# 2018-2019 MSNE Graduate Handbook

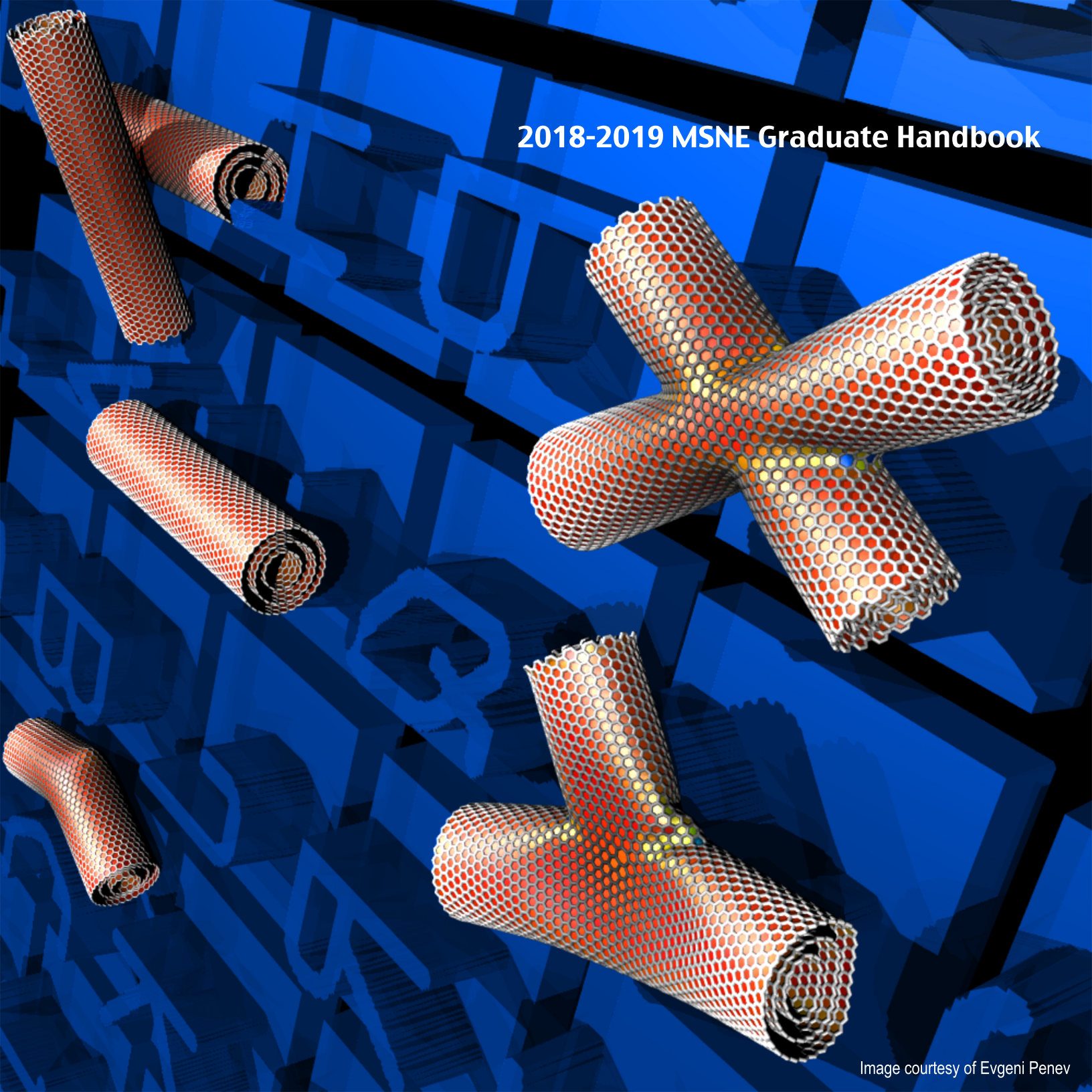

Image courtesy of Evgeni Penev

RICE UNIVERSITY

MSNE

Department of Materials Science and NanoEngineering

Rice University
6100 Main Street
Houston, TX 77005
MS 325
Tel: 713-348-3695

# Materials Science and NanoEngineering

2018-2019

Additional information for MSNE Graduate Program can be found in the Rice University General Announcements http://ga.rice.edu/programs.aspx?FID=2147483821 and the Office of Graduate and Postdoctoral Studies http://gps.rice.edu/home?destination=node/31

It's the student's responsibility to be conversant and familiar with the rules, requirements and procedures. Also, make sure that timelines and policies are followed to allow for a timely graduation. See graduate.rice.edu for applicable policies.

**This document summarizes Departmental requirements and includes information on some University requirements for graduate degrees.**

**Consult the General Announcements http://ga.rice.edu and Code of Conduct http://ga.rice.edu/Home.aspx?id=258&libID=278 for official and complete information on University requirements.**

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## Administration

Students have access to administrative staff for assistance. The primary contact person for graduate students is Kim Hardy. She and the other staff are listed below:

| Name | Title | Email | Location | Phone ext |
|---|---|---|---|---|
| Cindy Wilkes | Sr. Department Admin. | cindy.wilkes@ | E200G | 2296 |
| Gary Cisneros | Technician II | cisneros@ | 109 MEB | 4895 |
| Kim Hardy | Graduate & Undergraduate Admin. | kim.hardy@ | E200I | 3521 |
| Linda Lerma | Financial & Research Admin. | lindac@ | E200F | 3605 |
| Elizabeth Tippee | Administrative Assist | et21@ | E200F | 3689 |

**Cindy Wilkes – Sr. Dept. Administrator:**

Manages the departmental funds and budgets and supervises the staff members.
Go to Cindy for:

- Funding questions.
- Research guidelines.
- Department's physical facilities.
- University policies.
- Special circumstances.

**Gary Cisneros:**

Go to Gary for:

- Lab and equipment issues.
- Order for lab supplies.
- Lab safety training.
- Lab safety issues.

**Kim Hardy:**

Assists graduate students with academic and administrative issues during their study in MSNE. Coordinates the recruitment of graduate students.
Go to Kim for:

- Questions about academic policies and procedures.
- Assistance with processing forms related to your academic progress.
- Questions about payroll/paycheck/stipend.
- Requesting for verification letters (student status, etc.).
- Questions about course schedules, classroom locations.

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**Linda Lerma:**

Provides academic support for classes. Assists faculty members. Maintains the MSNE department reception area, workroom, and mail distribution. Coordinates MSNE Seminars and other special events.

