



Rensselaer |

Department of Mechanical,
Aerospace, and Nuclear Engineering

Graduate Student Handbook

RPI
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AY24-25

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Department of Mechanical, Aerospace & Nuclear Engineering

The Department of Mechanical, Aerospace, and Nuclear Engineering (MANE) is part of Rensselaer's School of Engineering (SoE). MANE offers four interconnected but distinct graduate programs leading to a master's or doctoral degree: Mechanical Engineering (MECL), Aeronautical Engineering (AERO), Nuclear Engineering (NUCL), and Engineering Physics (EPHY).

1.1 The MANE Office of Graduate Student Services (OGSS):

The MANE Office of Graduate Student Services (OGSS) is located in Jonsson Engineering Center (JEC) 2002. This office was established by the MANE department to assist graduate students as they navigate through the challenges they may face as a master's or doctoral student at Rensselaer. All necessary graduate student forms and advice to help students complete them can be found here. The OGSS also provides degree program information and planners, information on applying to graduate programs, help with scheduling and course registration issues, details on external funding programs, and guidance for students planning their future careers.

1.2 Contact List for MANE:

Graduate Student Resources

Office of Graduate Student Services (JEC-2002)

Graduate Programs Director:
Sr. Student Administrator:

Theodorian Borca-Tasciuc (borcat@rpi.edu)
Beth Ann Macey (maceyb2@rpi.edu)

MANE Department Offices (JEC-2049)

Department Head:

Dr. Antoinette Maniatty

Administrative Specialist:

Sue Miller (milles7@rpi.edu) – room reservations

Administrative Specialist:

Sara Jurnak (jurnas@rpi.edu) – Seminar requirements

Office of Undergraduate Student Services (JEC-2012)

Undergraduate Programs Director:

Tom Haley (haleyt@rpi.edu)

Sr. Student Administrator:

Kate Stockton (stockk@rpi.edu)

Technical Support

Technical Manager:
Academic Support Technician:

Randy McDougall (mcdour@rpi.edu)
Isaac Coffie (coffii@rpi.edu)

Financial Support

Business Manager:
Business Administrator:
Administrative Specialist:

Amy Edmans (edmana2@rpi.edu)
Lori Robichaud (robicl@rpi.edu)
Kathy Harrison (harrik3@rpi.edu)

MANE Department Website Links:

MANE Department Website: <http://mane.rpi.edu>
Faculty: <http://mane.rpi.edu/people>
Research: <http://mane.rpi.edu/research>
Labs: <http://mane.rpi.edu/labs>
Rensselaer at Work (Hartford): <https://ewp.rpi.edu/degrees/mechanical-engineering>

General Links:

The Institute Catalog <http://catalog.rpi.edu/>
Academic Calendar <https://info.rpi.edu/registrar/academic-calendar>
Institute Tuition Policy <https://graduate.rpi.edu/funding-and-fellowships/internal-funding>
Student Information System: <https://sis.rpi.edu/>
Grad Admissions-Accelerated Master's Applicants: <https://graduate.rpi.edu/co-terminal-program>
Graduate Student Forms: <https://graduate.rpi.edu/forms-and-policies>
Registrar Forms: <https://info.rpi.edu/registrar/registration/#RegistrarForms>
Office of Graduate Education (OGE): <https://graduate.rpi.edu/about>
Thesis Submission Information & Forms: <https://graduate.rpi.edu/academic-progress/submit-your-thesis-dissertation>
Rensselaer Libraries: <https://library.rpi.edu/>
Learning Management System: <https://lms.rpi.edu/>
UMI ETD Administrator (Thesis): <https://secure.etdadmin.com/cgi-bin/school?siteId=489>
External Funding Opportunities: <https://graduate.rpi.edu/funding-and-fellowships>
MANE Student Advisory Council: <https://sites.google.com/view/MANESAC>
Career Development Center: <https://ccpd.rpi.edu/>

1.2.1 Important Dates:

January 2025

Jan 1	Wed	Application for graduation for May 2025 available on SIS
Jan 6	Mon	Spring Semester Classes Begin
Jan 20	Mon	Martin Luther King, Jr. Day. No Classes. Staff Holiday
Jan 20	Mon	The last day for students to drop a course without being issued a W grade.
Jan 20	Mon	Last day for graduate and undergraduate students to add courses, change sections or to put courses on audit.
Jan 21	Tue	Classes Resume
Jan 31	Fri	Nomination of Master's Thesis Committee forms due to the Office of Graduate Education for May 2025 graduates.

February 2025

Feb 17	Mon	President's Day. No Classes. Staff Holiday
Feb 18	Tue	Classes Resume. Follow a Monday Schedule
Feb 24	Mon	Deadline for Masters thesis and Engineering projects, for May 2025 graduation applicants, to be turned in to advisors
Feb 24	Mon	Doctoral dissertations for May 2025 graduation applicants, due to advisors
Feb 28	Fri	Last day to file an on-line Degree Application via SIS for May 2025 graduation.

March 2025

Mar 1	Sat	Late Degree application (paper) for May 2025 graduation, if did not apply in SIS, will begin being accepted.
Mar 3 - Mar 7		Spring Break. No Classes
Mar 10	Mon	Classes resume. Registration for Summer 2025 begins.
Mar 14	Fri	Last day for students to drop a course with a W grade.
Mar 14	Fri	Last day to file a late degree application (paper) for May 2025 graduation.
Mar 14	Fri	Last day to file a petition to participate in the May 2025 commencement ceremony (for those who meet the criteria).
Mar 17 - Apr 4		Pre-registration for the Fall 2025 semester opens for all currently enrolled students
Mar 19	Wed	No Classes due to GM Week activities
Mar 21	Fri	Masters thesis due to the Office of Graduate Education for May 2025 graduation applicants. Last day for Doctoral candidates who applied for May 2025 graduation, to defend thesis.

April 2025

Apr 4	Fri	Deadline for Doctoral dissertations to be submitted to the Office of Graduate Education for May 2025 graduation applicants
Apr 23	Wed	Last day of Classes.
Apr 24 - Apr 27		Reading/Study days. Instructors can schedule no exams nor require any student work expectations on these days.
Apr 28 - May 2		Final Examinations

May 2025

May 10	Sat	Commencement Ceremony 2025
May 19	Mon	Summer 2025 session I and II classes begin
May 26	Mon	Memorial Day-no classes. Staff holiday.
May 28	Wed	Follow a Monday Class Schedule today

June 2025

Jun 18	Wed	Follow a Thursday Class Schedule today
Jun 19	Thu	Juneteenth-no classes. Staff Holiday
Jun 27	Fri	Last Day of Summer Session II Classes
Jun 30 - Jul 4		Summer Arch Break-no classes

July 2025

Jul 7	Mon	Summer Session III Classes Begin
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August 2025

Aug 15	Fri	Last day of Summer Session I and III classes
Aug 22	Fri	August 2025 Degree Conferral Date.
Aug 28	Thu	Fall 2025 Classes Begin-Follow a Monday Class Schedule today

1.3 MANE General Graduate Policies:

1.3.1 Advising Structure:

Most graduate students will select a graduate advisor at the beginning of the first semester in the program. An advisor should be selected by the end of a student's first semester. Any concerns which a student might have, should be discussed with their advisor first. If there is no resolution, the concern can be discussed with the Graduate Program Director (GPD) and finally, if necessary, the Department Head.

1.3.2 Forms and Procedures:

Students and their advisors must sign each form submitted to the GPD for review. **All forms are to be directly submitted to the MANE Office of Graduate Student Services (OGSS)** for consideration by the GPD or Department Head where appropriate. Once approved by the GPD, forms are recorded and forwarded to the Office of Graduate Education (OGE) for processing.

Graduate student forms can be found at the [Office of Graduate Education](#) and/or [Registrar](#) websites and may be completed electronically.

1.3.3 Semester Registration Credits:

Graduate students must register for at least 12 credits each semester, with a maximum of 16 credits, to maintain full-time status. The only exception to this requirement is for students serving as **teaching assistants or research assistants**. These students may register for a minimum of 9 credits to maintain their full-time status. Students registering for more than 16 credits during the fall or spring terms will be charged the academic year tuition rate plus a per-credit- hour rate for each credit hour exceeding 16 credits, and requires approval from OGE.

Summary of registration requirements for the Department of Mechanical, Aerospace & Nuclear Engineering (MANE):

- Students who are serving as TAs or RAs must register for a minimum of 9 credit hours (but no more than 16 credit hours) for the fall and spring semesters.
- Students not serving as TAs or RAs must register for 12-16 credit hours for the fall and spring semesters.
- All graduate students must register for Summer Administrative Registration(ADMN-6600), and do not take credit-bearing courses or research credits.
- Normal tuition charges apply for students who do take credit-bearing courses or research credits during the summer. **Students must make sure to discuss this with their advisors before registering.**
- Students must be registered each spring and fall term in order to receive their degree.
- Full-time students must register each semester for Graduate Seminar (MANE-6900), attend each seminar, and meet all requirements. **This requirement does not apply to Co-terminal or Accelerated Master's students.**
- **Students may NOT use 4000 level courses where a co-listed 6000 level is offered.**

It is critical that the registration requirements described above are met to be considered for full-time study. This is especially important for international students who have to meet certain visa requirements, but more generally for all students, in order to meet Rensselaer's residency requirements.

1.3.4 **Transferring Credits:**

In order to apply to transfer credits, the student must complete a [Transfer Credit Approval Form](#). Courses considered eligible for transfer must have been completed no more than 5 years prior to matriculation at Rensselaer. No more than 6 credits can be transferred for a master's degree and no more than 24 credits for a PhD degree. Graduate students must earn the equivalent of an A or B grade to transfer credit. No grade is shown on the RPI transcript for transfer credits and the grade from transferred courses do not factor into the RPI GPA. However, transferred credits do count in the total earned hours.

To complete the form students must:

- Obtain a course syllabus for the course they wish to take / have taken and a syllabus for the Rensselaer equivalent course. These courses must be evaluated by the corresponding RPI department. For example, if a student wants to transfer a Mathematics course, they will need prior approval from the RPI Mathematics Department.
- Include an official or unofficial transcript with the form if the course has already been completed. The student must also have the other college send a sealed official transcript directly to the Registrar's Office.
- Have their advisor sign the form, then submit the syllabi and form to the Office of Graduate Student Services (OGSS) for the Graduate Program Director's (GPD) review and approval. Once approved, the form will be sent to the Office of Graduate Education (OGE) for processing.

1.3.5 **Registering for Thesis, Dissertation, or Project Credits:**

Depending on the student's degree program, graduate students will register for thesis, dissertation, or project credits. The number of credits they register for each semester may vary, as long as they complete the minimum required to finish their degree in time. In order to register for these credits, students must visit the [Student Information System \(SIS\) website](#) and register for either **Master's Thesis (MANE 6990)**, **Master's Project (MANE 6980)** or **(MANE 6970 for Rensselaer At Work students)**, or **Dissertation (MANE 9990)**, under the name of their graduate advisor. For issues regarding registering for courses on SIS, students must contact the [Registrar](#).

Please note that when registering for thesis, dissertation, or project credits on (SIS) website, students will need to specify the number of credits in the drop-down menu that they intend to register for, since the default number shown is one credit hour. The 6 required credits of MANE-6980 or MANE-6990 cannot all be taken in one semester.

1.3.6 **Registering for a Graduate Independent Study:**

When a graduate student chooses to do an Independent Study (**MANE 6940**), they must complete a [Readings / Independent Study Registration Form](#).

Please note the following:

- The Independent Study must be completed with a faculty member **other** than the student's graduate advisor.
- No more than 3 credits of Independent Study may be used towards a graduate degree.
- It must be submitted to the Office of Graduate Student Services (OGSS) before each semester's deadline to add a course, as shown on the [Academic Calendar](#).

1.3.7 **Summer Administrative Registration:**

Summer Administrative Registration (SAR) is a registration requirement for graduate students. Payroll cannot be processed for students receiving stipends during the summer until the SAR requirement is completed.

