



RENSSELAER POLYTECHNIC INSTITUTE
School of Engineering

Aeronautical, Mechanical, & Nuclear Engineering

Department of Mechanical, Aerospace, and Nuclear Engineering Advising Book

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Department of Mechanical, Aerospace, & Nuclear Engineering

<http://www.eng.rpi.edu/mane/>

“Scientists dream about doing great things. Engineers do them.”

James A. Michener (U.S. novelist and short-story writer)

The MANE Department is made up of three distinct programs: Mechanical Engineering, Aerospace Engineering, and Nuclear Engineering.

Mechanical Engineering:

Mechanical engineers design, develop, manufacture, sell, and maintain machinery. Air conditioning and heating systems, automobiles, jets, power plants, spacecraft, and oil drilling equipment all bear the imprint of the mechanical engineer.

As an undergraduate, you'll follow the core engineering curriculum in your first two years, gaining solid grounding in mathematics, physics, and chemistry, as well as taking introductory courses in computing and mechanical engineering. You can then opt for technical electives in aeronautics, applied mechanics/mechanics of materials, design, manufacturing, energy systems, or space technology.

Many mechanical engineering graduates assume positions of management, while others prefer a career along technical lines.

Aeronautical/ Aerospace Engineering:

Today's aeronautical engineers not only develop airplanes and rockets, they design high-speed trains and submarines, hydrofoils and wind turbines. Rensselaer graduates have helped to develop the engines that propel jumbo jets, the lunar lander for the Apollo spacecraft and the Rover for the Mars Exploration Mission.

At Rensselaer, you'll begin with core engineering, basic science, computing, and the fundamentals of flight. These will prepare you for further studies of fixed-wing and rotary-wing aircraft, heat transfer, lightweight structures, and propulsion.

Our programs place emphasis on research, design, development, and operation of flight vehicles for aeronautical and space applications. Undergraduates focus on fixed-wing and rotary-wing aircraft design as well as spacecraft design, experimental fluid dynamics, boundary layers and heat transfer, lightweight structures, and propulsion.

Graduates choose careers in industry or government laboratories, doing research in anything from high-speed aerodynamics or high-temperature strength of jet engine blades to the sale of aircraft and aircraft components.

Nuclear Engineering:

Nuclear engineering focuses on the methods, devices, and systems required for the peaceful use of nuclear engineering.

Areas of research pursued at Rensselaer include reactor engineering, health and medical physics, dosimetry, radiation transport, neutron scattering, and x-ray production.

Careers in Nuclear engineering include electricity production, food safety, medical diagnostics and treatment, space and underwater propulsion applications, and non-destructive testing for industry.

The US Department of Labor (<http://www.bls.gov/oco/ocos027.htm>) provides information on the various fields of engineering and statistics concerning salary and job outlooks.

[Nature of the Work](#)

[Training, Other Qualifications, and Advancement](#)

[Employment](#)

[Job Outlook](#)

[Projections](#)

[Earnings](#)

[Wages](#)

[Related Occupations](#)

[Sources of Additional Information](#)

EDUCATIONAL OBJECTIVES

1. Be engaged in professional practice at or beyond the entry level or enrolled in high quality graduate programs building on a solid foundation in engineering, mathematics, the sciences, humanities and social sciences, and experimental practice as well as modern engineering methods.
2. Be innovative in the design, research and implementation of systems and products with strong problem solving, communication, teamwork, leadership, and entrepreneurial skills
3. Proactively function with creativity, integrity and relevance in the ever changing global environment by applying their fundamental knowledge and experience to solve real-world problems with an understanding of societal, economic, environmental, and ethical issues.

A note about the MANE Office of Undergraduate Student Services:

Located in JEC 2012 you will find the MANE Office of Undergraduate Student Services. This office was established by the MANE department to assist undergraduates as they navigate through their four years at Rensselaer. Here you will find all necessary Registrar's Office forms and advice to help you complete them; assistance with Registration issues; help with curriculum and course selection; and even some candy to help you through your day. If after using this booklet you still have questions or concerns, stop by JEC 2012 or email Marie (dieffm@rpi.edu) or JoAnn (gaglij@rpi.edu).

Contact List for MANE

Department Head	Timothy Wei (weit@rpi.edu)	JEC 2049
Administrative Coordinator, Sr:	Colleen Carroll (carroc@rpi.edu)	JEC2049

Undergraduate Office		
Senior Student Services Administrator:	Marie Dieffenbach (dieffm@rpi.edu)	JEC 2012
Administrative Specialist:	JoAnn Gagliardi (gaglij@rpi.edu)	JEC 2012

Graduate Studies		
Associate Head:	Terry Blanchet (blanct@rpi.edu)	JEC 2002
Administrative Secretary:	Darwisah Burgess (burged@rpi.edu)	JEC 2002

Degree Clearance Officer		
Undergraduate:	Catalin Picu (picuc@rpi.edu) ME/AE	JEC2048
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Technical Support:		
	Bill Mielke (mielke@rpi.edu)	JEC 1201
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	Esther Rendano (rendae@rpi.edu)	JEC 5049
	Francis Sanchez (sanchf2@rpi.edu)	JEC 5049

General Links:

Advising and Learning Assistance Center: <http://alac.rpi.edu/setup.do>

Career Development Center: <http://www.rpi.edu/dept/cdc/>

Co-Op / Internships: <http://www.rpi.edu/dept/cdc/students/experience/coop/index.html>
Course Catalog: <http://www.rpi.edu/academics/catalog/>
International Programs: <http://undergrad.rpi.edu/update.do?catcenterkey=81>
Registrar Forms: <http://srfs.rpi.edu/update.do?catcenterkey=29>
Student Handbook: <http://www.rpi.edu/dept/doso/2006-2008RPI-StudentHandbook.pdf>
Student Information System: <http://sis.rpi.edu/>

Student/Advisor Responsibilities Pertaining to Academic Advising

Student's Responsibilities

- To know their advisor's office hours and advising schedule.
- To make an appointment and prepare for registration advising by reviewing the Catalog, Class-Hour Schedule, and Curriculum Advising & Program Planning (CAPP) Program.
- To formulate questions regarding curriculum, course selections, career options, etc.
- To be aware of their academic and personal needs and to seek assistance when needed.
- To understand that the role of their advisor is to advise them, not to make decisions for them. Each student needs to realize that it's his or her education at stake, and that, with advisement, *they* are ultimately responsible for making any final decisions.

