MATERIALS SCIENCE, PH.D.

Admissions to the Materials Science Ph.D. have been suspended as of spring 2016 and will be discontinued as of fall 2019. If you have any questions, please contact the department (msaadept@engr.wisc.edu).

Society’s demand for a rapid and diverse succession of new, specialized materials requires a flexible and interdisciplinary approach to materials research and education. In the past, specialized materials were developed through a trial-and-error process. Today, the tools and expertise of scientists are being combined with those of engineers resulting in productive cooperation in both applied and theoretical areas.

Our search for new materials and the need to make better use of old ones continues to broaden the field of materials science. Creating the next generation of advanced materials—polymers, ceramics, metals, semiconductors or biomaterials—and advanced devices—such as lasers, micromotors, nanoscale technology or engineered tissues—requires a mastery of materials and interfaces with atomic to macroscopic level understanding. This is the challenging and exciting domain of materials science.

The Materials Science Program at UW–Madison is nationally recognized and is committed to providing leadership in research, education and outreach services. Graduate studies in our program at UW–Madison can lead to the M.S. and Ph.D. degrees in materials science.

The Materials Science Program provides excellent opportunities for interdisciplinary research through its faculty advisory committee made up of many faculty from departments throughout the UW–Madison campus. Represented in the MSP are virtually all of the engineering departments, as well as chemistry, physics, geology, human ecology, biological systems engineering, as well as several of the biological and medical sciences. Graduate students select their thesis research topics based on materials and interfaces that involve polymers, superconductors, semiconductors, advanced metals, composites, biological materials, or ceramics. Degree requirements are extremely flexible, permitting the student and advisors to formulate an educational plan that is optimal for the student’s educational and professional objectives.

The Materials Science Center (MSC) has state-of-the-art electron microscopes, X-ray diffractometers, atomic force microscopes, surface analysis equipment, and advanced light microscopes available for hands-on use by materials science students. Augmenting the Center’s capabilities is an impressive array of dedicated campus facilities, including the Synchrotron Radiation Center, and the Wisconsin Center for Applied Microelectronics. Kurt F. Wendt Library houses a comprehensive collection of reference material in engineering and the physical sciences. The MSC and MSP offices are located on the engineering campus, near Union South, a student center with a snack bar, cafeteria, and social, game, and activity areas.

A weekly seminar program provides students with an opportunity to hear and meet outstanding materials scientists and engineers from around the world.

Research assistantships generally are available to qualified applicants. Opportunities to obtain teaching assistantships are available directly with the departments of our faculty and not through the Materials Science Program office. Exceptionally well-qualified applicants are eligible for graduate fellowships.

ADMISSIONS

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FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding) is available from the Graduate School. Be sure to check with your program for individual policies and processes related to funding.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

<table>
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<tr>
<th>Face to Face</th>
<th>Evening/Weekend</th>
<th>Online</th>
<th>Hybrid</th>
<th>Accelerated</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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</table>

Mode of Instruction Definitions

Evening/Weekend: These programs are offered in an evening and/or weekend format to accommodate working schedules. Enjoy the advantages of on-campus courses and personal connections, while keeping your day job. For more information about the meeting schedule of a specific program, contact the program.

Online: These programs are offered primarily online. Many available online programs can be completed almost entirely online with all online programs offering at least 50 percent or more of the program work online. Some online programs have an on-campus component that is often designed to accommodate working schedules. Take advantage of the convenience of online learning while participating in a rich, interactive learning environment. For more information about the online nature of a specific program, contact the program.

Hybrid: These programs have innovative curricula that combine on-campus and online formats. Most hybrid programs are completed on-campus with a partial or completely online semester. For more information about the hybrid schedule of a specific program, contact the program.

