with my support.

We are reorganizing the graduate programs MS/PhD in Materials Science and MS/PhD in Materials Engineering with the effect of merging them to a single graduate program (MS/PhD in Materials Science and Engineering), housed in the College of Engineering.

There are three program changes:

a. Suspend admissions to the MS, MEng, PhD in Materials Science, effective Spring 2016.

b. Discontinue the MS, MEng, PhD in Materials Science, effective Fall 2019; summer 2019 will be the last term for enrollment or degrees for this program. All students who are enrolled as of Spring 2015 and who want to complete an MS/PhD in Materials Science are expected to graduate before Fall 2019.

c. Rename the MS, MEng, PhD Materials Engineering to MS, MEng, PhD in Materials Science and Engineering. The new name will be effective Spring 2016. Most students will transition from the graduate programs in Materials Engineering and in Materials to the renamed program Materials Science and Engineering in Spring 2016. The MS, MEng, PhD Materials Engineering name will remain available to students who are enrolled as of Fall 2015 until Summer 2019; Summer 2019 will be the last term for students to be enrolled or graduate under the old program name.

Supporting materials are posted here: [http://www.apir.wisc.edu/UAPC201415April.htm](http://www.apir.wisc.edu/UAPC201415April.htm). Please contact Jocelyn Milner (jocelyn.milner@wisc.edu, 263-5658) if you have any questions.

Copies:
- Ian Robertson, College of Engineering
- Susan Hagness, College of Engineering
- James Blanchard, College of Engineering
- Donald Stone, Materials Science and Engineering
- Ray Vanderby, Materials Science Program
- Wendy Crone, Graduate School
- Daniel Kleiman, Graduate School
- Marty Gustafson, Graduate School
- Jennifer Martin, Graduate School
- Steve Hahn, Vice Provost for Enrollment Management
- Scott Owczarek, Registrar
- Susan Fischer, Office of Student Financial Aid
- Phil Hull, Office of the Registrar
- Beth Warner, Office of the Registrar
- Greta Petersen, Office of the Registrar
- Suzanne Broadbary, Office of the Registrar
- Cathie Easter, Bursar
- Teresa Adams, Facilities Planning and Management
- Doug Rose, Space Management
- John Lucas, University Communications
- Toni Good, University Communications
- Steve Smith, Secretary of the Faculty
- Tim Norris, Madison Budget Office
- Clare Huhn, Academic Planning and Institutional Research
- Sarah Kuba, Academic Planning and Institutional Research
- Allison LaTarte, Academic Planning and Institutional Research
- Sara Lazenby, Academic Planning and Institutional Research
- Jocelyn Milner, Academic Planning and Institutional Research

Office of the Provost and Vice Chancellor for Academic Affairs
150 Bascom Hall  University of Wisconsin-Madison  500 Lincoln Drive  Madison, WI  53706
608.262.1304  FAX: 608.265.3324

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December 22, 2015

Stephen Robinson  
Interim Chair, Department of Materials Science and Engineering
Paul Voyles  
Director of Graduate Studies, Department of Materials Science and Engineering
College of Engineering
University of Wisconsin-Madison

Sent Electronically

Dear Professors Robinson and Voyles:

On November 20, 2015, the Graduate Faculty Executive Committee (GFEC) considered the request to discontinue the existing doctoral minor in Materials Science and to rename the doctoral minor in Materials Engineering to “Materials Science and Engineering.” The motion made on these matters was passed by the GFEC and will be effective Spring semester 2016. Practically speaking, at this point, both the Materials Science doctoral minor and the Materials Engineering doctoral minor will be discontinued, and a new doctoral minor titled Materials Science and Engineering will be created. Jennifer Martin and Judy Bauman in the Graduate School (jennifer.martin@wisc.edu and judy.bauman@wisc.edu) will continue to work with the program to ensure this transition is successful.

Thank you for your help in moving the efforts to restructure your Materials Science and Engineering programs forward and for your work on behalf of our graduate students.