Advisor's Responsibilities

- To be accessible to students throughout the year at posted office hours. If an advisor will be away from campus for an extended period of time, he or she should post the names and office locations of alternate advisors outside their offices, so that students will have other advising resources.
- To set aside designated times for registration advising and individual discussions.
- To be knowledgeable about current curriculum requirements, academic policies and procedures, referrals and resources on campus, and career opportunities in the major field.
- To guide students through academic programs that will complement their personal, educational, and professional interests.

Bachelor's Degree

In MANE, the minimum credit hour requirements for the Bachelor's Degree are the following:

- Mechanical Engineering – 129
- Aeronautical Engineering- 128
- Nuclear Engineering – 130
- Mechanical/Aeronautical dual degree – 134
- Mechanical/Nuclear dual degree – 132/133
- Mechanical/Biomedical dual degree – 139

Specific course requirements for MANE will be found at the end of this booklet in the degree templates for each major and dual major.

- The minimum grade point average (GPA) is **1.80**.
- To receive a baccalaureate degree, a student must have been admitted to the curriculum corresponding to the degree, must have satisfied the curriculum requirements, and must be enrolled in that curriculum at the time the degree is granted.
- The student must be registered full-time for a minimum of four semesters. Two semesters of part-time study at Rensselaer will be considered equivalent to one semester of full-time study. In addition, the student must complete a minimum of **48 credit hours** at Rensselaer, all of which will be applied to the baccalaureate degree. If a transfer student elects to study abroad or enroll in the co-op program, no more than 12 such credits may apply to the 48 needed for the bachelor's degree. The student's Plan of Study at Rensselaer must include at least 16 credits of courses above the 1000 level in the major field, or in an approved concentration.

ACADEMIC INFORMATION AND REGULATIONS

The Institute requires a degree candidate to earn the last 30 credits in courses completed on this campus or through a program formally recognized by the Institute. Transfer courses are limited to two courses or eight credits counting toward the student's last 30 credits and require approval of the director of the Advising and Learning Assistance Center.

Baccalaureate candidates must have passed all of the prescribed academic work and have satisfied the fee requirements. Candidates must also be in good academic and disciplinary standing. Undergraduate students on probation at the time of completion of course work may be required to meet certain stipulations for removal from probation. However, such requirements may be waived for those students whose cumulative GPAs satisfy the baccalaureate degree requirements. In general, a term's work with grades of not less than C will be required in programs arranged by the Committee on Academic Standing. The director of the Advising and Learning Assistance Center will state requirements to the students in writing.

Degree candidates must be registered during the semester in which they intend to graduate and must file a degree application with the registrar by the dates specified in the academic calendar. Students who previously applied for graduation but did not complete all their requirements on time must submit a new application specifying the new date of graduation.

Double Degrees

A student may become a candidate for a second baccalaureate degree when he or she has completed: (1) the equivalent of at least two terms (30 credit hours) of additional work beyond the requirements of a single degree, and (2) the courses in the department in which the student is registered and such other courses as are required for the second degree. ***From the MANE department's perspective, students considering a Double Degree may want to instead consider a Co-terminal or regular Masters degree. The ability to obtain a graduate level degree by taking 30 credits beyond the Bachelors degree should be seriously considered rather than taking 30 additional credits and still ending up with a Bachelors degree.***

Dual Majors

Undergraduate students who fulfill all the degree requirements for two curricula and who have met the conditions below will have completed a dual major. They will receive one diploma noting both majors. (1) The student must designate a first-named and second-named major in writing at least one semester prior to graduation, and have the appropriate department(s) approve this designation prior to filing the dual major form with the registrar. (2) Each student will be assigned an adviser in each department who will monitor progress towards degrees in that department. (3) The degree clearance officer in the department will certify that the student has met the degree requirements in that department. (4) The 24-credit-hour mathematics/science requirement and the 24-credit-hour humanities and social sciences requirement will satisfy the Institute requirements for both majors.

The MANE Department currently has established degree templates for the following dual majors:

- Mechanical Engineering and Aeronautical Engineering
- Mechanical Engineering and Nuclear Engineering
- Mechanical Engineering and Biomedical Engineering

Please note that these are NOT the only possible dual degree combinations that our students have successfully completed. These are the dual programs we currently have approved templates for. If you wish to pursue a different dual major (for example, Mechanical Engineering and Management), you should first consult with your academic advisor in MANE, and then meet with an advisor in the department you are considering for your dual major and see if the two majors can be completed within 8 semesters. Ideally, you will investigate the possibility of pursuing a dual major within your first year to maximize the possibility of completing the dual degree within 8 semesters.

For the degree templates for the dual majors listed above, and for any further questions, contact Marie Dieffenbach in the MANE Office of Undergraduate Student Services at dieffm@rpi.edu.

Required Courses and Prerequisites

At the end of this booklet, you will find the following:

- Degree templates for Mechanical Engineering, Aeronautical Engineering, and Nuclear Engineering and the three dual majors listed above
- Flow Charts of the required courses for each major including prerequisites and co-requisites

All MANE Department detailed course descriptions can be found in the online Course Catalog, under the prefix “MANE”:

<http://catalog.rpi.edu/content.php?catoid=8&navoid=187>

Registration

When: Registration for the Spring semester generally occurs in early November. Registration for the Fall semester occurs the preceding Spring, usually in early April. Exact dates are included in the [Academic Calendar](#).

How: Use the [Student Information System \(SIS\)](#) to register for your courses.

Where: There are no assigned rooms for registration. You can register for your classes using any computer with Internet access.

Time tickets

As a student here at Rensselaer, you are issued a "time ticket," which assigns you a specific window of time during which you may register for the next semester. Your time ticket will be sent to your RPI email address, 2 - 3 weeks before registration.

Your registration time is assigned based on the number of credit hours you have **earned** as a student. The table to the right shows the range of earned credit hours associated with each class. Please note that classes which are still in progress or courses which have been graded as "incomplete" do *not* count towards earned credits, nor do transferred courses and Advanced Placement (AP) credit.

