Program Management

Date Submitted: 06/21/19 12:03 pm

Viewing: **MSENPH MEPHPH** : Materials Science & Engineering, Microelectronics–Photonics, Doctor of Philosophy

Last edit: 07/16/19 4:01 pm
Changes proposed by: rickwise

Catalog Pages Using this Program
- [Microelectronics–Photonics (MEPH)](https://nextcatalog.uark.edu/programadmin/)

<table>
<thead>
<tr>
<th>Submitter:</th>
<th>User ID:</th>
<th>rickwise</th>
<th>Phone:</th>
<th>575-2875</th>
</tr>
</thead>
</table>

Program Status: **Active**

Academic Level: Graduate

Type of proposal: **Major/Field of Study**

Select a reason for this modification
- Reconfiguring an Existing Degree—(LON)

Are you adding a concentration? No
Are you adding a track? No
Are you adding a focused study? No

Effective Catalog Year: Fall 2020

College/School Code: Graduate School and International Education (GRAD)

Department Code: [Materials Science and Engineering (MSEN)](https://nextcatalog.uark.edu/programadmin/) [Department of Graduate Dean (GRSD)](https://nextcatalog.uark.edu/programadmin/)

Program Code: **MSENPH MEPHPH**

Degree: Doctor of Philosophy

CIP Code:
- 14.1801 40.1002 - Materials Engineering, Chemistry.

Program Title:
- Materials Science & Engineering, Microelectronics–Photonics, Doctor of Philosophy

Program Delivery

Method:
- **On Campus**

Is this program interdisciplinary? Yes

College(s)/School(s):

<table>
<thead>
<tr>
<th>College/School Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fulbright College of Arts and Sciences (ARSC)</td>
</tr>
</tbody>
</table>

In Workflow
1. GRAD Dean Initial
2. GRAD Dean Initial
3. Provost Initial
4. Director of Program Assessment and Review
5. Registrar Initial
6. Institutional Research
7. GRSD Chair
8. GRAD Dean
9. ARSC Dean
10. ENGR Dean
11. Global Campus
12. Provost Review
13. University Course and Program Committee
14. Graduate Committee
15. Faculty Senate
16. Provost Final
17. Provost's Office--Documentation sent to System Office
18. Higher Learning Commission
19. Board of Trustees
20. ADHE Final
21. Provost's Office--Notification of Approval
22. Registrar Final
23. Catalog Editor Final

Approval Path
1. 06/21/19 1:26 pm
Pat Koski (pkoski): Approved for GRAD Dean Initial
2. 06/21/19 1:29 pm
Pat Koski (pkoski): Approved for GRAD Dean Initial
College/School Name

College of Engineering (ENGR)

Does this proposal impact any courses from another College/School?

No

What are the total hours needed to complete the program?

48

Program Requirements and Description

Requirements
Materials Science & Engineering, Ph.D.

Requirements for the Doctor of Philosophy Degree in Materials Science & Engineering: Degree: Students choosing this degree program will be assigned an initial adviser upon acceptance to the program. This adviser will be their Cohort manager during that academic year. Students will work with the Materials Science & Engineering (MSEN) Program Director of the Microelectronics-Photonics program to define their dissertation committee after they are accepted by a research faculty for a research project. This committee will be made up of at least four faculty members, with at least one faculty member each from the Fulbright College of Arts and Sciences and the College of Engineering. The student’s research professor will chair the dissertation committee.

Candidates for the Ph.D. program are expected to have completed a Master of Science degree in either engineering or science, with each candidate’s academic background being evaluated by the Graduate Studies Committee of the Materials Science & Engineering program (GSCMSEN). GSCMER—Doctoral candidates in Materials Science & Engineering Microelectronics-Photonics are expected to have proficiency in the core curriculum of the Master of Science in Materials Science or Master of Science in Materials Science from the University of Arkansas. This core is described in detail above and in the requirements for the Master of Science in Materials Engineering and the Master of Science in Materials Science, as well as in the handbook of the Materials Science & Engineering of the Microelectronics-Photonics program and is the knowledge that will be tested in the Materials Science & Engineering in the Microelectronics-Photonics specific candidacy exam administered in the spring semester of each academic year.

Students who have graduated with a Master of Science degree in Materials Engineering or a Master Microelectronics-Photonics from the University of Science in Materials Science from the University of Arkansas will be expected to take the Materials Science & Engineering Microelectronics-Photonics written Ph.D. candidacy exam in the first spring semester after M.S. graduation. Students requesting admission to the Ph.D. program with a Master of Science degree from an institution or from another discipline will be required to take the Materials Science & Engineering Microelectronics-Photonics written Ph.D. candidacy exam within four semesters after admission to the PhD program and after having completed MSEN 5383 - Research Commercialization & Product Development.