Students on internships or planning to graduate during the summer must also be registered for SAR.

Students taking credit-bearing courses or research credits should not register for SAR.

Students must register for ADMN-6600 (SAR) by the registration deadline if they intend to stay at Rensselaer for graduate study during summer.

1.3.8 **MANE Lab Safety Course:**

Mechanical, Aerospace & Nuclear Engineering (MANE) graduate students are required to complete multiple requirements within our safety program. The Dean of SOE requires that anyone doing any lab/shop work has to take a quiz produced by SOE and found in [Percipio](#). Every graduate, co-term, URP, application lab student, SOE club member must take the Percipio training at the beginning of every semester. This is a recurring requirement, meaning that if you are a Graduate student that works in the labs at RPI then you will have to take the SOE quiz at the start of every semester. If you are a URP student that works on-and-off five times in 4 years then you will take the quiz 5 times; once at the beginning of each semester in which you are actively employed in a lab.

Please go to RPI info and click Percipio and log in using your RCS ID and Password. For detailed step-by-step instructions to access and complete requirements, go to [Guide for Fulfilling the General Safety Requirement for MANE students](#).

Please complete these training modules before you begin your work.

1.3.9 **Department Seminars:**

All Troy-campus graduate students (except for Co-terminal/Accelerated Master's students) are required to register each semester for **Graduate Seminar MANE 6900** and meet all requirements. Announcements are sent to students each week to inform them of upcoming seminars. Students must attend a full seminar to receive credit.

1.3.10 **Responsible Conduct of Research Training:**

All students who are supported on National Science Foundation funds must complete the **Responsible Conduct of Research Training** prior to receiving support. This training is offered by CITI for RPI. Additional information on the training can be found at: <http://rpi.edu/research/office/rcr.html>. Furthermore, all PhD students are required to complete the training prior to their Candidacy Exam.

A copy of the certificate of completion of the training and training report must be included with the [Record of Candidacy Exam form](#).

1.3.11 **Graduate Change of Status:**

The [Graduate Change of Status form](#) is used to change curriculum or degree program, add an additional master's degree program, change campuses, return to active status, or withdraw from a program. The form is to be completed and signed by the student and advisor (both current and new advisors, if changing curriculum), then submitted to Office of Graduate Student Services (OGSS) for the Graduate Program Director (GPD)'s review. **A current or updated Plan of Study (2.2.2) must be submitted with the Change of Status form.**

A change from one curriculum to another or adding an additional degree program is treated as an admissions decision. It is the responsibility of the student to supply the (new) department with required credentials. The new department may require a student to file a full application for the degree through the [Graduate Admissions Office](#).

This form may not be used by non-matriculated graduate students seeking admission as matriculated students and for master's students applying to a PhD program.

1.3.12 Satisfactory Academic Progress:

To remain eligible for graduation, a graduate student must:

- Maintain a GPA of 3.0 or greater each semester.
- Courses with a grade of “D” or below are not eligible to be counted towards a graduate degree. Receiving two “F” grades may trigger dismissal from the graduate program.
- Incompletes (“I” grades) must be completed within one semester and the work required to fulfill the course requirement is determined by the advisor. An “I” grade will be counted as an “F” if the work is not completed in time.
- Receive an “S” “in Research (dissertation, thesis, or project credits), and Seminar participation where applicable.
- Have an approved [Graduate Plan of Study \(GPS\)](#) on file no later than the end of the second semester.
- Co-terminal/Accelerated Master's students must ensure that they have an updated Plan of Study on file with the Office of Graduate Education (OGE) for **each** semester of graduate study.
- The Plan of Study may be adjusted each semester as necessary.
- Must be on track to fulfill the requirements of their degrees on time.

Eligibility for current and future financial support is contingent on satisfactory academic progress.

For more detailed information on The Federal Satisfactory Academic Progress regulations, visit:

<https://admissions.rpi.edu/aid/sap>.

1.3.13 Enforcement:

If a student is not in compliance with the Institute requirements, he/she will be subject to receiving a warning from the OGSS. The student will have one semester to make satisfactory arrangements (in consultation with the GPD and the student's advisor) to come back into compliance. If these arrangements are not made, then the student will be prevented from registering the following semester and may be subject to losing graduate student status.

Students with a GPA below 3.0 for any term of graduate study will be placed on probation by OGE and must come back into compliance by the end of the following semester.

1.3.14 Intellectual Property:

Rensselaer has devised The Rensselaer Intellectual Property Policy to benefit the public by encouraging and enabling technology development and transfer. The Rensselaer community is inherently creative, and Rensselaer's physical and intellectual resources enhance the creativity of members of that community. This policy reflects, in part, Rensselaer's contribution to that creativity. It encourages creators to innovate by guaranteeing them a share in the benefits resulting from the Intellectual Property that they develop. At the same time, it also promotes research and education activities at Rensselaer by allowing Rensselaer to retain a share of the benefits flowing from Intellectual Property developed under its auspices.

There are numerous types of Intellectual Property, and a distinct body of law applies to each one. The primary categories of Intellectual Property are patent, copyright, trademark, and integrated circuit mask work protection, though from time-to-time other types of protection and other bodies of law may also fall under the broad heading of Intellectual Property. Intellectual Property rights govern the ownership, licensing, distribution, and commercialization of Intellectual Property.

For more detailed information on The Rensselaer Intellectual Property Policy, visit:

<https://research.rpi.edu/about/policies>.

1.3.15 Rensselaer Travel Reimbursement and Purchasing Policies and Procedures:

Graduate students who are planning Institute-related travel usually arrange to be sponsored and/or reimbursed through their advisors. To facilitate this process, students should sign up for Concur, the Institute's on-line travel service. To register for Concur, students will need a fund number and their graduate advisor's signature on the "Concur Authorization Form For Rensselaer Students", which is available online at:

<https://info.rpi.edu/travel-and-expense/accessing-and-using-concur>

Once students are registered, they are enrolled in the travel service program (somewhat like Expedia and other travel services) and they are also connected to Rensselaer's travel agency, Direct Travel, which uses a Rensselaer credit card to pay for airfare, train fare, hotels, rental cars and many other registration fees. Students may need to contact the agency by phone for some services. Students are strongly encouraged to use Direct Travel if they are planning any trip to a foreign country. Students can also rent cars from Enterprise / National through Concur for a discounted rate, as long as the student's advisor has approved the travel. Students should be aware of the following when registering for Concur:

1. The student's advisor must approve the travel arrangements within 24 hours via email, or they will be cancelled.
2. Students must complete an expense report in Concur to verify their travel expenses and attach receipts in the program within 30 days after they return from a trip. For assistance, there are several programs available online and students can also contact Amy Edmans at edmana2@rpi.edu with any questions they may have.
3. Passwords expire every 2 months.
4. To facilitate the registration process, students should type the registration form rather than write the information by hand.

For most current details on Institute-related travel, students should refer to the complete [Travel Reimbursement Policy](#) available online.

Students who have been asked to procure supplies for a lab or for experiments should work with their advisor to contact the person that does their ordering. It varies by faculty member, currently. That person can provide students with forms which include the information that the MANE Department requires for the order as well as a place for the student's advisor to list the fund number to use and the advisor's approval signature.

If students are planning to order a large number of different items from vendors, they may want access to the "Shop Only" option on Rensselaer's purchasing system (OSCAR) so that they can set up shopping carts to be processed by the person assigned to your advisor.

For any questions regarding purchasing, travel, and expenses, students may contact Amy Edman, MANE's Business Administrator, at edmana2@rpi.edu.

1.3.16 **Academic Integrity:**

Intellectual integrity is critical to the foundation of all academic work. Academic dishonesty, therefore, is considered a serious matter and will be addressed as such.

As defined in the current Rensselaer Handbook of Student Rights and Responsibilities, examples of academic dishonesty include, but are not limited to: **academic fraud, collaboration, copying, cribbing, fabrication, plagiarism, sabotage, and substitution**. Specific examples include acts such as: copying sections verbatim from a previously published article into a thesis without appropriate referencing, tampering with an instructor's grade book, or falsifying lab records or reports. Additionally, attempts to commit academic dishonesty, or to assist in the commission or attempt of such an act, are also violations of the academic dishonesty policy.

If a student is found in violation of the academic dishonesty policy, they may be subject to two types of penalties. The instructor administers an academic (grade) penalty, and the student may also enter the Institute judicial process and be subject to such additional sanctions as: warning, probation, suspension, expulsion, and alternative actions as defined in the current Handbook of Student Rights and Responsibilities.

Graduate students in MANE are expected to be aware of Rensselaer's policy and of their discipline's ethical code and act accordingly. Failure to comply with these codes is grounds for dismissal from a graduate program. Since adherence to the policy is so crucial, it is strongly recommended that students view (and retain) a copy of the full **Academic Integrity Policy**, which can be found online at <http://dosso.rpi.edu/update.do?artcenterkey=676>.

1.3.17 **Rensselaer Handbook of Student Rights & Responsibilities:**

All graduate students at Rensselaer are expected to own a copy of the [Rensselaer Handbook of Student Rights & Responsibilities](#) which details regulations governing student conduct. These policies are intended to help maintain an atmosphere conducive to learning and personal growth and to make the process of education positive and successful for all members of the community. Graduate students should also obtain a copy of the [Graduate Student Supplement to the Handbook](#), which sets guidelines specifically applied to graduate students and graduate education.

Doctoral Degree in Mechanical, Aerospace & Nuclear Engineering

2.1 Doctoral Program:

The Doctor of Philosophy (PhD) degree represents the culmination of a significant amount of work, creativity, and perseverance by the student. The degree is earned once the student's graduate advisor and doctoral committee agree that the student has demonstrated independent thought and research, made original contributions to the fundamental knowledge in a given field, and has produced a substantial body of information in the form of a dissertation. The dissertation documents the student's research and is expected to be a scholarly work.

To earn a PhD degree in MANE, both Institute and department requirements must be met. Both full-time and part-time students must adhere to these requirements. Students admitted through the **BS-PhD program** must also adhere to these requirements.

In addition to these requirements, students should be familiar with the information in the [Rensselaer Catalog](#) and the [Institute Graduate Tuition Policy](#) in order to plan their PhD degrees appropriately.

2.2 Institute Requirements:

The Institute Requirements to complete the PhD degree are as follows:

- Must complete seventy-two (72) credit hours past the B.S. degree, or complete forty-eight (48) credit hours past a Master's degree earned elsewhere. This is a residency requirement. **Further details on this requirement can be found in section 2.4.**
- The minimum average of all grades used for credit toward an advanced degree must be B (3.0). The student will not be eligible to receive their degree if their cumulative GPA is below 3.0 when they apply to graduate.
 - Incompletes ("I" grades) must be completed within one semester and the work required to fulfill the course requirements is determined by the advisor. An "I" grade will be counted as an "F" if the work is not completed in time.
 - Courses with a grade of "D" or below are not eligible to be counted towards a graduate degree.
 - Receiving two "F" grades may trigger dismissal from the graduate program.
 - The Pass/No Credit option cannot be used for courses applied toward a graduate degree.
- A minimum of 2/3 of the total course credits listed in the Plan of Study must be at the 6000-6999 level. (ie: Of the minimum 36 course-work credits required, at least 24 credits must be completed at the 6000-6999 level; not including thesis. MANE-9990 Dissertation credit is NOT considered course-work credit.
- Present an independent thesis that demonstrates creativity, originality, and scholarly writing.
- Acquire a graduate advisor, form a [Doctoral Committee](#), submit a [Graduate Plan of Study](#) (GPS) pass a [Candidacy Exam](#), and [defend the thesis](#).