School of Engineering

Freshman	0 - 30
Sophomore	31 - 60
Junior	61 - 95
Senior	96 - 128

You should receive your time ticket via e-mail approximately four weeks prior to the scheduled registration period. In addition to making the registration assignment, this e-mail message notifies you of any existing holds which may prevent you from registering if you do not resolve them.

SAM holds

Students are required to meet with their faculty advisor once per year. If you do not meet with your advisor once per year, a Student Advisor Meeting (SAM) hold will be placed on your account and you will be prevented from registering when your time ticket is up. To resolve this situation, contact your academic advisor. If they are unavailable after repeated attempts to contact them, please contact JoAnn Gagliardi in MANE's Office of Undergraduate Student Services at gaglij@rpi.edu.

CAPP reports

Your Curriculum Advising and Program Planning (CAPP) report is a planning and advising tool -- available only to undergraduate students -- that allows you to track the progress you're making toward your Bachelor's Degree. You can access your CAPP report via the main menu of the [Student Information System \(SIS\)](#).

FAQs - Registration

What do I do if a class I want to register for is full?

The MANE Department strives to accurately anticipate how many seats we need to have available for all of the courses we offer; however, because of the size of the department and classroom size restrictions, sometimes you may be closed out of a course you would like to take when you attempt to register. If this happens, we do maintain wait lists for classes to ensure that students who need certain courses in order to graduate on time are able to take them.

Students are NOT prevented from graduating on time due to closed sections of courses! It is for this reason that we use a wait list system for certain courses to ensure fairness.

If you are unable to register for a course because it is full, please see the following staff for information and to be placed on a wait list:

- For CORE Engineering courses (course prefix is ENGR) - Go to the CORE office in JEC 3018
- For TF II, TF lab sections and Mod Con - Please see Hollis McEvelly in JEC 2049 or email her at mcevih@rpi.edu
- For all other MANE prefix courses - Please see JoAnn Gagliardi or Marie Dieffenbach in JEC 2012 or email them at gaglij@rpi.edu or dieffm@rpi.edu

Please contact JoAnn or Marie if you have a Registrar's hold (NOT Student-Advisor-Meeting (SAM) related - in those cases, you need to contact your academic advisor in order to be cleared) and are unable to register for classes at all. If you have a financial or other hold and need to take certain courses in order to graduate on time, we need to make sure we save you a slot in those classes.

How do I add/drop a course?

You may use the [Student Information System \(SIS\)](#) to add or drop courses. Generally speaking, from the beginning of the semester, you will have **two weeks to add** courses and **eight weeks to drop** them. Please refer to the Academic Calendar for specific add and drop deadline dates.

If you wish to petition to add or drop classes after the published deadline, you may do so using a [Late Add/Drop Form](#). Please note that after the instructor's signature (if required), the form must also be approved by the Advising and Learning Assistance Center.

MANE Department Professional / Student Organizations

American Nuclear Society (ANS)

Faculty Advisor: Peter Caracappa

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)

Faculty Advisor: Catalin Picu

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.

Design Build Fly Team (DBF)

Faculty Advisor: Matt Oehlschlaeger

Design/Build/Fly (DBF) is an international aircraft design competition in which student teams from universities across the world design, build, and fly a remote controlled aircraft. Each year the American Institute for Aeronautics and Astronautics (AIAA) presents a new design challenge requiring a completely new aircraft to be created. The competition is sponsored by the AIAA, Cessna Aircraft and Raytheon Missile Systems and is focused on the development of unmanned aerial vehicles. You can find out more about the competition at the [Design/Build/Fly](#) website.

RPI's team functions as an extra-curricular activity that typically meets twice per week in the design phase and as often as possible during the build and test phases. RPI DBF made its first appearance at the 2006-2007 competition, and recently broke into the Top 10 with a 9th place finish (out of 69 teams) in the 2009-2010 competition.

Hybrid Car

Faculty Advisor: Tim Wei

An outgrowth of the Formula SAE Program, the Formula Hybrid Program emphasizes drive train innovation and fuel efficiency in a high performance green technology application.

Rensselaer Aeronautical Federation (RAF)

Kevin Mossey: President (mossek@rpi.edu)

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.

Pi Tau Sigma

Faculty Advisor: Theodorian Borca-Tasciuc

Pi Tau Sigma, the international mechanical engineering honor society, was founded in March 1915 to recognize outstanding students who display both distinguished scholarship in technical fields and exemplary character. Pi Tau Sigma is highly regarded within industry and the academic world, and has

grown to include 150 chapters in universities across the country. The Rensselaer Phi chapter was chartered in 1940, and is currently working towards hosting programs targeted towards freshmen and sophomores concerning research opportunities, as well as mentoring. Please visit our website at <http://pts.union.rpi.edu/> for more information.

Society of Auto Engineers (SAE)

Faculty Advisor: Matt Oehlschlaeger

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.

Solar Car

Faculty Advisor: Michael Jensen

The RPI Solar Car Racing Team is designing a completely solar-powered car for entry in the [North American Solar Challenge](#) and the cross-Australia [World Solar Challenge](#).

Undergraduate Research Project (URP)

Want to work on rocket engines?

Interested in Nanotechnology?

Curious about the next generation of Nuclear Reactors ?

You should do an Undergraduate Research Project (URP) in the MANE department!

How to find a URP:

- 1) Find a professor whose research area interests you. You can do this by checking out the faculty pages of the MANE website: <http://www.eng.rpi.edu/mane/faculty.cfm>

Each faculty member's profile will list their main areas of research. Some faculty members have their own homepages with much more details about their work. Do your homework!

- 2) Once you have picked someone who you would like to work with, go to see them during their office hours or email them to make an appointment to see them. It is much more difficult to turn someone down in person!
- 3) When you meet with the professor, think of it as a job interview; bring your resume and transcript, and be prepared to talk about what excites you about their research and how your interests and experience can contribute to the project.
- 4) Once a faculty member agrees to have you work with them, stop by JEC 2012 to complete the URP paperwork. You may complete a URP under one of the following circumstances:
 - a. For pay - the amount will be worked out between you and the faculty member. If you receive Federal Work Study funds as part of your financial aid package, you may be able to complete those work hours through your URP.
 - b. For credit - this is done as an Independent Study and will fulfill either Free Elective requirements OR possibly Technical Elective requirements, depending on your major.
 - c. For the experience of getting to work with a world class researcher (great for your resume!).