Accelerated: These on-campus programs are offered in an accelerated format that allows you to complete your program in a condensed time-frame. Enjoy the advantages of on-campus courses with minimal disruption to your career. For more information about the accelerated nature of a specific program, contact the program.
### CURRICULAR REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Minimum Credits</th>
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<tbody>
<tr>
<td>Minimum Credit Requirement</td>
<td>51 credits</td>
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<tr>
<td>Minimum Residence Credit Requirement</td>
<td>32 credits</td>
</tr>
<tr>
<td>Minimum Graduate Coursework Requirement</td>
<td>Half of degree coursework (26 credits out of 51 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 (<a href="http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle">http://my.wisc.edu/CourseGuideRedirect/BrowseByTitle</a>).</td>
</tr>
<tr>
<td>Overall Graduate GPA Requirement</td>
<td>3.00 GPA required.</td>
</tr>
<tr>
<td>Other Grade Requirements</td>
<td>The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.</td>
</tr>
<tr>
<td>Assessments and Examinations</td>
<td>Doctoral students are required to take a comprehensive preliminary/oral examination after they have cleared their record of all Incomplete and Progress grades (other than research and thesis). Deposit of the doctoral dissertation in the Graduate School is required.</td>
</tr>
<tr>
<td>Language Requirements</td>
<td>Contact the program for information on any language requirements.</td>
</tr>
<tr>
<td>Doctoral Minor/ Breadth Requirements</td>
<td>All doctoral students are required to complete a minor.</td>
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### REQUIRED COURSES

A minimum of 10 classroom courses consisting of at least 28 credits. The following additional requirements and restrictions apply to these 10 courses:

- At least one course (3 or more credits) must be in mathematical analysis techniques or emphasizing its application (choose from CBE 660 Intermediate Problems in Chemical Engineering, MATH 703 Methods of Applied Mathematics 1, MATH 704 Methods of Applied Mathematics-2, or PHYSICS 721 Theoretical Physics-Electrodynamics. Others possible by petition).
- At least five courses consisting of at least 14 credits must be at or above the 600 level. Students can petition for exceptions for other courses that must not be generally regarded as part of undergraduate curricula (examples of exceptions: M S & E 530 Thermodynamics of Solids, M S & E 570 Properties of Solid Surfaces, m s & e 445, CBE 540 Polymer Science and Technology, CBE/E C E/M S & E 544 Processing of Electronic Materials. Others possible by petition).
- M S & E 900 Materials Research Seminar may not be used to satisfy any aspect of this requirement.
- The courses must span two or more Departments, meeting the objective of an interdisciplinary education in materials.

Two semester of M S & E 900 Materials Research Seminar, which must be taken in the first and second semester of enrollment if it does not conflict with other requirements.

Within the first year, each student must select and declare to the MSP office three core courses that are fundamental to their research specialization. These courses must be approved by the student's MSP advisor. In the RRE exam, the student will be examined orally on these subjects in addition to questions on their research presentation.

### POLICIES

### GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

### MAJOR-SPECIFIC POLICIES

### GRADUATE PROGRAM HANDBOOK

A Graduate Program Handbook containing all of the program’s policies and requirements is forthcoming from the program.

### PRIOR COURSEWORK

**Graduate Work from Other Institutions**

With program approval, students are allowed to count up to two graduate courses from other institutions toward the minimum graduate degree credit requirement and the minimum graduate coursework (50%) requirement. No credits from other institutions can be counted toward the minimum graduate residence credit requirement. Coursework earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements.

**UW–Madison Undergraduate**

When rigorous and consistent with expectations of graduate work, up to 7 credits numbered 300 and above may be counted toward the minimum graduate degree credit requirement; if those courses are numbered 700 or above, they may be counted toward the minimum graduate coursework (50%) requirement. No credits can be counted toward the minimum graduate residence credit requirement. Coursework earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements.

**UW–Madison University Special**

With program approval and payment of the difference in tuition (between Special and graduate tuition), students are allowed to count up to 15 credits of coursework taken as a UW–Madison Special student numbered 300 or above toward the minimum graduate residence credit requirement, and the minimum graduate degree credit requirement; if the coursework is numbered 700 or above, it may count toward the minimum graduate coursework (50%) requirement. Coursework earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements.
PROBATION
The Graduate School regularly reviews the record of any student who earned grades of BC, C, D, F, or Incomplete in a graduate course (300 or above), or grade of U in research credits. This review could result in academic probation with a hold on future enrollment or in being suspended from the Graduate School.