Go to Linda for:

- Travel requests and reimbursements.
- Issuance of office/lab keys ($10 deposit required for 1st two keys).
- Reimbursements via a check or cash for out of pocket expenses.
- PCard reallocation.

**Elizabeth Tippee:**

provides academic support for classes; assists faculty members; maintains the MSNE department reception area, workroom and mail distribution; coordinates MSNE Seminars and other special events.

Go to Elizabeth for:

- Assigning desk space
- Assistance with incoming/outgoing mail, the workroom, and its equipment (fax, copier, printer, and other office supplies).
- FedEx
- Problems with building access with your Rice ID card.
- Processing Academic Visitors paperwork, Visitor Portal
- Room/Building maintenance issues.
- Room reservation
- Questions about MSNE Seminars and other department events.
- Tax exemption forms for general purchases and Texas lodging travel (Rice University does not pay for sales tax within the state of Texas).
- Website maintenance

# Materials Science and NanoEngineering

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## Faculty

Faculty members have a myriad of responsibilities including the advising and mentoring of undergraduate, graduate students and post doctoral fellows, supervising research in their areas of interest and expertise, managing the financial aspects of their labs, and instruction at the undergraduate and graduate level.

**Doctor of Philosophy (PhD) and Master of Science (MS) Students:** The primary faculty contact for PhD and MS students is the student's individual advisor.

**2018-2019 Graduate Committee:** Drs. Egap,Lou, Tang, and Pimpinelli.

**2018-2019 Professional Master Students (MMSNE) advisors:** Drs. Lou, and Tang

| | |
|---|---|
| ***Ajayan, Pulickel*** | Benjamin M. and Mary Greenwood Anderson Professor of Engineering, and Department Chair. |
| ***Barrera, Enrique*** | Professor of Materials Science and NanoEngineering. |
| ***Cordero, Zachary*** | Assistant Professor of Materials Science and NanoEngineering. |
| ***Egap, Eliaf*** | Assistant Professor of Materials Science and NanoEngineering. |
| ***Lou, Jun*** | Professor and Associate Chair of Materials Science and NanoEngineering. |
| ***Tang, Ming*** | Assistant Professor of Materials Science and NanoEngineering. |
| ***Thomas, Edwin L.*** | Ernest Dell Butcher Professor of Materials Science and NanoEngineering. |
| ***Yakobson, Boris I.*** | Karl F. Hasselmann Professor of Materials Science and NanoEngineering. |
| ***Zhu, Hanyu*** | Assistant Professor of Materials Science and NanoEngineering. |
| ***John, Randy*** | Lecturer of Materials Science and NanoEngineering. |
| ***Loos, Peter*** | Professor in Practice of Materials Science and NanoEngineering |
| ***Pimpinelli, Alberto*** | Executive Director of Rice Quantum Institute, Faculty Fellow in Materials Science and NanoEngineering. |
| ***Vajtai, Robert*** | Associate Research Professor. |

# Materials Science and NanoEngineering

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## MSNE Graduate Student Association

| | |
|---|---|
| ***Yedinak, Emily*** | ***President*** |
| ***Isenhart, Lucas*** | ***Treasurer*** |
| | ***Secretary*** |

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## Student Resources

**ESTHER:** http://registrar.rice.edu/students/esther_FAQs/#whatis
Esther (Employee and Student Tools, Help, and Electronic Resources) is the web application for students, faculty, and staff. Students will use ESTHER to register for classes and retrieve certain data such as grades and account information.

**Graduate Students Association (GSA)**: http://gsa.rice.edu
GSA comprises degree seeking graduate students at Rice University. The GSA mission is to enrich the graduate student experience and to represent, support, and promote graduate student interests and values. An integral and essential part of the Rice community, the GSA provides programs and services aiding in recruitment and retention of graduate students, represents graduate student interests to the University administration, and builds a strong sense of community both on and off campus.

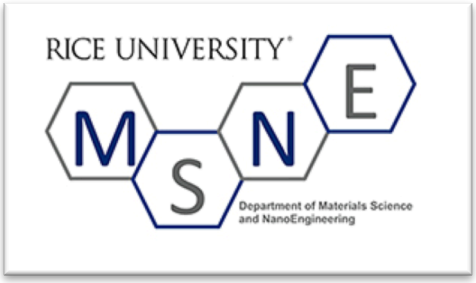
**Mentor Program:**
Where current MSNE students are able to help the incoming students get established and find their way in the new environment they're in. Valuable experiences gained and lessons learned are passed along, to help make the transition to Rice enjoyable and rewarding, paving the way to a successful future.

**Shared Equipment Authority:** http://sea.rice.edu
The Shared Equipment Authority (SEA) is a core facility that provides access to scientific equipment to all Rice staff and students. They have dedicated personnel that train, monitor and maintain all their equipment.

**Health Insurance Requirement:** http://oiss.rice.edu/studenthealth/
All students at Rice University are required to have health insurance coverage and show proof of coverage ***before*** registering for classes. All non-immigrant visa holders and their dependents are required to carry insurance for the duration of their program. Health insurance is necessary for everyone in the United States, as medical costs are very high.
***Note:*** *All Rice-sponsored **F-1** and **J-1** international students must enroll in either 1) Aetna (Rice's Student Health Insurance Plan) or 2) SAS (Rice's Approved Alternate Health Insurance Plan for Internationals).*

**Employment Resources and Related Issues:** http://oiss.rice.edu/studentwork/
For International F-1 or J-1 students, you have the opportunity to engage in on-campus work or practical training opportunities off-campus. However, you must obtain the appropriate work authorization *before* starting to work. *If you work even one day before or one day after your authorization period, you must leave the U.S. or face deportation.*

**Title IX information:** http://safe.rice.edu/
Rice encourages any student who has experienced an incident of sexual, relationship, or other interpersonal violence, harassment or gender discrimination to seek support. There are many options available both on and off campus for all graduate students, regardless of whether the perpetrator was a fellow student, a staff or faculty member, or someone not affiliated with the university.
Students should be aware when seeking support on campus that most employees are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. The therapists at the Rice Counseling Center and the doctors at Student Health Services are confidential, meaning that Rice will not be informed about the incident if a student discloses to one of these Rice staff members. Rice prioritizes student privacy and safety, and only shares disclosed information on a need-to-know basis.
If you are in need of assistance or simply would like to talk to someone, please call Rice Wellbeing and Counseling Center, which includes

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Title IX Support: **3311/(713) 348-3311.** Policies, including Sexual Misconduct Policy and Student Code of Conduct, and more information regarding Title IX can be found at safe.rice.edu

# Materials Science and NanoEngineering

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## Academics Policies and Procedures

**Degrees offered:**

The department offers three graduate degrees: Doctor of Philosophy (PhD), Master of Science (MS) and Professional Master (MMSNE).