Additional information about the Undergraduate Research Program and downloadable application forms may be found here: <http://undergrad.rpi.edu/update.do?catcenterkey=77>

Minors

Minors are NOT available in either Mechanical Engineering or Aeronautical Engineering. Students interested in a minor in Nuclear Engineering may choose a minor focused on either Reactor Engineering or Medical Applications of Radiation Technology. For detailed information on Nuclear Engineering minors, please contact Marie Dieffenbach in the MANE Office for Undergraduate Student Services at dieffm@rpi.edu.

International Programs **Study Abroad in MANE**

The Study Abroad opportunity available at Rensselaer is an excellent experience for both professional and personal growth and the department fully supports students wishing to take advantage of this wonderful opportunity.

Information on the various Study Abroad programs, application materials, and Frequently Asked Questions about the program may be found here on the Office for International Programs site : <http://undergrad.rpi.edu/update.do?catcenterkey=81>

Once students have contacted the Office for International Programs, for MANE-specific information, Professor Catalin Picu (picuc@rpi.edu) and Marie Dieffenbach (dieffm@rpi.edu) have been designated the Study Abroad contacts for the MANE Department.

When considering Study Abroad options, planning is required to minimize the impact on the graduation plans of the participant. In most situations, the time away does not delay graduation.

Depending on your AP and transfer credit amounts, your choice of major, dual major or coterminal plans, and in consultation with your academic advisor, you may choose to study abroad either in your sophomore year or junior year.

For MANE-specific course equivalents, please check the “Transfer Equivalency Catalog” listing, which can be found on the Log In page of the Student Information System (SIS): <http://sis.rpi.edu/>

Students are encouraged to choose from this list of pre-approved courses. If you are considering coursework that does not appear on the pre-approved list, please provide the course description from the university abroad and if possible a syllabus for that course. A prior approval form has to be completed and signed by the International Adviser of the Department. The forms are available on the Registrar’s website http://www.rpi.edu/dept/srfs/transfer_credit_approval.pdf, or from the MANE Undergraduate Student Services Office in JEC 2012.

In addition, students may transfer courses that will be used as Free electives or Humanities and Social Sciences courses. Students are encouraged to take abroad Humanities and Social Science (H&SS) courses

or Free electives which are above the 1000 level here at RPI. Courses that the host university considers to be junior level or senior level courses can usually be transferred in to RPI.

Note: The system at RPI is based on 4 credit hour courses while many foreign universities rely on 3 credit courses so one can wind up one credit short per course. So you may wind up taking 2 courses to fill the credit hour requirement for one course at RPI with the extra credits going to 'Free Elective' as a split course on the CAPP report.

In all cases, prior approval of transfer credit is encouraged and from a student perspective, this prior approval is the 'guarantee' they should have that coursework taken abroad will count towards their graduation requirements at RPI.

Mechanical, Aerospace, and Nuclear Engineering Department

Five Year Co-terminal Degree Program Guidelines

- The five year co-terminal 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. For others, completion of the program may require more than five years.

Rensselaer undergraduates may apply to the program in the Spring or Fall semester of their junior year, once they have attained 90 credits (in progress or earned) of coursework towards their undergraduate degrees. Students must apply to the co-terminal program by the end of their junior year; applications from seniors will not be accepted.

Students who have considerable interest in and/or engagement with undergraduate research will likely find the Master of Science (M.S.) degree most appropriate, since there is a thesis associated with it. Alternately, other students may find the Master of Engineering (M.Eng.) more suitable, since it can be completed by taking 30 credits of courses.

MANE students may obtain application guidelines and materials in the MANE Office for Undergraduate Student Services (JEC 2012).

- Minimum requirements for admission to the program:
 - GPA of 3.3
 - Two letters of recommendation : Reference form may be accessed at <http://www.rpi.edu/dept/admissions/resources/GraduateRecommendation.pdf>
Forms may be scanned and emailed to Marie at dieffm@rpi.edu, or faxed to 518-276-3055, or dropped off in JEC 2012
 - Statement of purpose and goals – this should include your reasons for pursuing graduate study, your intended use of your graduate degree, and your preparation/qualifications for graduate work
 - Resume
 - Graduate Plan of Study – student should meet with their undergraduate academic advisor for assistance in graduate course selection for the Plan of Study, which can be downloaded at <http://www.rpi.edu/dept/grad/docs/pos02.PDF>
- Advising:
Upon acceptance into the program, the student will have the opportunity to switch his or her academic advisor, in cases where the student's area of interest for graduate studies differs from that of the student's undergraduate advisor.

Students are required to meet with their advisors (and update the Graduate Plan of Study) at least once per semester, from the time they are accepted into the co-terminal degree program until the time they are awarded their degrees.

Once accepted into the program, the student must maintain a GPA of 3.0 in courses used towards their graduate degree, as required by the graduate school.