- Full-time students must complete all the above requirements within three (3) calendar years of passing the candidacy exam and within seven (7) years of beginning PhD studies.
- Students entering with a master's degree in their prospective or closely related field of study must finish all degree requirements for the PhD within five (5) years.
- Must be registered each fall and spring term and complete all requirements on the [PhD Degree Checklist](#) to obtain their degree.
- File a Degree Application with the Registrar's Office by the date specified in the Institute's [Academic Calendar](#) for the semester in which the student plans to graduate. **If a degree application was filed the previous semester but the requirements were not fulfilled, a new degree application must be filed for the semester in which the student will actually graduate.**
- Submit signed and completed Record of Dissertation Exam, Survey of Earned Doctorates, and Graduate Student Exit Survey forms to the Office of Graduate Education (OGE) prior to submitting the dissertation electronically. These forms can be found on the [PhD Degree Checklist](#).
- Submit an electronic copy of the dissertation via [UMI/ProQuest's ETD Administrator website](#) in PDF format. The dissertation submitted must already have been approved by the student's Committee. Students will need to use a credit or debit card to pay a fee as part of the UMI ETD Administrator submission process. This fee covers the cost of UMI/ProQuest supplying a bound paper copy of the dissertation to the Rensselaer Libraries for preservation. Please note that students may file for copyright registration via UMI/ProQuest for an additional fee.

2.2.1 Transfer Students:

If a student transfers from another doctoral program at RPI, he/she still must adhere to the above requirements. According to the Institute residency requirements, up to twenty-four (24) credit hours of prior graduate study can be applied toward the seventy-two (72) credit hours required for the PhD degree. Often these twenty-four (24) credit hours include credit hours for a master's degree at a different university.

Students must use a [Transfer Credit Approval Form](#) for approval of transfer courses.

2.3 Summary of Steps to Complete a PhD in Mechanical, Aerospace & Nuclear Engineering (MANE)

1. Choose a graduate advisor, preferably by the end of the 1st semester, no later than the beginning of the 2nd semester.
2. File a [Graduate Plan of Study](#) that fulfills the curriculum requirements before the end of the 2nd semester. The Plan of Study may be adjusted each semester as needed.
3. Take the oral Doctoral Qualifying Exam (DQE) one semester after completing MANE Master Degree or equivalent course credits (entering with a bachelor's degree) or one semester after admission (entering with a master's degree). *Students completing Master's degree requirements may add degree after successfully completing DQE's.
4. Form a Doctoral Committee.
5. Submit a [Nomination of Doctoral Committee Form](#) which must be received and approved prior to taking the Candidacy Exam.
6. Take the [Candidacy Exam](#) within two years of passing the DQE. (No more than 12 semesters from beginning the PhD - fall/spring/summer semesters counted.)
7. Complete all required course-work.
8. Successfully complete research and write a dissertation.
9. Defend the thesis no less than one year after passing the Candidacy Exam.
10. Submit dissertation to OGE for final approval.
11. Complete PhD checklist.

2.3.1 Choose a Graduate Advisor (end of 1st semester, no later than beginning of 2nd semester):

The graduate advisor will guide the student in all aspects of his/her academic and research programs. They are usually from the MANE department. But, a student can choose to work with a faculty member from a different department. If a student has an advisor from another department, then a Primary Advisor/doctoral committee co-chair from within the MANE department is required. Thesis credits must be registered under the primary advisor.

2.3.2 File a Graduate Plan of Study (before the end of the 2nd semester):

A Graduate Plan of Study (PoS) form is created by the student and advisor and lists all the courses and dissertation credits used to complete the PhD degree requirements. Once it is prepared it must be submitted to the Graduate Program Director (GPD) for review and signature. Courses listed on the Plan of Study (to be counted toward the graduate degree) are determined by the needs of the student's research with the guidance of the graduate advisor.

The Plan of Study is preferably submitted by the start of the second semester in the PhD program, but must be submitted before the end of the 2nd semester after being admitted for PhD study. A revised Plan of Study is required when courses listed on the original are not offered or more appropriate courses need to be completed instead. **Please note that Graduate Seminars should not be included on the Plan of Study form.**

2.3.4 Doctoral Qualifying Exam (after Master Degree or Equivalent Course Credits):

After admission to the doctoral program, students must pass an oral Doctoral Qualifying Exam (DQE) to be advanced to doctoral student status. The purpose of the DQE is to evaluate the intangible factors essential for a successful PhD that coursework does not necessarily show. Each student will be questioned to determine his/her capability to think, synthesize information, speculate based on background knowledge, demonstrate more than textbook problem-solving skills, and convey thoughts and ideas clearly to others. In order to be adequately prepared for the exam, students should maintain a GPA of 3.3 and above, and ensure that they have sufficient background in their subject area(s) beforehand. No more than one full semester beyond the completion of the MANE Master Degree or equivalent course credits may pass before taking the DQE. This applies to both full-time and part-time students. If necessary, the student may request that the DQE be deferred. In this case, the student's advisor must contact the Office of Graduate Student Services (OGSS) to discuss this request.

The exam will be administered at the beginning of the fall and spring semesters during the first two weeks of classes. Three faculty members (graduate advisor is excluded) will question a student for approximately one hour in two areas, primary and secondary, of the student's choice from a list of areas. Relevant applied mathematics questions will be included. The areas to choose from are:

- Controls
- Fluid Mechanics
- Heat Transfer & Thermodynamics
- Flight Mechanics & Aerodynamics
- Design
- Engineering Computation
- Dynamics
- Nuclear Radiation Interaction
- Manufacturing
- Reactor Engineering & Physics
- Solid Mechanics
- Helicopters.

Sample questions and information about potential topics are available in the MANE Office of Graduate Student Services (OGSS). Students will be notified of the examiners at least ten weeks before the exam. Prior to the exam,

students are encouraged to meet with examining committee members to discuss appropriate subjects on which they may be quizzed. Questions will be at the first-year-graduate-student level.

After all the DQEs have been given for a semester, examiners will meet to discuss the results and determine the outcome. Students will be notified shortly thereafter.

Please note that inability to answer a question due to language difficulties may be treated as an inability to answer due to technical deficiencies.

The possible outcomes of the DQE are:

- The student receives an unconditional pass.
- The student receives a conditional pass and upon completion of the condition, the student will be advanced to doctoral student status (e.g., taking a specific course or courses).
- The student fails one or both areas, but is allowed to retake the exam one more time (no more than one re-take will be allowed).
- The student fails and must leave the PhD program (in this case, the student may choose to obtain a master's degree instead, if the student does not already have a master's degree from RPI, provided the performance is at a satisfactory level for a master's degree).

2.3.4 Forming a Doctoral Committee (by end of 3rd semester after Master's Degree or equivalent course credits):

The committee members are chosen through consultations between the student and his or her graduate advisor. The committee is composed of:

- One chair who must be an RPI tenured/tenure track faculty member from within the MANE department. Non-tenure track faculty may serve as co-chair only.
- Two committee members either tenured, tenure-track or non-tenure track faculty (lecturers, senior lecturers, and professors of practice) from within the MANE department.
- One outside committee member. *This outside member can be a faculty member from another department at RPI, an individual from another institution, or a scholar in a discipline appropriate to the student's dissertation. Members from outside the Institute are acceptable if approved by the Graduate Program Director (GPD) and the Office of Graduate Education (OGE); these members would be in addition to the three full-time MANE faculty.

Doctoral students must submit a [Nomination of Doctoral Committee Form](#) for approval from the Department and OGE prior to taking the Candidacy Exam.

2.3.5 Taking the Candidacy (within 2 years after passing DOE/ 12 semesters from start):

The candidacy exam is focused on the student's doctoral dissertation research proposal. The student will present his/her proposal in writing, in sufficient detail, before the exam (so the committee can study it) and orally during the exam, so that the doctoral committee can assess their progress, goals, future research plans, and investigation rigor. Candidacy must be completed within 12 semesters (fall/spring/summer) of beginning PhD.

Basic Guidelines:

- The text of the written research proposal (not including subsequent figures, tables, and reference sections) may not exceed 15 single-spaced pages.
- During the oral exam, the student must be able to respond well in English against potentially rigorous questioning.
 - In addition to assessing passage of the exam, the committee can recommend alternative approaches, suggest modifications to goals and tasks, require additional courses, or provide other guidance.
- The candidacy exam is taken within two years of passing the DQE, and 12 semesters (fall/spring/summer) of beginning PhD.

- Students are expected to pass the candidacy exam at least one year prior to the subsequent dissertation defense.

Students seeking to meet Candidacy requirements must submit a [Record of Candidacy Form](#) and [CITI Program Completion Certificate](#) when they have passed the Candidacy Exam. Instructions for completing the CITI program requirements are found on page 2 of the form.

2.3.6 Defending the Thesis (at least 1 year after Candidacy Exam):

The student must prepare a written dissertation and present a public seminar defending the thesis before the doctoral committee. After the public session is over, the doctoral committee will further examine and discuss the dissertation with the student in private. The committee can accept, reject, or ask for changes in the dissertation.

The defense is scheduled when the student and the graduate advisor agree that it is time, but must be done within **seven years of being admitted for PhD study, or within five years if entering with a master's degree.** Furthermore, it is suggested that the student have a minimum of at least one journal paper on the thesis topic accepted for publication prior to the defense.

2.3.7 Submitting a Dissertation:

Doctoral candidates must submit a copy of the dissertation in its final form along with a copy of the abstract to the graduate advisor at least one month before the end of the term in which it is expected that the degree will be awarded. The student must furnish each doctoral committee member with an individual copy of the dissertation and the abstract at least one week before the dissertation defense. For due dates specific to the intended semester of graduation, check the [Academic Calendar](#).

Bring the following items to Office of Graduate Education (OGE) in paper form no later than the published submission due date in the Academic Calendar (these items are separate from, but in addition to, the electronic submission of your dissertation).

- The [Record of Dissertation Exam Form](#) with the original signatures of the advisor and committee.
- The Graduate Student [Exit Survey](#), available on the OGE website.
- [Survey of Earned Doctorates \(SED\)](#) certificate of completion.
- Complete the [Future Plans Survey](#) located on the Center for Career and Professional Development website.
- Complete the Destination Survey sent to all graduating students by OGSS.

It is strongly suggested that students visit the Office of Graduate Student Services (OGSS) to review their dissertations in advance. It is also suggested that students complete the [Dissertation Checklist](#) to ensure that they have submitted all paper work and that they have completed all degree requirements before submitting the dissertation. For more details, visit the [“Submitting Your Thesis”](#) page on the [Office of Graduate Education \(OGE\) website](#).

2.3.8 Electronic Submission:

Students must bring the approved [Record of Dissertation / Thesis Exam Form](#) and the supporting paperwork to the OGE **before** submitting the dissertation to UMI ETD Administrator for review.

Instructions:

When the student is ready to submit, they will go to the [UMI ETD Administrator website](#) and click “Submit my dissertation / thesis” and then “Create an Account.” After they have created their account, they will receive an

email to activate their account. After the account is activated, they can begin the submission process by logging in to the UMI ETD Administrator website.

The websites of both the OGE and the [Libraries](#) also contain a link to UMI ETD Administrator. If students have questions about the UMI ETD Administrator submission process, they should contact ETD Support.

For detailed information on dissertation format requirements and electronic submission, read the [Preparation Guide for Dissertations and Thesis](#) found on the OGE website.

