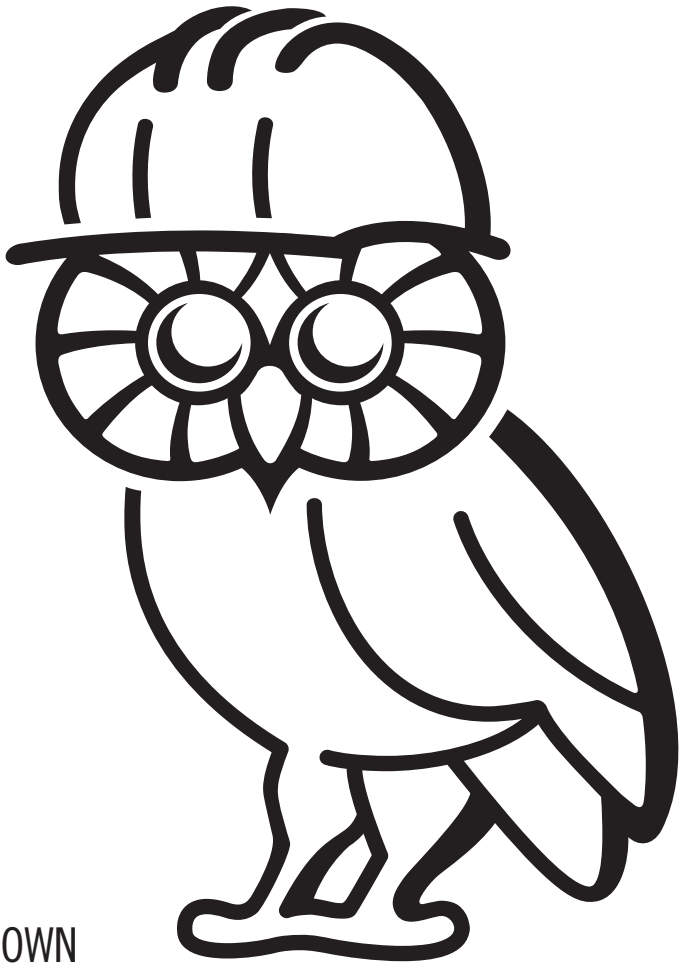
ADVISING BOOKLET

FALL 2015



GEORGE R. BROWN
SCHOOL OF ENGINEERING

UNDERGRADUATE ADVISING

FALL 2015

This advising booklet provides only the first step toward the design of your Rice education. Your divisional advisor is a crucial ally who will help tailor a plan of study that best fits your inclinations and aspirations.

Student-faculty interaction is a trademark of Rice education. Consult regularly with your divisional advisor, one of the many faculty members waiting to work with you in the coming years.

CONTENTS

This booklet is intended to give you, as a freshman engineering student, an overview of the undergraduate degree programs in the School of Engineering. It includes some general advice and contact information along with degree summaries and sample degree plans for each engineering degree.

The degree summaries and sample plans will help you compare majors and provide a starting point for mapping out your own course schedule. The booklet is intended as a supplement to, not a replacement for, other department advising materials. Although we have worked hard to make this booklet as accurate as possible, the information in the General Announcements is the final authority on degree requirements and academic regulations at Rice.

Two Kinds of Faculty Academic Advising

Every incoming engineering student is assigned an Engineering Divisional Advisor—a faculty member from the School of Engineering who is associated with your residential college and who provides academic advising to students considering engineering majors. You should consult with your Divisional Advisor prior to registering for classes each semester.

When you declare your major, the department will assign you to an academic advisor within the department. Your departmental advisor will help you decide what courses you will take to satisfy your degree requirements and when you should take them.

The School of Engineering strongly encourages students planning engineering majors to declare their majors in the spring semester of their freshman year before registering for the sophomore year. Declaring a major in the freshman year should not discourage you from continuing to discuss degree plans with as many advisors as you wish (divisional or departmental, inside or outside of Engineering). Many students are looking at more than one field in their freshman year. However, if you wait until the end of the sophomore year to choose a major, it may be difficult to complete a degree in four years.

Advanced Placement Credit and the Sample Degree Plans

Many entering freshmen come to Rice with substantial Advanced Placement course credit, particularly in math, physics and chemistry. Talk with your Divisional Advisor and the instructors in the relevant courses if necessary, to determine whether your background has prepared you for more advanced courses at Rice. The sample degree plans in this booklet assume that you have no AP or transfer credit. Each sample is also only one of many possible schedules. Talk with your Divisional Advisor and a department academic advisor if necessary, to begin developing a degree plan that fits your situation and goals.

Freshman Writing Intensive Seminars

Unlike all other courses at Rice, you are assigned a specific semester in which to take a Freshman Writing Intensive Seminar. Therefore, if you plan to pursue an Engineering major, you need to carefully consider these courses during registration to make sure that you are able to get into a section that does not have a time conflict with courses that are required for your major.

In all of the sample schedules throughout this book, the FWIS course is listed in the Fall of the Freshman year and there is at least one Distribution course listed in the Spring of the Freshman year. If you are assigned to take an FWIS in the Spring, you should swap the semesters of the FWIS and a Distribution course in the Freshman year. For further information about the FWIS requirements, please visit http://pwc.rice.edu/.

Selecting Courses in the Major

You will see on many of the degree summaries that you often have choices for courses. For example, a degree may require physics, but allow you to choose either PHYS 101 or PHYS 111. Several of the sample plans or degree summaries note these choices so that you are aware of your options. Sometimes a department will specify a preferred course, sometimes not. Consult other department advising materials and/or talk to the department advisors for more information.

International Engineering

Every department in the School of Engineering strongly encourages its students to incorporate international experiences into their education at Rice. Academic advisors in your department can help you determine appropriate course work for study abroad and the Office of Study Abroad can help make arrangements.

Information on research and industrial internships abroad can be found at http://engr.rice.edu/engineersabroad/. Financial support is available for some of these opportunities. See the website for more details. Many other opportunities for international experiences are available through Engineers Without Borders (ewb.rice.edu) and Beyond Traditional Borders (btb.rice.edu). If you are interested in making a difference in people's lives through these organizations, see their web sites for more information.

Rice Center for Engineering Leadership

A career in engineering will require you to become a key member of an engineering team, a team leader, or maybe even to start a business based on your ideas. The Rice Center for Engineering Leadership (RCEL) will prepare you for these challenges with the RCEL Certificate in Engineering Leadership. You'll get a great start in engineering design and team work in ENGI 120, acquire hands-on experience leading a team through engineering challenges in ENGI 218/9, learn how to interview for and land an industry or research internship, and learn state-of-the-art practices for leading teams and driving innovation in ENGI 315. To learn more about RCEL and the Certificate in Engineering Leadership go to http://rcel.rice.edu.

DESCRIPTION OF MAJORS

OFFERED BY DEPARTMENTS

Bioengineering

The overall goal of the B.S. degree in Bioengineering (BSB) is to prepare graduates to succeed in professional careers by equipping them with the conceptual and technical expertise sought after by top graduate and medical schools, as well as companies seeking technical skills in bioengineering. Recognizing that graduates may embark on a number of different educational and career paths, the educational objectives that graduates are expected to exhibit or achieve with the BSB from Rice University are:

1. Graduates demonstrate technical and/or professional skills, which may include engineering problem-solving, scientific inquiry, and/or engineering design, to solve challenging problems in bioengineering and related fields.

2. Graduates are accomplished at communicating and working collaboratively in diverse work environments.

3. Graduates seeking further education at graduate, medical or other professional schools find appropriate levels of success in admission to and progression through these programs. Graduates entering professional careers find appropriate career progression and success.

Chemical and Biomolecular Engineering

Our department offers two undergraduate degrees: the Bachelor of Science in Chemical Engineering (BSChE) and Bachelor of Arts (BA) degree. Only the program leading to the BSChE degree is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

In today's rapidly changing business climate, industrial sectors from petrochemicals to biotechnology and semiconductor manufacturing offer a wide variety of employment opportunities to our graduates. As a result, chemical engineering graduates may get involved with (among others):

- the development of new processes and products for the chemical industry;
- exploration, production and refining of oil and natural gas;
- design and optimization of fabrication facilities for semiconductors or magnetic storage devices;
- production of advanced materials from plastics and fibers to catalysts and biomaterials;
- design of water and air pollution control devices;
- production of pharmaceuticals and biologic devices for medical applications.

Although industry employs the majority of chemical engineering students receiving a bachelor's degree, a large fraction of our graduates continue their education in graduate schools to prepare for academic or industrial R&D careers, and in medical, law or business schools.

Civil and Environmental Engineering

The oldest of the recognized "disciplines" in engineering, Civil and Environmental Engineering addresses a broad range of current issues related to materials, computational mechanics, urban systems, smart structures and infrastructure, water, energy, pollution, risks, disasters and sustainability. At Rice, CEE offers a choice among four educational foci: Environmental engineering, hydrology and water resources, structural engineering and mechanics, and urban infrastructure, reliability and management.

CEE prepares leaders who can deal with present and future technical and societal problems. We provide a rigorous, coherent curriculum from which students gain an understanding of the physical, mathematical, chemical and biological, as well as socio-economic systems that affect engineering research and practice. We emphasize design and the development of professional communication skills and strategies, especially those requiring collaboration and teamwork.

Our internship program places students in companies throughout Houston and the U.S. To prepare for the global workplace, we offer international service learning experiences that focus on solving complex engineering problems in diverse cultural situations. For example, you may want to become involved with Rice's nationally recognized Engineers Without Borders, a student-run organization that works to bring sustainable technologies to developing regions of the world like Central and South America. The educational experience in CEE is fun and unique because of its strong emphasis on student leadership and its integration of undergraduate education with cutting-edge research.

Computational and Applied Mathematics

Our graduates have enjoyed an excellent job market for decades and can expect to be hired in engineering consulting, government, regulatory agencies, industry and academia.

In the CAAM undergraduate program, students learn to apply the advanced techniques needed to model and analyze complex physical systems. The curriculum provides a sound grounding in underlying mathematical theory, emphasizes a variety of useful mathematical techniques, and helps students develop proficiency in computational modeling and high performance computing. Graduates with degrees in computational and applied mathematics are in demand in industry, government and academia, where they often join with physical and biological scientists, engineers, and computer scientists to form teams. Such interdisciplinary teams represent the modern approach to dealing with complex problems whose solutions require mathematical and scientific skills.

Computer Science

An education in Computer Science includes training in systems design, implementation (i.e., programming), mathematics, and the analysis of algorithms, systems and problems. A computer scientist must understand what can be computed, what can be computed quickly, and what can be built. The undergraduate Computer Science curriculum at Rice includes a core set of courses that teach skills common to all areas in Computer Science, as well as specialized courses that delve more deeply into specific areas such as artificial intelligence, bioinformatics, computer architecture, databases, graphics, networking,programming language design and implementation, physical algorithms, security and verification. We welcome students with little or no programming experience. Computer science requires the ability to think clearly and analytically; we can teach you the rest.

With computing integrated into every facet of modern life, a computer science degree can lead to many diverse careers. We develop tools that enable fields such as scientific simulation, financial market analysis, medical imaging and robotic exploration.

Electrical and Computer Engineering

Electrical and computer engineers have been at the forefront of the digital technology revolution over the last twenty years. Smartphones, the Internet of Things, digital video, wireless networks, personal computers, and MRI health care imaging, are all examples of systems designed by electrical and computer engineers that have changed society.

The Electrical and Computer Engineering Department's flexible programs primarily prepare graduates for leadership roles in engineering, with many also pursuing careers in business, energy, law and medicine.

The faculty's research programs involve many undergraduates in projects in our laboratories in communications, networking and nano-devices through independent research and the Vertically Integrated Projects (VIP) program. Many summer internship opportunities are available in ECE labs, with our industrial affiliates and through the NanoJapan program.