M.S. graduation, but not before completing MERM 5911 1st Year Operations Seminar – Personnel Management and MERM 5383 Research Commercialization and Product Development. A second part of the candidacy exam, a detailed Ph.D. research proposal, must be accepted by the student’s committee before the end of the 24th month after the start date of the student’s first semester as a Ph.D. student, or the student will be removed from the Ph.D. program. This research proposal is not linked to the written candidacy exam and may be presented to the committee any time in this 24 month period.

Students who fail to pass their written candidacy exam will have a joint consultation with their major professor and the MSEN Program Director to formulate a specific action plan to correct student deficiencies identified by the exam. The student will be allowed to retake the written exam only one additional time, which must be during the next scheduled written examination period.

A Ph.D. curriculum will be defined to meet each student’s research interests as well as the Microelectronics-Photonics program’s interest in course breadth. It is to be expected that certain Master of Science degrees will be poorer matches to the Microelectronics-Photonics program focus areas and will therefore require a greater number of graduate courses in the Ph.D. curriculum as a requirement for graduation. Curriculum will be defined to meet each student’s research interests as well as ensure student must include a minimum of 27 hours of graduate coursework beyond the Materials Master of Science & Engineering program’s core courses have been taken. The course plan for each student must include a minimum of 27 hours of graduate coursework beyond the Master of Science degree requirements. Specific courses will be chosen by the student and must be approved by the student’s major professor and
the MSEN Program Director. The coursework list for the Ph.D degree will be dependent upon the MS degree with which the student enters the program: doctoral advisory committee:

 MEPH 5811 1st Year Operations Seminar—Infrastructure Management 1
 MEPH 5911 1st Year Operations Seminar—Personnel Management 1
 MEPH 6811 2nd Year Operations Seminar—Management and Leadership 1
 MEPH 5821 Ethics for Scientists and Engineers 1
 MEPH 5832 Proposal Writing and Management 2

### Requirements for the PhD Degree

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>M.S. in Materials Engineering or Materials Science from UA/Hours</th>
<th>M.S. in Materials Engineering Science from another institution/Hours</th>
<th>Other Science or Engineering M.S. degrees/Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSEN 6313 Advanced Materials Science &amp; Engineering</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>BENG 5703 Design and Analysis of Experiments for Engineering Research OR INEG 5333 Design of Industrial Experiments OR other Design of Experiments course</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>MSEN 5821 Ethics for Scientists and Engineers</td>
<td>1 (Applied from MS curriculum)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>MSEN 6323 Materials Engineering Design</td>
<td>If not taken in MS curriculum</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>MSEN 5811 / MSEN 5911 / MSEN 6811 / MSEN 6911 Operations Management Seminar Series (Core)</td>
<td>Taken in MS curriculum</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>MSEN 5383 Research Commercialization and Product Development</td>
<td>Taken in MS curriculum</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5000- and 6000-level elective courses in science and engineering</td>
<td>17-20</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>MEEG 591V Special Topics (Introduction to Manufacturing)</td>
<td>Taken in MS curriculum</td>
<td>Recommended elective</td>
<td>Recommended elective</td>
</tr>
<tr>
<td>MSEN 5322 Materials Characterization</td>
<td>Taken in MS curriculum</td>
<td>Recommended elective</td>
<td>2</td>
</tr>
<tr>
<td>MSEN 5313 Fundamentals of Materials Science</td>
<td>Taken in MS curriculum</td>
<td>Recommended elective</td>
<td>3</td>
</tr>
<tr>
<td>MSEN 5253 Emerging Technologies in Industry</td>
<td>Recommended elective</td>
<td>Recommended elective</td>
<td>Recommended elective</td>
</tr>
<tr>
<td>MSEN 700V Dissertation</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>48</td>
<td>48</td>
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</table>

The coursework list for the Ph.D degree will then be combined with the courses completed during the student’s Master of Science studies to assure that the combined course list includes: at least 27 hours of 5000- and 6000-level courses in science and engineering, at least six hours of courses relevant to the management of technology, no more than six hours of special problems, and no more than nine hours of special topics courses, and no more than four hours of:

- If a student is taking either a special problems independent study course (such as MSEN 588V) or MEPH 588V) or a special topics course (such as MSEN 587V) to MEPH 587V) to meet partial requirements for their Ph.D. degree, then the instructor must supply the MSEN Microelectronics-Photonics program office with a syllabus of that class to be included in their program records. The syllabus must include at least the course title, semester, instructor name, a list of specific course objectives, a list of student learning outcomes, sources of content knowledge, and method by which the student’s mastery of the learning objectives is demonstrated. Students are required to attend monthly Materials Science & Engineering Microelectronics-Photonics Research Communication Seminars during the first five semesters of their Ph.D. degree program, and will enroll in MSEN 6611 Research Communication Seminar of PhD Students in their fifth semester.
CHEM 700V, ELEG 700V, etc. as appropriate to match to the department of each student’s major research professor. The dissertation format must meet all Graduate School published guidelines and the MSEN Microelectronics Photonics guidelines as listed in the Materials Science & Engineering Microelectronics Photonics Graduate Student Handbook. A Ph.D. candidate wishing to use a compilation of published papers for the dissertation must receive explicit permission from the GSCMSEN GSCMEP required prior to his or her dissertation defense, with a meeting between the student’s committee chair and the GSCMSEN GSCMEP required before permission can be granted.

Students should also be aware of Graduate School requirements with regard to doctoral degrees.

<table>
<thead>
<tr>
<th>Are Similar Programs available in the area?</th>
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<tbody>
<tr>
<td>No</td>
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</table>

Estimated Student Demand for Program: 40

Scheduled Program Review Date: 2020-2021

Program Goals and Objectives

1. Provide students with interdisciplinary education and training in materials science engineering to meet the needs of emerging technology industries.

2. Place students in interdisciplinary groups performing rigorous and challenging research to prepare them for careers in industrial research teams, national labs, and academic positions.

3. Prepare students to be effective in technology management and entrepreneurship.

Learning Outcomes
### Learning Outcomes

1. Define and explore new areas of research in an interdisciplinary environment, expanding the breadth and depth of state-of-the-art knowledge in the field of materials, materials processing, and devices enabled by advances in materials.

2. Master knowledge, practices, and skills from traditional graduate level programs in Physics, Chemistry, Electrical Engineering, Chemical Engineering, Mechanical Engineering, Biological Engineering, and Biomedical Engineering, regardless of prior traditional educational background.

3. Communicate effectively deep level knowledge of their work to persons well-versed in their field, detailed technical concepts to persons with strong technical backgrounds outside of their field, and general concepts and applications to the general public.

4. Work efficiently in interdisciplinary team environments, fully supporting team goals through active membership or through team leadership as appropriate.

5. Implement intellectual property management and research commercialization processes, encouraging migration of ideas from formulation to societal benefit during their professional careers.

6. Execute duties found in entry-level professional positions with the operational skills equivalent to at least one year’s experience in that position.

7. Embrace the role of citizen-scientist in both their professional and societal communities, utilizing their sound ethical and analytical backgrounds, to lead the discussions that will be needed to balance what can be done with what should be done.

### Description and justification of the request

<table>
<thead>
<tr>
<th>Description of specific change</th>
<th>Justification for this change</th>
</tr>
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<tbody>
<tr>
<td>Reconfiguration of the Microelectronics-Photonics PhD program into the PhD in Materials Science &amp; Engineering.</td>
<td>Program has developed with a clear focus on materials science and engineering which is a nationally recognized degree. Given a world-class materials research building and facilities, faculty trained in materials and research on materials, the marketability of our graduates can be improved by granting them degrees in Materials Science &amp; Engineering. With an established track record (grants, PhDs produced, publications, facilities, etc.,) the program should soon be recognized as a top national program. This will further attract top students and faculty, result in more research funding, and garner increased interest from industry.</td>
</tr>
</tbody>
</table>

### Upload attachments

- MSENPH - Reconfig - Ltr of Notification.pdf
- MSENPH - Reconfig - Curriculum.pdf

### Reviewer Comments

- **Alice Griffin (agriffin)** *(07/03/19 10:12 am)*: Attention Registrar Staff: No new students admitted into the MEPHPH after summer 2020. Allow students in MEPHPH program to complete through summer 2025.

- **Alice Griffin (agriffin)** *(07/03/19 10:38 am)*: Updated LON and Curriculum in consultation with submitter.

- **Norman Dennis (ndennis)** *(07/16/19 4:01 pm)*: Added the requirement of student learning
outcomes in course syllabi. Change the wording in candidacy exam requirements for non-UAF grads to four semesters "after admission to the PhD program"