2.4 Mechanical, Aerospace & Nuclear Engineering (MANE) Department Curriculum Requirements for PhD

2.4.1 PhD Students Admitted with a Bachelor's Degree and BS-PhD Students:

Doctoral students admitted to the program with a bachelor's degree are expected to complete degree requirements as follows:

Minimum Required Number of Course Work Credits: 36

Minimum Required Total Number of Credits: 72

Of the minimum required 36 credits of course work:

- All courses used to earn the PhD degree must be taken at the 4000 or 6000-7999 level.
- A minimum of 2/3 of the total course credits listed in the Plan of Study must be at the 6000-6999 level. (Of the minimum 36 course-work credits required, at least 24 credits must be completed at the 6000-6999 level, not including research. MANE-9990 Dissertation is not considered course work credit.)
- If a student uses more than 36 course credits on their plan of study, the 2/3 rule described above, applies.
- At least half of course credits applied must be from MANE. To specify, these courses must contain the MANE prefix.
- Credits from departments outside of the School of Engineering or School of Science require prior approval from the Graduate Program Director before counting them towards a graduate degree.
- The course requirements for a Master's degree must be completed first. Refer to Master's Degrees in Chap. 3.
- External courses must be approved by your advisor and Program Director. And must be of a technical nature from programs within the [School of Science](#) or [School of Engineering](#).
- A minimum of 48 credits must be earned at Rensselaer with satisfactory grades to meet residency requirements.
- One (1) 4000 or 6000-level MATH or MATP course is required. MANE-5000 may be used. Note that this requirement does not apply to students admitted to the program prior to the Spring 2014 semester.
- Students may NOT use a 4000-level course where a co-listed 6000 level is offered.

- Up to 3 credits of an [Individual Project / Independent Study](#) course may be used. Individual Project / Independent Study credits must be completed with a faculty member other than the student's graduate advisor.
- Courses required for the completion of a bachelor's degree in Mechanical, Aerospace, or Nuclear Engineering are not eligible to be applied to a graduate degree in the same program, **with an exception for NUCL program courses.** (See appendices for NUCL program course requirements)
- Must register for MANE 6900 Graduate Seminar each semester and attend the required number of seminars.
- Must meet [Institute requirements from Rensselaer Course Catalog](#).

2.4.2 **PhD Students Admitted with a Master's Degree:**

Master's degrees awarded outside of Rensselaer Polytechnic Institute represent 24 credits of course work and are applied to the 72 credits required for the doctoral degree. Students admitted to the program with a master's degree will have already completed the first 24 credits of the total 36 credits of required course work at their previous graduate institution, leaving only 12 credits of course work remaining. Research credit is not transferrable.

Doctoral students admitted to the program with a master's degree are expected to complete degree requirements as follows:

Minimum Required Number of Course Work Credits: 12

Minimum Required Total Number of Credits: 48

Of the required 12 credits of course work:

- All courses used to earn the PhD degree must be taken at the 4000 or 6000-6999 level.
- Students may NOT use a 4000-level course where a co-listed 6000 level is offered.
- A minimum of 2/3 of the total course credits listed in the Plan of Study must be at the 6000-6999 level. MANE-9990 Dissertation is not considered course work credit.
- **IF** a student uses more than 12 course-work credits on their Plan of Study, after the MS degree, the 2/3 rule for 6000-6999 level graduate course requirements must also be satisfied.
- At least half of course credits applied must be from MANE. To specify, these courses must contain the MANE prefix.
- No more than 6 credits of course work from programs outside of MANE are accepted.
- External courses must be approved by your advisor and Program Director. And, they must be of a technical nature from programs within the [School of Science](#) or [School of Engineering](#).
- Credits from departments outside of the schools of Engineering or Science require prior approval from the Graduate Program Director before counting them towards a graduate degree.
- Up to 3 credits of an [Individual Project / Independent Study](#) course may be used. **Individual Project / Independent Study credits must be completed with a faculty member other than the student's graduate advisor.**
- Courses required for the completion of a bachelor's degree in Mechanical, Aerospace, or Nuclear Engineering are not eligible to be applied to a graduate degree in the same program, **with an exception for NUCL program courses.** (See appendices for NUCL program course requirements)

- Must register for MANE 6900 Graduate Seminar each semester and attend the required number of seminars.
- Must meet [Institute requirements from Rensselaer Course Catalog](#).

2.5 Doctoral Student Evaluations

2.5.1 TA Evaluations:

Teaching Assistants will be evaluated based on feedback from the undergraduate students who were in a class where the student served as the TA as well as the course instructor for this class. Additionally, the graduate student is asked to provide feedback on their assignment and asked to report how many hours per week was spent on the TA assignment as the department seeks to evenly distribute the load of the TA assignments among the students serving as a TA.

2.2.1 Doctoral Student Yearly Review (DSYR):

These reviews are conducted annually for all doctoral students. Students will meet with their advisors to review progress in research and coursework mid-semester in the spring of every year of graduate study. At this time, students and their advisors will complete a Doctoral Student Yearly Review On-line form which will be submitted to the Office of Graduate Student Services (OGSS) for review and approval. The records will be reviewed by the Office of Graduate Education (OGE) where it will be kept on record to evaluate progress through the course of the degree. If a student has deviated from their approved plan of study, an updated one must be submitted with the DSYR.

[Developing Smart Goals](#)

Master's Degrees

Both **Master of Science (MS)** and **Master of Engineering (MEng)** degrees are offered in Mechanical, Aerospace & Nuclear Engineering (MANE). Detailed information about specific requirements for each degree is presented in this section.

The **MS degree** is perceived to be scholarly and fundamental and is well suited to students who wish to prepare for a professional career and also to measure their ability to pursue a PhD without commitment of extra time beyond that required for an MS.

Students completing the MS degree will write a thesis based on a research topic chosen by the student and a professor who serves as their advisor. The topic is chosen based on mutual interests and needs. Course work is typically focused on subjects related to the research topic. The corresponding thesis, independently written by the student as a single author, must be approved by the advisor as well as two additional committee members from the department's faculty. A thesis defense will be presented to this committee.

The **MEng degree** is intended to be more applied and practically oriented in comparison to the MS degree. Students in the MEng program will complete a research project chosen by the student and a professor who serves as the student's academic advisor. Course work typically focuses on subjects related to the research project topic.

***The Co-terminal/Accelerated Master's Degree should review additional details related to your program in Chapter 4.**

****The EDUCATION FOR WORKING PROFESSIONALS master's degree requirements differ from the traditional master's degrees outlined in this chapter. EDUCATION FOR WORKING PROFESSIONALS students should refer to Chapter 5 for details on the requirements of their degree.**

3.1 Institute Requirements

The [Institute Requirements to complete a Master's degree](#) are as follows:

- The minimum average of all grades used for credit toward an advanced degree must be B (3.0). The student will not be eligible to receive their degree if their cumulative GPA is below 3.0 when they apply to graduate.
 - Incompletes ("I" grades) must be completed within one semester and the work required to fulfill the course requirements is determined by the advisor. An "I" grade will be counted as an "F" if the work is not completed in time.
 - Courses with a grade of "D" or below are not eligible to be counted towards a graduate degree.
 - Receiving two "F" grades may trigger dismissal from the graduate program.
 - The Pass / No Credit option cannot be used for courses applied towards a graduate degree.
- Submit a [Graduate Plan of Study \(PoS\)](#) before the start of the second semester. To graduate, the courses students have taken must agree with the PoS. They can file a revised PoS to ensure agreement.
- At least half the total course credit hours presented toward the degree must have the suffix numbers 6000-6999. Research credits are not counted as course credits.

- File a degree application with the Student Information System, [SIS](#) by the date specified in the academic calendar for the semester in which a student plans to graduate.
- Must be registered each term and complete all requirements of the [Master's Degree Checklist](#) to obtain their degree.
- Full-time students must meet all of the above requirements within two-and-a-half (2.5) years and three-and-a-half (3.5) years for part-time students. Co-terminal/Accelerated Master's students are permitted 2 semesters to complete their degree requirements.

Please note that when registering for thesis, dissertation, or project credits on (SIS) website, students will need to specify the number of credits that they intend to register for, since the default number shown is one credit hour.

In addition to these requirements, students should be familiar with the information in the [Rensselaer Catalog](#) and the [Institute Graduate Tuition Policy](#) in order to plan out master's study appropriately.

3.2 Master of Science (in general, more scholarly and fundamental)

321 Steps to Complete a Master of Science (MS) Degree in Mechanical, Aerospace & Nuclear Engineering (MANE):

Students must follow these steps for completing an MS degree:

- Find a graduate advisor.
- File a [Plan of Study](#) form before the start of the second semester in the program.
- Form an MS committee (three full-time tenure-track faculty members, all of whom must be from the MANE department) with approval from Office of Graduate Education (OGE) before the end of the second term).
- Submit a [Nomination of Master's Committee Form](#) which must be received by the deadline specified on the [Academic Calendar](#) for that semester.
- Successfully complete research and write a thesis.
- Submit the thesis to MS committee at least one week prior to the presentation.
- Successfully complete the [thesis presentation](#) as judged by the MS committee.
- Submit completed thesis electronically for final approval.
- Complete all required coursework on the Plan of Study.

Master of Science Course Work Requirements:Minimum Required Number of Course Credits: 24Minimum Required Master's Thesis Credits: 6Minimum Required Total Number of Credits: 30

- **All courses used to earn the master's degree must be taken at the 4000 or 6000-level.**
- At least half the total course credit hours presented toward the degree must have the suffix numbers 6000-6999. It is recommended that a prospective PhD student complete 2/3 of their coursework at the 6000-6999 level. Research credits are not considered course credits.
- A minimum of 15 course credits must be from MANE. To specify, these courses must contain the MANE prefix or be cross-listed with a MANE course.
- One (1) 4000 – 6000 level MATH or MATP course is required. MANE-5000 may be applied. **See appendix 16.**
- Courses from outside of MANE (including the MATH course) may be counted towards the degree. These courses are limited up to 9 credits of Engineering or Science courses of a technical nature.
- Credits from departments outside of the Schools of [Engineering](#) or [Science](#) require prior approval from the Graduate Program Director before counting them towards an MS degree.
- Courses required for the completion of a bachelor's degree in Mechanical, Aerospace, or Nuclear Engineering (MANE) are not eligible to be counted towards a graduate degree in the same discipline.
- A maximum of 3 credits of [Individual Project/Independent Study](#) are accepted. **Note: Individual Project / Independent Study credits must be completed with a faculty member other than the student's graduate advisor.**
- Each full-time student must register each semester for Graduate Seminar MANE-6900 and attend the required number of seminars. **This requirement does not apply to Co-terminal/Accelerated Master's students.**
- **Students may NOT use a 4000-level course where a co-listed 6000 level is offered.**

323 Master of Science (MS) Thesis Committee:

The student's graduate advisor serves as the chair of the student's thesis committee. Thesis committees for students seeking an MS degree consist of three members, who must be primary or joint tenure-track faculty in MANE. It is possible to have more than three members in the committee, where no restrictions on the affiliation apply to the additional members.

If a committee member is not a faculty member at RPI, the student must submit a CV and rationale for why their participation is beneficial to the MS student to the Graduate Program Director (GPD). Students must complete a [Nomination of Master's Committee form](#), obtain all necessary signatures, and submit to the MANE department for the GPD's approval. This form is forwarded to the Office of Graduate Education (OGE) for consideration and the student will receive confirmation of the committee from OGE.

The deadline to submit this form is specified in the [Academic Calendar](#) for each semester.

324 Master of Science Thesis and Presentation:

A thesis, independently written by the student as single author, must be approved by the advisor as well as two

additional committee members from the department's faculty (thesis committee). Students will be required to present their work to this committee. This requirement may be fulfilled using one of three methods (outlined in section [3.2.4.1](#)).

The MS thesis is expected to be original work contributing to the scientific community at large. Students should review the [Preparation Guide for Dissertations and Thesis](#) for more information detailing MS thesis format.

The thesis must be submitted to the committee at least one week prior to the presentation. At the end of the presentation, the student, graduate advisor, and committee members must complete a [Record of Thesis and Oral Presentation form](#), to be submitted to OGE.

3.2.4.1 Methods of Completing the Master of Science (MS) Presentation:

There are three different methods used to complete the MS presentation requirement (with approval from the graduate advisor).

Program or Institute Seminar:

A presentation announcement must be posted publically within the department (electronic or paper copy) at least one week prior to the date of the presentation. A copy of the announcement must be included when the student submits the [Record of Master's Thesis & Oral Presentation](#) form to the Office of Graduate Education (OGE).