Sincerely,

William J. Karpus  
Dean of the Graduate School

Cc: Ian Robertson, College of Engineering  
James Blanchard, College of Engineering  
Susan Haggness, College of Engineering  
Diana Rhoads, Department of Materials Science and Engineering  
Daniel Kleinman, Graduate School  
Marty Gustafson, Graduate School  
Jennifer Martin, Graduate School

Graduate School
Bascom Hall  500 Lincoln Drive  Madison, WI  53706-1380  grad.wisc.edu

Dean’s Office
608-262-2433 • Fax: 608-265-9505
Appendix 2: GFEC Guidance for Materials Science and Engineering Graduate Programs May, 2015

May 15, 2015

Don Stone
Chair, Department of Materials Science and Engineering
Ray Vanderby
Director, Materials Science Program
University of Wisconsin-Madison
Sent Electronically

Dear Professors Stone and Vanderby:

As you know, the Graduate Faculty Executive Committee (GFEC) has an oversight and governance role where graduate programs seek to restructure or reorganize. At its April 10, 2015 meeting, the GFEC considered the proposal to restructure the Materials Science and Materials Engineering graduate programs. Specifically, the programs requested approval to:

- Rename the Materials Engineering M.Eng./M.S./Ph.D. to Materials Science and Engineering M.Eng./M.S./Ph.D. – effective Spring 2016;
- Suspend Admissions for Materials Science M.Eng./M.S./Ph.D. – effective Spring 2016.
- Discontinue the Materials Science M.Eng./M.S./Ph.D. – effective Fall 2019;

Among the central commitments of those proposing these changes are:

- Retaining the interdisciplinary strength of the Materials Science program and the integrity of the materials engineering discipline;
- Integration of Materials Science faculty into the Materials Engineering Department as faculty affiliates;
- The establishment of a shared admission process, qualifying exam structure, preliminary exam structure, and core courses that will become the Materials Science and Engineering program’s core requirements.

Members of the GFEC appreciated the value of making these changes and passed a motion to approve them. However, the GFEC’s approval is contingent on several follow-up requests. First, the Committee understands that the details of a shared admission process, qualifying exam structure, preliminary exam structure, and degree requirements have not been settled by faculty. Because these issues will be central to moving restructuring forward, the GFEC would like to receive a detailed timeline for attending to these details no later than September 4, 2015.

Graduate School
Bascom Hall 500 Lincoln Drive Madison, WI 53706-1380 grad.wisc.edu
Dean’s Office
608-262-2433 • Fax: 608-265-6742
Second, no later than October 1, 2015, the GFEC would like to receive specific information regarding how current and incoming students have been communicated with about these changes, and the students’ reactions to the changes. In this context, the GFEC requests the programs provide to the Graduate School a list of all students enrolled in both the Materials Engineering and Materials Science programs as of Fall 2015 that details under which program name students will continue and finish their degree. Please also make a note of any individuals who you know of that are not currently enrolled, but have taken informal or formal leave with the intention of returning to the program, and confirm that any students returning to enrollment in the program as of the spring 2016 term will re-enroll under the new name, “Materials Science and Engineering.”

Finally, the GFEC would like to remind the program that both the Materials Engineering and the Materials Science programs have active doctoral minors that were not addressed in the proposal to restructure the M.Eng./M.S./Ph.D. programs. The GFEC requests that the programs submit a proposal for merger via the mechanisms of renaming and discontinuation these existing doctoral minors by October 1, 2015.

The GFEC is excited by the potential that the proposed restructuring offers to current and future graduate students and looks forward to hearing more about your plans in the months ahead. As you may be aware, with GFEC’s approval your proposal moves to the University Academic Planning Council (UAPC) where it will be a matter for automatic consent.

Thank you for your efforts on behalf of UW-Madison graduate students.

Sincerely,

Wendy C. Crone
Interim Dean of the Graduate School

cc:

Ian Robertson, College of Engineering
Jake Blanchard, College of Engineering
Sue Hagness, College of Engineering
Diana Rhoads, Material Science Program
Jocelyn Milner, Office of the Provost
Daniel Kleinman, Graduate School
Marty Gustafson, Graduate School
Jennifer Martin, Graduate School
# Appendix 3: MS&E Faculty Affiliates

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<th>Name</th>
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<th>Department</th>
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</thead>
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<td>*</td>
<td>Electrical and Computer Engineering</td>
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*Became MS&E affiliate during the implementation of the MS&E Graduate Program.*
Appendix 4: Summary of MS and PhD Degree Requirements

Current Degree Requirements for PhD

In addition to the Graduate School minimum academic progress and degree requirements, the following are required:

- Minimum Credit Requirement = 51 credits
- Minimum Residence Credit Requirement = 32 credits
- Minimum Graduate Coursework Requirement Half of degree coursework (26 credits out of 51 total credits) must be completed graduate-level coursework.
- Overall Graduate GPA Requirement = 3.00 GPA required.
- Students entering without a previous master's degree must pass a qualifying exam in Materials Science and Engineering. They must pass a preliminary exam/thesis proposal exam. And, they must prepare a doctoral dissertation, present it in a public seminar, defend it in closed examination by their doctoral committee, and deposit it with the Graduate School.
- Students entering with a master's degree must pass the qualifying exam, thesis proposal exam, and thesis defense as described above, on the same schedule with respect to their matriculation date.
- Doctoral Minor/Breadth Requirements = All doctoral students are required to complete a minor. If students choose a distributed minor (Option B), they must select a topic or theme and three courses around that theme. At least one course must be graduate level (numbered 700 or above or has Graduate Course Attribute). There are no other restrictions on the course department or topic.

Current Degree Requirements for Master of Science

The Department of Materials Science and Engineering offers two distinct Master of Science (M.S.) degree programs:

1. Materials Science and Engineering M.S., Research - traditional master's program culminating in a thesis for students wishing to conduct research during their program
2. Materials Science and Engineering M.S., Nanomaterials and Nanoengineering - accelerated, course-based master's program

In addition to the Graduate School minimum academic progress and degree requirements, the following are required for these two M.S. degrees:

- Minimum Credit Requirement = 30 credits
- Minimum Residence Credit Requirement = 16 credits
- Minimum Graduate Coursework Requirement = Half of degree coursework (15 credits out of 30 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university's Course Guide (https://registrar.wisc.edu/course-guide/).
- Overall Graduate GPA Requirement = 3.00 GPA required.

Specific Requirements for Materials Science and Engineering, Nanomaterials and Nanoengineering

The following courses are required:
- **M S & E 350** Introduction to Materials Science: must be taken during the first semester of enrollment (3 credits).
- **M S & E 900** Materials Research Seminar: must be taken in both the Fall and Spring semester (1 credit each, 2 credits total).
- **M S & E 553** Nanomaterials & Nanotechnology

In addition, a minimum of 22 additional credits from the courses listed below.
- At least 10 credits of the additional coursework must be at the graduate level.
- At most 4 credits of **M S & E 699** Independent Study may be taken.

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<td>Introduction to Materials Science</td>
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<td><strong>M S &amp; E 553</strong></td>
<td>Nanomaterials &amp; Nanotechnology</td>
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<tr>
<td><strong>M S &amp; E 401</strong></td>
<td>Special Topics in Materials Science and Engineering (by instructor consent)</td>
<td>1-3</td>
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<td><strong>M S &amp; E/CHEM 421</strong></td>
<td>Polymeric Materials</td>
<td>3</td>
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<tr>
<td><strong>M S &amp; E 434</strong></td>
<td>Introduction to Thin-Film Deposition Processes</td>
<td>3</td>
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<td><strong>M S &amp; E 448</strong></td>
<td>Crystallography and X-Ray Diffraction</td>
<td>3</td>
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<tr>
<td><strong>M S &amp; E 456</strong></td>
<td>Electronic, Optical, and Magnetic Properties of Materials</td>
<td>3</td>
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<tr>
<td><strong>M S &amp; E 521</strong></td>
<td>Advanced Polymeric Materials</td>
<td>3</td>
</tr>
<tr>
<td><strong>M S &amp; E 530</strong></td>
<td>Thermodynamics of Solids</td>
<td>3</td>
</tr>
<tr>
<td><strong>M S &amp; E 551</strong></td>
<td>Structure of Materials</td>
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<tr>
<td><strong>M S &amp; E 560</strong></td>
<td>Fundamentals of Atomistic Modeling</td>
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<td><strong>M S &amp; E 570</strong></td>
<td>Properties of Solid Surfaces</td>
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<td><strong>M S &amp; E 748</strong></td>
<td>Structural Analysis of Materials</td>
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<td><strong>M S &amp; E 752</strong></td>
<td>Advanced Materials Science: Phase Transformations</td>
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<tr>
<td><strong>M S &amp; E 756</strong></td>
<td>Structure and Properties of Advanced Electronic Materials</td>
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<td><strong>M S &amp; E 760</strong></td>
<td>Molecular Dynamics and Monte Carlo Simulations in Materials Science</td>
<td>3</td>
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</tbody>
</table>
### M S & E 803
Special Topics in Materials Science (by instructor consent)  \(^3\)  \(1-3\)

### M S & E 699
Independent Study  \(^3,4\)  \(1-4\)

1. Required course.
2. Must be enrolled in both fall and spring semesters.
3. Electives adding to a minimum of 22 credits chosen from this list.
4. At most 4 credits may be taken.