Rice's Department of Electrical and Computer Engineering offers students a dynamic learning environment that features close relationships with world-class faculty in ECE, opportunities for interdisciplinary collaborations with other world-renowned faculty at Rice, an excellent computing infrastructure, state-of-the-art laboratories, and frequent research seminars by internal and external speakers. At Rice, the Electrical and Computer Engineering faculty conduct cutting-edge research in a number of exciting areas, including communications, networking, signal and image processing, control, parallel computing,

performance evaluation, computer architecture, VLSI architectures, nanoscale structures, laser spectroscopy, photonics, semiconductor devices, materials for energy, ultrafast optoelectronics, biological systems modeling, neuroengineering and medical electronics.

Materials Science and NanoEngineering

Materials science is concerned with the production, characterization and application of materials used by society. These include metals and their alloys, semiconductors, ceramics, glasses, polymers, composites and nanomaterials. The materials scientist is interested in applying the basics of applied math, physics and chemistry to design, produce, characterize and utilize the materials necessary for today's engineering.The Materials Science and NanoEngineering curriculum provides students with the requisite skills and educational background to contribute to the solution of many materials and nanoengineering problems, allow him or her to work in a fascinating field and make it possible to become a leader in one of the most challenging technological areas.

Mechanical Engineering

Mechanical Engineering, one of the broadest and most versatile of the engineering professions, generally deals with the relations among forces, work or energy, and power in designing systems to improve the human environment. The products of their efforts may be automobiles or jet aircraft, nuclear power plants or air-conditioning systems, large industrial machinery or household can openers.

The Mechanical Engineering program is designed to prepare the graduate to assume positions of leadership, qualify for admittance to top level graduate programs, contribute to the advancement of knowledge, and to have a strong understanding of engineering professional and ethical responsibilities.

Statistics

Statistics is concerned with the interrelationships between observation and theory. Thus statistics deals with the formulation and application of the scientific method. Important components of statistical studies include probability, mathematical statistics, model building, statistical computing, quality and process control, time series analysis, regression theory, nonparametric function estimation, experimental design, Bayesian analysis, stochastic processes, sampling theory, biostatistics, bioinformatics, genetics, epidemiology, computational finance, enviromentrics, defense analysis and simulation.

The department's goals are to acquaint students with the role played in the modern world by probabilistic and statistical ideas and methods, to provide instruction in the theory and application of techniques that have been found to be commonly useful, and to train research workers in statistics. The undergraduate statistics program is flexible and may be oriented towards theoretical or applied training or towards joint work in a related department, such as Biology, Economics, Education, Electrical Engineering, Computational and Applied Mathematics, Mathematics, Political Science or Psychology.

Statisticians make important contributions in business, medicine, economics, defense and engineering. The demand for statisticians at the bachelor's, master's and doctoral levels is one of the highest for any professional group.

DESCRIPTION

OF ENGINEERING-RELATED MINORS

Computational and Applied Mathematics

The departmental minor in Computational and Applied Mathematics develops a range of skills in mathematical modeling, analysis, and scientific computing that complements any major in science, engineering and economics.

Summary requirements

CAAM 210, CAAM 335, (CAAM 336 or CAAM 378), three additional CAAM electives, two at or above the 400 level.

For details, see

www.caam.rice.edu/undergrad_minor.html

Minor advisors

Illya Hicks, hicks@rice.edu
Steven Cox, cox@rice.edu

Energy and Water Sustainability

Sustainabilty encompasses an approach to design and decision-making that takes into account the economic, social and environmental implications of human activities. This interdisciplinary minor studies the design of safe, secure, sustainable energy and water resources.

Summary requirements

CEVE/ENGI 302, CEVE 307, (CEVE 322/ENGI 303 or ECON 480), three electives, and 1-credit design practicum.

For details, see

http://ceve.rice.edu/sustainabilityminor.aspx

Minor advisor

Jim Blackburn, jbb@blackburncarter.com

Financial Computation and Modeling

The interdisciplinary minor in Financial Computation and Modeling (FCAM) prepares students for quantitative positions in the financial industry. Students are prepared in the advanced quantitative methodologies as well as in the basics of financial markets.

Summary of requirements

Students take three courses each from two groups ("Basic Tools" and "Financial and Computational Modeling") of economics and statistics courses.

For details, see

http://cofes.rice.edu/content.aspx?id=36

Minor Advisor

Katherine Ensor, ensor@rice.edu

Statistics

In the modern information age, the ability to understand and process data from a variety of sources is critical in every area of human inquiry. The minor in statistics is designed to complement a student's primary area of study. Two tracks are offered: Track A is designed for students with strong mathematical and computational interests; Track B develops a broad understanding of and appreciation for the correct use of statistical methodologies.

Summary of requirements

Three specific courses and three elective courses from statistics at the 300 level or higher.

For details, see

http://statistics.rice.edu/statminor/

Minor advisor

Rudy Guerra, rguerra@rice.edu

Global Health Technologies

The minor in Global Health Technologies (GLHT) offers a unique, multidisciplinary program to educate and train students to reach beyond traditional disciplinary and geographic boundaries to understand, address and solve global health disparities.

Summary of requirements

GLHT 201(Bioengineering and World Health), followed by a series of core and elective courses in Science/Engineering and Humanities/Social Science/Policy.

For details, see

http://beyondtraditionalborders.rice.edu/programs.cfm?doc_id=9254

Minor advisor

Veronica Leataud Suderland, vl2@rice.edu

Mathematics

The departmental minor in Mathematics develops specific analytical problem solving skills, as well as a logical perspective that is valuable in many science and engineering disciplines.

Summary requirements

Typically MATH 211-212 or 221-222; courses in Analysis, Linear Algebra, and Discrete Mathematics/Algebra; and one additional class at the 300-level or higher.

For details, see

www.math.rice.edu/undergrad-math-degree/MathMinor.html

Minor advisors

Tim Cochran, cochran@rice.edu
Frank Jones, fjones@rice.edu
Andy Putman, andyp@rice.edu

BIOE

Bioengineering

WEB LINKS	http://bioe.rice.edu/ (general website) http://bioengineering.rice.edu/undergrad/degree_requirements.aspx
FRANK ADVICE	Don't try to rush through this 4-year program. Prerequisites are very important for BIOE classes; since some courses are offered once a year, failure to get the correct prerequisites can put you behind an entire year. You must take ELEC 243 before BIOE 383/5, and MECH 211 before BIOE 372. Get involved in research.
ADVICE FOR STUDENTS WITH AP CREDIT	Take BIOC 201 or a more advanced math (e.g., MATH 211) during your first year. Consider ENGI 120 or ENGI 128.
ALTERNATIVE CURRICULA	If you are a pre-med student, consult with Health Professions Advising in the Office of Academic Advising. There are a few "extra" courses above the BIOE major that you must complete as a pre-med student.
BS VERSUS BA	BIOE only offers a B.S. degree.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	BIOE 202 Careers in Bioengineering; take this one hour course in the spring of your freshman year. A series of guest lectures will help you find out what bioengineering is all about.

RESEARCH	Over 70% of our students participate in research either at Rice or at an institution in the Texas Medical Center. When participating in research at Rice, students can either receive credit as BIOE 400 or BIOE 401, or they can be paid. Students conduct research during the school year as well as during the summer. Contact a faculty member directly if you are interested in working in his/her laboratory.
INTERNSHIPS	Internships in industry and other universities are available for all levels of students. Rice BIOE also offers several summer research internship opportunities.
STUDY ABROAD	The best time to study abroad is during the spring semester of the sophomore year; a few students go during the spring semester of the junior year. Typically, students complete technical coursework while abroad. Consult a BIOE advisor early if you are interested in study abroad opportunities.
PROFESSIONAL ORGANIZATIONS	The Biomedical Engineering Society (BMES) has a student chapter at Rice. They plan activities throughout the year that focus on professional development as well as social interactions between all levels of students and faculty. http://www.ruf.rice.edu/~bmes/index.html
INTERESTING COURSES FOR NON-MAJORS	The Beyond Traditional Borders program offers a minor in Global Health Technologies. Selected courses for non-majors include GLHT 201, GLHT 360, GLHT 392, GLHT 451, GLHT 452.

B.S. In Bioengineering

Specializations: None Available. Students select technical electives to suit their academic interests and career plans.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL

FRESHMAN		17 credits
MATH 101	Single Variable Calculus I	3
PHYS 101	Mechanics w/Lab	3*
CHEM 121	General Chemistry I w/Lab	4*
FWIS	Freshman Writing	3
OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		16 credits
MATH 211	Ord Diff Eqs & Linear Algebra	3
CHEM 211	Organic Chemistry I	3
BIOC 201	Introductory Biology	3
BIOE 440	Statistics for Bioengineers	1
BIOE 252	Bioengineering Fundamentals	3
DIST	Distribution elective	3

JUNIOR		16 credits
BIOE 383	Biomed Eng Instrumentation	3
BIOE 385	Biomed Eng Instr Lab	1
BIOE 370	Biomaterials	3
BIOC 341	Cell Biology	3
MECH 211	Engineering Mechanics	3
DIST	Distribution elective	3

SENIOR		17 credits
BIOE 420	Biosys Trnspt & Rxn Processes	3
BIOE 442-9	Adv BIOE Labs (2 required)	2
BIOE 451	Bioengineering Design I	3
TECH	BIOE Technical elective	3
DIST	Distribution elective	3
OPEN	Open elective	3

SPRING

FRESHMAN		17 credits
MATH 102	Single Variable Calculus II	3
PHYS 102	Electricity & Magnetism w/Lab	4*
CHEM 122	General Chemistry II w/Lab	4*
CAAM 210	Intro. to Eng. Computation	3*
DIST	Distribution elective	3

SOPHOMORE		17 credits
MATH212	Multivariable Calculus	3
BIOE 391	Numerical Methods	3
ELEC 243	Intro. to Electronics	4*
BIOE 320	Systems Physiology Lab	1
BIOE 322	Fund Systems Physiology	3
DIST	Distribution elective	3

JUNIOR		16 credits
BIOE 330	Bioreaction Engineering	3
BIOE 342	Tissue Culture Lab	1*
BIOE 372	Biomechanics	3
BIOE 332	Thermodynamics	3
DIST	Distribution elective	3
OPEN	Open elective	3

SENIOR		18 credits
BIOE 452	Bioengineering Design II	3
TECH	BIOE Technical elective	3
TECH	BIOE Technical elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

Basic requirements	General Math & Science Courses	36–37
	Core Courses in Major	49
Elective requirements	BIOE Technical Electives	9
	Open Electives and LPAP	15–16
	FWIS and Distribution Courses	24
	Minimum credit required for the B.S.	134

Of the 134 total degree credits, the BS in Bioengineering requires 94 credits in general math and science courses and core and elective engineering courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101/111/125	3*	Mechanics w/Lab
PHYS 102/112/126	4*	Electricity and Magn. w/Lab
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
CHEM 211	3	Organic Chemistry
CAAM 210	3*	Introduction to Engineering Computation (pre-req to BIOE 252)
MECH 211	3	Engineering Mechanics (pre-req to BIOE 372)
ELEC 243	4*	Introduction to Electronics (pre-req to BIOE 383)
BIOC 201	3	Introductory Biology
BIOC 341	3	Cell Biology
BIOE 252	3	Bioengineering Fundamentals
BIOE 320	1	Systems Physiology Lab Module
BIOE 322	3	Fundamentals of Systems Physiology
BIOE 330	3	Bioreaction Engineering
BIOE 332	3	Thermodynamics
BIOE 342	1*	Tissue Culture Laboratory
BIOE 370	3	Biomaterials
BIOE 372	3	Biomechanics
BIOE 383	3	Biomedical Eng Instrumentation (pre-req to BIOE 451)
BIOE 385	1	Biomedical Eng Instrumentation Lab
BIOE 391	3	Numerical Methods
BIOE 420	3	Biosystems Transport & Reaction Processes
BIOE 440	1	Statistics for Bioengineers
BIOE 44X	2	Advanced Bioengineering Labs (2 of 7, see GA)
BIOE 451	3	BIOE Design I (Must take 451 and 452 the same year)
BIOE 452	3	BIOE Design II (Must take 451 and 452 the same year)
TECH elective**	3	Technical Elective
TECH elective**	3	Technical Elective
TECH elective**	3	Technical Elective

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

*** Must have 6 engineering points within 3 TECH elective courses*

CHBE

Chemical and Biomolecular Engineering

WEB LINKS	http://rice.edu/chbe/undergraduate/
FRANK ADVICE	Start talking to your advisor as early as possible and explore the many options available to you!
ADVICE FOR STUDENTS WITH AP CREDIT	Consider taking more advanced MATH (211/212), organic chemistry or the introductory CHBE courses during your freshman year. Contact Ken Cox (krcox@rice.edu) for advice.
ALTERNATIVE CURRICULA	Students following the BS program can use their electives to create a concentration or focus area in one of five disciplines: biotechnology/bioengineering, environmental engineering, computational engineering, energy and sustainability for engineering or materials science and engineering. The more flexible BA program allows students to pursue a double major.
BS VERSUS BA	Our department offers two undergraduate degrees: the Bachelor of Science in Chemical Engineering (BSChE) and Bachelor of Arts (BA) degree. Only the program leading to the BSChE degree is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The BSChE degree is the more appropriate path for students wanting to pursue a professional career in the field of Chemical and Biomolecular Engineering. The BA program is more flexible and allows a student to pursue other areas of interest or prepare for professional careers in medicine, law or business.

NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	Biochemistry, numerical analysis, cell biology, courses on environmental studies (ENST), other courses listed in the specialization areas.
RESEARCH AND INTERNSHIPS	Most CHBE majors participate in undergraduate research, either through the courses (CHBE 495 or CHBE 499) or through summer research internships. For further information on research opportunities talk to CHBE undergraduate advisors or contact directly the faculty whose research interests you. Most students also pursue industrial or national lab internships.
STUDY ABROAD	Study abroad semesters are possible and encouraged. Keep in mind that core ChBE courses are offered only once a year, and some courses are somewhat hard to match. With advanced planning however, several international locations work for ChBE students, who commonly go abroad in their sophomore or junior spring terms.
PROFESSIONAL ORGANIZATION	The American Institute of Chemical Engineers (AIChE) has a very active Student Chapter at Rice that provides real-world experience with internships at sponsor companies, talks on technical, career, and professional topics, scholarships, etc. See http://aiche.rice.edu for details on membership, meetings, and more.
INTERESTING COURSES FOR NON–MAJORS	CHBE 100 Intro to Chemical and Biomolecular Engineering. CHBE 281 Engineering Sustainable Communities.

B.A. In Chemical Engineering

Specializations: Not Applicable

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101 or 111	Mechanics w/Lab	3*	PHYS 102 or 112	Electricity & Magnetism w/Lab	4*
CHEM 121	General Chemistry I w/Lab	4*	CHEM 122	General Chemistry II w/Lab	4*
FWIS	Freshman Writing	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**18 credits**	**SOPHOMORE**		**18 credits**
MATH 211	Ord Diff Eqs & Linear Algebra	3	MATH 212	Multivariable Calculus	3
CHEM 211	Organic Chemistry	3	CHBE 305	Comp Methods Chem Eng	3*
CHEM 217 or 215	Organic Chemistry Lab	1	CHEM 212 or CHEM 311 or 312	Organic Chemistry	3
CHBE 301	Chemical Eng Fundamentals	3	OPEN	Open elective	3
CHBE 303	Comp Prog Chem Engineers	2*	DIST	Distribution elective	3
OPEN	Open elective	3	DIST	Distribution elective	3
OPEN	Open elective	3			
JUNIOR		**15 credits**	**JUNIOR**		**16 credits**
CHEM 311	Physical Chemistry or CHEM 312	3	CHBE 343	Chemical Engineering Lab I	3*
CHBE 390	Kinetics and Reactor Design	3	CHBE 350	Process Safety in Chem Eng	1
CHBE 401	Transport Phenomena I	3	CHBE 402	Transport Phenomena II	3
CHBE 411	Thermodynamics I	3	CHBE 412	Thermodynamics II	3
OPEN	Open elective	3	CAAM 336 or MATH 381	Diff Eqs in Science and Eng	3
			DIST	Distribution elective	3
SENIOR		**16 credits**	**SENIOR**		**15 credits**
CHBE 403	Design Fundamentals	4*	DIST	Distribution elective	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	40–41
	Core Courses in Major	31
ELECTIVE REQUIREMENTS	Open Electives and LPAP	36–37
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	132

Of the 132 total degree credits, the BA in Chemical Engineering requires 71-72 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
CAAM 336/MATH 381	3	Diff Eqs in Science and Engr/Intro to Partial Differential Eqns
MATH 381	3	Diff Eqs in Science and Engr/Intro to Partial Differential Eqns
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4	Electricity and Magnetism w/Lab
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
CHEM 211	3	Organic Chemistry
CHEM 217/215	1–2	Organic Chem Lab for Chem Engineers/Organic Chem Lab
CHEM 212/311/312	6	Organic/Physical Chemistry (2 required)
CHBE 301	3	Chemical Engineering Fundamentals
CHBE 303	2*	Computer Programming in Chemical Engineering
CHBE 305	3*	Computational Methods in Chemical Engineering
CHBE 343	3*	Chemical Engineering Lab I
CHBE 350	1	Process Safety in Chemical Engineering
CHBE 390	3	Kinetic and Reactor Design
CHBE 401	3	Transport Phenomena I
CHBE 402	3	Transport Phenomena II
CHBE 403	4*	Design Fundamentals
CHBE 411	3	Thermodynamics I
CHBE 412	3	Thermodynamics II

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

B.S. In Chemical Engineering

Specializations: Bioengineering
Computational Engineering
Environmental Engineering
Materials Science and Engineering
Energy and Sustainability Engineering
Engineering Breadth

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101 or 111	Mechanics w/Lab	3*	PHYS 102 or 112	Electricity and Magnetism w/Lab	4*
CHEM 121	General Chemistry I w/Lab	4*	CHEM 122	General Chemistry II w/Lab	4*
FWIS	Freshman Writing	3	DIST	Distribution elective	3
OPEN	Open elective	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**15 credits**	**SOPHOMORE**		**18 credits**
MATH 211	Ordinary Diff Eqs & Linear Alg	3	MATH 212	Multivariable Calculus	3
CHEM 211	Organic Chemistry	3	CHBE 305	Comp Methods Chem Eng	3*
CHEM 217 or 215	Organic Lab for Chem Eng	1	CHBE 310	Fund of Biomolecular Eng	3
CHBE 301	Chemical Engineering Fund	3	CHEM 212	Organic Chemistry CHEM 311 or 312	3
CHBE 303	Comp Prog Chemical Eng	2*	DIST	Distribution elective	3
DIST	Distribution elective	3	DIST	Distribution elective	3
JUNIOR		**18 credits**	**JUNIOR**		**16 credits**
CHEM 311	Physical Chemistry or CHEM 312	3	CAAM 336 or MATH 381	Diff Eqs in Science and Eng	3
CHBE 390	Kinetics and Reactor Design	3	CHBE 343	Chemical Engineering Lab I	3*
CHBE 401	Transport Phenomena I	3	CHBE 350	Process Safety in Chem Eng	1
CHBE 411	Thermodynamics I	3	CHBE 402	Transport Phenomena II	3
SPEC	CHBE Specialization area elec	3	CHBE 412	Thermodynamics II	3
DIST	Distribution elective	3	SPEC	CHBE Specialization area elec	3
SENIOR		**16 credits**	**SENIOR**		**16 credits**
CHBE 403	Design Fundamentals	4*	CHBE 404	Product and Process Design	4
CHBE 443	Chemical Engineering Lab II	3*	SPEC	CHBE specialization area elec	3
CHBE 470	Process Dynamics and Control	3	SPEC	CHBE specialization area elec	3
SPEC	CHBE specialization area elec	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	40–41
	Core Courses in Major	44
ELECTIVE REQUIREMENTS	Specialization Area Courses	12–16
	Open Electives and LPAP	7–12
	FWIS and Distribution Courses	24
	Minimum credit required for the B.S.	132

Of the 132 total degree credits, the BS in Chemical Engineering requires 84 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
CAAM 336/MATH 381	3	Diff Eqs in Science and Engr/Intro to Partial Differential Eqns
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4*	Electricity and Magnetism w/Lab
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
CHEM 211	3	Organic Chemistry
CHEM 217/215	1–2	Organic Chemistry Lab for Chem Engineers/Organic Chemistry Lab
CHEM 212/311/312	6	Organic/Physical Chemistry (2 required)
CHBE 301	3	Chemical Engineering Fundamentals
CHBE 303	2*	Computer Programming in Chemical Engineering
CHBE 305	3*	Computational Methods in Chemical Engineering
CHBE 310	3	Fundamentals of Biomolecular Engineering
CHBE 343	3*	Chemical Engineering Lab I
CHBE 350	1	Process Safety in Chemical Engineering
CHBE 390	3	Transport Phenomena I
CHBE 401	3	Kinetics and Reactor Design
CHBE 402	3	Transport Phenomena II
CHBE 403	4*	Design Fundamentals
CHBE 404	4	Product and Process Design
CHBE 411	3	Thermodynamics I
CHBE 412	3	Thermodynamics II
CHBE 443	3*	Chemical Engineering Lab II
CHBE 470	3	Process Dynamics and Control
SPEC	3–4	CHBE specialization area elective
SPEC	3	CHBE specialization area elective
SPEC	3	CHBE specialization area elective
SPEC	3	CHBE specialization area elective
SPEC	3	CHBE specialization area elective

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

CEE

Civil and Environmental Engineering

WEB LINKS	http://ceve.rice.edu/undergrad/
FRANK ADVICE	Make a 4 year plan early on to know what the major entails; update as you go as classes may change. Consult with advisors if in doubt. Don't overload your schedule in the first two semesters; try to get the requisites out of the way and aim to take around 15-18 credits. Take CEVE 101 in the freshman year to get a broad overview of courses and research in the department, as well as CEVE 481 in the fall term and CEVE 480 in the spring term of your senior year. Try studying in groups, after your own reviews, to enhance your learning experience and critical discussion skills. Join and actively participate in student and professional organizations.
ADVICE FOR STUDENTS WITH AP CREDIT	With at least a 4 on AP exams, you may not need to take courses such as Physics, Chemistry, Calculus or Biology. If you feel you are ready, you can take higher level courses or honors courses. You can also get started with your master's degree in the last one to two years.
FWIS AND DISTRIBUTION	Remember that you need 24 credit hours of FWIS and distribution; this is a great opportunity to take courses in subject areas that interest you such as Art, Philosophy and Languages. Consider taking college courses; although not considered distribution, they are a great way to diversify your knowledge.
BS VERSUS BA	BS: This is the only program accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The BS offers specialization in four tracks: environmental engineering, hydrology and water resources, structural engineering and mechanics, and urban infrastructure, reliability and management. It is recommended to students interested in graduate studies or seeking careers as practicing engineers. The BS is the most direct route toward the Professional Engineering license. BA: Can specialize in two tracks: environmental engineering or civil engineering. The BA degree is recommended to students interested in graduate studies outside of engineering such as law or medicine. This is a great route if you are interested in a double major or a minor, such as the one in Energy and Water Sustainability.

NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	CEVE 304 Structural Analysis, (required for students in the structures and mechanics specialty), CEVE 322 Engineering Economics, CEVE 313 Uncertainty and Risk in Urban Infrastructures, CAD/CAE course (CEE tutorial), and Fondren Library's Introduction to GIS.
RESEARCH	Students are encouraged to seek undergraduate research experience with CEE faculty members. All faculty hire undergraduates year round. Find out early on what research you might be interested in. Talking to professors and showing your interest will give you an advantage. CEVE 101 will give you the chance to meet the faculty and learn about their research.
INTERNSHIPS	All students are encouraged to apply for summer internships; the ASCE student chapter is a great resource for finding internships. Rice also has career fairs and offices dedicated to internships; it doesn't have to be in an engineering firm. Approximately 70% of the CEE students participate in internships.
STUDY ABROAD	For engineering majors in general, study abroad can be challenging. This is because Rice programs have specific classes that you need to take that may not be offered at universities abroad. Expect to go abroad in the spring of the sophomore year or fall of the junior year. Consider Engineers without Borders. They provide students the opportunity to travel to implement engineering projects in developing countries. Approximately 30% of the CEVE students pursue international travel and study abroad programs.
PROFESSIONAL ORGANIZATIONS	ASCE (American Society of Civil Engineers) student chapter, EWB (Engineers without Borders), Chi Epsilon Honor Society , Earthquake Engineering Research Institute (EERI).
INTERESTING COURSES FOR NON–MAJORS	CEVE 101 Fundamentals of Civil and Environmental Engineering, CEVE 310 Principles of Environmental Engineering, CEVE 307 Energy and the Environment, CEVE 406 Environmental Law, CEVE 313 Uncertainty and Risk in Urban Infrastructures.