Presentation:

A presentation given at a conference or symposium is another method of satisfying the MS thesis presentation requirement. A copy of the schedule / announcement must be included when students submit the Record of Master's Thesis Presentation form to OGE.

Thesis Defense:

The entire committee is required to be present. The date, time, and location are pre-arranged by the student and committee.

325 Submitting the Thesis:

Master's candidates must submit their thesis to the advisor and advisory committee for review **at least one week before the final copy is due in the OGE**. For deadlines, students should refer to the [Academic Calendar](#).

The following items must be submitted to OGE in paper form, no later than the published submission due date in the Academic Calendar (these items are separate from, but in addition to, the [electronic submission](#) of your thesis).

- The Record of Master's Thesis Presentation Form with the original signatures of the advisor and committee.
- The Graduate Student [Exit Survey](#), available on the OGE website.
- Complete the [Future Plans Survey](#).
- Complete the Destination Survey sent to all graduating students by OGSS.

It is strongly suggested that students complete the [Master's Checklist](#) to ensure that students have submitted all paperwork and that they have completed all degree requirements before submitting their thesis. For more details, visit the ["Submitting Your Thesis"](#) page on the [OGE website](#).

Deadlines for the presentation and thesis submission are posted on the OGE website as well as the Academic Calendar each semester.

326 **Electronic Submission:**

Students must bring the approved [Record of Master's Thesis & Oral Presentation](#) and the supporting paperwork to the OGE **before** submitting the thesis to UMI ETD Administrator for review.

Instructions:

When the student is ready to submit, they will go to the [UMI ETD Administrator website](#) and click "Submit my dissertation/thesis" and then "Create an Account." After they have created their account, they will receive an email to activate their account. After the account is activated, they can begin the submission process by logging in to the UMI ETD Administrator website.

The websites of both the OGE and the Libraries also contain a link to UMI ETD Administrator. If students have questions about the UMI ETD Administrator submission process, they should contact ETD Support.

For detailed information on dissertation format requirements and electronic submission, read the Preparation Guide for Dissertations and Thesis found on the [Office of Graduate Education](#) (OGE) website.

3.3 Master of Engineering (MEng) (in general, more applied and practical)

331 **Steps to Complete a MEng Degree in Mechanical, Aerospace & Nuclear Engineering (MANE):**

Students must follow these steps for completing a MEng degree:

- **Find a graduate advisor.**
- **Complete a Graduate Plan of Study before the end of the second semester in the program (at the beginning of the first semester for co-terminal students).**
- **Participate in the MEng graduate poster presentation at the end of the final semester.**
- **Complete all required coursework on Plan of Study.**

332 **Master of Engineering Course Work Requirements:**

Minimum Required Number of Course Credits: 24

Minimum Required Master's Project Credits: 6

Minimum Required Total Number of Credits: 30

- All courses used to earn the master's degree must be taken at the 4000 or 6000-6999 level.
- Students may NOT use a 4000-level course where a co-listed 6000 level is offered.
- At least **half the total course credit hours** presented toward the degree must have the suffix numbers 6000-6999. It is recommended that a prospective PhD student complete 2/3 of their coursework at the 6000 level. Research credits are not considered course credits.
- A minimum of 15 course credits must be from MANE. To specify, these courses must contain the MANE prefix.
- One (1) 4000-6000 level MATH or MATP course is required. MANE-5000 may be applied. See appendix 16.
- Courses from outside of MANE (including the MATH course) may be counted towards the degree. These courses are limited up to 9 credits of [Engineering](#) or [Science](#) courses of a technical nature.

- Credits from departments outside of the Schools of Engineering or Science require prior approval from the Graduate Program Director before counting them towards an MS degree.
- Courses required for the completion of a Bachelor's degree in Mechanical, Aerospace, or Nuclear Engineering (MANE) are not eligible to be applied to a graduate degree in the same discipline.
- A maximum of **3 credits** of [Individual Project/Independent Study](#) are permitted. **Individual Project / Independent Study credits must not be completed with the same faculty member as the student's graduate advisor.**
- Each full-time student must register each semester for Graduate Seminar MANE-6900 and attend the required number of seminars. **This requirement does not apply to Co-terminal /Accelerated Master's students.**

333 **Final Project:**

As a final project (in lieu of a thesis), students pursuing a Master of Engineering (MEng) degree are expected to prepare a abstract & poster, and present their work at the MEng graduate poster session held in the MANE department at the end of the semester. Graduates are notified of the scheduled date, time and location a month prior to the event. The poster may be prepared in any format, style or size as agreed upon between the student and advisor. **The poster must be approved by the advisor at least a week prior to the event.**

Alternative arrangements may be considered for extenuating circumstances. In these cases, the alternative method of completing the presentation requirement must be arranged with the student's graduate advisor and confirmed with the Office of Graduate Student Services (OGSS).

The final project presentation requirement does not apply to Master of Engineering students in the EDUCATION FOR WORKING PROFESSIONALS program. For details on EDUCATION FOR WORKING PROFESSIONALS program degree requirements, students should refer to Chapter 5.

3.4 **MATH Requirement:**

The intent of the MANE graduate degree mathematics requirement is for you, in consultation with your advisor, to embrace higher levels of problem solving in your research and course work. This information provides guidance to help you have that discussion with your advisor.

From your undergraduate studies, you know that *problem solving* and *mathematical modeling* are synonymous. The ability to-

- express a physical problem in mathematical terms,
- obtain a solution using appropriate methods and tools, and
- interpret the results

is fundamental to what engineers do. As your graduate studies delve deeper into engineering analysis, deeper and more robust mathematical methods and tools are advantageous, and sometimes necessary.

Courses that Satisfy the Requirement

Table 1 on appendix 16 lists courses from the [Department of Mathematical Sciences](#) that are most likely to be relevant to a MANE graduate degree, and that most graduate students will have the prerequisites for. These include courses in the subject areas of Mathematics (MATH), and Mathematical Programming, Probability, and Mathematical Statistics (MATP). As indicated, some courses have prerequisites that are required or are somewhat popular among undergraduate students in MANE. Courses not in Table 1 may also be appropriate in certain circumstances and are acceptable, subject to your advisor's approval for your Plan of Study.

MANE sometimes also offers MANE-5000 *Advanced Engineering Mathematics* as a blended course (i.e., partially via distance education) through the Hartford / EDUCATION FOR WORKING PROFESSIONALS program. This course will also satisfy the department mathematics requirements.

You should review the catalog descriptions of the various mathematics courses and discuss with your advisor which may be most applicable to your research area and MANE course interests.

Restrictions

To satisfy the requirement, select at least one course at the 4000 or 6000 level, for three or more credits. The course may be the MANE-5000 course, from the MATH or MATP subject areas at Rensselaer, or transferred as such with approval from the Department of Mathematical Sciences according to Rensselaer's Office of Graduate Education rules for transferring graduate courses, as shown in the [Transfer Credit Approval form](#).

A course that is required for an undergraduate major may not be applied to a graduate degree. For example, MATH-4800 Numerical Computing is required for undergraduate Aeronautical Engineers at Rensselaer, and may not be applied to an Aeronautical Engineer's graduate program. nor may it be used for an Aeronautical Engineering graduate degree regardless of the student's undergraduate major. (Note that, while Numerical Computing may not be directly applicable, it is a useful prerequisite for other valuable mathematics courses.)

Additional details for Co-Terminal/Accelerated Master's Program

The Co-terminal/Accelerated Master's degree timeline is achievable by many students in good academic standing. Students who enter Rensselaer with some college credits (for example AP credits) will find it easiest to complete the program in five years (i.e., one year beyond the bachelor's degree).

Students completing a **Master of Science (MS)** degree in Mechanical, Aerospace & Nuclear Engineering (MANE) will complete a time-intensive thesis. Students completing a **Master of Engineering (MEng)** degree in MANE will complete a master's research project.

4.1 Steps for Completing a Co-Terminal/Accelerated Master's Degree in Mechanical, Aerospace & Nuclear Engineering (MANE):

Students will complete a [Graduate Plan of Study](#) form as part of their application when they apply to the co-terminal program. They will also choose a faculty member to act as the graduate advisor, whose endorsement on the [application](#) is required before the application will be approved by the Graduate Program Director (GPD).

Once admitted, the MANE department's requirements to complete a co-terminal master's degree are as follows:

- Complete all required course work on the Plan of Study. The courses taken must agree with the Plan of Study.
- Revise Plan of Study form as necessary.
- Form a MS committee (for students completing a Master of Science degree only).
- MS students must submit a [Nomination of Master's Committee form](#) which must be received by the deadline specified for that semester in the [Academic Calendar](#).
- Submit thesis (MS) to the [Office of Graduate Education](#) or present research project (MEng).

4.1.1 Institute Requirements for Co-Terminal Students:

The [Institute requirements to complete a co-terminal master's degree](#) are as follows:

- The minimum average of all grades used for credit toward an advanced degree must be B (3.0). The student will not be eligible to receive their degree if their cumulative GPA is below 3.0 when they apply to graduate.
 - Incompletes ("I" grades) must be completed within one semester and the work required to fulfill the course requirements is determined by the advisor. An "I" grade will be counted as an "F" if the work is not completed in time.
 - Courses with a grade of "D" or below are not eligible to be counted towards a graduate degree.
 - Receiving two "F" grades may trigger dismissal from the graduate program.

- The Pass / No Credit option cannot be used for courses applied towards a graduate degree.
- Submit a [Graduate Plan of Study](#) (PoS) before the end of the first semester. To graduate, the courses students have taken must agree with the PoS. They can file a revised PoS to ensure agreement.
- File a degree application in [SIS](#) by the date specified in the academic calendar for the semester in which a student plans to graduate.
- Must be registered each term and complete all requirements of the [Master's Degree Checklist](#) to obtain their degree.
- Bachelor's degree must be completed prior to the Master's degree. File degree application for the Bachelor's upon completion. File degree application for Master's degree with the Registrar's Office by the date specified in the academic calendar for the semester in which a student plans to graduate.
- Must be registered each term as a full-time student.
- Full-time students must meet all of the above requirements within five years (10 semesters). Co-terminal/Accelerated Master's students are not eligible for part-time status.

Please note that when registering for thesis, dissertation, or project credits on (SIS) website, students will need to specify the number of credits that they intend to register for, since the default number shown is one credit hour.

In addition to these requirements, students should be familiar with the information in the [Rensselaer Catalog](#) and the [Institute Graduate Tuition Policy](#) in order to plan out master's study appropriately.

4.2 Registration:

Co-terminal students often encounter some unique challenges when registering for graduate courses and credits. Registration guidelines are the same for all Master's programs.

- Students must register for research each semester of the Co-term program. (6 credits of MANE 6990 thesis (MS) or MANE 6980 project (MEng) credits.) These credits cannot all be taken in one semester.
- Students may NOT use a 4000-level course where a co-listed 6000 level is offered.
- The [Graduate Plan of Study](#) form must be updated each semester if planned coursework has changed. In these instances, it is best for students to contact the Office of Graduate Student Services (OGSS) to ensure that they are still on track to graduate and are meeting all requirements for their degree.
- **Co-terminal students are not required to attend graduate seminars.**
- Students must be registered for **no more than 16 credits** for each semester that they are taking graduate courses to count towards their ME or MS degree.
- Courses required for the completion of a bachelor's degree in Mechanical, Aerospace, or Nuclear Engineering are not eligible to be applied to a graduate degree in the same program.
- The Pass / No Credit option cannot be used for courses applied towards a graduate degree.

4.3 **Co-Terminal Student Advising:**

Students are required to meet with their graduate advisors at least once at the beginning of each semester, from the time they are accepted into the co-terminal degree program until the time they are awarded their degrees. Most critically, students must submit an updated [Plan of Study](#), approved by their advisor, at a date between their pre-registration for their final semester and the start of that final semester.