- The PhD degree requires completion of at least 90 semester (or credit) hours of advanced relevant study, of which at least 18 semester hours must be for coursework, and an approved thesis. As final evidence of preparation for this degree, the candidate must pass a public oral examination and submit the approved thesis to the Office of Graduate and Postdoctoral Studies. The residency requirement for the doctorate is four semesters of full-time study at the university. Successful candidates must pass a qualifying exam and write and orally defend a thesis on his or her original research. For more detailed information, please go to PhD degree requirement.

- The MS degree requires at least 30 semester (or credit) hours of study, of which at least 18 semester hours must be for coursework. The Thesis Master programs require original work reported in a thesis and a public oral examination. Most students take three or four semesters to complete the requirements for a master's degree (some programs may require more time). Students receiving a master's degree must be enrolled in a graduate program at Rice University for a minimum of 2 semesters of full-time study. For more detailed information, please go to MS degree requirement.

- The MMSNE degree requires at least 30 semester (or credit) hours of study. Minimum residency is one fall or spring semester of full-time or part time graduate study. Students must submit a petition for the degree, signed by the MMSNE advisor, to the graduate administrator by the deadline specified in the official academic calendar. For more detailed information, please go to MMSNE degree requirement.

**Advisor selection:**

MSNE 599 "Lab Rotations and Advisor Selection" assists PhD students to select their advisors by spending time in several research groups.

a. Students must register for MSNE 599 in the first semester, and submit the rotation form at the beginning of the semester to the graduate administrator to set up the rotation schedule.
b. By the end of November students must complete the Advisor Selection form and email it to the graduate administrator.
c. The graduate administrator will notify the students at the beginning of January who will be his/her advisor.

**Changing Advisor:**

MSNE Students are allowed to change their research advisor but must do so judiciously since this may lead to a delay to graduation. A student who is considering changing his/her advisor will need approval from the Chair of the Department.

**Changing degree from PhD to MS or MMSNE:**

In the case where a MSNE student can no longer complete the PhD program these are the options available:

1. Change degree to MS thesis- Speak with his/her advisor to see if they have enough credits and research to switch to MS thesis.
   - In this case where the above mentioned is achieved and advisor approves, student may change degrees to MS thesis.
     - Student will defend MS thesis.
     - Student will submit thesis and apply for graduation.

- No tuition repayment necessary.

- In the case where the student does not have enough credits and/or research requiring additional time to meet the degree requirements, the responsibility will be that of the advisor. The decision is up to the advisor whether to financially support the student until the degree requirements and thesis defense are complete. No tuition repayment while enrolled in the PhD program is required.

2. Apply for MMSNE – Students who wish to change degree programs from PhD to MMSNE must apply to the MMSNE program.
   - Student will apply to the MMSNE degree program through the application system.
   - Student will formally request to change degree programs and detail the credits transferring into the MMSNE program in written form.
   - The admission committee will review application and request to change degrees.
   - If admitted, the student will be required to pay back the full tuition for any credits taken in the PhD program and transferred toward the MMSNE degree requirements.
   - Tuition repayment will be at the current tuition rate.
3. Student may request a leave of absence with the intent to finish the PhD at a later date.
4. Student can withdraw and leave with no degree.

**Annual Performance review: the form is available at http://msne.rice.edu**

All MS/PhD students in MSNE must complete an annual review in conjunction with their advisors. The purpose of this review is to:

- Evaluate progress towards the degree
- Communicate to your advisor objectives for the coming year
- Ensure a shared set of expectations between student and advisor as to what defines satisfactory progress for the coming year. Each MS/PhD student will be asked to complete a self-evaluation each April and discuss the year's progress with the advisor. Following this review conversation, it is the student's responsibility to ensure that the annual review is submitted to the graduate administrator. If a student has not met the goals from the previous year and/or is not demonstrating satisfactory progress towards the degree, the advisor will prepare a written plan that includes the goals and deadlines the student need to meet and a clear statement of the consequences if they are not met. A copy of the plan will be placed in the student's academic file.

**Credit transfer:**

If a student wishes to have graduate courses taken at another university or within a different program at Rice counted for credits toward an advanced degree offered by the Department, he/she should petition the Department in writing, listing not only the grades earned but also including detailed description of the courses and syllabus involved. Transfer of credits are subject to the following restrictions:

- Courses must be from a regionally accredited U.S. institution or an international institution officially recognized by that country's Ministry of Education or equivalent.
- The course must be recorded on an official transcript sent directly from the original institution to Rice or hand-delivered by the student in an official sealed envelope.
- Students seeking to transfer credits must submit an approved Graduate Request for Transfer Credit form to the Office of the Registrar.
- For PhD Degree, the number of transferred credit hours will be decided by a member of the Graduate Committee in consultation with the Department Chair on a case-by-case basis. PhD candidates must still complete a total of 90 semester hours of advanced study and four semesters of full-time residency at the Rice University.

- For the MS degree, only 6 transferred credit hours will be accepted towards the degree requirement. The candidate needs to obtain approval from the Rice instructors of the courses he/she wishes to waive. The syllabus and course description of the substitute courses from the candidate's prior institution(s) must be provided to the instructors to determine the appropriateness of the waiver. Final decision will be made by a member of the Graduate Committee.
- For the MMSNE degree, only 6 transferred credit hours will be accepted towards the degree requirement. The candidate needs to obtain approval from the Rice instructors of the courses he/she wishes to waive. The syllabus and course description of the substitute courses from the candidate's prior institution(s) must be provided to the instructors to determine the appropriateness of the waiver. Final decision will be made by a member of the Graduate Committee.

**Replacement course(s):**
You must complete the approval replacement form with signatures from your advisor and one of the graduate committee, and then email the form to the graduate administrator for your record (without the approval replacement form, the course will not count towards your degree)

**Grades:**
In general, a graduate student is expected to earn letter grades of at least B- in all courses taken, and maintain a minimum GPA of 3.0. If a student's GPA is below 3.0, the student will be placed on probation. The student may be dismissed from the program if his/her GPA falls below 3.0 for two semesters. Final decision will be made by the Graduate Committee in consultation with the Department Chair.