B.A. In Civil & Environmental Engineering

(Track E: Environmental Core Curriculum)

Specializations: Courses labeled as SPEC cover topics in which environmental engineering and other disciplines share a common interest. Take 7 courses from electives approved by an advisor assigned by the CEE Dept., including 4 from one specific focus area. Of these 7 electives, 4 must be 300 level courses or above, and 2 of these upper-division courses must be from the CEE curriculum. Examples of areas of specialization include Environmental Science and Engineering, Civil Engineering, Biology, Chemical Engineering, Chemistry, Economics or Management

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101 or 111/125	Mechanics w/Lab	3*	PHYS 102 or 112/126	Electricity & Magnetism w/Lab	4*
CHEM 121	General Chemistry I w/Lab	4*	CHEM 122	General Chem II w/Lab	4*
CEVE 101	Fundamentals of CEE	3	DIST	Distribution elective	3
FWIS	Freshman Writing	3	OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
MATH 211	Ord Diff Eqs & Linear Algebra	3	SPEC	Specialization elective	3
CEVE 307	Energy & the Environment	3	DIST	Distribution elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
CEVE 310	Principles of Engineering	3	SPEC	Specialization elective	3
CEVE 401	Environmental Chemistry w/Lab	4*	SPEC	Specialization elective	3
CEVE 479 or CEVE 308	Eng Project Mgmt	3	DIST	Distribution elective	3
SPEC	Specialization elective	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
SPEC	Specialization elective	3	CEVE 412	Hydrology & Water Resources Engineering	3
SPEC	Specialization elective	3	SPEC	Specialization elective	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

Basic requirements	General Math & Science Courses	24
	Core Courses in Major	16
Elective requirements	Engineering Specialization Electives	21
	Open Electives and LPAP	35
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	120

Of the 120 credits, the BA in Civil and Environmental Engineering requires 61 credits in general math and science, core and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary and Differential Equations
PHYS 101/111/125	3*	Mechanics w/Lab
PHYS 102/112/126	4*	Electricity and Magnetism w/Lab
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
CEVE 101	3	Fundamentals of Civil & Environmental Engineering
CEVE 307	3	Energy and the Environment
CEVE 310	3	Principles of Environmental Engineering
CEVE 401	4*	Environmental Chemistry and Lab
CEVE 412	3	Hydrology and Water Resources Engineering
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

B.A. In Civil & Environmental Engineering

(Track C: Civil Core Curriculum)

Specializations: The SPEC courses cover general Civil Engineering topics. Take 7 courses from electives approved by an advisor assigned by the CEE Dept., including at least 4 with the CEVE designation. Of these 7 electives, 4 must be 300 level courses or above.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL

FRESHMAN		17 credits
MATH 101	Single Variable Calculus I	3
PHYS 101	Mechanics w/Lab	3*
CHEM121	General Chemistry I w/Lab	4*
CEVE 101	Fundamentals of CEE	3
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		15 credits
MATH 211	Ord Diff Eqs & Linear Algebra	3
CEVE 211	Engineering Mechanics	3
CEVE 310	Principles of Engineering	3
DIST	Distribution elective	3
OPEN	Open elective	3

JUNIOR		16 credits
CEVE 363	Applied Fluid Mechanics	3
CEVE 407	Reinforced Concrete (SPEC)	3
CEVE 408	Concrete Lab (SPEC)	1
STAT 312	Probability & Statistics for Civil Engineers	3
DIST	Distribution elective	3
OPEN	Open elective (SPEC)	3

SENIOR		15 credits
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective (SPEC)	3
STAT 312	Probability and Statistics	3
OPEN	Open elective	3

SPRING

FRESHMAN		16 credits
MATH 102	Single Variable Calculus II	3
PHYS 102	Electricity & Magnetism w/Lab	4*
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SOPHOMORE		16 credits
CAAM 210	Intro to Eng Computation	3*
CEVE 304	Structural Analysis I (SPEC)	3
CEVE 311	Mechanics of Solids & Structures	3
CEVE 312	Strength of Materials Lab	1
DIST	Distribution elective	3
OPEN	Open elective	3

JUNIOR		15 credits
CEVE 412	Hydrology & Water Resources Engineering (SPEC)	3
CEVE 313	Uncertainty and Risk in Urban Infrastructures	3
DIST	Distribution elective	3
OPEN	Open elective (SPEC)	3
OPEN	Open elective	3

SENIOR		15 credits
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	22–23
	Core Courses in Major	16
ELECTIVE REQUIREMENTS	Specialization Area Courses	21–22
	Open Electives and LPAP	35–37
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	120

Of the 120 credits, the BA in Civil and Environmental Engineering requires 59–61 credits in general math and science, core, and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4*	Electricity and Magnetism w/Lab
CAAM 210/COMP 110/ CAAM 335	3*/3	Intro to Engineering Computation/Computation in Science & Eng/ Matrix Analysis
CHEM 121/BIOC 122	3-4*	General Chemistry I w/Lab/Fundamental Concepts in Biology/
CEVE 101	3	Fundamentals of Civil and Environmental Engineering
CEVE 211	3	Engineering Mechanics
CEVE 310	3	Principles of Environmental Engineering
CEVE 311	3	Mechanics of Solids and Structures
CEVE 312	1	Strength of Materials Lab
CEVE 363	3	Applied Fluid Mechanics
CEVE 304/307/313/322/405/ 407/412/417/424/427/452/460/ 470 (4 credits)/492	12-13*	Any 4 of these civil engineering specialization courses (SPEC)
OPEN	9	At least 3 Open electives approved as SPEC for the Civil Engineering BA Track

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

B.S. In Civil Engineering

Specializations: Environmental Engineering
Hydrology and Water Resources
Structural Engineering and Mechanics
Urban Infrastructure, Reliability and Management

Sample Degree Plan

THIS IS ONE GENERIC EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

(SAMPLES FOR EACH OF THE SPECIALIZATION AREAS CAN BE FOUND AT HTTP://CEVE.RICE.EDU/UNDERGRAD/)

FALL

FRESHMAN		17 credits
MATH 101	Single Variable Calculus I	3
PHYS 101	Mechanics w/Lab	3
CHEM121	General Chemistry I w/Lab	4*
CEVE 101	Fundamentals of CEE	3
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		18 credits
MATH211	Ord Diff Eqs Algebra	3
CAAM 210	Intro. To Eng. Computation	2
CAAM 211	Intro. To Eng. Computation Lab	1
CEVE 310	Principles of Enviro Engineering	3
CEVE 211	Engineering Mechanics	3
SPEC	Specialization Course	3
DIST	Distribution elective	3

JUNIOR		16 credits
CEVE 401	Enviro. Chem & Lab	4
CEVE 363	Applied Fluid Mechanics	3
SPEC	Specialization Course	3
SPEC	Specialization Course	3
DIST	Distribution elective	3

SENIOR		16 credits
CEVE 481	Intro. Senior Design	1
SPEC	Specialization Course	3
SPEC	Specialization Course	3
SPEC	Specialization Course	3
REC	Recommmended elective	3
DIST	Distribution elective	3

SPRING

FRESHMAN		17 credits
MATH 102	Single Variable Calculus II	3
PHYS 102	Electricity & Magnetism w/Lab	4
CHEM122	General Chemistry II w/Lab	4*
DIST	Distribution elective	3
DIST	Distribution elective	3

SOPHOMORE		16 credits
MATH 212	Multivariable Calculus	3
ESCI 321	Earth System Evol. or BIOC 201/ESCI 340/ ESCI435/EBIO 325	3
CEVE 311	Mechanics of Solids	3
CEVE 312	Strength of Materials Lab	1
SPEC	Specialization Course	3
DIST	Distribution elective	3

JUNIOR		18 credits
STAT 312	Probability and Statistics	3
CAAM 335	Matrix Analysis or Math 355 Linear Algebra	3
SPEC	Specialization Course	3
OPEN	Open elective	3
SPEC	Specialization	3
DIST	Distribution elective	3

SENIOR		15 credits
CEVE 480	Senior Design	3
REC	Recommended elective	3
REC	Recommended elective	3
SPEC	Specialization Course	3
OPEN	Open Elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	39
	Core Courses in Major	24
	Specialization Courses	18
ELECTIVE REQUIREMENTS	Focus Area	12
	Open Electives and LPAP	6
	Recommended Electives†	9
	FWIS and Distribution Courses	24
	Minimum Credit required for the B.S.	132

Of the 132 credits, the BS in Civil Engineering requires 93 credits in general math and science, core, and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
BIOC 201/ESCI 321 (no lab)/ESCI 340/ ESCI 435 EBIO 325	3	Introductory Biology/Earth Science Evolution and Cycles/Global Biogeochemical Cycles/Ecology
CAAM 210	3	Introduction to Engineering Comp
CAAM 335 or MATH 355 or MATH 354	3	Matrix Analysis/Linear Algebra (or approved equivalent)/Honors Linear Algebra
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations
MATH 212	3	Multivariable Calculus
PHYS 101	3	Mechanics w/Lab
PHYS 102	4*	Electricity and Magnetism w/Lab
STAT 312	3	Probability and Statistics or equivalent
CEVE 101	3	Fundamentals of Civil and Environmental Engineering
CEVE 211	3	Engineering Mechanics
CEVE 310	3	Principles of Environmental Engineering
CEVE 311	3	Mechanics of Solids and Structures
CEVE 312	1	Strength of Materials Lab
CEVE 363	3	Applied Fluid Mechanics
CEVE 401***	4	Environmental Chemistry and Lab
CEVE 470 ††	3	Principles of Soil Mechanics
CEVE 480	3	Senior Design
CEVE 481	1	Introduction to Senior Design
SPEC (CEVE)**	18	6 courses from three of the four specialization areas below
SPEC (CEVE)**	6	2 courses from the remaining specialization area below
REC **	9	3 courses from list of recommended electives below, or from BIOC/ESCI/EBIO above, or CEVE 500 - BIOC level courses

*** The Engineering Specializations are broken down into 4 focus areas.*

**** For focus areas 1 and 2*

- *Environmental Engineering - CEVE 302, 307, 308, 404, 406, 411, 434 or other approved course.*
- *Hydrology and Water Resources - CEVE 412, 418, 420, 512, 518 or other approved course.*
- *Structural Engineering and Mechanics - CEVE 304, 400, 405, 407, 408, 427, 476 or other approved course.*
- *Urban Infrastructure, Reliability and Management - CEVE 313, 322, 424, 452, 460, 470, 479, 492 or other approved course.*

† *List of CEVE Recommended Electives Courses (in addition to 500-level CEE courses, and select courses form MECH, CAAM, CHEM, ECON, STAT, and math or science, which are posted online at http:ceve.rice.edu/undergrad/): CEVE 314, 320, 417, 454, 490, 496, 499*

†† *For focus areas 3 and 4*

CAAM

Computational and Applied Mathematics

WEB LINKS	http://www.caam.rice.edu/undergrad_program.html
FRANK ADVICE	CAAM 210 (Introduction to Engineering Computation) develops important MATLAB skills; most future CAAM classes require more mathematical analysis and less programming. Students with a strong math background and programming experience can potentially take CAAM 210 in the fall of their freshman year.
ADVICE FOR STUDENTS WITH AP CREDIT	CAAM majors with a 5 on the BC Calculus exam should strongly consider the Honors Calculus sequence (MATH 221/222) in place of the MATH 212 (Multivariable Calculus) requirement. Because the content from MATH 212 is spread over both semesters of 221/222 (in greater depth and breadth), students must complete both 221 and 222 in place of 212: but most students find the extra effort to be well worth it.
ALTERNATIVE CURRICULA	CAAM majors are strongly encouraged to take the physical laboratory option for CAAM 335 (Matrix Analysis). Double majors can coordinate some of the CAAM "specialization electives" with classes from their other majors. Students completing a senior design project in another engineering major can usually coordinate that with the CAAM senior design requirement. Please consult a CAAM major advisor to work out a program of study as soon as possible.
BS VERSUS BA	CAAM only offers a B.A. degree.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	Students who intend to pursue graduate study in applied math should take MATH 321 (Introduction to Analysis I) and MATH 322 (Introduction to Analysis II); these students would also benefit from MATH 425 (Integration Theory).