Confirming a Graduate Advisor:

Co-terminal students must visit the Office of Graduate Student Services (OGSS) or send an email to maceyb2@rpi.edu to confirm their graduate advisor by the beginning of the semester that they start graduate research. They must also inform OGSS if they choose to work with a different faculty member. No further action is required.

4.4 **Curriculum:**

The curriculum requirements for the co-terminal/Accelerated master's degree are the same as the curriculum requirements for the traditional master's degree in the Mechanical, Aerospace & Nuclear Engineering (MANE) department. The same rules, regulations, and requirements apply to co-terminal students as they would master's students. One notable exception to this is the **co-terminal students are not required to attend graduate seminars**. Courses are selected based on relevancy to chosen research topics and may be changed at the discretion of the student and graduate advisor.

Please note that co-terminal students completing a Master of Science degree must adhere to the academic deadlines and should pay particular attention to the deadline to submit the [Nomination of Master's Committee Form](#) and the thesis submission deadline. These deadlines are posted every semester on the [Academic Calendar](#).

Co-terminal students completing a Master of Engineering (MEng) degree are expected to attend a poster session at the end of the semester they graduate.

Students should refer to **Chapter 3** for more details on the requirements for their particular degree.

4.5 **Financial Aid for Co-Terminal/Accelerated Master's Students:**

In most cases, all Rensselaer aid used for an undergraduate degree continues through the 5th year of study. However, upon receiving their B.S. degree, students are no longer eligible for undergraduate financial aid. It is highly recommended that Co-terminal/Accelerated Master's students meet with a financial aid representative to confirm funding options. Co-terminal/Accelerated students are eligible to apply for competitive graduate fellowships such as the NSF fellowship, SMART fellowship, and the Rickover Fellowship Program in Nuclear Engineering.

Please note that Co-terminal/Accelerated Master's students who have not completed their degree requirements by the end of their final year (10th semester) may not be granted their degree, or extended funding.

Education for Working Professionals

Through the Rensselaer's Education for Working Professionals, working engineering professionals and recent graduates with work experience can complete their degree in three years and one semester as part-time students. The Education for Working Professionals Master of Engineering (MEng) degree offers classes taught in a blended format (a mix of online and face-to-face meetings) and allow students to continue their careers while pursuing the MEng.

General Overview:

- The Education for Working Professionals MEng degree consists of a total of 30 credit hours.
- The program results in a Master of Engineering in Mechanical Engineering degree.
- Program includes coursework in project management, manufacturing and Lean Six Sigma.
- The program is delivered using online and blended instruction designed to fit into the lives of busy professionals.
- Masters Project courses I and II are applied projects the student develops with a faculty member to demonstrate program mastery.

Please note that the Education for Working Professionals MEng degree program requirements differ from the traditional MEng degree program.

5.1 General Institute Policies and Registration:

To receive a Master of Engineering degree in the Mechanical, Aerospace & Nuclear Engineering (MANE) Education for Working Professionals, students must:

- Successfully complete 30 graduate level credits.
- Complete 18 credits with the 6xxx MANE designation.
- Successfully complete Master's Professional Project MANE-6970 (for a letter grade).
- Complete all courses on a [Graduate Plan of Study](#) form. The courses taken must agree with the Plan of Study form.
- Have a final GPA of 3.0 or above.
 - Courses with a grade of "D" or below are not eligible to be counted toward a graduate degree.

- Incompletes (“I” grades) must be completed within one semester and the work required to fulfill the course requirements is determined by the advisor. An “I” grade will be counted as an “F” if the work is not completed on time.
- Receiving two “F” grades may trigger dismissal from the graduate program.
- Complete all degree requirements within three years and one semester.

In order to register for courses and project credits, Education for Working Professionals students must visit the [Student Information System \(SIS\) website](#) to register for courses and **Master’s Project (MANE 6970)** credits under the name of their graduate advisor.

When registering on SIS, students must register for the correct section for each course that they will be taking. If students are attending a course at Hartford, they should select the section indicated by “H01”. For courses attended at Troy campus, they should register for section “T”.

5.2 **Advising:**

Once admitted to the program, students will be assigned a faculty advisor who will be their point of contact for all academic related matters during their program.

5.3 **Curriculum:**

The curriculum for the Master of Engineering in Mechanical Engineering is as follows:

ISYE 4240	Engineering Project Management
MANE 5000	Advanced Engineering Mathematics
MANE 6960	Advanced Heat Transfer
MANE 6170	Mechanics of Solids
MANE 4240	Introduction to Finite Elements
MANE 6720	Computational Fluid Dynamics
MANE 6970	Professional Project 1
MANE 4640	Analysis of Manufacturing Processes
MGMT 6960	Lean Six Sigma 1
MANE 6970	Master’s Professional Project

5.4 **EDUCATION FOR WORKING PROFESSIONALS Contacts and Web Links:**

Hartford Campus:

Director, Student Support & Success Services:	Jessica Anderson (gelmaj@rpi.edu)
Department: Director, Technical Systems & Analytics:	Brian Clement (clemeb@rpi.edu)
Associate Director, Enrollment & Marketing:	Bonnie Sofarelli (soforb@rpi.edu)

Faculty

<u>Prof. Francisco Cunha:</u>	Mechanical & Aerospace Engineering	cunhaf@rpi.edu
<u>Prof. Ernesto Gutierrez:</u>	Mechanical & Aerospace Engineering	guttee@rpi.edu
<u>Prof. Michael Hughes:</u>	Mechanical & Aerospace Engineering	hughem6@rpi.edu
<u>Prof. Antonella Zompa:</u>	Mechanical & Aerospace Engineering	zompaa@rpi.edu

Troy Campus:

Office of Graduate Student Services (JEC 2002)

Graduate Program Director:	Theo Borca-Tasciuc (borcat@rpi.edu)
Sr. Student Services Administrator:	Beth Macey (maceyb2@rpi.edu)

Web Links:

Academic Calendar:	http://www.rpi.edu/academics/calendar/
Learning Management System (LMS):	https://lms.rpi.edu/webapps/login/
Student Information System (SIS):	http://sis.rpi.edu/
Webmail:	https://webmail.rpi.edu/
Help Desk:	https://dotcio.rpi.edu/support/helpdesk
Library:	http://library.rpi.edu
E-bills:	https://info.rpi.edu/bursar/payment
Financial Aid:	https://admissions.rpi.edu/aid https://admissions.rpi.edu/guide/graduate

Financial Assistance and External Support

Financial assistance to graduate students within the department of Mechanical, Aerospace and Nuclear Engineering falls into two principal categories: fellowships and assistantships. Assistantships are either graduate research assistantships or graduate teaching assistantships. Stipend payments for assistantships are usually processed twice a month, while fellowship payments follow a payment schedule determined by the individual fellowship. Graduate advisors and the MANE department make every effort to provide aid for the PhD students and almost all of them receive full financial support.

Rensselaer Polytechnic Institute requires that fellowship holders must register for at least 12 credits per semester to maintain full-time status, with a maximum of 16 credits. The teaching assistants and research assistants may register for a minimum of 9 credits per semester to maintain full-time status.

6.1 Teaching Assistants (TA) and Research Assistants (RA):

Assistantships are contracts for students to do research or assist faculty in the classroom in exchange for salary and tuition benefits. The MANE Dept. limits these positions to qualified PhD students.

Teaching Assistant: A matriculated and registered graduate student who assists a faculty member to teach his or her course. Duties may vary and include: preparing for class sections and/or labs, grading exams or papers, and holding regular office hours. Teaching assistants are not expected to individually assign final grades. Continuation of a teaching assistantship depends on the quality of the work performed and academic performance.

If assigned a teaching assistantship, you are required to provide course assistance and be available on campus throughout the entire semester. **You must be on campus by the first day of classes, and cannot leave until the last day of exams.**

Research Assistant: A matriculated and registered graduate student who participates in research under the supervision of a faculty member. For the most part, research assistants are selected by individual faculty with sufficient research funding. Continuation of a research assistantship depends on the productivity and quality of the research performed, availability of research funds, and academic performance.

6.2 Duration of Financial Assistance:

Students who receive financial assistance are normally continuously supported, either on a 9-month basis or on a 12-month basis as long as they demonstrate satisfactory progress in a degree program and funding resources are available. Financial assistance for PhD students includes a stipend (for TAs and RAs) and covers tuition costs. Continuation of financial aid is contingent upon the availability of funds and satisfactory academic/research performance.

Please note that support via teaching assistantships is limited to a total of four semesters of support as per the [Graduate Tuition and Student Support policy](#). Additional support may be provided in the form of graduate research assistantships or fellowships if available.

To remain eligible for current and future federal financial loan programs, students must be in good academic standing (SAP). For additional information on SAP, students should refer to the [Graduate Federal Satisfactory Academic Progress](#) regulations document.

6.3 Fellowships and External Funding Opportunities:

An alternative way for graduate students to receive financial assistance is through fellowships and scholarships. The MANE department offers information sessions, workshops, and individual assistance to help students apply to fellowships and create competitive applications to maximize the chances of success. External funding opportunities include fellowships, scholarships, international programs, and internships. Additional funding options are available for international, underrepresented minorities, and female applicants.

Most fellowship deadlines fall between September and December of each year. Students receive an email every month announcing upcoming opportunities and submission deadlines.

If students are interested in applying to fellowships or external funding programs, they are encouraged to visit the [Office of Graduate Education](#) on upcoming external fellowships and scholarships. Students are also welcome to visit the Office of Graduate Student Services in MANE to receive information on the various opportunities available and for assistance with the application process.

6.3.1 Cooperative Education & Professional Opportunities:

Rensselaer's Cooperative (Co-op) Education program provides graduate students with a method of external funding which allows for an integration of academic curriculum and real-world work experience, can help to confirm or redirect career decision-making through on-the-job experience in a chosen field, provides financial assistance for educational costs through employer-paid wages and can improve job opportunities after graduation by granting valuable work experience and contact with potential future employers.

There are two co-op options — **full time co-op** and **parallel co-op**. Students on **full time co-op** work full time for an employer recognized by the Co-op program as able to provide the student with a work experience that will reinforce career objectives. A **parallel co-op** is usually worked locally and is comparable to a part-time job. Parallel co-op students generally enroll for two or three courses (but no more than 12 credits) while on co-op.

Graduate students must have at least a 3.2 GPA to be eligible for a co-op and they may work for one term (semester or summer) up to one calendar year. Also, students must have at least one term of full-time study remaining in their academic program. Students interested in applying for a co-op should visit the **Center for Career & Professional Development (CCPD)**'s [website](#) on the Co-op Education program for details.

The CCPD also provides a wide variety of comprehensive services to assist students seeking internship and summer employment as well as general career development opportunities. Students are strongly encouraged to visit the [CCPD's general website](#) for more information.

Appendices

These appendices are for reference only.
Please use official forms found on the [Registrar](#) and/or [Office of Graduate Education's](#) website.

Doctoral Requirements for NUCL Program:

Courses required for the completion of a bachelor's degree in Mechanical, Aerospace, or Nuclear Engineering are not eligible to be applied to a graduate degree in the same program, with the following exceptions:

Nuclear Engineering students may apply to select up to three (3) courses or their equivalent from the list below to include in their graduate Plan of Study for credit:

- MANE-4350 Nuclear Instrumentation and Measurement
- MANE-4430 Linear Accelerator Laboratory
- MANE-4370 Nuclear Engineering Laboratory
- MANE-4470 Radiological Engineering
- MANE-4480 Physics of Nuclear Reactors
- MANE-4400 Nuclear Power Systems Engineering

Nuclear Engineering graduate students shall choose at least three (3) courses from the table below. Each of the three courses must be included in the student's graduate Plan of Study for credit, or the student must show that this course or an equivalent has been successfully completed previously for a grade at the undergraduate or graduate level.