Graduate Study in MANE

Areas of Study/Degrees	<ul style="list-style-type: none"> ▪ Aeronautical Engineering, MS, MEng, PhD ▪ Engineering Physics, MS, PhD ▪ Mechanical Engineering, MS, MEng, PhD ▪ Nuclear Engineering, MS, MEng, PhD 	Typical Degree Requirements <ul style="list-style-type: none"> ▪ MS, 30 credits (24 course work, 6 thesis) ▪ MEng, 30 credits coursework ▪ PhD 42 credits beyond MS (72 beyond BS) + dissertation
Research Areas	<p>We offer a wide range of disciplines that are sufficiently flexible to accommodate individual interests. The main research interests are separated into several broad areas which includes:</p> <div style="display: flex; justify-content: space-between;"> <ul style="list-style-type: none"> ▪ Multiscale/Computational Modeling ▪ Nanostructured Materials and Properties ▪ Aerodynamics ▪ Propulsion ▪ Nuclear Physics / Nuclear Reactor Design ▪ Advanced Nuclear Materials <ul style="list-style-type: none"> ▪ Heat Transfer and Energy Conversion ▪ Fluid Mechanics (Computational, Theoretical, and Experimental) ▪ Medical Imaging, Health Physics ▪ Dynamics and Vibrations ▪ Manufacturing ▪ Fission Systems & Radiation Transport </div>	
Interdisciplinary Centers	<div style="display: flex; justify-content: space-between;"> <ul style="list-style-type: none"> ▪ Scientific Computation Research Center (SCOREC) ▪ Center for Automation Technologies (CATS) ▪ Flexible Manufacturing Center (FMC) ▪ Center for Integrated Electronics & Electronics Manufacturing (CIEEM) <ul style="list-style-type: none"> ▪ Center for Fuel Cell and Hydrogen Research (CFCH) ▪ Computational Center for Nanotechnology Innovations (CCNI) ▪ Center for Multiphase Research </div>	
Admission	<ul style="list-style-type: none"> ▪ Submit on-line at: http://admissions.rpi.edu/graduate/ ▪ Deadlines are January 1 for Summer and Fall admissions and August 15 for Spring admission <p>You will need: a well-written Statement of Background & Goals; official transcripts from all colleges attended; at least 2 letters of recommendation (preferably from faculty); official GRE scores (general test only) and official TOEFL or IELTS scores (required for all international applicants); resume; non-refundable application fee.</p>	
Financial Aid/Tuition	<ul style="list-style-type: none"> ▪ Financial aid is available for qualified students in the form of Fellowships, Teaching Assistantships and Research Assistantships. ▪ Apply for financial aid through the admission application, <i>no separate form is required</i>. ▪ Awards are made based on merit, not on need, and priority is given to doctoral candidates. ▪ International students are eligible for all forms of aid except a few Federal programs that require US citizenship. ▪ Tuition for the 2010-2011 academic year is \$38,100; fees and insurance are \$1,938; Living expenses, books and supplies can vary widely but are estimated at approximately \$10,400. RPI's scholarships fully cover the cost of tuition and provide a standard stipend for 9-months. The standard stipend is \$17,500 for 9-months academic year. For Research Assistants, summer stipend may be available at a level set by the student's research advisor. 	
Contact Info	<p>Ms. Darwisah Burgess Phone: 518-276-6432 Email: burged@rpi.edu http://www.rpi.edu/dept/mane</p>	

Aeronautical Engineering

FIRST YEAR

FALL

SPRING

credit hours			credit hours		
CHEM-1100	Chemistry I	4	ENGR-1300	Engineering Processes ^{1,2}	1
ENGR-1100	Intro to Engineering Analysis	4	MANE-2060	Fundamentals of Flight	4
ENGR-1200	Eng Graphics & CAD ¹	1	MATH-1020	Calculus II	4
MATH-1010	Calculus I	4	PHYS-1100	Physics I	4
	Hum. or Soc. Sci. Elective	4		Hum. or Soc. Sci. Elective	4

SECOND YEAR

FALL

SPRING

ENGR-2530	Strength of Materials	4	ENGR-2050	Intro to Engineering Design	4
MATH-2400	Intro Differential Equations ⁷	4	ENGR-2090	Engineering Dynamics	4
PHYS-1200	Physics II	4	ENGR-2250	Thermal & Fluids Eng. I	4
	Hum. or Soc. Sci. Elective	4	CSCI-1190	Beginning C Programming for Engineers	1
			MATH-2010	Multivariable Calculus ⁷	4

THIRD YEAR

FALL

SPRING

ENGR-2600	Modeling & Analysis of Uncertainty	3	MANE-4050	Modeling & Control of Dynamic Systems ⁴	4
MANE-4060	Aerospace Structural Analysis	3	MANE-4900	Aeroelasticity and Structural Vibration	3
MANE-4070	Aerodynamics I	3	MANE-4920	Aerospace Structures and Controls Laboratory	2
MATH-4800	Numerical Computing	4		Hum. or Soc.Sci. Elective	4
	Hum. or Soc.Sci. Elective	4		Professional Development II ³	2

FOURTH YEAR

FALL

SPRING

MANE-4080	Propulsion Systems	4		Capstone Design Elective ⁶	3
ENGR-4010	Professional Develop. III ⁴	1		Free Elective	4
MANE-4800	Boundary Layers & Heat Transfer	3		Free Elective	4
MANE-4910	Fluid Dynamics Lab	2		Free Elective	4
	Flight Mechanics Elective ⁵	4			

¹These required courses may be taken in any order.

²Alternative: ENGR-1300 Introduction to Engineering Electronics

³This course is fulfilled from a published list at the start of each semester.

⁴Can be taken either semester.

⁵Choice of MANE-4090 Flight Mechanics, MANE-4100 Spaceflight Mechanics, MANE-4200 Rotorcraft Performance, Stability & Control.

⁶Choice of MANE-4230 Fixed-Wing Aircraft Design, MANE-4850 Transatmospheric Vehicle Design, MANE-4860 Intro to Helicopter Design.

⁷Math 2010 and Math 2400 may be taken in either semester of the second year.

Mechanical Engineering

FIRST YEAR

FALL

SPRING

credit hours			credit hours		
ENGR-1100	Intro. to Eng. Analysis	4	ENGR-1300	Engineering Processes ¹	1
ENGR-1200	Eng. Graphics & CAD ¹	1	ENGR-1600	Materials Science for Eng.	4
CHEM-1100	Chemistry I	4	MATH-1020	Calculus II	4
MATH-1010	Calculus I	4	PHYS-1100	Physics I	4
HASS	HASS Elective	4	HASS	HASS Elective	4

SECOND YEAR

FALL

SPRING

ENGR-2530	Strength of Materials	4	ENGR-2050	Intro to Engineering Design	4
MATH-2400	Intro to Differential Equations ²	4	ENGR-2090	Engineering Dynamics	4
PHYS-1200	Physics II	4	ENGR-2250	Thermal and Fluids Eng. I	4
HASS	HASS Elective	4	CSCI- 1190	Beginning C Prog. for Eng.	1
			MATH-2010	Multivariable Calculus & Matrix Algebra ²	4

THIRD YEAR

ENGR-2350	Embedded Control	4
ENGR-2600	Modeling & Analysis of Uncertainty	3
ENGR-4300	Electronic Instrumentation	4
MANE-4050	Modeling & Control of Dynamic Systems ⁵	4
	Mechanical Engineering Core Module ³	6
	Mechanical Engineering Core Module ³	6
HASS	HASS Elective	4
	Professional Develop. II ⁴	2

FOURTH YEAR

ENGR-4010	Professional Development III ⁶	1
MANE-4260	Design of Mechanical Eng. Systems ⁵	3
	Technical Elective	3
	Technical Elective	3
	Technical Elective	3
HASS	HASS Elective	4
	Free Elective	4
	Free Elective	4
	Free Elective	4

¹These required courses may be taken in any order.