RESEARCH	Many CAAM majors engage in undergraduate research, either with a CAAM professor or beyond (e.g., in the Texas Medical Center). Students often find a research opening by first making a positive impression on professors through active and constructive participation in class.
INTERNSHIPS	Summer research internships are often available, too. Many students also pursue industrial or lab internships; notices are posted to the CAAM undergrad email list.
STUDY ABROAD	Study abroad semesters are possible and encouraged.
PROFESSIONAL ORGANIZATION	The student chapter of the Society for Industrial and Applied Mathematics (SIAM) offers occasional talks on technical, career, and professional development topics. For membership and meeting details, see http://www.caam.rice.edu/~siamchapter/ for details on membership and meetings.
INTERESTING COURSES FOR NON-MAJORS	CAAM 210: Intro to Engineering Computation (mathematical modeling and MATLAB programming) CAAM 335: Matrix Analysis (matrices, linear systems, least squares, eigenvalues) CAAM 336: Differential Equations in Science and Engineering (Fourier series and finite elements) CAAM 378: Intro to Operations Research and Optimization (good for math econ (MTEC) majors) CAAM 519: Computational Science I (scientific programming in C/C++ with advanced math libraries)

B.A. In Computational and Applied Mathematics

Specializations: Four additional quantitative courses at 300 level or above, two of which must be at the 400 level or above. Recommended courses include CAAM 415, 423, 436, 519, 560; MATH 425, 427; STAT 431. Students are strongly encouraged to develop expertise in other disciplines that use computational and applied mathematics.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		17 credits	**FRESHMAN**		15 credits
MATH 101†	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
DIST	Distribution elective	3	CAAM 210	Intro to Eng Computation	3*
FWIS	Freshman Writing	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		15–16 credits	**SOPHOMORE**		15 credits
CAAM 335	Matrix Analysis	3–4	CAAM 336	Diff Eqs in Science & Eng	3
MATH 212	Multivariable Calculus	3	STAT 310	Probability and Statistics	3
DIST	Distribution elective	3	or STAT 331		
OPEN	Open elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
			OPEN	Open elective	3
JUNIOR		15 credits	**JUNIOR**		15 credits
CAAM 378	Intro to Oper Res & Optim	3	SPEC	Specialization elective	3
MATH 302	Elements of Analysis	3	SPEC	Specialization elective	3
or MATH 321			DIST	Distribution elective	3
SPEC	Specialization elective	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
OPEN	Open elective	3			
SENIOR		14–16 credits	**SENIOR**		14–15 credits
CAAM 453	Numerical Analysis I	3	CAAM 454	Numerical Analysis II	3
CAAM 495	Senior Design Project I	2–3	or CAAM 471		
SPEC	Specialization elective	3	CAAM 496	Senior Design Project II	2–3
DIST	Distribution elective	3	OPEN	Open elective	3–4
OPEN	Open elective	3–4	DIST	Distribution elective	3
			OPEN	Open elective	3

** In addition to class hours, this course has a regularly scheduled lab that must fit into your schedule.*

† Students with prior experience with calculus may replace this class with a 3-credit quantitative elective at the 200-level or above, as approved by a CAAM undergraduate advisor. (This quantitative elective is in addition to the four required specialization electives.)

BASIC REQUIREMENTS	General Math & Science Courses	9
	Core Courses in Major	28–31
ELECTIVE REQUIREMENTS	Specialization Electives	12
	Open Electives and LPAP	43–46
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the BA in Computational and Applied Mathematics requires 49–52 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101†	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 212	3	Multivariable Calculus
CAAM 210	3*	Introduction to Engineering Computation
CAAM 335	3–4	Matrix Analysis
CAAM 336	3	Differential Equations in Science and Engineering
STAT 310/331	3	Probability and Statistics/Applied Probability
CAAM 378	3	Intro to Operations Research & Optimization
MATH 302/321	3	Elements of Analysis/Introduction to Analysis I
CAAM 453	3	Numerical Analysis I
CAAM 454/471	3	Numerical Analysis II/Into to Linear and Integer Programming
CAAM 495	2–3	Senior Design Project I
CAAM 496	2–3	Senior Design Project II
Specialization elective	3	300 or above
Specialization elective	3	300 or above
Specialization elective	3	400 or above
Specialization elective	3	400 or above

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

† Students with prior experience with calculus may replace this class with a 3-credit quantitative elective at the 200-level or above, as approved by a CAAM undergraduate advisor. (This quantitative elective is in addition to the four required specialization electives.)

COMP

Computer Science

WEB LINKS	http://cs.rice.edu/undergrad/
FRANK ADVICE	The sample schedule is the best guide, especially for the first few semesters where it's important to take the core courses. But, generally, take the following as early as possible: COMP 140 or 160, 182, 215, 321 and ELEC 220.
ADVICE FOR STUDENTS WITH AP CREDIT	Computer science AP credit does not count toward the major requirements. If you have AP credit for Math, you should take the upper level math requirements earlier.
ALTERNATIVE CURRICULA	There is a lot of flexibility with the timing of the MATH/CAAM/STAT requirements and the upper-level COMP courses.
BS VERSUS BA	The BS provides more depth than the BA. The only difference in courses in the first two years is the Physics requirements for a BS. Students should speak with a major advisor about the choice of degrees as the best choice depends largely on circumstances and objectives.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	Some popular computer science courses include COMP 410, 430, 440.

RESEARCH	Many computer science undergraduates pursue research. The best way to find out about research opportunities is to talk with faculty who work in areas that you are interested in.
INTERNSHIPS	Internships are plentiful in computer science, some of which are posted on the department web site and emailed to majors. Most students have little trouble finding internships if they are interested.
STUDY ABROAD	With advance planning, it's not difficult to study abroad, even if not taking major-related courses while abroad. Most of the project-oriented courses are hard to get transfer credit for, while the mathematical requirements and theoretical courses are fairly easy to get transfer credit for. Going abroad during the spring semester is easier.
PROFESSIONAL ORGANIZATIONS	Rice University Computer Science Club (http://csclub.rice.edu/) CSters (Rice University's Society for Women in Computer Science) (http://csters.rice.edu/) ACM Programming Contest – contact John Greiner (greiner@rice.edu) for info.
INTERESTING COURSES FOR NON–MAJORS	COMP 140, 160, 162 COMP 182, 200, 435

B.A. In Computer Science

Specializations: Not Applicable

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**14 credits**	**FRESHMAN**		**14 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
COMP 140	Comp Thinking or 160	4*	COMP 182	Algorithmic Thinking	4*
FWIS	Freshman Writing	3	ELEC 220	Fund of Computer Engineering	4*
OPEN	Open elective	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**14 credits**
MATH 211 or 212 or 221 or 222	Ordinary Differential Equations	3	COMP 321	Intro to Computer Systems	4*
COMP 215	Introduction to Program Design	4*	COMP 322	Principles of Parallel Prog	4*
DIST	Distribution elective	3	DIST	Distribution elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
OPEN	Open elective	3			
JUNIOR		**16 credits**	**JUNIOR**		**13 credits**
COMP 310	Adv Object-Oriented Prog & Design	4*	COMP 421	Operating Sys & Concurrent Prog	4
MATH 355 or 354 or CAAM 335	Linear Algebra/ Matrix Analysis	3	STAT 310 or 312 or 331	Probability and Statistics	3
COMP 382	Reasoning About Algorithms	3	CORE	COMP elective course	3
DIST	Distribution elective	3	OPEN	Open elective	3
OPEN	Open elective	3			
SENIOR		**16 credits**	**SENIOR**		**15 credits**
COMP 411 or 412	Advanced Prog Languages	4	DIST	Distribution elective	3
CORE	COMP elective course	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	15
	Core Courses in Major	39
ELECTIVE REQUIREMENTS	Specialization Electives	6–8
	Open Electives and LPAP	34–36
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the BA in Computer Science requires 60–62 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211/212/221/222	3	Ordinary Differential Equations & Linear Algebra/Multivariable Calculus/ Honors Calculus III/Honors Calculus IV
MATH 355/354/ CAAM 335	3	Linear Algebra/Honors Linear Algebra/Matrix Analysis
STAT 310/312/331	3	Probability & Statistics/Probability & Statistics for CEVE/Applied Probability
ELEC 220	4*	Fundamentals of Computer Engineering
COMP 140/160	4*	Intro To Computational Thinking/Intro to Computer Game Creation
COMP 182	4*	Algorithmic Thinking
COMP 215	4*	Introduction to Program Design
COMP 310	4*	Advanced Object - Oriented Programming And Design
COMP 321	4*	Intro to Computer Systems
COMP 322	4*	Principles Of Parallel Programming
COMP 382	3	Reasoning About Algorithms
COMP 411/412	4	Advanced Programming Languages/Compiler Construction
COMP 421	4	Operating Systems and Concurrent Programming
COMP Elective	3–4	COMP 300 or above
COMP Elective	3–4	COMP 300 or above

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

B.S. In Computer Science

Specializations: One design course and any coherent set of 3-4 CS-related courses with a minimum of 15 credits that is approved by an academic advisor. Examples are posted on the Undergraduate Academics section of www.compsci.rice.edu/undergrad. COMP specializations designed by students must be approved by an academic advisor.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**14 credits**	**FRESHMAN**		**14 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics w/Lab	3*	COMP 182	Algorithmic Thinking	4*
or 111 or 125			ELEC 220	Fund of Comp Engineering	4*
COMP 140	Computational Thinking	4*	DIST	Distribution elective	3
or 160					
FWIS	Freshman Writing	3			
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**18 credits**
MATH 211	Ordinary Differential Equations	3	PHYS 102	Electricity and Magnetism	4*
or 212 or 221 or 222			or 112 or 126		
COMP 215	Introduction to Program Design	4*	COMP 321	Intro to Computer Systems	4*
DIST	Distribution elective	3	COMP 322	Principles of Parallel Prog	4*
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		**17 credits**	**JUNIOR**		**17 credits**
COMP 310	Adv Object-Oriented Prog & Design	4*	COMP 421	Operating Sys & Concurrent Prog	4
MATH 355	Linear Algebra	3	STAT 310	Probability and Statistics	3
or 354 or CAAM 335			or 312 or 331		
COMP 382	Reasoning About Algorithms	3	CORE	COMP elective course	4
CORE	COMP elective course	4	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**17 credits**
COMP 412	Compiler Construction	4	SPEC	COMP cap course elective	4
or 411			SPEC	COMP cap course elective	4
COMP 413	Distributed Program Construction	4	DIST	Distribution elective	3
or 410 or 460			OPEN	Open elective	3
SPEC	COMP cap course elective	4	OPEN	Open elective	3
DIST	Distribution elective	3			

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	22–23
	Core Courses in Major	39
ELECTIVE REQUIREMENTS	Computer Science Electives	6–8
	Engin Spec (COMP design & "cap" courses)	15
	Open Electives and LPAP	19–22
	FWIS and Distribution Courses	24
	Minimum credit required for the B.S.	128