The record of a graduate student who receives a failing grade in a course will be reviewed, and the Department will make specific recommendations regarding further study at the university.

For University academic probation policies, please see http://ga.rice.edu/Home.aspx?id=2147483680.

- Satisfactory/Unsatisfactory Courses:
  Satisfactory/unsatisfactory courses are those that assign a grade of S or U rather than a letter grade. With S/U courses, instructors issue the S grade if the student has successfully completed the course, or the U if he/she has not. An S grade will not count towards grade point average (GPA) but will count towards total credits earned. A U grade will not count towards the degree total credit

  requirements of MSNE graduate programs. Student who receives two consecutive "U"s in S/U courses will be put on academic probation. A third "U" will result in suspension from the program.

- Auditing Courses: Currently enrolled students may audit courses at Rice without charge by securing permission of the instructor and registering as an auditor with the Office of the Registrar. Upon completion, the audited course will appear on the student's transcript with a grade of either "AUD" or "NC" (No Credit). There are no credit hours associated with audited courses, and auditing a course does not affect a student's GPA. Requests to audit a class or to change from audit to credit or vice versa must be approved by the end of the second week of the semester.

- Pass/Fail Option: All degree-seeking graduate students may take course(s) pass/fail outside their department. They must designate a course as pass/fail no later than the end of the 10th week of classes; however, they may later convert a pass/fail to a graded course by submitting the proper online form with the Office of the Registrar by the end of the second week of the following semester. Students should be aware that while a grade of P does not affect their Grade Point Average, a grade of F is counted as a failure and is included in their GPA.

**Guidelines for dismissals, petitions, Appeals, Grievances and Problem resolution:**
For information, go to http://ga.rice.edu/GR_disputes/#Guidelines_Regarding_Petitions_and_Appeals

**Financial Aid:**
Departmental funding is available to most incoming PhD and MS students during their first year of studies. The department will provide these students with a 9-month stipend at the current stipend rate. Stipend is paid semi-monthly, the fall from August 16th to December 31st, and the spring from January 1st to May 15th.
Advisors become responsible for financially supporting students on the first day of their tenth month of study. Advisors are expected to pay 100% of the student's stipend unless that stipend is funded by an external fellowship, scholarship, training grant, or other source of external funding which covers all or a portion of the student's stipend. Continued financial support depends on acceptable academic progress.

Summer Support (from May 16th to August 15th) – Students should discuss their summer plans well in advance with their advisors. In order to be paid by Rice for the summer, students must register for at least 6 hours of MSNE 800. Students planning a summer internship off-campus, with advisor's approval, must inform the Graduate Administrator by May 1 in order to complete the financial arrangements required.

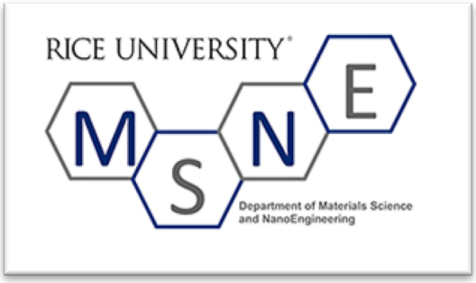
Termination of Financial Support –. Active participation in required research activities is a basic condition for continued financial support. When a graduate student is placed on probationary status due to inadequate academic progress, his/her research advisor may decide to reduce or suspend the financial support to the student. Students who are absent from required research activities for consecutive 2 weeks without permission and without mitigating circumstance may be subject to termination of financial support. In addition, they will be judged to be not making adequate academic progress. Thus, if absences have to occur, they must be prearranged with the advisor with the exception of medical and family emergencies, in which case timely notification is required.
See the General Announcements' section on Academic and Judicial Discipline for details: http://ga.rice.edu/GR_dismissal/

External Fellowships/Scholarships: Students are encouraged to seek external fellowships and awards. The Office of
Proposal Development (http://opd.rice.edu) offers an extensive array of proposal development services when developing and writing proposals for federal agencies and other entities to seek funding for the research projects. Assistance can also be obtained from the Office of Dean of Graduate and Post Doctoral Studies. Go to http://gps.rice.edu/universityfellowships for more information. Students are encouraged to take advantage of the services and resources available to them. Students are required to notify the Materials Science and NanoEngineering

Department of any external fellowships or scholarships they receive immediately upon receiving an award including award received prior to matriculation.

The National Science Foundation and many Government Agencies and Foundations offer Scholarships, Fellowships, and other funding opportunities for Graduate students. Some of these opportunities are listed on the website of the George R. Brown School of Engineering, http://engineering.rice.edu/gradopps/. Additionally, Rice maintains a LibGuide with a large listing of available funding opportunities, http://libguides.rice.edu/c.php?g=45066&p=286600. Graduate students are strongly encouraged to seek out these opportunities, and contact the MSNE graduate administrator.

**Teaching Assistant:**
All teaching assistants (TAs) must attend a TA workshop. They need to discuss with the instructors about their responsibilities before the courses start and are expected to attend the classes upon the request of the instructors.

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**Student Vacation:**

PhD and MS students are receive to vacation time (2 weeks annually). The nominal vacation periods are appropriate and must be discussed with their advisors.

**Withdrawals:**

Medical leaves and other types of interruptions of study should be handled according to the guidelines in the General Announcements (http://ga.rice.edu/GR_withdrawals/)

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## MSNE Areas of Specialization

1. Advanced Manufacturing.
2. Atomic Scale Charaterization.
3. Computational Materials Science.
4. Electronic and Opto-electronic Materials.
5. Energy Conversion and Storage.
6. Metals and 3D Printing.
7. Multifunctional Composites.
8. Nanomechanics.
9. Polymer Science.
10. Quantum Materials and Phenomena.

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## Requirements for the PhD degree

**If you are accepted as an MSNE PhD student but your Advisor is from another department, you still need to meet all the MSNE requirements to obtain the MSNE PhD degree.**

Full-time students seeking the PhD degree are expected to complete all the requirements for the degree within five calendar years, following entrance into the program. Continuation in the program beyond this time limit will require special approval by the Department.

The PhD program is full-time and requires students to register a minimum of 9 credit hours per semester.

**Residency:** The minimum residence requirement for the Ph.D. degree is four semesters (fall/spring) of full-time study at the university.