**Required Courses for Materials Science and Engineering: Research, M.S.**

Students must prepare a Master's thesis, present it in a public seminar, and defend it in closed examination by their Master's committee.

The following courses are required:

<table>
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<tr>
<th>CODE</th>
<th>TITLE</th>
<th>CREDITS</th>
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<tbody>
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<td><strong>M S &amp; E 900</strong></td>
<td>Materials Research Seminar</td>
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<td>Select three courses:</td>
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<td>Advanced Polymeric Materials</td>
<td></td>
</tr>
<tr>
<td><strong>M S &amp; E 530</strong></td>
<td>Thermodynamics of Solids</td>
<td></td>
</tr>
<tr>
<td><strong>M S &amp; E 551</strong></td>
<td>Structure of Materials</td>
<td></td>
</tr>
<tr>
<td><strong>M S &amp; E 752</strong></td>
<td>Advanced Materials Science: Phase Transformations</td>
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</tr>
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</table>

*Graduate-level Math Course (students may only count one of the following as a Materials Core Course)*

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<td>Engineering Analysis 1</td>
</tr>
<tr>
<td><strong>CBE 660</strong></td>
<td>Intermediate Problems in Chemical Engineering</td>
</tr>
<tr>
<td><strong>MATH 703</strong></td>
<td>Methods of Applied Mathematics -1</td>
</tr>
<tr>
<td><strong>MATH 704</strong></td>
<td>Methods of Applied Mathematics-2</td>
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<tr>
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<td>Course Title</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>PHYSICS 721</td>
<td>Theoretical Physics-Electrodynamics</td>
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<tr>
<td>Materials Elective Courses</td>
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</table>

*Electives must be selected from the list of Materials Elective Courses.*

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>M S &amp; E 790</td>
<td>Master's Research or Thesis</td>
</tr>
</tbody>
</table>

| Total Credits | 30 |

^1Take two consecutive semesters for 1 credit each semester.
Appendix 5: Topics of MS&E 900 in 2019-2020

I. Fall 2019

Schedule for Tuesday Seminars

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/10/2019</td>
<td>1st day of class, Introductions</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>9/17/2019</td>
<td>Kramer Lecture, no class</td>
<td>See email for room</td>
</tr>
<tr>
<td>9/24/2019</td>
<td>Time Management- Graduate student Panel</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>10/01/2019</td>
<td>Career Opportunities for Graduate Students- Julie Rae</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>10/08/2019</td>
<td>CoE Shared Facilities-Jerry Hunter</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>10/15/2019</td>
<td>Entrepreneurial Skills- Dan Olszewski</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>10/22/2019</td>
<td>Lab-notebook</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>10/29/2019</td>
<td>Research Ethics-Prof. Wendy Crone</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>11/05/2019</td>
<td>Computational Facilities- Lauren Michael</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>11/12/2019</td>
<td>Resilience, stress management and Mental Health-</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td></td>
<td>Michael Balsan (4:00-5:30 PM)</td>
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</tr>
<tr>
<td>11/19/2019</td>
<td>CoE Lab Safety-Jesse Decker</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>11/26/2019</td>
<td>Presentations Section 1 (4:00-5:30 pm*)</td>
<td>265 MS&amp;E</td>
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<td>12/03/2019</td>
<td>Presentations Section 2 (4:00-5:30 pm*)</td>
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<tr>
<td>12/10/2019</td>
<td>Presentations Section 3 (4:00-5:30 pm*)</td>
<td>265 MS&amp;E</td>
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II. Spring 2020