Of the 128 total degree credits, the BS in computer science requires 82–85 credits in general math and science courses and core, and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211/212/221/222	3	Ordinary Differential Equations & Linear Algebra/Multivariable Calculus/ Honors Calculus III/Honors Calculus IV
MATH 355/354/ CAAM 335	3	Linear Algebra/Honors Linear Algebra/ Matrix Analysis
STAT 310/312/331	3	Probability & Statistics/Probability & Statistics for CEVE/Applied Probability
PHYS 101/111/125	3-4*	Mechanics w/Lab/General Physics w/Lab
PHYS 102/112/126	4*	Electricity & Magnetism w/Lab/General Physics II w/Lab
ELEC 220	4*	Fundamentals of Computer Engineering
COMP 140/160	4*	Intro To Computational Thinking/Intro to Computer Game Creation
COMP 182	4*	Algorithmic Thinking
COMP 215	4*	Introduction to Program Design
COMP 310	4*	Advanced Object - Oriented Programming And Design
COMP 321	4*	Introduction to Computer Systems
COMP 322	4*	Principles Of Parallel Programming
COMP 382	3	Reasoning About Algorithms
COMP 411/412	4	Advanced Programming Languages/Compiler Construction
COMP 421	4	Operating Systems and Concurrent Programming
COMP Elective	3–4	COMP 300 or above
COMP Elective	3–4	COMP 300 or above
SPEC Design	4	COMP design course (COMP 410/413/460)
SPEC	4	COMP cap course elective
SPEC	4	COMP cap course elective
SPEC	3–4	COMP cap course elective

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

ELEC

Electrical and Computer Engineering

WEB LINKS	http://ece.rice.edu/academics/undergrad.aspx
FRANK ADVICE	Start with MATH, CHEM, PHYS, and COMP requirements to get a solid background. Some of the sophomore core ELEC courses may be taken freshman year, such as ELEC 220, but often ELEC 241, 242, and 261 are best taken in the sophomore year. See the ECE Department academics web page and the IEEE Student Branch Freshman Handbook at http://ieee.rice.edu/ for additional sample degree plans.
ADVICE FOR STUDENTS WITH AP CREDIT	ELEC 220, ELEC 241, ELEC 242, and ELEC 261 are introductory core courses. Many students take ELEC 261 or ELEC 220 in freshman year, but depending on one's math background, ELEC 241, ELEC 242 may be better taken in the sophomore year.
ALTERNATIVE CURRICULA	The ECE Department has four specialization areas: Computer Engineering, Neuroengineering, Photonics, Electronics, and Nano-devices (PEN), and Systems: communications, control, networks and signal processing. The department provides many electives in these areas and more information on courses is at ece.rice.edu/academics/undergrad/specareaelec.aspx. Computer Engineering focuses on the hardware design aspects of computer systems including computer architecture, VLSI, and hardware description languages. PEN focuses on new devices and materials and lasers. Neuroengineering focuses on understanding and treating diseases of the human neural systems and networks. The Systems area focuses on wireless communication systems, digital signal processing, image processing and networking.
BS VERSUS BA	ECE offers the traditional BSEE degree for students interested in engineering careers. Only the program leading to the BSEE is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org.The BA degree program allows more flexibility for careers in finance, law or medicine.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	ELEC 262 Introduction to Waves and Photonics ELEC 342 Analog Electronic Circuits ELEC 345 Introduction to Computer Vision

RESEARCH	There are many opportunities for undergraduate research in ECE. To get involved, find out about individual faculty research programs. You can do this through faculty presentations at Friday lunch talks, given in coordination with the student chapter of IEEE. The department also has an annual laboratory open house. ECE has an active Industrial Affiliates Program, http://www.ece.rice.edu/corp (contact Jennifer Hunter, hunterj@rice.edu), and encourages students to attend the annual event (April 2016 date TBA) to meet informally with member companies.
INTERNSHIPS AND STUDY ABROAD	There are many opportunities in Electrical and Computer Engineering for study abroad and international internships. For example see nanojapan.rice.edu/ or contact Sarah Phillips, sphillips@rice.edu.
PROFESSIONAL ORGANIZATIONS	The Institute for Electrical and Electronics Engineers (IEEE) has an active student chapter and Eta Kappa Nu honor society at Rice. See http://ieee.rice.edu for details on the Friday lunch talk schedule and the annual laboratory open house. The IEEE Student Chapter Co-Presidents for 2015-2016 are Julia Kwok (jk28@rice.edu) and Leo Meister (lpm2@rice.edu). Also, the ECE Department has an active colloquium series, http://ece.rice.edu/events.aspx with many events co-sponsored by IEEE Houston chapters chaired by ECE faculty.
INTERESTING COURSES FOR NON–MAJORS	ELEC 220 Fundamentals of Computer Engineering ELEC 243 Electronic Measurement Systems ELEC 261 Electronic Materials and Quantum Devices

B.A. In Electrical Engineering

Specializations:
- Computer engineering
- Data science
- Neuroengineering
- Photonics, electronics, and nano-devices
- Systems: communications, control, networks and signal processing

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN	14 credits		**FRESHMAN**	17 credits	
COMP 140	Computational Thinking	4**	ELEC 220	Fund of Computer Engineering	4*
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics w/Lab	3*	PHYS 102	Electricity & Magnetism w/Lab	4*
FWIS	Freshman Writing	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1	OPEN	Open elective	3
SOPHOMORE	14 credits		**SOPHOMORE**	16 credits	
ELEC 241	Fund of Electrical Engineering I	4*	ELEC 242	Fund of Electrical Engineering II	4*
ELEC 261	Electronic Mat & Quantum Devices	3	MATH 212	Multivariable Calculus	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	4	OPEN	Open elective	3
			OPEN	Open elective	3
JUNIOR	15 credits		**JUNIOR**	15–16 credits	
ELEC 303	Random Signals	3	CAAM 335 or MATH 355	Matrix Analysis	3–4
ELEC 326	Digital Logic Design	3*	ELEC 305	Intro to Physical Electronics	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SPEC	ECE specialization elective	3	OPEN	Open elective	3
SENIOR	15 credits		**SENIOR**	15 credits	
SPEC	ECE specialization elective	3	ELEC	ECE Design Lab elective	3
SPEC	ECE specialization elective	3	SPEC	ECE specialization elective	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*
*** Comp 140 in the fall followed by COMP 182 in the spring of freshman year is strongly recommended for Computer Engineering*

BASIC REQUIREMENTS	General Math & Science Courses	25–26
	Core Courses in Major	25
ELECTIVE REQUIREMENTS	Engineering Specialization Electives	12-16
	Open Electives and LPAP	30–35
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	121

Of the 121 total degree credits, the BA in Electrical Engineering requires 61–68 credits in general math and science courses, core courses and Engineering Specialization Electives.

Major Requirements

NUMBER	CREDIT	TITLE
COMP 140**	4*	Computational Thinking
ELEC 327/332/364	3	ECE Design Lab elective
ELEC 220	4*	Fundamentals of Computer Engineering
ELEC 241	4*	Fundamentals of Electrical Engineering I
ELEC 242	4*	Fundamentals of Electrical Engineering II
ELEC 261	3	Electronic Materials & Quantum Devices
ELEC 303	3	Random Signals
ELEC 305	3	Introduction to Physical Electronics
ELEC 326	3*	Digital Logic Design
MATH 101/111	3	Single Variable Calculus I
MATH 102/112	3	Single Variable Calculus II
MATH 212	3	Multivariable Calculus
MATH 355/CAAM 335	3–4	Linear Algebra or Matrix Analysis
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4*	Electricity and Magnetism w/Lab
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

*** Comp 140 in the fall followed by COMP 182 in the spring of freshman year is strongly recommended for Computer Engineering*

B.S. In Electrical Engineering

Specializations: Computer engineering
Data science
Neuroengineering
Photonics, electronics, and nano-devices
Systems: communications, control, networks and signal processing

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL

FRESHMAN		18 credits
CHEM 121	General Chemistry I w/Lab	4*
COMP 140	Computational Thinking**	4*
MATH 101	Single Variable Calculus I	3
PHYS 101	Mechanics w/Lab	3*
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		15 credits
ELEC 241	Fund of Elec Engineering I	4*
ELEC 261	Electronic Mat & Quantum Devices	3
OPEN	Open Elective	3
DIST	Distribution elective	3
OPEN	Open Elective	2

JUNIOR		18 credits
ELEC 301	Introduction to Signals	3
ELEC 303	Random Signals	3
ELEC 326	Digital Logic Design	3*
OPEN	Open elective	3
SPEC	ECE specialization elective	3
SPEC	ECE specialization elective	3

SENIOR		15 credits
ELEC 494	ECE Senior Design	3
SPEC	ECE specialization elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SPRING

FRESHMAN		17 credits
ELEC 220	Fund of Computer Engineering	4*
MATH 102	Single Variable Calculus II	3
PHYS 102	Electricity & Magnetism w/Lab	4*
DIST	Distribution elective	3
DIST	Distribution elective	3

SOPHOMORE		16–17 credits
CAAM 335 or MATH 355	Matrix Analysis	3–4
ELEC 242	Fund of Electrical Engineering II	4*
MATH 212	Multivariable Calculus	3
DIST	Distribution elective	3
OPEN	Open Elective	3

JUNIOR		18 credits
ELEC 305	Intro to Physical Electronics	3
ELEC	ECE math and science elective	3
ELEC	ECE Design Lab elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
SPEC	ECE specialization elective	3

SENIOR		17 credits
ELEC 494	ECE Senior Design	3
SPEC	ECE specialization elective	4
SPEC	ECE specialization elective	4
DIST	Distribution elective	3
OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*
*** Comp 140 in the fall followed by COMP 182 in the spring of freshman year is strongly recommended for Computer Engineering*

BASIC REQUIREMENTS	General Math & Science Courses	32
	Core Courses in Major	34
ELECTIVE REQUIREMENTS	Engineering Specialization Electives	18–24
	Open Electives and LPAP	20–26
	FWIS and Distribution Courses	24
	Minimum credit required for the B.S.	134

Of the 134 total degree credits, the BS in Electrical Engineering requires at least 83 credits in general math and science courses, core courses and Engineering Specialization Electives.

Major Requirements

NUMBER	CREDIT	TITLE
CHEM 121	4*	General Chemistry I w/Lab
COMP 140**	4*	Computational Thinking/Intro to Engineering Computation
ELEC	3	ECE Math and Science elective
ELEC 220	4*	Fundamentals of Computer Engineering
ELEC 241	4*	Fundamentals of Electrical Engineering I
ELEC 242	4*	Fundamentals of Electrical Engineering II
ELEC 261	3	Electronic Materials & Quantum Devices
ELEC 301	3	Introduction to Signals
ELEC 303	3	Random Signals
ELEC 305	3	Introduction to Physical Electronics
ELEC 326	3*	Digital Logic Design
ELEC 494	4	Senior Design
ELEC 327/332/364	3	ECE Design Lab elective
MATH 101/111	3	Single Variable Calculus I
MATH 102/112	3	Single Variable Calculus II
MATH 212	3	Multivariable Calculus
MATH 355/CAAM 335	3–4	Linear Algebra or Matrix Analysis
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4*	Electricity and Magnetism w/Lab
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective
SPEC	3–4	ECE Specialization elective

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

*** Comp 140 in the fall followed by COMP 182 in the spring of freshman year is strongly recommended for Computer Engineering*

MSNE

Materials Science and NanoEngineering

WEB LINKS	http://msne.rice.edu
FRANK ADVICE	Many MSNE students pursue graduate degrees in top graduate schools after earning their BS degree, so undergraduate research experiences are quite important. Research intern experiences also help students obtain industrial jobs after graduation.
ADVICE FOR STUDENTS WITH AP CREDIT	Students with AP credit for Calculus would do well to move the MATH and CAAM sequence up. If the CAAM sequence can be fully completed in the sophomore year, this reduces the junior year pressure and also allows for more opportunities to participate in undergraduate research.
ALTERNATIVE CURRICULA	Not applicable.
BS VERSUS BA	Students are encouraged to pursue the BS degree instead of the BA degree, especially those who plan to pursue a graduate degree.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	See the Undergraduate Program page on our website, http://msne.rice.edu

RESEARCH	All MSNE majors participate in undergraduate research; some even start during their freshman year. To get involved, speak to a MSNE undergraduate advisor or directly to a MSNE faculty member.
INTERNSHIPS	Summer research internships are often available through individual MSNE research labs, too. Many students also pursue industrial or government lab internships as well. Notices are posted to the MSNE undergrad email list.
PROFESSIONAL ORGANIZATIONS	American Ceramic Society (ACerS) http://www.ceramics.org Association for Iron & Steel Technology (AIST) http://www.aist.org Materials Information Society http://www.asminternational.org Minerals, Metals, and Materials Society (TMS) http://www.tms.org Rice Undergraduate Materials Science and NanoEngineering Society http://materialsociety.blogs.rice.edu Rice Center for eEngineering Leadership(RCEL) http://rcel.rice.edu
INTERESTING COURSES FOR NON–MAJORS	MSNE 201 Introduction to NanoEngineering MSNE 402 Mechanical Properties of Materials MSNE 406 Physical Properties of Solids

B.A. In Materials Science and NanoEngineering

Specialization Areas: None Available. Students select specialization electives to suit their academic interests and career plans.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE.