- MANE-6260 Radiation Technology and Applications
- MANE-6280 Nuclear Reactor Analysis II
- MANE-6290 Radiation Transport Methods
- MANE-6300 Numerical Methods in Reactor Analysis
- MANE-6350 Radiation Shielding
- MANE-6360 Reactor Reliability & Safety
- MANE-6370 Thermal-Hydraulic Design of Nuclear Reactors
- MANE-6380 Nuclear Reactor Materials
- MANE-6390 Applied Atomic & Nuclear Physics
- MANE-6840 An Introduction to Multiphase Flow & Heat Transfer I

Suggested Mathematics (MATH) Courses

4000 and 6000-level courses used to fulfill the MATH course requirement

Course Number	Course Title	Schedule
MATH 4100	Linear Algebra	Fall
MATH 4300	Introduction to Complex Variables: Theory & Applications	Spring
MATH 4400	Ordinary Differential Equations & Dynamical Systems	Fall
MATH 4500	Methods of Partial Differential Equations of Mathematical Physics	Spring
MATH 4600	Advanced Calculus	Fall & Spring
MATH 4700	Foundations of Applied Math	Fall
MATH 4800	Numerical Computing	Fall & Spring
MATH 4820	Introduction to Numerical Methods for Differential Equations	Spring
MATH 6600	Methods of Applied Math	Fall
MATH 6620	Perturbation Methods	Spring even-numbered years
MATH 6640	Complex Variables and Integral Transforms with Applications	Spring odd-numbered years
MATH 6660	Stochastic Processes & Modeling	Spring even-numbered years
MATH 6800	Computational Linear Algebra	Fall
MATH 6820	Numerical Solution of Ordinary Differential Equations	Spring odd-numbered years
MATH 6840	Numerical Solution of Partial Differential Equations	Fall odd-numbered years
MATH 6860	Finite Element Analysis	Spring even-numbered years

Research

MANE offers a widerange of disciplines that are sufficiently flexible to accommodate individual interests. The main research interests are separated into several broad areas which include:

Mechanics and Materials

Research Areas: Acoustics, Multi-body dynamics, Fatigue and fracture processes, Friction and wear, Biomechanics, Plasticity, Composites, Microelectronic materials, Materials under extreme loading conditions, Irradiation hardening, Nano mechanics of materials, and Multiscale computational methods.

Participating faculty: Kurt Anderson, Terry Blanchet, Nikhil Koratkar, Jie Lian, Emily Liu, Antoinette Maniatty, Kristen Mills, Catalin Picu, Mark Shephard, John Tichy, Daniel Walczyk, and Lucy Zhang.

Thermal and Fluids Engineering

Research Areas: Energy efficiency and sustainability; Advanced microfluidics for thermal management, System level thermal management, heat conduction and solid-state thermoelectric energy conversion in nanostructured materials, Nanoscale thermal metrology, Interfacial heat transfer, Convection and phase-change in micro channels, Structured surfaces for enhanced heat transfer, Nanostructured thermal interface materials, Thermal energy storage materials, Heat generation and dissipation in radio frequency heated magnetic nanoparticles, Microsystems for energy harvesting, Plasmonic nanoparticles spectrally coupled with luminescent solar concentrators, Loop heat pipes, Combustion, and Inertial microfluidics /Opt fluidics.

Participating faculty: Theodorian Borca-Tasciuc, Diana Andra Borca-Tasciuc, Amir Hirs, Jie Lian, Shankar Narayanan, Matthew Oehlschlaeger, and Lucy Zhang.

Design and Manufacturing

Research Areas: Design methodology in general and mechanical engineering design techniques in particular; Tribology, Metrology; Rapid prototyping, Flexible manufacturing, Micro/Nano-scale manufacturing (subtractive and additive techniques), Process modeling, Material design for manufacturing, Sustainable manufacturing, Fiber-composite processing, Fuel-cell manufacturing, Bio-medical manufacturing, New manufacturing techniques, Operation of manufacturing facilities, CAD/CAM, and Diagnostics and controls.

Participating faculty: Terry Blanchet, Antoinette Maniatty, Sandipan Mishra, Johnson Samuel, Daniel Walczyk, and John Wen.

Dynamics and Controls

Research Areas: Adaptive and Smart Optics Systems, Intelligent Building Systems, Control of Micro/Nano-scale Manufacturing, Learning Control Systems, Nonlinear, Robust and Adaptive Control, and Human-in-the-loop Control Design.

Participating faculty: John Wen, Sandipan Mishra, and Kurt Anderson.

Fluid Dynamics / Aerodynamics

Research Areas: Experimental, numerical, and theoretical fluid mechanics, Advanced aerodynamic flow control techniques: passive and active, Aerodynamics of low, moderate and high Reynolds number flows, Manned and unmanned aerial vehicle aerodynamics, Acoustics and vibrations, Compressible flows; Wind energy, Bio fluids, Interfacial hydrodynamics, and Microfluidics.

Participating faculty: Michael Amitay, Jason Hicken, Amir Hirsra, Onkar Sahni, John Tichy, and Lucy Zhang.

Advanced Structures / Materials

Research Areas: Active structures, Morphing structures, Cellular structures, Structures with integrated damping capability, Energy absorption capability; Advanced materials including piezoelectric materials, Shape memory alloys and polymers, Electrorheological and magnetorheological fluids, Nano-materials; Advanced composites, Bio-composites, Advanced structural analysis methods, Nonlinear aero elasticity, nonlinear multi-body dynamics, and Computational structural dynamics.

Participating faculty: Prabhat Hajela, Jason Hicken, Nikhil Koratkar, Emily Liu, Catalin Picu, and Daniel Walczyk.

Optimization

Research Areas: Multidisciplinary design optimization, Aerodynamic shape optimization, trajectory optimization, Optimization under uncertainty, Inverse problems and model reduction

Participating faculty: Prabhat Hajela, Jason Hicken, and Onkar Sahni.

Space

Research Areas: Spacecraft trajectory control optimization, Spacecraft relative motion optimization, Alternative ways to optimize propellant consumption relying on atmospheric differential drag, Large flexible spacecraft dynamics and control, Space vehicle control, Fluid dynamics in microgravity, and Thermal management in microgravity.

Participating faculty: Kurt Anderson and Amir Hirsra

Combustion / Propulsion

Research Areas: Fuel chemistry; Optical diagnostics, Solid propellants, Spray combustion, Nano-energetics, Swirls, Stabilized combustion, Transonic combustion.

Participating faculty: Matthew Oehlschlaeger

Nuclear Power Systems

Research Areas: Novel reactor design concepts, Nuclear safety / risk analysis / emergency preparedness, Nuclear thermal hydraulics, Fuel cycle (spent fuel storage, geological repository, re-processing), Fuel design and performance, Nuclear data instrumentation and detector development, Computational methods (neutronics analysis, multi-physics and multi-scale modeling), and Nuclear fusion and energy policy.

Participating faculty: Yaron Danon, Thomas Haley, Wei Ji, Hyun Kang, Emily Liu, Jie Lian, Shanbin Shi, and Bimal K. Malaviya.

Applied Radiation Technologies

Research Areas: Accelerator physics, Neutron, x-ray, and light scattering physics & experiments, Radiation detection and measurement, Novel radiation sources, Nuclear cross-section data measurement and analysis, and Nuclear non-proliferation.

Participating faculty: Wei Ji and Emily Liu.

Radiation Protection, Medical and Industrial Uses of Radiation

Research Areas: Radiation dosimetry, Imaging and radio therapy of cancer, Medical isotope production, and Non-destructive testing (civil engineering, materials, oil exploration).

Participating faculty: Yaron Danon, Hyun Kang and Wei Ji.

Nuclear Materials

Research Areas: Radiation interaction and radiation effects, Advanced nuclear fuels and structural materials, Aging management, Materials for nuclear waste management, and Nanostructured materials for nuclear applications.

Participating faculty: Jie Lian, Emily Liu, and Wei Zhou.

For more information about MANE faculty and their current research, visit the [People](#) section of the MANE Department website.

Cross-Cutting Research Areas:

Energy Science and Engineering

Brief description: This cross-cutting research theme is focused on clear common interests in Energy efficiency, Energy storage, Energy harvesting, and Thermal controls. It builds on the strong expertise in fundamental thermal sciences and engineering across Multiscale, Thermal metrology, Nanostructured materials, Electrochemical energy storage, and Microsystem fabrication technologies.

Participating faculty: Theodorian Borca-Tasciuc, Diana Andra Borca-Tasciuc, Jason Hicken, Wei Ji, Nikhil Koratkar, Jie Lian, Emily Liu, Shankar Narayanan, Matthew Oehlschlaeger, Onkar Sahni, Mark Shephard, John Tichy, and Lucy Zhang.

Materials, Materials Processing and Controls

Brief Description: MANE faculty are engaged in high impact interdisciplinary research in Materials, Manufacturing and Controls as well as research that effectively links the three disciplines to come up with system level solutions to important technological problems. The research interests of the faculty include materials for Energy, Nano-materials, Nano composites, Nanoscale heat transfer, Thermoelectric, Nano-mechanics, Fiber-reinforced composites, Additive manufacturing, Non-linear controls, Micro-machining, Spaceflight control, Tribology, Non-linear dynamics, Nuclear materials, Bio-materials, Smart materials, Adaptive structures, and Computational Nano and bio mechanics.

Participating faculty: Kurt Anderson, Terry Blanchet, Diana Andra Borca-Tasciuc, Theodorian Borca-Tasciuc, Jason Hicken, Amir Hirs, Nikhil Koratkar, Jie Lian, Emily Liu, Antoinette Maniatty, Sandipan Mishra, Catalin Picu, Johnson Samuel, Mark Shephard, Daniel Walczyk, and John Wen

Human Health and Safety

Brief Description: This cross-cutting research theme is focused on common interests in Biomechanics, Virtual surgery, Radiation dosimetry, Medical robotics, Biomechanical imaging, Experimental Nano-bio-science, Biomedical device and cancer diagnosis, and Biotechnology.

Participating faculty: Diana Andra Borca-Tasciuc, Amir Hirsu, Hyun Kang, Antoinette Maniatty, Kristen Mills, Sandipan Mishra, Emily Liu, John Tichy and Lucy Zhang.

More information on research areas can be found on the **Research** section of the MANE department website.

Research Centers & Laboratories 1

Research Centers

The Center for Flow Physics and Control

Director: Prof. Miki Amitay

The Gaerttner Linear Accelerator (LINAC) Center

Director: Prof. Yaron Danon

Center for Multiphase Research

Director: Prof. Michael Podowski

Research Laboratories

Combustion and Energy Systems Laboratory

Director: Matt Oehlschlaeger

Computational Dynamics Laboratory

Director: Prof. Kurt Anderson

Computational Mechanics Laboratory

Director: Prof. Lucy Zhang

Computational Nanomechanics Laboratory

Director: Catalin Picu

Computational Solid Mechanics Laboratory

Director: Prof. Antoinette Maniatty

Experimental Cell & Tissue Biomechanics Laboratory

Director: Prof. Kristen Mills

Fluid Mechanics and Interfacial Hydrodynamics Laboratory

Director: Prof. Amir Hirsu

Intelligent Systems Automation and Control (ISAaC) Laboratory

Director: Prof. Sandipan Mishra

Multiscale Transport and Thermal Energy (MuTATE) Laboratory

Director: Prof. Shankar Narayanan

Nano / Micro-Scale Manufacturing and Material Design Laboratory (Nano-M3 Design Lab)

Director: Prof. Johnson Samuel

Nanoengineering Laboratory

Director: Prof. Diana-Andra Borca-Tasciuc

Nano-Nuclear and Energy Materials Laboratory

Director: Prof. Jie Lian

Nanoscale Thermophysics and Energy Conversion Lab (NanoTEC)

Director: Prof. Theodorian (Theo) Borca-Tasciuc

Nanostructured Devices and Materials Laboratory

Director: Prof. Nikhil Koratkar

Neutron Calibration Laboratory

Director: Prof. Yaron Danon

Nuclear Energy Advanced Modeling and Simulation Laboratory

Director: Prof. Wei Ji

Nuclear Nano-Science and Nano-Engineering (NSNE) Laboratory

Director: Prof. Li (Emily) Liu

Nuclear Plant Reliability and Safety Laboratory

Director: Prof. Hyun Gook Kang

Optimal Design Laboratory

Director: Prof. Jason E. Hicken

Flow Computation and Physics Laboratory

Director: Prof. Onkar Sahni

The Scientific Computation Research Center (SCOREC)

Director: Prof. Mark Shephard

Tribological Materials Laboratory

Director: Prof. Thierry Blanchet

Instructional Labs

The Manufacturing Innovation Learning Laboratory (MILL)

The MILL is the foundation for an emerging effort in undergraduate education in Nano manufacturing and other advanced manufacturing technologies at Rensselaer.