**Course Requirement:** Candidates for the PhD degree are required to complete at least 90 semester (or credit) hours of advanced relevant study, of which at least 18 credit hours must be for coursework. Courses that are required for a BS degree in MSNE at Rice cannot be counted towards the credit hours to satisfy the degree requirements. For students with a MS or MMSNE degree from the MSNE department and have completed some or all of the required Core courses listed below, those courses can be replaced by additional Elective courses. For students with a BS or BA degree from the MSNE department and have completed MSNE 401, MSNE 402, MSNE 406 and MSNE 435, the required Core courses can be replaced by additional Elective courses.

1. Coursework courses:

(a) Core courses (required): MSNE 502, MSNE 503, MSNE 506 and MSNE 535.

(b) Elective courses: MSNE 500+* and 600+ level courses, or course(s) from other departments upon approval from their advisors or one member of the Departmental Graduate Committee. 2. Non-coursework courses:

Credits received for MSNE 500, MSNE 501 and MSNE 800 will not be counted as coursework credits. They will count toward the degree total credit requirement (90 credit hours for PhD).

MSNE 500 "*Materials Science Seminar*": PhD students must attend at least 10 of the 13 MSNE seminars per semester for the duration of their study. The students are required to earn an "S" (satisfactory) grade in MSNE 500 for every semester. There will be a sign-in sheet available at seminars and the students need to sign in prove attendance. Please go to the section "Grades" for more information.

MSNE 501 "*Graduate Student Seminar*": PhD students must attend at least 9 of the 14 seminars per semester for the duration of their study. The students are required to earn an "S" (satisfactory) grade in MSNE 501 for every semester. There will be a sign-in sheet available at seminars and the students need to sign in prove attendance. Please go to the section "Grades" for more information.

MSNE 800 "*Research and Thesis*": The students who register MSNE 800 are required to earn an "S" (satisfactory) grade. Please go to the

**MSNE 500 and MSNE 501 are not elective courses*

section "Grades" for more information.

**Instructional Assistance** (Teaching Assistant/Grader): PhD students are required, as part of their research degree program and educational experience, to provide instructional assistance to the department. This instructional assistance, which could be in the form of grading, lecturing, assisting in labs or developing course material, will not exceed ten hours per week. PhD Students are required to perform such duties for at least 4 semesters but no more than 6 semesters.

**Year 1:**

1. **Requirement:** All first year students must meet with your temporary advisor prior to course registration, to seek advice on what courses to take, and how to choose your research advisors.

2. **Recommendation:** register for core courses- MSNE 502, MSNE 503, MSNE 506, MSNE 535, plus elective courses. Active research should begin as soon as possible but not late than the end of the first academic year.

3. **End of year 1:** *Preliminary Candidacy Evaluation (PCE)-the form is available at http://msne.rice.edu*
   Entering PhD students will be subject to a preliminary evaluation of their candidacy for the PhD degree program. The evaluation will be conducted by the end of the first year of enrollment, and will be based on a review of the academic performance up to the time of evaluation, including:
   - Performance in coursework
   - Research progress and its documentation.

   **Procedure:**
   - By the end of March in the first year, students need to meet with their research advisors for the PCE evaluation, complete 2 pages of research review (using font size 12 and double space) with input from the advisor, and email the PCE form to the graduate administrator.
   - The advisor is responsible for suggesting two MSNE faculty members as the student's PCE committee members.

   The panel assessment will result in one of the following four possible outcomes:
   - Approve preliminary candidacy.
   - Approve preliminary candidacy conditionally, and specify conditions.
   - Extend the period of evaluation, and receive candidacy approval no later than the end of the third semester of enrollment in the MSNE graduate program.
   - Disapprove candidacy.

   Once a preliminary evaluation is completed, the reviewed material will be made available to the students.
   Students not progressing sufficiently within the first year will be dismissed from the program.

*Note:* After the required coursework credit hours have been completed, students may register as full-time under MSNE 800 (Research and Thesis).

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**Year 2:** **Conduct research and take courses approved by advisor.**

**All the core courses (MSNE 502, MSNE 503, MSNE 506 and MSNE 535) must be completed before taking the Oral Qualifying Examination.**

**Years 3:** Make significant progress in research and pass Oral Qualifying Examination.

Oral Qualifying Examination- the form is available at msne.rice.edu

PhD students must pass the oral qualifying examination. The purpose of this examination is to determine whether the student is qualified to conduct independent research at the technical level required for a PhD thesis. The student's grasp of fundamental concepts in his/her field and related fields of interest will be examined.
The result of this examination will be the principal factor in the department's decision on the student's admission to candidacy for the PhD program. Should the student fail this examination, he/she may be given a second chance to take the examination upon the recommendation of the examining committee.

**Procedure:**

- By the end of March in the third year:
  a. Students need to meet with their research Advisors to review performance and discuss research plans.
  b. The student is responsible for meeting with their advisor to select the committee, which should include the advisor, a MSNE faculty member and non-MNSE faculty member withing the university.
  c. After the above, complete the Oral Qualifying Evaluation schedule form and email to the graduate administrator.

***Students with GPA 3.0 and above***

- The student will submit a written research proposal to his/her committee, and set up a date for the exam (The committee should receive the written proposal at least 1 week in advance of oral exam date). The research proposal needs to have a minimum of 25 pages and use font size 12 and double space. It should address elements in the student thesis research including motivation and background, literature review, key preliminary results, research plans and references.
- On the day of the oral exam, the student presents the preliminary work and the proposed research to the committee in an oral presentation. The committee will question the student on the proposal, knowledge of literature review/background, current progress, and other related questions in the field of the proposal. Following the oral presentation, questions may be asked by the committee on the contents of the 4 core courses (MSNE 502, MSNE 503, MSNE 506 and MSNE 535).

***Students with GPA below 3.0:***

- The student will be required to pass a written exam on all core courses (MSNE 502, MNSE 503, MSNE 506 and MSNE 535) before they can take the Oral Qualifying Exam.
- Student needs to answer two questions for each core course (502, 503, 506 and 535), i.e. a total of 8 questions within 2 hours. The questions will be given by the faculty teaching the core courses.

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**Year 4:** Petition for PhD Candidacy (http://graduate.rice.edu/candidacy)

Ph.D. students must submit by email the petition for approval of candidacy for a Doctoral Degree (form available at http://msne.rice.edu to the graduate coordinator by the end of eighth semester of their residency at Rice. Achieving candidacy for the PhD degree implies that a graduate student has:

- Completed 45 hours of advanced relevant study.
- Maintain a 3.0 (B) GPA
- Demonstrated the ability of clear oral and written communication, and the ability to carry on scholarly work in his/her subject area. This is determined by successful presentation during the oral qualifying examination.