FALL

FRESHMAN		17 credits
MATH 101	Single Variable Calculus I	3
CHEM 121 or CHEM 151	General Chem I w/Lab	4*
PHYS 101	Mechanics w/Lab or PHYS 111	3*
MSNE 201	Introduction to NanoEngineering	3
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		15 credits
MATH 211	Ord. Diff. Eqs. & Linear Algebra	3
MSNE 301	Materials Science	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

JUNIOR		15 credits
MSNE 406	Physical Properties of Materials	3
DIST	Distribution elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SENIOR		15 credits
MSNE 402	Mechanical Properties of Materials	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SPRING

FRESHMAN		14 credits
MATH 102	Single Variable Calculus II	3
CHEM 122	General Chemistry II w/Lab	4*
PHYS 102 or PHYS 112	Electr & Magnetism w/Lab	4*
DIST	Distribution elective	3

SOPHOMORE		15 credits
MATH 212	Multivariable Calculus	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

JUNIOR		15 credits
MSNE 303	Materials Sci Junior Laboratory	1
MSNE 311	Materials Selection and Design	4
MSNE 401	Thermodynamics & Transport Phenomena	4
DIST	Distribution elective	3
OPEN	Open elective	3

SENIOR		15 credits
MSNE 435	Crystallography & Diffraction	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	27
	Core Courses in Major	24
ELECTIVE REQUIREMENTS	Open Electives and LPAP	43
	FWIS and Distribution Courses	27
	Minimum credit required for the B.A.	121

Of the 121 total degree credits, the BA in Materials Science and NanoEngineering requires 51 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4*	Electricity and Magnetism w/Lab
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
MSNE 201	3	Introduction to NanoEngineering
MSNE 301	3	Materials Science
MSNE 303	1	Materials Science Junior Lab
MSNE 311	4	Materials Selection and Design
MSNE 401	4	Thermodynamics & Transport Phenomena in Materials Science
MSNE 402	3	Mechanical Properties of Material
MSNE 406	3	Physical Properties of Solids
MSNE 435	3	Crystallography and Diffraction

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

B.S. In Materials Science and NanoEngineering

Specializations: None Available. Students select specialization electives to suit their academic interests and career plans.

Engineering Sciences Electives: At least four electives for a total of 12 hours of credit approved by a department academic advisor: One basic science elective at the 200 level or higher, one engineering elective (not MSNE), and two technical electives in science, engineering (including MSNE) or math at the 200 level or higher.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
CHEM 121	General Chem I w/Lab	4*	CHEM 122	General Chem II w/Lab	4*
PHYS 101 or 111	Mechanics w/Lab	3*	PHYS 102 or 112	Electr & Magnetism w/Lab	4*
MSNE 201	Introduction to NanoEngineering	3	OPEN	Open elective	3
FWIS	Freshman Writing	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**15 credits**	**SOPHOMORE**		**18 credits**
MATH 211	Ord Diff Eqs & Linear Algebra	3	MATH 212	Multivariable Calculus	3
PHYS 201 or CHEM 211/ 311	Waves & Optics	3	CAAM 210	Intro to Eng Computation	3
			DIST	Distribution elective	3
SPEC	MSNE Technical elective	3	DIST	Distribution elective	3
MSNE 301	Materials Science	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
CAAM 335	Matrix Analysis	3	MSNE 303	Materials Science Junior Lab	1
MSNE 406	Physical Properties of Solids	3	MSNE 311	Materials Selection and Design	4
MSNE 415	Ceramics and Glasses	3	MSNE 401	Thermodynamics & Transport Phenomena in Mat Sci	4
MSNE 451	Materials Science Seminar	1			
SPEC	MSNE Engineering elective	3	MSNE 411	Mtllogrphy & Phase Relations	3
DIST	Distribution elective	3	OPEN	Open elective	3
SENIOR		**16 credits**	**SENIOR**		**16 credits**
MSNE 402	Mechanical Properties of Materials	3	MSNE 408	Capstone Design II	3
MSNE 407	Capstone Design I	4	MSNE 435	Crystallography and Diffraction	3
MSNE 450	Materials Science Seminar	0	MSNE 437	Materials Science Senior Lab	1
SPEC	MSNE Technical elective	3	DIST	Distribution elective	3
SPEC	MSNE Science elective	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	36
	Core Courses in Major	39
ELECTIVE REQUIREMENTS	Specialization Electives	12
	Open Electives and LPAP	19
	FWIS and Distribution Courses	24
	Minimum credit required for the B.S.	130

Of the 130 total credits, the BS in Materials Science and NanoEngineering requires 75 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations & Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101/111	3*	Mechanics w/Lab
PHYS 102/112	4*	Electricity and Magnetism w/Lab
CHEM 121/123	4*	General Chemistry I w/Lab
CHEM 122/124	4*	General Chemistry with II Lab
CAAM 210	3	Introduction to Engineering Computation
CAAM 335	3	Matrix Analysis
MSNE 201	3	Introduction to NanoEngineering
MSNE 301	3	Materials Science
MSNE 303	1	Materials Science Junior Lab
MSNE 311	4	Materials Selection & Design
MSNE 401	4	Thermodynamics& Transport Phenomena in Materials Science
MSNE 402	3	Mechanical Properties of Materials
MSNE 406	3	Physical Properties of Solids
MSNE 407	4	Capstone Design I
MSNE 408	3	Capstone Design II
MSNE 411	3	Metallography and Phase Relations
MSNE 415	3	Ceramics and Glasses
MSNE 435	3	Crystallography and Diffraction
MSNE 450	0	Materials Science Seminar
MSNE 451	1	Materials Science Seminar
MSNE 437	1	Crystallography & Diffraction Lab/Materials Science Senior Lab
PHYS 201/CHEM 211/311	3	Waves and Optics/Organic Chemistry/Physical Chemistry
Elective	3	1 approved science elective (not MSNE)
Elective	3	1 approved technical elective (MSNE)
Elective	3	1 approved technical elective (MSNE)
Elective	3	1 approved engineering elective (not MSNE)

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

MECH

Mechanical Engineering

WEB LINKS	mech.rice.edu/undergrad
FRANK ADVICE	Students should register with Center for Career Development (http://ccd.rice.edu/) and create a résumé. The CCD maintains RICElink, where potential employers post open positions. If students are sure that they are going to major in mechanical engineering, then they are encouraged to declare their major early in the spring semester of freshman year and see a major advisor to discuss their degree plan.
ADVICE FOR STUDENTS WITH AP CREDIT	Students with AP credit for Calculus are encouraged to take the MATH and CAAM sequences earlier than suggested in the sample degree plan.
ALTERNATIVE CURRICULA	Double majoring is not encouraged due to the large number of required classes in the BSME degree. If students intend to double major, consultation with a major advisor is encouraged to develop a program of study.
BS VERSUS BA	Only the BS degree is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org, and is the most direct route toward becoming a licensed professional engineer (PE). The BA is recommended only for students who will pursue professional careers in medicine, law, or business immediately after their undergraduate education. These students will need to take additional prerequisite classes for these professional post-graduate programs.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	MECH 403, Computer Aided Design is not required, but is a highly recommended class. In particular, the knowledge gained from this class often helps students obtain summer internships after either sophomore or junior years.

RESEARCH	Undergraduate research is arranged by talking directly to professors. Students are encouraged to investigate the research profiles of faculty members at http://mech.rice.edu.
INTERNSHIPS	Most students participate in summer internships in industry, especially after sophmore and junior years. Summer research positions at Rice are often available as well.
STUDY ABROAD	Study abroad and co-ops are most feasible in the fall semesters of the sophomore and junior years. This avoids conflicts with Lab classes that are difficult to find elsewhere (MECH 331, 332) and also avoids conflicts with the year-long senior design sequence (MECH 407/408).
PROFESSIONAL ORGANIZATIONS	The American Society of Mechanical Engineers (http://asme.rice.edu/), which is free for the first year of membership, occasionally hosts industry representatives and organizes outreach, service and design projects. The American Institute of Aeronautics and Astronautics (http://www.ruf.rice.edu/~aiaa/) organizes presentations, study breaks, and other activities for students interested in aerospace engineering. Many mechanical engineering students are also active in the Rice Engineers Without Borders chapter (http://ewb.rice.edu/). Leadership positions are often available to freshmen and sophomores of all of these organizations.
INTERESTING COURSES FOR NON–MAJORS	MECH 454 Computational Fluid Mechanics MECH 498 Introduction to Robotics MECH 594 Introduction to Aeronautics

B.A. In Mechanical Engineering

Specializations: Not Applicable

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
CHEM 121	General Chemistry I w/Lab	4*	CHEM 122	General Chemistry II w/Lab	4*
PHYS 101	Mechanics w/Lab	3*	PHYS 102	Electricity & Magnetism w/Lab	4*
FWIS	Freshman Writing	3	CAAM 210	Intro to Eng Computation	3
OPEN	Open elective	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
MATH 211	Ordinary Differential Equations	3	MATH 212	Multivariable Calculus	3
MECH 211	Engineering Mechanics	3	MECH 200	Classical Thermodynamics	3
MSCI 301	Materials Science	3	MECH 311	Mechanics of Solids	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		**16–17 credits**	**JUNIOR**		**15–16 credits**
CAAM 335	Matrix Analysis	3–4	CAAM 336	Diff Eqs in Science & Eng	3–4
MECH 343	Modeling of Dynamic Systems	4*	MECH 401	Machine Design Applications	3
MECH 371	Fluid Mechanics I	3	MECH 420	Fundamentals of Control Systems	3
DIST	Distribution elective	3	MECH 481	Heat Transfer	3
OPEN	Open elective	3	DIST	Distribution elective	3
SENIOR		**18 credits**	**SENIOR**		**15 credits**
DIST	Distribution elective	3	MECH 412	Vibrations	3
OPEN	Open elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3			

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	39
	Core Courses in Major	28
ELECTIVE REQUIREMENTS	Open Electives and LPAP	36
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	127

Of the 127 total degree credits, the BA in Mechanical Engineering requires 67 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210	3	Introduction to Engineering Computation
CAAM 335	3–4	Matrix Analysis
CAAM 336	3–4	Diferential Equations in Science & Engineering
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations & Linear Algebra
MATH 212	3	Multivariable Calculus
MSCI 301	3	Materials Science
PHYS 101	3*	Mechanics w/Lab
PHYS 102	4*	Electricity and Magnetism w/Lab
MECH 200	3	Classical Thermodynamics
MECH 211	3	Engineering Mechanics
MECH 311	3	Mechanics of Solids & Structures
MECH 343	4*	Modeling of Dynamic Systems
MECH 371	3	Fluid Mechanics I
MECH 401	3	Mechanical Design Applications
MECH 412	3	Vibrations
MECH 420	3	Fundamentals of Control Systems
MECH 481	3	Heat Transfer