Schedule for Tuesday Seminars

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/21/2020</td>
<td>1st day of class, Introductions</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>1/28/2020</td>
<td>Making Scientific Presentation- Laz German</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td></td>
<td>From “me” to “we”; Working efficiently as a part of a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>small team- Deepankar</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>2/04/2020</td>
<td>No Class</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>2/11/2020</td>
<td>WARF- Stephanie Whitehorse</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>2/18/2020</td>
<td>Writing Research Paper- Prof. Jason Kawasaki</td>
<td>265 MS&amp;E</td>
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<tr>
<td>2/25/2020</td>
<td>National Research Facilities- Prof. Paul Evans</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>3/03/2020</td>
<td>Peer-Review: Prof. Daniel Rhodes</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>3/10/2020</td>
<td>Spring break</td>
<td>265 MS&amp;E</td>
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<tr>
<td>3/17/2020</td>
<td>Implicit Bias- Jenn Sheridan</td>
<td>265 MS&amp;E</td>
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<tr>
<td>3/24/2020</td>
<td>Sexual Harassment- Lauren Hasselbacher</td>
<td>265 MS&amp;E</td>
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<tr>
<td>3/31/2020</td>
<td>Proposal Writing and Proposal processes</td>
<td>265 MS&amp;E</td>
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<tr>
<td>4/07/2020</td>
<td>Qualifying Exam- Prof. Paul Evans and Deepankar</td>
<td>265 MS&amp;E</td>
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<tr>
<td>4/14/2020</td>
<td>Hostile Behaviour in Academia- Prof. Chris Brace</td>
<td>265 MS&amp;E</td>
</tr>
<tr>
<td>4/21/2020</td>
<td>Kramer’s Lecture</td>
<td>See Email for room</td>
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<tr>
<td>4/28/2020</td>
<td></td>
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</table>
Appendix 6: Assessments

6.1 Example of Annual Assessment Report

MS&E Degree Program Assessment of Graduate Learning Goals

Masters

There were 5 responses to the Master’s degree survey, with one student completing his/her thesis defense in January 2018, one in March 2018, two in May 2018, and one in June 2018. The evaluation of the Masters Graduate Learning Goals, completed by the supervising faculty member, was as follows:

Is there evidence in the student's written dissertation and final defense presentation that he/she has achieved the following learning goals for the MS graduate degree program:

X-axis (full text)

1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to solve these problems.
4. Recognize and apply principles of ethical and professional conduct.

Ph.D.

There were 15 responses to the Ph.D degree survey, with one student completing their Ph.D. thesis defense in each of the following months: June 2017, August 2017, September 2017, January 2018, May
2018, June 2018, August 2018, and September 2018; two in November 2017 and March 2018; and three in December 2017. The evaluation of the Ph.D Graduate Learning Goals, completed by the supervising faculty member, was as follows:

**Is there evidence in the student's written dissertation and final defense presentation that he/she has achieved the following learning goals for the PhD graduate degree program:**

![Bar Chart](chart.jpg)  

**X-axis (full text)**

1. Demonstrate an extraordinary, deep understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
4. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
5. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and/or social sciences to help frame problems critical to the future of their discipline.
6. Demonstrate an ability to conduct original research and communicate it to their peers.
### 6.2 Assessment Summary

#### Assessment questions for MS:
1. Demonstrate a strong understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to solve these problems.
4. Recognize and apply principles of ethical and professional conduct

#### Assessment questions for PhD:
1. Demonstrate an extraordinary, deep understanding of mathematical, scientific, and engineering principles in the field.
2. Demonstrate an ability to formulate, analyze, and independently solve advanced engineering problems.
3. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
4. Apply the relevant scientific and technological advancements, techniques, and engineering tools to address these problems.
5. Demonstrate an ability to synthesize knowledge from a subset of the biological, physical, and/or social sciences to help frame problems critical to the future of their discipline.
6. Demonstrate an ability to conduct original research and communicate it to their peers.

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Appendix 1: MS&E Graduate Program Expectations

Draft February 18, 2020
Revised March 1, 2020
Revised March 22, 2020
Revised March 24, 2020
Revised April 19, 2021

This document provides expectations for faculty and students participating in the MS&E PhD and MS-research graduate programs and describes the procedures that will be used to disseminate these expectations.

I. Expectations

The MS&E graduate program is guided by expectations for the conduct of students and faculty that help to establish a safe, collegial, and productive environment facilitating scientific discovery and professional development. These expectations reflect professional guidelines provided by the UW-Madison College of Engineering and the UW-Madison Graduate School.

The specific expectations of the program are:

1. Intellectual and professional integrity

MS&E graduate students and their faculty mentors are expected to show respect for the profession and for those working in it. Research activities will be conducted without plagiarism, with proper attribution of work with collaborators, and with respect for applicable professional ethical considerations, such as those associated with the involvement of human subjects.