The Nuclear Engineering and Engineering Physics Laboratory (NEEP)

The NEEP supports undergraduate education in engineering physics and nuclear engineering. The lab is equipped with facilities and apparatus providing students opportunities to gain hands-on experiences and skills in instrumentation, computer-controlled instrument interfacing and data acquisition, electronics, optical interferometry, Laser-Doppler interferometry, multiphase flow, fluid dynamics, photon-matter interaction and alpha spectroscopy.

The O.T. Swanson Multidisciplinary Design Laboratory (Design Lab)

The O.T. Swanson Multidisciplinary Design Laboratory (a.k.a. the Design Lab) at Rensselaer provides clinical real-world experiences for students that build confidence and teaches integration of discipline-specific knowledge with practice on challenging multidisciplinary design projects. The Design Lab process provides a culminating experience intended to prepare students to enter the workforce. The projects are open-ended, technically challenging design problems that encompass a broad array of important contemporary issues. In addition to defining an important problem, sponsors provide a significant grant and interact directly with the students, faculty and staff who work to provide design solutions.

The Subsonic Wind Tunnel Laboratory

The Subsonic Wind Tunnel Laboratory features a custom-fabricated closed-loop wind tunnel that is used for the undergraduate senior-level fluid dynamics laboratory. Controlling the tunnel is a Rensselaer-developed, Labview-based data acquisition and control system, which also tracks operating conditions. Measurements of pressure, detailed velocity, and aero-dynamic forces can be recorded. Also, the computer-controlled movable top panel and three-dimensional traverse system allow probes to be positioned throughout most of the test section for detailed surveys.

The Walthousen Reactor Critical Facility (RCF)

The Walthousen Reactor Critical Facility is one of only 25 research reactors at U.S. universities. It is the only low power (less than 100 Watts) facility using fuel rods that are similar to those used in commercial light water reactors. Because of its design, the RCF is a unique facility that does not exist anywhere else in the nation and probably not the world. It is ideally suited for fundamental reactor physics measurements and benchmarks evaluating material specimens with relatively high reactivity worth, such as neutron control materials. Students can directly touch the core, without the concerns about loose contamination that often occur in other reactor facilities. In contrast, students working with other reactors are only able to read various instruments from a separate control room while a licensed reactor operator executes the experiment. For this reason, RPI's NE students receive hands-on experience in experimental planning, radiation protection, and criticality safety. Additionally, students who are interested in pursuing a career in nuclear operations receive comprehensive training so they are licensed by the U.S. Nuclear Regulatory Commission for reactor operation. Over the years, the RCF has supplied a large pool of such licensed reactor operators for the U.S. nuclear power industry. The RCF is currently licensed by the USNRC to operate through June 26, 2031.

More information on laboratories can be found on the [Labs](#) section of the MANE department website.

Student and Professional Organizations

American Nuclear Society (ANS)

The American Nuclear Society is a not-for-profit, international organization dedicated to promoting the advancement of nuclear science, engineering, and technology. ANS serves its members in their efforts to develop and safely apply nuclear science and technology for public benefit through knowledge exchange, professional development, and enhanced public understanding. ANS consists of over 10,000 members worldwide, including more than 1,000 students. Our chapter consists of approximately 30 active members and is governed by a four-member executive board. Our mission is to provide services to students that will foster personal and career development in a friendly environment.

American Society of Mechanical Engineers (ASME)

ASME is a society for all Engineers that provides opportunities to grow as an engineer and as a professional. Through conferences, competitions and meetings/tours, ASME is a way to explore the many fields of engineering and stay up to date on what is happening across the world. ASME is not strictly for Mechanical engineers, but for anyone majoring in any field of engineering.

MANE Student Advisory Council (SAC)

Established to pull student influence into the MANE Departments official business, the MANE Student Advisory Council betters the student experience by facilitating technical seminars, bringing in guest lecturers, and participating in various administrative tasks. In the past, public forum events, faculty hiring, and seminar series have been provided to the campus community by the Council. [The MANE Student Research & Design Journal](#) is promoted and published through SAC and can be found on the [MANE Department website](#) and at the [MANE SAC Wordpress website](#).

National Society of Black Engineers (NSBE)

The mission of RPI's chapter of the National Society of Black Engineers is to "increase the number of culturally responsible black engineers who excel academically, succeed professionally and positively impact the community."

Rensselaer Aeronautical Federation (RAF)

The purpose of the RAF is to promote interest in aviation and aviation safety within the Rensselaer community, to encourage safe and economical flying, and to increase flight proficiency of the membership.

Society of Auto Engineers (SAE)

The Rensselaer Formula SAE Team is a dynamic group of individuals representing a broad array of academic disciplines who collaborate to conceive, design, and fabricate a high-performance formula style racecar. The Team was formed in 1991 and participated in competition for the first time in 1992. Since then, we have continued to place competitively, usually in the top third.

Society of Hispanic Professional Engineers (SHPE)

"SHPE changes lives by empowering the Hispanic community to realize its fullest potential and to impact the world through STEM awareness, access, support, and development."

RPI's chapter has established itself as a respectful group of high-quality Hispanic students attending Rensselaer Polytechnic Institute with a special focus on science, technology, engineering, and mathematics. They work to develop their members professionally through leadership and community outreach by creating a friendly atmosphere among members.

Society of Women Engineers (SWE)

The Society of Women Engineers (SWE) is an international society designed to encourage and support women in the pursuit of a professional career in the engineering and technological fields, through corporate interaction, community outreach, and social events, both on the local and national levels.

Throughout the year, SWE offers many events focusing on professional development, networking, and outreach to young children. Opportunities include monthly general meetings, presentations, and networking with corporate guests, informational sessions on graduate school and research, scholarships, RPI SWE job resources, conference attendance, outreach events with local Girl Scout troops and many fun socials, which offer the chance to learn new skills, such as taking up the business sport of golf!

Underrepresented Minorities in Engineering

Today's diverse and complex world requires exceptional leaders who lead multidisciplinary teams to solve challenging problems at home and abroad. Rensselaer's underrepresented minority students are breaking barriers to create diverse teams of technological leaders, developing learning communities where they excel academically, and are inspiring younger generations to explore engineering professions and pursue advanced degrees.

Women at Rensselaer Mentor Program (primarily for graduate students who may be interested in mentoring)

Started in 1994, Rensselaer has been growing its women's network with the Women at Rensselaer Mentor Program. The program matches first-year students with a mentor with the same or related major. Matches also take interests into account to help incoming students transition to the college environment at Rensselaer. Mentors help students transition by providing insight and resources about where to go for help, or how to get through a class that they have previously taken. For up-to-date information about the program and to learn more about the current members, please visit their [student-run website](#).

Women in Entrepreneurship

The Severino Center's "Women in Entrepreneurship" programs encompass several initiatives designed to communicate the unique experiences of successful women entrepreneurs and to encourage and support entrepreneurial initiatives among women of all ages. Women in Entrepreneurship sponsors a symposium series to encourage women to pursue careers and entrepreneurial ventures in science and technology by presenting role models in specific fields. At the events, distinguished high school junior women from across the country are honored with the Kathleen M. Severino Future Leader Award in recognition of their academic excellence and leadership interest in science and technology. The symposium's focus is driven by the experiences of many of the award recipients.

Women in Engineering

Rensselaer's women in engineering programs offer a host of opportunities for exceptional women to prepare and succeed in today's technologically advanced and culturally diverse workforce.

Housing

Most graduate students live off campus and arrange housing for themselves. This website: <https://sll.rpi.edu/off-campus-commons> provides information on housing options, as well as information on the Troy community. If you need advice on finding a house in a good area, please reach out to [Graham Knowles](#), Associate Dean, off campus common.

Holidays, Vacations, and Sick Leave

Graduate students who are paid a stipend are expected to engage in Graduate Assistantship duties an average of 20 hours per week. This does not include the students' own class time, coursework, or research (e.g., thesis or dissertation work). The actual amount worked in a Graduate Assistantship in any given week can vary given the nature of the work, but over the course of any rolling four-week period, the average should not exceed 20 hours per week. Students and advisors are expected to engage collaboratively to manage this work schedule, but students who feel they are being asked or pressured to work in excess should report the matter to the OGE.

Students are entitled to observe Institute closings for Holidays and other recognized events. Otherwise, students who are employed by the Institute are expected to follow the same schedule as Institute staff employees, meaning that the times between semesters, and the summer term (for those students who are supported through the summer) are not considered days off.

Graduate students who are employed in Graduate Assistantships for the full calendar year (Fall, Spring and Summer terms) are allowed two weeks of vacation per calendar year. Students who are employed only for the academic year (Fall, Spring) are not eligible for vacation during the period of support. Students must obtain approval for their planned vacation dates from their advisor and department at least one month in advance. Students who are employed as TAs shall not take vacation (except during Spring break) during the semester in which they are assigned TA duties.

Vacation requests can be made by completing the [Vacation Request](#) form and submitting for approval.

TA Evaluation Form

TEACHING ASSISTANT (TA) EVALUATION FORM

- It is the responsibility of the TA to arrange an evaluation meeting with the course instructor(s) upon completion of the TA assignment.
- It is also the responsibility of the TA to return this form to the Graduate Student Services Office following the evaluation meeting. The Graduate Student Services Office will keep a copy of the form in the student's file. In addition, copies will be mailed to the TA, to the course instructor(s), and to the TA's graduate advisor(s).

TA Name: _____

Instructor Name(s): _____

Date of Evaluation: _____

Course Number: _____

Semester/Year: _____

Graduate Advisor Names(s) _____

Evaluation of the TA Performance

(Faculty, please circle the appropriate category)

1. Technical knowledge of the course material:

Excellent *Very Good* *Good* *Average* *Poor* *N/A*

2. Performance during office hours and review sessions:

Excellent *Very Good* *Good* *Average* *Poor* *N/A*

3. Ability to develop new homework and exam problems:

Excellent *Very Good* *Good* *Average* *Poor* *N/A*

4. Ability to grade homework and exam problems accurately and in a timely manner:

Excellent *Very Good* *Good* *Average* *Poor* *N/A*

5. Availability to students:

Excellent *Very Good* *Good* *Average* *Poor* *N/A*

6. Management of the course logistics, including:

- Preparation of solutions to homework and exam problems.
- Photocopying of course materials.
- Maintenance of the course Web site.
- Preparation of electronic and/or hard-copy versions of the course solution book.

Excellent *Very Good* *Good* *Average* *Poor* *N/A*

7. Ability to communicate student concerns to the instructor(s):

Excellent Very Good Good Average Poor N/A

8. Planning, designing, and supervising of laboratory experiments (for TAs in laboratory courses):

Excellent Very Good Good Average Poor N/A

9. Communication and personal skills when interacting with students:

Excellent Very Good Good Average Poor N/A

10. Overall TA performance:

Excellent Very Good Good Average Poor N/A

If the instructor(s) have additional comments and recommendations, please attach them.

TA Signature: _____

Instructor Signature(s): _____

Acknowledgement 1

I, _____, have read and understand the rules and regulations of the Mechanical, Aerospace and Nuclear Engineering Graduate Program.

Signature

Date

*Due at the end of your first term in the Mechanical, Aerospace and Nuclear Engineering Graduate Program.