**Procedure:**

- The student is responsible for meeting with the advisor to select the committee, which should include the advisor, a MSNE faculty member and a non-MSNE faculty member within the university.
- Petition for approval of candidacy of PhD Candidacy form should be emailed to the graduate administrator with the names of committee members for the student's thesis defense and a checklist of courses taken.

Additionally, if a student plans to defend and submit a thesis for the next degree conferral, students must file their petitions for approval of Ph.D. candidacy at the Office of Graduate and Postdoctoral Studies before the deadline, see http://ga.rice.edu/Home.aspx?id=123 and http://registrar.rice.edu/calendars/

Each candidate for the PhD degree must complete a thesis demonstrating ability in research of a fundamental nature (analytical or experimental). It is expected that the research will be of sufficient importance and quality that leads to publication. Instructions for preparation of theses can be obtained at the appropriate time through the office of graduate and postdoctoral studies.

**NOTE: Ph.D. students must be approved for candidacy before the beginning of the ninth semester of their residency at Rice.**

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**Year 5:** Oral defense http://graduate.rice.edu/oraldefense

- A committee consisting of at least three members will conduct the defense. The committee include your advisor (the committee chair), a faculty member from MSNE and non-MSNE faculty member within the university. The committee members should be announced early enough so that the candidate may discuss with them the nature of the thesis research and the contents of the thesis. The thesis must be made available to the members of the examining committee at least two weeks before the defense date. Although the defense will be concerned primarily with the candidate's thesis, the questioning may also cover other related areas.
- Schedule the final oral defense of thesis to take place at a time agreeable to all members of the committee. Be sure to consult the deadlines listed in the Academic Calendar (http://registrar.rice.edu/calendars/) to ensure that you meet the defense deadline for commencement. In order to graduate, the final thesis must be submitted to the Office of Graduate and Postdoctoral Studies before noon on the deadline listed in the Academic Calendar http://registrar.rice.edu/calendars/ (or six months after the oral defense, which ever occurs first).
  For the PhD degree, the examination must be publicly announced. Students should note that announcements should be made at least two weeks before the scheduled defense. Defense announcements can be submitted to the Office of Graduate and Postdoctoral Studies by filling out the following form at http://events.rice.edu/rgs/. The thesis defense cannot take place without announcements being sent out.
- Should a student fail the oral defense, the committee chair may schedule a second examination. Students who fail a second time will be dismissed from the university.
- Within a week after passing the oral thesis defense, please upload a scanned version of your Approval of Candidacy for the Doctoral Degree form, signed (and dated) by the thesis committee, along with the defended draft of the thesis. This signifies a successful defense of the thesis. Directions to upload documents to the thesis.rice.edu website can be found here: http://gps.rice.edu/submitthesis.
- Students registered for the previous semester that pass the oral examination on or before the end of the first week of classes of any semester do not have to register for that or any subsequent semester even though they may be continuing to make minor revisions to the final copy of their thesis.
- No later than six months following the successful oral examination in defense of the thesis, the thesis must be submitted to Office of Graduate & Postdoctoral Studies.

**Thesis Preparation:** Instructions for preparation of thesis can be obtained at the appropriate time through the Office of Graduate and Postdoctoral studies. http://gps.rice.edu/thesis.
Candidates for the PhD degree must register for Research and Thesis (MSNE 800) during the year preceding the anticipated date of graduation.

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**Thesis Deadline:** http://graduate.rice.edu/thesis

Students must observe the deadlines set by the Office of Graduate and Postdoctoral Studies for submission of the final thesis to receive their degree for either December or May conferral. Otherwise students have six months from the date of defense to submit their final thesis to the Office of Graduate and Postdoctoral Studies.

**Thesis Submission:** Each candidate for the PhD degree must complete a thesis that constitutes an original contribution to scientific knowledge. The thesis will be bound in buckram (**Buckram** is a stiff cloth, made of cotton, and still occasionally linen, which is used to cover and protect books), or submitted online http://thesis.rice.edu

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## Requirements for the MS degree

**If you are accepted as an MSNE MS student but your Advisor is from another department, you must complete your MSNE requirements to get the MSNE MS degree.**

Full-time students seeking the MS degree are expected to complete all the requirements for the degree within two calendar years, following entrance into the program. Continuation in the program beyond this time limit will require special approval by the Department.

The MS program is full-time and requires students to register a minimum of 9 credit hours per semester.

**Residency:** The minimum residence requirement for the MS degree is 2 semesters of full-time study at the university.

**Course Requirement:**

Candidates for the MS degree are required to complete at least 30 credit hours of study, of which at least 18 credit hours must be for coursework. Courses that are required for a B.S. degree in MSNE at Rice cannot be counted towards the credit hours to satisfy the degree requirements. For students with a BS or BA degree from the MSNE department and have completed MSNE 401, MSNE 402, MSNE 406 and MSNE 435, the required Core courses can be replaced by additional Elective courses.

1. Coursework courses:
   (a) Core courses (required): MSNE 502, MSNE 503, MSNE 506 and MSNE 535
   (b) Elective courses: MSNE 500+ · or 600+ level courses, or course(s) from other departments upon approval from their advisor or one member of the Graduate Committee.
2. Non-coursework courses:
   Credit received for MSNE 500, MSNE 501 and MSNE 800 will not be counted as coursework credits. They will count toward the degree total credit requirement (30 credit hours for MS).

MSNE 500 "*Materials Science Seminar*": MS students must attend at least 6 of the 13 MSNE seminars per semester for the full term of the program. The students are required to earn an "S" (satisfactory) grade in MSNE 500 for every semester. There will be a sign-in sheet available at seminars and the students need to sign in prove attendance. Please go to the section "Grades" for more information.

MSNE 501 "*Graduate Student Seminar*": PhD students must attend at least 6 of the 13 seminars per semester for the duration of their study. The students are required to earn an "S" (satisfactory) grade in MSNE 501 for every semester. There will be a sign-in sheet available at seminars and the students need to sign in prove attendance. Please go to the section "Grades" for more information.

MSNE 800 "*Research and Thesis*": The students who register MSNE 800 are required to earn an "S" (satisfactory) grade. Please go to the section "Grades" for more information.