2. Safe and environmentally responsible conduct of research

Research in the MS&E graduate program is expected to be conducted with a high level of respect for the safety of the students, faculty, and other participants. Students and faculty must observe the requirements defined at the research group, department, college, and university for safe and environmentally responsible research. Faculty are expected to develop and maintain lab safety plans, to appoint a safety coordinator within their labs, and to advise students of the safety training required for work in their groups. Students are expected to seek and to obtain the required safety training, to remain up-to-date with required recurrent training, and to follow the safety guidelines at all times.

3. Professional research environment

Students and faculty are expected to contribute to a collegial professional research environment, practicing mutual respect for all students, faculty, and staff. The MS&E department strives to create an environment free from harassment, bias, and hostile and intimidating behavior. Students supported by teaching assistant appointments are expected to balance the time commitments to research and teaching after consultation with their advisor and the faculty member responsible for the course to which they are assigned. These arrangements may evolve during the course of the student’s PhD program.

These expectations include responsiveness to communications, including (as applicable) a regular schedule of meetings and response to electronic communication during defined working hours.
Students and faculty are expected (as required) to participate in group meetings and individual or small-group collaborative meetings, and lab activities such as those associated with mentoring other students and maintaining a safe working environment. Students are not expected to provide personal assistance for faculty advisors or to perform other duties outside of their university research, teaching and service commitments. Students and faculty are expected to be aware of issues in implicit bias, sexual harassment, and ethical conduct of research.

4. Professional development and achievement in research

Students are expected to develop and to maintain a set of research goals with the potential to lead to outputs such as research publications, the development of intellectual property, and scientific presentations. Research goals can include original research discoveries, contributions to the scientific literature, and other outputs as mutually agreed by the student and faculty advisor. These goals must be reached in agreement with the faculty mentors. Students are expected to conduct their research within the intellectual property guidelines associated with their source of financial support (e.g. the requirements of the Bayh-Dole act for federally supported research).

5. Ongoing clear communications about expectations and feedback on student progress

Students and faculty will have regular communications about the progress that students are making towards their degree requirements and expectations for the conduct of research. Students can offer feedback about faculty using the College of Engineering’s annual GOAALS survey or through direct communication with the MS&E Chair, the MS&E Associate Chair for PhD Study, or the College of Engineering Assistant Dean for Graduate Study. The MS&E department will include a discussion of these expectations as part of the required student orientation activities. Students can expect clear communications from faculty about their progress in the program, feedback on research and educational issues, and the progress towards the degree.

II. Procedures for Disseminating Expectations and Verifying Ongoing Awareness and Development of Expectations among Students and Faculty

The expectations discussed in part I will be disseminated to graduate students and faculty through several mechanisms.

1. Students starting the research graduate programs in Fall 2020 or later.

The dissemination of expectations will be conducted and verified through the required MS&E 900 graduate seminar course. MS&E 900 provides the following activities.

i. The expectations will be disseminated in writing and discussed during an early meeting of the MS&E 900 seminar.

ii. MS&E 900 seminar further provides the students with the background required in each of the areas described in section I in a series of professional development seminars. The list of seminars used to do this in the 2019-2020 academic year is given in Supplementary Document 2.

iii. Students will be required to discuss expectations with their research advisors as part of “expectations document” assignment as part of MS&E 900. The completion of this document will be required in order to satisfactorily complete MS&E 900 and to continue in the program. A draft of the advisor/student expectations document requirement for
MS&E 900 is in Supplementary Document 3. The expectation assignment planned for Fall 2020 builds on an existing assignment document safety requirements, given in Supplementary Document 3.

iv. The faculty committee assembled for the preliminary exam will be instructed to discuss the status of advisor/advisee expectations as part of the prelim exam meeting and will inform the program in writing that this discussion has occurred.

2. Currently Enrolled Students

The expectations will be disseminated in a series of in-person or virtual meetings with graduate students in Summer 2021. Beginning in Fall 2021 the preliminary exam will be modified for existing students to include a discussion of advisor/advisee expectations.
Appendix 8: MS&E Procedures for Transitions between Advisors

Draft February 18, 2020
Revised March 30, 2020
Revised April 19, 2021

A. Change of Advisor due to Change in Research Interests.
When the change arises due to a change in the research interests of the student, the student is responsible for:

- Informing the current advisor of their desire to move to a different research group within a reasonable time period to be negotiated among the student, graduate program, current advisor and new advisor.
- Establishing a mentor-mentee agreement with the new advisor, documenting the agreement in writing, and notifying the graduate program of the intent to transfer between groups.
- Securing financial support from the new advisor.