² Math-2010 & Math-2400 may be taken in either semester of the second year.

³Choice of Mechanical Design Module and Thermal & Fluids Module. Both modules are required for graduation; each module may be taken in either

semester. The Mechanical Design Module consists of MANE-4030 Elements of Mechanical Design and MANE-4040 Mechanical Systems Laboratory.

The Thermal & Fluids Module consists of MANE-4010 Thermal & Fluids Engineering II and MANE-4020 Thermal & Fluids Engineering Laboratory. Third year courses may be taken in either semester, and the courses within each module do not have to be taken together.

⁴Students choose either PSYC-4170 or STSS-4840 to fulfill this requirement. It must be completed before MANE-4260.

⁵Can be taken either semester.

⁶Can be taken either semester senior year.

Fall 2010 – Class of 2014

Nuclear Engineering

FIRST YEAR

FALL

credit hours

SPRING

credit hours

ENGR-1100	Intro to Eng. Analysis	4	ENGR-1200	Eng. Graphics & CAD	1
CHEM-1100	Chemistry I	4	ENGR-1600	Materials Science for Engineers	4
MANE-1961	Intro to Nuclear Eng. ²	1	MATH-1020	Calculus II	4
MATH-1010	Calculus I	4	PHYS-1100	Physics I	4
HASS	HASS Elective	4	HASS	HASS Elective	4
		17			17

SECOND YEAR

FALL

SPRING

MATH-2400	Intro Differential Equations ⁶	4	CSCI-1190	Beginning C Prog. for Engineers	1
PHYS-1200	Physics II	4	ENGR-2050	Intro. To Eng. Design ¹	4
HASS	HASS Elective	4	MANE-2830	Nucl. Phen. for Eng. Appl.	4
	Free Elective 1	4	MATH-2010	Multivariable Calculus ⁶	4
			HASS	HASS Elective	4
		16			17

THIRD YEAR

FALL

SPRING

ENGR-2250	Thermal and Fluids Eng. I	4	ENGR-2600	Modeling & Analysis of Uncertainty	3
MANE-4350	Nuclear Instrumentation and Measurement	3	MANE-4400	Nuclear Power Sys. Eng.	4
MANE-2400	Fundamentals of Nucl. Eng.	4	MANE-4470	Radiological Engineering	3
HASS	HASS Elective	4	MANE-4480	Physics Of Nuclear Reactors	4
				Professional Development II ⁵	2
		15			16

FOURTH YEAR

FALL

SPRING

MANE-4050	Mod. & Control of Dyn. Sys.	4	MANE-4390	NEEP Senior Design Project II	2
MANE-4370	Nuclear Engineering Lab	4	MANE-4440	Critical Reactor Laboratory	3
MANE 4380	NEEP Senior Design Project I	1		Technical Elective ⁴	3
ENGR-4010	Professional Dev. III ³	1		Restricted (NE) Elective II	3
	Restrictive (NE) Elective I	3		Free Elective III	4
	Free Elective II	4			
		17			15

¹ Includes Professional Development I.

² Other 1-credit Engineering Exploration courses, such as ENGR-1300 may be substituted.

³ May be taken either semester Senior year.

⁴ Any course in Engineering or Science at the 2000 level or higher.

⁵ Students choose either PSYC 4170 or STSS 4840 to fulfill this requirement.

⁶ Math 2010 and Math 2400 may be taken in either semester of the second year.

Dual Majors in Mechanical and Aeronautical Engineering **(Class of 2012 and later)**

Dual major programs lead to a single baccalaureate degree embracing two fields. Special programs which can be completed in 8 semesters have been developed.

Dual Aeronautical/Mechanical Degree:

- Satisfy all Aeronautical Engineering program requirements
- Choose the following as Free Electives:
 - ENGR 1600 – Materials Science for Engineers
 - ENGR 2350 – Embedded Control
 - ENGR 4300 – Electronic Instrumentation
- Take MANE 4040 Mechanical Systems Laboratory, and MANE 4030 Elements of Mechanical Design.
- This adds up to minimum total credit hours of 130 for the dual degree of BS in Aeronautical and Mechanical Engineering.

Dual Mechanical/Aeronautical Degree:

The easy way to make certain that requirements for the dual degree in ME/AE are met is to declare for a Dual Major in Mechanical Engineering and Aeronautical Engineering (if that is your preferred order), but to follow the program for the Dual Major in Aeronautical Engineering and Mechanical Engineering as described above.

If you have any additional questions, please consult with your advisor!

Mechanical/Biomedical Eng. Dual Degree

FIRST YEAR

FALL

credit hours

SPRING

credit hours

ENGR-1100	Intro to Eng. Analysis	4	ENGR-1300	Engineering Processes ¹	1
CHEM-1100	Chemistry I	4	ENGR-1600	Materials Science for Engineers	4
ENGR-1200	Eng. Graphics & CAD ¹	1	MATH-1020	Calculus II	4
MATH-1010	Calculus I	4	PHYS-1100	Physics I	4
HASS	HASS Elective	4	BIOL-2120	Intro Cell and Molecular Biology	4
		17			17

SECOND YEAR

FALL

SPRING

MATH-2400	Intro Differential Equations	4	ENGR-2250	Thermal & Fluids Eng. I	4
PHYS-1200	Physics II	4	ENGR-2050	Intro. To Eng. Design ²	4
ENGR-2530	Strength of Materials	4	BMED-2961	Biomaterials Sci & Eng	4
HASS	HASS Elective	4	BMED-4540	Biomechanics	4
CSCI-1190	Beginning C Programming	1	ENGR-2090	Engineering Dynamics	4
		17			20