ADVISOR / COMMITTEE
Every graduate student is required to have an advisor. An advisor is a faculty member, or sometimes a committee, from the major department responsible for providing advice regarding graduate studies. An advisor generally serves as the thesis advisor. In many cases, an advisor is assigned to incoming students. Students can be suspended from the Graduate School if they do not have an advisor.

To ensure that students are making satisfactory progress toward a degree, the Graduate School expects them to meet with their advisor on a regular basis.

A committee often accomplishes advising for the students in the early stages of their studies.

CREDITS PER TERM ALLOWED
15 credits

TIME CONSTRAINTS
Doctoral degree students who have been absent for ten or more consecutive years lose all credits that they have earned before their absence. Individual programs may count the coursework students completed prior to their absence for meeting program requirements; that coursework may not count toward Graduate School credit requirements.

A candidate for a doctoral degree who fails to take the final oral examination and deposit the dissertation within five years after passing the preliminary examination may be required to take another preliminary examination and to be admitted to candidacy a second time.

OTHER
n/a

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES
Take advantage of the Graduate School’s professional development resources (https://grad.wisc.edu/pd) to build skills, thrive academically, and launch your career.

PEOPLE

Faculty: Professor Vanderby (director) (BME/Ortho); Associate Professor Stone (associate director) (Materials Science and Engineering); Professors Abbott (Chemical and Biological Engineering), Anderson (Civil and Environmental Engineering), Babcock (Materials Science and Engineering), Beebe (Biomedical Engineering), Blick (Electrical and Computer Engineering), Booske (Electrical and Computer Engineering), Botez (Electrical and Computer Engineering), Coppersmith (Physics), Cramer (Civil and Environmental Engineering), Drugan (Engineering Physics), Eom (Materials Science and Engineering), Eriksson (Physics), Giacomin (Mechanical Engineering), Gilbert (Physics), Hamers (Chemistry), Hitchon (Electrical and Computer Engineering), Keely (Cell and Regenerative Biology), Klingenberg (Chemical and Biological Engineering), Kou (Materials Science and Engineering), Kuech (Chemical and Biological Engineering), Lagally (Materials Science and Engineering), Lakes (Engineering Physics/Biomedical Engineering), Martin (Mechanical Engineering), Mawst (Electrical and Computer Engineering), McCaughan (Electrical and Computer Engineering), Nealey (Chemical and Biological Engineering), Onellion (Physics), Osowski (Mechanical Engineering), Perepezko (Materials Science and Engineering), Rowlands (Mechanical Engineering), Sarmadi (Human Ecology), Shohet (Electrical and Computer Engineering), Tikoff (Geology and Geophysics), Tungr (Mechanical Engineering), Vanderweide (Electrical and Computer Engineering), Wendt (Electrical and Computer Engineering), Winokur (Physics), Wong (Bacteriology); Associate Professors Allen (Engineering Physics), Block (Medical Physics), Chesler (Biomedical Engineering), Crane (Engineering Physics), Evans (Materials Science and Engineering), Gopalan (Materials Science and Engineering), Gong (Biomedical Engineering), Jiang (Electrical and Computer Engineering), Jin (Chemistry), Li (Mechanical Engineering), Lynn (Chemical and Biological Engineering), Ma (Electrical and Computer Engineering), Masters (Biomedical Engineering), Morgan (Materials Science and Engineering), Murphy (Biomedical Engineering), Negrut (Mechanical Engineering), Palecek (Chemical and Biological Engineering), Pfefferkorn (Mechanical Engineering), Ploeg (Mechanical Engineering), Root (Chemical and Biological Engineering), Rzchowski (Physics); Szuftarska (Materials Science and Engineering), Thelen (Mechanical Engineering), Voyles (Materials Science and Engineering), Williams (Biomedical Engineering), Xu (Geology and Geophysics); Assistant Professors Arnold (Materials Science and Engineering), Cai (Radiology/Medical Physics), Li (BME/Ortho), Mahanthappa (Chemistry), McDermott (Physics), Ogle (Biomedical Engineering), Sheinis (Astromony), Wang (Materials Science and Engineering), Weibel (Biochemistry)