The graduate program will facilitate, but cannot guarantee, the identification of potential new advisors through individual meetings with the Associate Chair for PhD Study.

The student intending to transfer between advisors needs to be respectful of the person who has funded and mentored them to date and to pursue the research of the previous group until the transfer. The student is responsible for all milestones before the transfer. Mutually agreed plans for milestones, such as the preliminary exam, that are impacted by the transfer will be developed by student and the Associate Chair for PhD study. The dates of milestones after the transfer can in principle be extended upon the agreement of the student, the new advisor, and the Associate Chair for PhD Study.

B. Change of Advisor due to Research-Group Climate. A change in advisor due to climate reasons raises important concerns about possible systematic climate issues that will be addressed collaboratively by the MS&E Department and the College of Engineering.

If a student finds the research environment hostile or intimidating, they can bring the situation to the MS&E Chair, MS&E Associate Chair for PhD Studies, and/or the COE Assistant Dean for Graduate Affairs. If the issue is brought to the MS&E Chair or MS&E Associate Chair for PhD Studies, the department will discuss the situation with college and develop a plan for resolving the situation. As appropriate, immediate financial support for the student will be secured, including assistance from the MS&E department, and college. Support during a transition is foreseen to continue for a period of up to 1 year.

In the case of students leaving groups of affiliate faculty members, the affiliate’s home department may be asked to supply a TA position or other department funding before using MS&E department positions. Affiliate faculty members and the chairs of their department will be informed of this expectation each time an affiliate faculty member agrees to serve as the research supervisor of an MS&E student.

If necessary, the program will also request for partial (or full) financial support from the former faculty member’s flexible funding and the College of Engineering.
## Appendix 9: Stipend Rates for Graduate Student Appointments through MS&E

<table>
<thead>
<tr>
<th>FY2022</th>
<th>Research Assistant 50% FTE</th>
<th>Monthly pay (60% FTE)</th>
<th>Annual salary (60% FTE)</th>
<th>100% Rate</th>
<th>w/18% Fringe</th>
<th>w/95.3% Overhead</th>
<th>w/$12K Tuition Remission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 4</td>
<td>NSF fellowship equivalency</td>
<td>$2,833.33</td>
<td>$34,000</td>
<td>$68,000</td>
<td>$40,120</td>
<td>$</td>
<td>74,387</td>
</tr>
<tr>
<td>Level 3</td>
<td>COE senior RA rate (dissertation)</td>
<td>$2,541.67</td>
<td>$30,500</td>
<td>$61,000</td>
<td>$35,990</td>
<td>$55,984</td>
<td>67,954</td>
</tr>
<tr>
<td>Level 2</td>
<td>WDGF Equivalency</td>
<td>$2,750.00</td>
<td>$28,500</td>
<td>$57,000</td>
<td>$33,630</td>
<td>$52,295</td>
<td>64,295</td>
</tr>
<tr>
<td>Level 1</td>
<td>COE Standard RA rate/TA Rate</td>
<td>$2,277.75</td>
<td>$27,333</td>
<td>$54,666</td>
<td>$32,283</td>
<td>$50,153</td>
<td>62,153</td>
</tr>
</tbody>
</table>

- Students are appointed at Level 4 after finishing a major external fellowship
- Ph.D. students receive a bump to Level 3 after achieving dissertator status
- Ph.D. students receive a bump to Level 2 after passing department’s “qualifying exam”
- Ph.D. students who are recipients of a University of Wisconsin System Distinguished Graduate Fellowship are appointed at Level 2 at the completion of their fellowship
- MS and new Ph.D. students are appointed at Level 1

<table>
<thead>
<tr>
<th>FY2021</th>
<th>Herb fellowship 100% FTE</th>
<th>Monthly stipend</th>
<th>Annual stipend</th>
<th>w/18.2% Fringe</th>
<th>w tuition</th>
</tr>
</thead>
<tbody>
<tr>
<td>only rate</td>
<td>MSE Herb Fellowship</td>
<td>$2,375.00</td>
<td>$28,500</td>
<td>$33,117</td>
<td>$47,587</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FY2021</th>
<th>TA - C-Basis/8month salary</th>
<th>Monthly Pay</th>
<th>9 month salary</th>
<th>100% Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior</td>
<td>RA Level 2 equivalent</td>
<td>$2,375.00</td>
<td>$21,375.00</td>
<td>$42,750.00</td>
</tr>
<tr>
<td>Standard</td>
<td>RA Level 1 equivalent</td>
<td>$2,277.75</td>
<td>$20,489.75</td>
<td>$40,998.50</td>
</tr>
</tbody>
</table>