THIRD YEAR

FALL

SPRING

ENGR-4300	Electronic Instrumentation	4	ENGR-2350	Embedded Control	4
ENGR-2600	Modeling & Analysis of Uncertainty	3	BMED-2200	Modeling of Biomed Systems	4
	Professional Development II ³	2	HASS	HASS Elective	4
BIOL-4290	Human Physiological Sys	4	MANE-4010	Thermal & Fluids Eng II	4
HASS	HASS Elective	4	MANE-4020	Thermal & Fluids Eng Lab	2
		17			18

FOURTH YEAR

FALL

SPRING

MANE-4050	Mod. & Control of Dyn. Sys.	4	BMED-4600	Biomedical Eng Design ⁴ OR	
MANE-4030	Elements of Mech Design	4	MANE-4260	Design of Mechanical Systems ⁴	3
MANE-4040	MECH Systems Lab	2	BMED-4240	Tissue-Biomaterial Interactions	3
			BMED-4500	Advanced Systems Physiology	4
BMED-4010	Bioengineering Lab	4	MATH-2010	Multivariable Calculus and Matrix Algebra	4
HASS	HASS Elective	4	ENGR-4010	Professional Development III	1
		18			15

¹ These required courses may be taken in any order.

² Includes Professional Development I

³ Students choose **either** PSYC 4170 **or** STSS 4840 to fulfill this requirement.

⁴ Students may choose either Capstone Design course; however the project pursued will have to be interdisciplinary in nature, reflecting elements of both Biomedical and Mechanical Engineering regardless of which course is chosen to fulfill this requirement.

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Mechanical/Nuclear Engineering Dual Degree

FIRST YEAR

FALL

credit hours

SPRING

credit hours

ENGR-1100	Intro to Eng. Analysis	4	ENGR-1300	Engineering Processes	1
CHEM-1100	Chemistry I	4	ENGR-1600	Materials Science for Engineers	4
ENGR-1200	Eng. Graphics & CAD	1	MATH-1020	Calculus II	4
MATH-1010	Calculus I	4	PHYS-1100	Physics I	4
HASS	HASS Elective	4	HASS	HASS Elective	4
		17			17

SECOND YEAR

FALL

SPRING

MATH-2400	Intro Differential Equations ¹	4	CSCI-1190	Beginning C Prog. for Engineers	1
PHYS-1200	Physics II	4	ENGR-2050	Intro. To Eng. Design ²	4
ENGR-2530	Strength of Materials	4	MANE-2830	Nucl. Phen. for Eng. Appl.	4
HASS	HASS Elective	4	MATH-2010	Multivariable Calculus ¹	4
			ENGR-2090	Engineering Dynamics	4
		16			17

THIRD YEAR

FALL

SPRING

ENGR-2250	Thermal and Fluids Eng. I	4	ENGR-2350	Embedded Control	4
ENGR-2600	Modeling & Analysis of Uncertainty	3	MANE-4480	Physics Of Nuclear Reactors	4
MANE-2400	Fundamentals of Nucl. Eng.	4	HASS	HASS Elective	4
	Mechanical Eng Core Module ³	6		Mechanical Eng Core Module ³	6
		17			18

FOURTH YEAR

FALL

SPRING

MANE-4050	Mod. & Control of Dyn. Sys.	4	MANE-4390	NE Senior Design Project II	2
MANE-4370	Nuclear Engineering Lab	4	MANE-4440	Critical Reactor Laboratory	3
MANE 4380	NE Senior Design Project I ⁴	1	MANE-4470	Radiological Engineering	3
	Professional Dev. II ⁵	2	HASS	HASS Elective	4
	ME or NE Elective	3	ENGR-4010	Professional Development III	1
ENGR 4300/ MANE 4350	Electronic Instrumentation OR Nuclear Inst. & Meas. ⁶	4/3			
		17/ 18			13

¹ Math 2010 and Math 2400 may be taken in either semester of the second year.

² Includes Professional Development I

³ Choice of Mechanical Design Module and Thermal & Fluids Module. Both modules are required for graduation; each module may be taken in either semester. The Mechanical Design Module consists of MANE 4030 Elements of Mechanical Design and MANE 4040 Mechanical Systems Laboratory. The Thermal & Fluids Module consists of MANE 4010 Thermal & Fluids Engineering II and MANE 4020 Thermal & Fluids Engineering Laboratory. Third year courses may be taken in either semester, and the courses within each module do NOT have to be taken together.