· *MSNE 500 and MSNE 501 are not elective courses.*

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**Instructional Assistance** (Teaching Assistant/Grader): MS students are required, as part of their research degree program and educational experience, to provide instructional assistance to the department. This instructional assistance, which could be in the form of grading, lecturing, assisting in labs or developing course material, will not exceed ten hours per week. MS students are required to perform such duties for at least 2 semesters but no more than 3 semesters.

1. **Requirement:** All first year students must meet with your temporary advisor prior to course registration, to seek advice on what courses to take in your MS program
2. **Recommendation:** register for Core courses - MSNE 502, MSNE 503, MSNE 506, MSNE 535, plus elective courses. Active research should begin as soon as possible but not late than the end of the first semester.

**Year 1:** *Preliminary Candidacy Evaluation (PCE )*

Entering MS students pursuing a thesis degree program will be subject to a preliminary evaluation of their candidacy for the MS degree. The evaluation will be conducted by the end of the first year of enrollment, and will be based on a review of the academic performance up to the time of evaluation, including:

- Performance in coursework
- Research progress and its documentation.

**Procedure:**

- By the end of March in the first year, students need to meet with their research advisors for the PCE evaluation, complete 8 pages of research review (using font size 12 and double space) with input from the advisor, and email the PCE form to the graduate administrator.
- The student should consult with the advisor and invite another MSNE faculty member and a non-MSNE faculty member within the University to form the PCE committee.

The panel assessment will normally result in one of the following four possible outcomes:

- Approve preliminary candidacy
- Approve preliminary candidacy conditionally, and specify conditions
- Extend the period of evaluation, and receive candidacy approval no later than the end of the third semester of enrollment in the MSNE graduate program
- Disapprove candidacy

Once a preliminary evaluation is completed, the reviewed material will be made available to the students. Students not progressing sufficiently within the first year will be dismissed from the program.

*Note:* After the required coursework credit hours have been completed, students may register full-time under MSNE 800 (Research and Thesis)

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**All the core courses (MSNE 401, MSNE 502, MSNE 506 and MSNE 535) must be completed before petition for MS Candidacy**

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**Year 2:**

**Beginning of year 2:** Conduct research, take courses approved by advisor and petition for MS Candidacy (http://gps.rice.edu/candidacy)
MS students must submit by email the petition for approval of candidacy for Master of Science Degree (form available at) to the graduate coordinator by end of third semester of their residency at Rice University.

Achieving candidacy for the MS implies that a graduate student has:

- Completed core courses
- Maintain a 3.0 GPA.
- Demonstrated the ability for clear oral and written communication, and show the ability to carry on scholarly work in his/her subject area.

Procedure:

- The student is responsible for meeting with the advisor to select the committee, which includes the advisor, a MSNE faculty member and a non-MSNE faculty member within the university.
- Petition for approval of MS Candidacy form must provide a committee to conduct the defense
- Petition for approval of MS Candidacy form should be emailed to the graduate administrator with the names of the committee members for the student's thesis defense and a checklist of courses.

Additionally, if a student plans to defend and submit a thesis for the next degree conferral, students must file their petitions for approval of MS candidacy at the Office of Graduate and Postdoctoral Studies before the deadline, see http://ga.rice.edu/Home.aspx?id=123 and http://registrar.rice.edu/calendars/

Each candidate for the MS degree must complete a thesis demonstrating ability in research of a fundamental nature (analytical or experimental). It is expected that the research will be of sufficient importance and quality that positive results would lead to publication. Instructions for preparation of theses can be obtained at the appropriate time through the office of graduate and postdoctoral studies.

Candidates for the MS degree must register for Research and Thesis (MSNE 800) during the year preceding the anticipated date of graduation.

Oral defense https://gps.rice.edu/oraldefense

a) A committee consisting of at least three members will conduct the defense. The committee include your advisor (committee chair), a MSNE faculty member and a non-faculty from another department within the university. The members of the committee should be announced early enough so that the candidate may discuss with them the nature of the thesis research and the contents of the thesis. The thesis must be made available to the members of the examining committee at least two weeks before the defense date. Although the defense will be concerned primarily with the candidate's thesis, the questioning may also cover other related areas.

b) Schedule the final oral defense of thesis to take place at a time agreeable to all members of the committee. Be sure to consult the deadlines listed in the Academic Calendar http://registrar.rice.edu/calendars/ to ensure that you meet the defense deadline for commencement. In order to graduate, the final thesis must be submitted to the Office of Graduate and Postdoctoral Studies before noon on the deadline listed in the Academic Calendar http://registrar.rice.edu/calendars/ (or six months after the oral defense, which ever occurs first).
For the MS degree, the examination must be publicly announced. Students should note that announcements should be made at least one week before the scheduled defense. Defense announcements can be submitted to the Office of Graduate and Postdoctoral Studies by filling out the following form: http://events.rice.edu/rgs/. The thesis defense cannot take place without announcements being sent out.

c) Should a student fail the oral defense, the committee chair may schedule a second examination. Students who fail a second time will be dismissed from the university.

d) Within a week after passing the oral thesis defense, please upload a scanned version of your Approval of Candidacy for the MS degree form, signed (and dated) by the thesis committee, along with the defended draft of the thesis. This signifies a successful defense of the thesis. Directions to upload documents to the thesis.rice.edu website can be found here http://gps.rice.edu/submitthesis

e) Students registered for the previous semester that pass the oral examination on or before the end of the first week of classes of any semester do not have to register for that or any subsequent semester even though they may be continuing to make minor revisions to the final copy of their thesis.

**Thesis Preparation:** Instructions for preparation of thesis can be obtained at the appropriate time through the Office of Graduate and Postdoctoral studies. http://gps.rice.edu/thesis.

**Thesis Deadline:** http://gps.rice.edu/thesis
Students must observe the deadlines set by the Office of Graduate and Postdoctoral Studies for submission of the final thesis to receive their degree for either January or May conferral. Otherwise students have six months from the date of defense to submit their final thesis to the Office of Graduate and Postdoctoral Studies.

# Materials Science and NanoEngineering

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## Requirements for the Professional Master's Degree (MMSNE)

The Department of Materials Science and NanoEngineering at Rice University offers a non-thesis (Professional) master's degree of Materials Science (MMSNE) in two focus areas: Materials Science and NanoEngineering. Students must complete at least 30 semester hours of courses approved by the department (a one-semester course is usually three semester hours credit). Of these 30 credit hours, at least 24 must be taken at Rice. Requirements and specific courses to be taken depend on each student's field of study. Students must have their individual degree plans and programs of study approved by the advisor of MMSNE program.