Senior = dissertator status + 3 prior semesters TA experience

- The MS&E protocol for selecting the appropriate TA or PA stipend level for a particular student is as follows:
  - New TAs or PAs are appointed at Level 1
  - Experienced TAs and PAs are appointed at Level 2 (defined as the “senior” TA and PA rate) TAs must have taught for at least three semesters and be in dissertator status.

PA grader/reader (grad student): $21.57/hr
Grader (undergrad student): $19.04/hr

**Student Hourly:**
Minimum Hrly Rate: $10/hr

Note: Student hourly jobs (including all concurrent UW jobs) must not exceed 30 hours average over 90 days unless the position is less than 90 days

<table>
<thead>
<tr>
<th>FY2021</th>
<th>Research Associate @ 100% FTE (base rate)</th>
<th>Monthly Pay</th>
<th>Annual Rate</th>
<th>w/21.1% Fringe</th>
<th>w/95% Overhead</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$3,559.33</td>
<td>$42,750.00</td>
<td>$57,302.50</td>
<td>$</td>
</tr>
</tbody>
</table>

- $4,983.50 x $7,401.66
Date: 24 February 2022

To: Ian M. Robertson, Dean, College of Engineering
    David A. Noyce, Executive Associate Dean, College of Engineering

From: Allison La Tarte, Interim Associate Vice Provost for Academic Planning and Institutional Research

Subject: Academic Program Review Completion Confirmation — Materials Science and Engineering Graduate Programs (MS, PhD, minor) (5-year review)

Thank you for advancing the five-year academic program review for the graduate programs in the Department of Materials Science and Engineering, specifically the master’s, the PhD, and the doctoral minor. As a university, we have established program review as a valuable and periodic opportunity to assess each academic program’s quality and effectiveness, stimulate planning and continuous improvement, and encourage strategic development. We also understand it is a time-consuming and intense process and we appreciate the work you and your faculty and staff, as well as the members of the review committee, have given to this effort.

We have read your summary of the review, including the self-study report, the report from the review committee, and the department’s response to that report. All is in order and clearly reflects the attention the College of Engineering and the Department of Materials Science and Engineering have given to these graduate programs and this review process. This program review also speaks to the work that went into the successful merger of the two programs and associated structures and resources, which is commendable. The program’s strengths are many and clearly defined. Challenges, while also prevalent, were acknowledged both by the department and Executive Associate Dean Noyce in his summary. We are confident the recommendations will provide you and your faculty with areas of focus for the coming months and years.

We did notice that the doctoral minor was not included in the analysis within the self-study report nor in the review committee report. My office has brought this oversight to the attention of Sara Hagen in the College of Engineering, who is already working with the department on a remedy. We have requested a very brief addendum to the review, to be submitted to Provost Scholz and Dean Karpus, covering some of the key considerations and data associated with the minor. This can come directly from the department and will not require any additional engagement or analysis by the review committee or College governance groups.

Per the university’s program review policy and process, the Graduate Faculty Executive Committee (GFEC) will also consider this review and associated documents. Professor Kevin Black, the GFEC representative who served on the review committee, will present major findings and recommendations, and lead a discussion at an upcoming GFEC meeting. Following that GFEC discussion, the Graduate School will also send you a formal letter summarizing the conversation and requesting more information or a response, as/if needed.
Thank you again. We have documented the completion of this review and have scheduled the programs’ next review for 2032. Please let us know if there is anything we can do to support your efforts in the meantime.

Copies
Karl Scholz, Provost and Vice Chancellor for Academic Affairs
William Karpus, Dean, Graduate School
Jenna Alsteen, Assistant Dean, Graduate School
Karen Mittelstadt, Institutional Academic Planner, APIR
Kathy Prem, Assistant Dean for Graduate Affairs, College of Engineering
Izabela Szlufarska, Chair, Department of Materials Science and Engineering, College of Engineering
Sara Hagen, Academic Planner, College of Engineering
Oguz Alagoz, Program Review Committee Chair