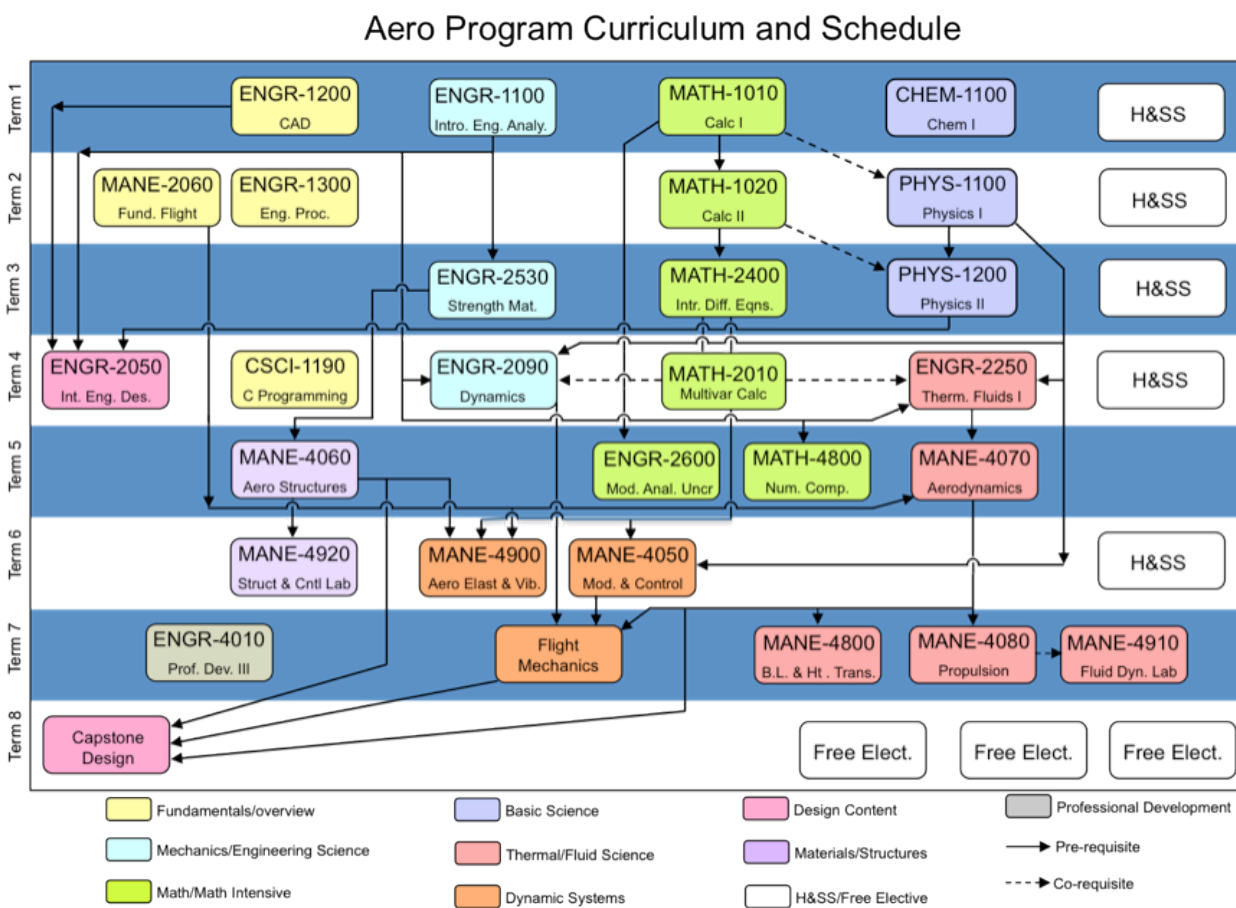
⁴ The NE Senior Design Project must be interdisciplinary NE and ME for dual degree students.

⁵ Students choose either PSYC 4170 or STSS 4840 to fulfill this requirement.

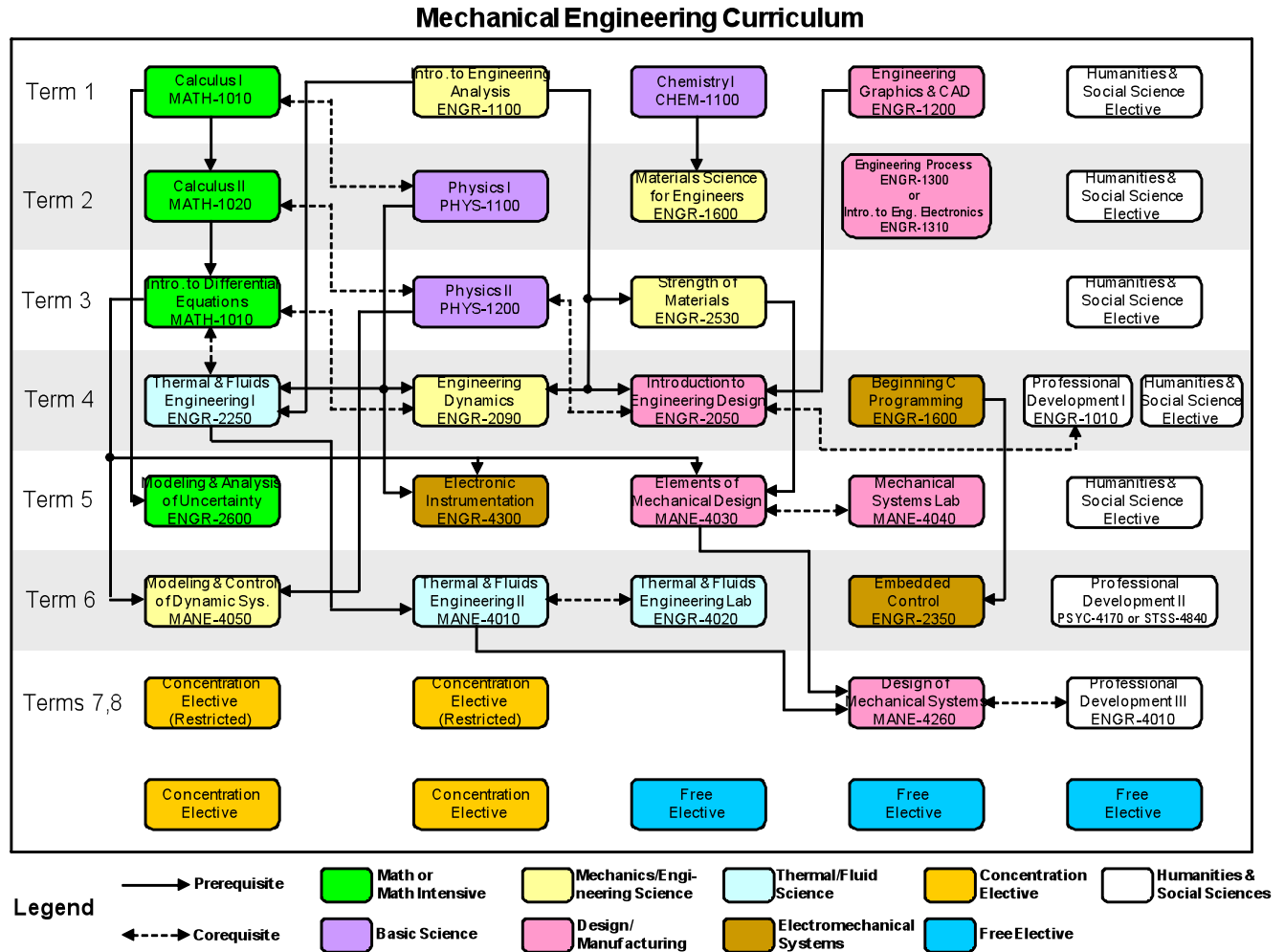
⁶ Students choose either ENGR 4300 or MANE 4350

Fall 2010 – Class of 2014

Aeronautical Engineering Curriculum Flow Chart



Mechanical Engineering Curriculum Flow Chart



Nuclear Engineering Curriculum Flow Chart