### Materials Science Area

| | |
|---|---|
| At least 3 core courses. | Required to register for MSNE 502 and MSNE 503 AND choose one of these courses: MSNE 505, MSNE 506, MSNE 509, MSNE 517 and MSNE 535. For students with a BS or BA degree from the MSNE department, MSNE 502 and MSNE 503 can be replaced by other courses in the list. |
| A total of 9 credit hours technical electives[1,2] | MSNE 510, MSNE 516, MSNE 523, MSNE 533, MSNE 545, MSNE 555, MSNE 569, MSNE 580, MSNE 613, MSNE 614, MSNE 615 and MSNE 650. |
| Research Project | MSNE 621, MSNE 622. |
| 1 of these courses | ENGI 510, ENGI 528, ENGI 529, ENGI 530, ENGI 542, ENGI 545, ENGI 610, ENGI 615 and NSCI 511. |
| Credit hours of remaining coursework[3] | See the course catalog for a full list courses. |

### NanoEngineering Area

| | |
|---|---|
| At least 3 core courses. | Required to register for MSNE 506 and MSNE 535 AND choose one of these courses: MSNE 502, MSNE 503, MSNE 505, MSNE 509, and MSNE 517. For students with a BS or BA degree from the MSNE department, MSNE 502 and MSNE 503 can be replaced by other courses in the list. |
| A total of 9 credit hours technical electives[1,2] | MSNE 510, MSNE 516, MSNE 523, MSNE 533, MSNE 545, MSNE 555, MSNE 569, MSNE 580, MSNE 613, MSNE 614, MSNE 615 and MSNE 650. |
| Research Project | MSNE 621, MSNE 622. |
| 1 of these courses | ENGI 510, ENGI 528, ENGI 529, ENGI 530, ENGI 542, ENGI 545, ENGI 610, ENGI 615 and NSCI 511. |
| Credit hours of remaining coursework[3] | See the course catalog for a full list courses. |

*[1] MSNE 502, MSNE 503, MSNE 505, MSNE 506, MSNE 509, MSNE 517 and/or MSNE 535 that are not used towards satisfying the core requirements can be taken as Technical Electives.*
*[2] MSNE 500 and MSNE 501 are not technical or elective courses.*
*[3] Student can repeat MSNE 622*

# Materials Science and NanoEngineering

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## *Resources*

| | |
|---|---|
| General Announcement | http://ga.rice.edu |
| International Student Information | http://oiss.rice.edu |
| Graduate and Postdoctoral Studies | http://gps.rice.edu/current-students |
| Registration information for Graduate students | http://gps.rice.edu/registration |
| Academic Calendars | http://registrar.rice.edu/students/calendars/ |
| GPS Form Library | http://gps.rice.edu/forms |
| General Information for thesis | http://graduate.rice.edu/thesis |
| Thesis format guidelines | http://gps.rice.edu/thesisformat |
| Thesis template documents | http://graduate.rice.edu/thesistemp |
| Online Thesis Submission | http://graduate.rice.edu/submitthesis |
| Information Technology | http://it.rice.edu |
| Student Health | http://health.rice.edu |
| Wellness Center | http://wellness.rice.edu/home/ |
| Rice Counseling Center | http://rcc.rice.edu/home/ |

# Materials Science and NanoEngineering

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## Typical Time Chart of PhD Degree Candidates

| | Fall | Spring | Summer |
|---|---|---|---|
| **Year 1** | MSNE 502, MSNE 506, MSNE 503, MSNE 500, MSNE 501 | MSNE 535, MSNE 500, MSNE 501, MSNE 800, 2 MSNE Elective courses<br>Complete PCE and Annual Review by March | MSNE 800 (at least 6 credit hours) |
| **Year 2** | MSNE 500, MSNE 501, MSNE 800, MSNE Elective course | MSNE 500, MSNE 501, MSNE 800<br>Complete Annual Review by March | MSNE 800 (at least 6 credit hours) |
| **Year 3** | MSNE 500, MSNE 501, MSNE 800 | MSNE 500, MSNE 501, MSNE 800<br>Complete OQE, and Annual Review by March | MSNE 800 (at least 6 credit hours) |
| **Year 4** | MSNE 500, MSNE 501, MSNE 800 | MSNE 500, MSNE 501, MSNE 800<br>Complete Petition for approval of candicacy, and Annual Review by March | MSNE 800 (at least 6 credit hours)<br>WRITE THESIS |
| **Year 5 & beyond** | MSNE 500, MSNE 501, MSNE 800<br>WRITE THESIS | MSNE 500, MSNE 501, MSNE 800<br>WRITE, DEFEND & SUBMIT THESIS | MSNE 800 (at least 6 credit hours) if beyond 5 year |

# Materials Science and NanoEngineering

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## Typical Time Chart of MS Degree Candidates

| | | | |
|---|---|---|---|
| **Year 1** | **Fall**<br>MSNE 500, MSNE 502, MSNE 503<br>MSNE 506 | **Spring**<br>MSNE 500, MSNE 535, MSNE 800<br>2 MSNE Elective courses<br>Complete PCE, and Annual Review by March | **Summer**<br>MSNE 800 (at least 6 credit hours) |
| **Year 2** | **Fall**<br>MSNE 500, MSNE 800<br>MSNE Elective course<br>Complete Petition approval of candicacy by March<br>WRITE THESIS | **Spring**<br>MSNE 500, MSNE 800<br>WRITE AND DEFEND THESIS<br>SUBMIT THESIS | |

# Materials Science and NanoEngineering

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## Typical Time Chart of MMSNE Degree Candidates

| | | |
|---|---|---|
| **Year 1** | **Fall**<br>***1 MSNE core course***<br>***1 ENGI course***<br>***1 Research project*** **MSNE 621** | **Spring**<br>***1 MSNE core course***<br>***3 hours of MSNE technical elective*** or any course from the core course list not used to satisfy the core requirement.<br>***1 Research project:*** MSNE 622 |
| **Year 2** | **Fall**<br>***1 MSNE core course***<br>***6 hours MSNE technical elective*** or any course from the core course list not used to satisfy the core requirement. | **Spring**<br>***Research project MSNE 622*** (repeat)<br>***Or register*** graduate level (500+ and above) courses depending upon each student's interest and discussions with his/her advisor |