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

B.S. In Mechanical Engineering

Specializations: Aerospace Engineering, Computational Engineering, Fluid Mechanics and Thermal Science, Solid Mechanics and Materials, and System Dynamics and control. Requirements include at least 3 upper-level courses (cluster courses) of which at least 2 must come from Group A (MECH 400, 403, 411, 417, 454, 474, 488, 498, 555, 594 and MSCI 402) and the third can come from Group A or Group B. Group B courses include any 300+ course offered within the School of Engineering.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics w/Lab	3*	PHYS 102	Electricity & Magnetism II w/Lab	4*
CHEM 121	General Chemistry I w/Lab	4*	CHEM 122	General Chemitry II w/Lab	4*
FWIS	Freshman Writing	3	CAAM 210	Intro to Engineering Computation	3
OPEN	Open elective	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**16 credits**
MATH 211	Ordinary Differential Equations	3	MATH 212	Multivariable Calculus	3
MECH 211	Engineering Mechanics	3	MECH 200	Classical Thermodynamics	3
MSCI 301	Materials Science	3	MECH 311	Mechanics of Solids	3
MECH 340	Industrial Processing Lab	1	MECH 331	Junior Laboratory I - Mechanics	1
OPEN	Open elective	3	DIST	Distribution elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
JUNIOR		**16–17 credits**	**JUNIOR**		**16–17 credits**
CAAM 335	Matrix Analysis	3–4	CAAM 336	Diff Eqs in Science & Eng	3–4
MECH 343	Modeling of Dynamic Systems	4*	MECH 332	Junior Laboratory II - Fluids/Solids	1
MECH 371	Fluid Mechanics I	3	MECH 401	Machine Design	3
SPEC	MECH Cluster #1	3	MECH 420	Fund of Control Systems	3
DIST	Distribution elective	3	MECH 481	Heat Transfer	3
			DIST	Distribution elective	3
SENIOR		**17 credits**	**SENIOR**		**18 credits**
MECH 407	Mechanical Design Project I	4	MECH 408	Mechanical Design Project II	3
MECH 431	Senior Laboratory	1	MECH 412	Vibrations	3
MECH 472	Thermal Systems Design	3	SPEC	MECH Cluster #3	3
STAT	STAT 305 or 310 or 331	3	DIST	Distribution elective	3
SPEC	MECH Cluster #2	3	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

BASIC REQUIREMENTS	General Math & Science Courses	42
	Core Courses in Major	42
ELECTIVE REQUIREMENTS	Engineering Specialization Electives	9
	Open Electives and LPAP	15
	FWIS and Distribution Courses	24
	Minimum credit required for the B.S.	132

Of the 132 total degree credits, the BS in Mechanical Engineering requires at least 84 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210	3	Introduction to Engineering Computation
CAAM 335	3–4	Matrix Analysis
CAAM 336	3–4	Differential Equations in Science and Engineering
CHEM 121	4*	General Chemistry I w/Lab
CHEM 122	4*	General Chemistry II w/Lab
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
MSNE 301	3	Materials Science
PHYS 101	3*	Mechanics w/Lab
PHYS 102	4*	Electricity and Magnetism w/Lab
STAT 305/310/331	3	Limited Elective
MECH 200	3	Classical Thermodynamics
MECH 211	3	Engineering Mechanics
MECH 311	3	Mechanics of Solids & Structures
MECH 331	1	Junior Laboratory I (Mechanics Lab)
MECH 332	1	Junior Laboratory II (Thermo/Fluids Lab)
MECH 340	1	Industrial Processing Lab
MECH 343	4*	Modeling of Dynamic Systems
MECH 371	3	Fluid Mechanics I
MECH 401	3	Mechanical Design Applications
MECH 407	4	Mechanical Design Project I
MECH 408	3	Mechanical Design Project II
MECH 412	3	Vibrations
MECH 420	3	Fundamentals of Control Systems
MECH 431	1	Senior Laboratory
MECH 472	3	Thermal Systems Design
MECH 481	3	Heat Transfer
SPECIALIZATION CLUSTER	3	Mech Area Cluster Course #1
SPECIALIZATION CLUSTER	3	Mech Area Cluster Course #2
SPECIALIZATION CLUSTER	3	Mech Area Cluster Course #3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

STAT

Statistics

WEB LINKS	http://statistics.rice.edu/undergraduateprogram/
FRANK ADVICE	STAT 310 is a calculus-based introduction to the theory of statistics. Students without AP credit should consider STAT 280 or STAT 305 prior to STAT 310 in order to develop background in statistical concepts. These courses are not a prerequisite for STAT 310 but we find that students who have some familiarity with statistics when they enter STAT 310 are able to glean more from the course and perform better. STAT 310 is very different from AP statistics. STAT 410 is a calculus-based introduction to regression. STAT 410 requires STAT 310 or STAT 312 as a prerequisite. A background in linear algebra is very helpful for STAT 410.
ADVICE FOR STUDENTS WITH AP CREDIT	Many courses beyond STAT 310 use the statistical computing package, R. STAT 405 is a course on R and should thus be taken as early as possible. AP credits are respected at the level of STAT 280 (introductory statistics course). Engineering students with AP credits should consider taking STAT 310 or STAT 312. STAT 310/312 prerequisites are very important; do not attempt 310/312 until they have all been satisfied. Science and/or PreMed students should consider STAT 305.
ALTERNATIVE CURRICULA	Double majors are welcome to select several "specialization electives" that coordinate with their other majors. Such courses should contain a statistical component in order to earn credit as statistics electives. Talk with an advisor prior to registering for these courses.
BS VERSUS BA	STAT only offers a B.A. degree.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	Students interested in "data analytics" should consider STAT 405 and 444. Students with Bioinformatics or Systems Biology interests should consider STAT 423 (contact Profs. Kimmel, kimmel@rice.edu, Guerra, rguerra@rice.edu, or Vannucci, marina@rice.edu). Students with Computational Finance interests should consider STAT 482, 486, STAT 421 (contact Prof. Ensor, ensor@rice.edu).

RESEARCH	Many STAT majors participate in undergraduate research. If there is a professor whose research interests you, ask him or her if you may join his or her research group. Summer research opportunities may require applications as early as Jan-Feb of the spring term. Talk with an advisor for more information.
INTERNSHIPS	Summer research internships are often available. MD Anderson (joint Biostatistics program), Baylor College of Medicine (Bioinformatics) or Texas Children's Hospital (Bioinformatics and Systems Biology) summer internships may be available. The Department of Statistics maintains a web page listing of the various opportunities for undergraduate statistics students. See statistics.rice.edu/opportunities.
PROFESSIONAL ORGANIZATION	Houston Area Chapter of American Statistical Association (HACASA) welcomes student participants at their meetings. See https://sites.google.com/site/houstonasa/ for details.
INTERESTING COURSES FOR NON–MAJORS	STAT 305 Introduction to Statistics for Biosciences STAT 312 Probability and Statistics for Engineers STAT 313 Uncertainty & Risk in Urban Infrastructures STAT 385 Methods of Data Analysis and System Optimization STAT 405 Statistical Computing and Graphics STAT 423 Probability in Bioinformatics and Genetics STAT 485 Quantitative Environmental Decision Making **Financial Computation and Modeling minor** STAT 486 Computational Finance I: Market Models STAT 421 Computational Finance II: Applied Time Series and Finance

B.A. Statistics

Specializations: Finance, Biostatistics/Bioinformatics and Environment.
Students interested in an early start to statistics should consider taking STAT 280 or 305 followed by 385 as early as the freshman year. These courses are less mathematical than STAT 310 and 410 but are excellent in developing foundations in statistics and data analysis skills.

Sample Degree Plan

THIS IS ONE EXAMPLE OF MANY POSSIBLE SCHEDULES.
CONSULT A DIVISIONAL OR DEPARTMENTAL ADVISOR TO CUSTOMIZE YOUR DEGREE PLAN.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**15 credits**
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
STAT 280	Elementary Applied Statistics	4*	DIST	Distribution elective	3
FWIS	Freshman Writing	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
MATH 212	Multivariable Calculus	3	STAT 405	Stat Computing and Graphics	3
STAT 310	Probability and Statistics	3	SPEC	Special elective	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
STAT 410	Linear Regression	4*	SPEC	Specialization elective	3**
MATH 355	Linear Algebra	3	SPEC	Specialization elective	3
DIST	Distribution elective	3	SPEC	Specialization elective	3
OPEN	Open elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
SPEC	Specialization elective	3	STAT 450	Senior Capstone Project	3
SPEC	Specialization elective	3	DIST	Distribution elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab that must fit into your schedule.*

*** STAT 305, 339, and 385 may not count as electives for the statistics major. Students may request approval for up to two statistics-related courses from other departments to count toward the specialization electives.*

BASIC REQUIREMENTS	General Math & Science Courses	12
	Core Courses in Major	12
ELECTIVE REQUIREMENTS	Specialization Electives	18
	Open Electives and LPAP	54
	FWIS and Distribution Courses	24
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the BA in Statistics requires 42 credits in general math and science, core, and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I
MATH 102	3	Single Variable Calculus II
MATH 212	3	Multivariable Calculus
MATH 355/CAAM 335	3	Linear Algebra /Matrix Analysis
STAT 310	3	Probability and Statistics **
STAT 410	4	Linear Regression
STAT 405	3	Statistical Computing & Graphics
STAT 450	3	Senior Capstone Project
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
		STAT 305, 339 and 385 may not count as electives. Up to two statistics-related courses from other departments may qualify as electives, with advisor approval.

MAJOR ADVISORS

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Mechanical Engineering

See the MECH web site for a list of major advisors: http://mech.rice.edu/undergrad_advisor.

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REQUIREMENTS FOR BACHELOR'S DEGREES

Below is a checklist for some of the requirements for earning a bachelor's degree from Rice that apply to ALL majors. The Rice University General Announcements is the final authority on all academic regulations, including those pertaining to degree and major requirements. See "Information for Undergraduate Students: Graduation Requirements" in the Rice University General Announcements for more details and additional requirements. See http://rice.edu/catalog/, then Undergraduate Students, then Graduation Requirements.

Major requirements are specified by the department or program; for example, the specific math and science courses, core engineering courses, and engineering electives that you must complete to be awarded a degree in a given major.

Degree requirements are specified by the university; for example, the number of semester hours that must be taken to satisfy distribution requirements or the portion of upper-level course hours that must be taken at Rice.

General Rice Degree Requirements

In order to graduate with a bachelor's degree from Rice University, you must:

- ☐ Be registered at Rice full time for at least four full fall and/or spring semesters.
- ☐ Complete the requirements of at least one major degree program.
- ☐ Complete at least 120 semester hours (some degree programs require more than 120 hours).
- ☐ Complete at least 60 semester hours at Rice University.
- ☐ Complete at least 48 hours of all degree work in upper-level courses (at the 300 level or higher).
- ☐ Complete more than half of the upper-level courses in degree work at Rice.
- ☐ Complete more than half of the upper-level courses in your major work at Rice (certain departments may specify a higher proportion).
- ☐ Complete all Rice courses satisfying degree requirements with a cumulative grade point average of at least 1.67 or higher.
- ☐ Complete all Rice courses satisfying major requirements with a cumulative grade point average of at least 2.00 or higher.
- ☐ Satisfy the English composition requirement.
- ☐ Satisfy the Lifetime Physical Activity Program requirement.
- ☐ Complete courses to satisfy the distribution requirement.

ENGINEERING COURSES

ACCESSIBLE TO FRESHMEN

For course descriptions, see http://rice.edu/catalog/
then Courses of Instruction.

THERE ARE NO PREREQUISITES FOR THESE COURSES:

ENGI 120	Introduction to Engineering Design (Fall/Spring)
ENGI 128	Introduction to Engineering Systems (Fall)
BIOE 202	Careers in Bioengineering (Spring)
CEVE 101	Fundamentals of Civil and Environmental Engineering (Fall)
CEVE 307	Energy and the Environment (Fall)
CEVE 322	Engineering Economics (Spring)
CHBE 100	Introduction to Chemical and Biomolecular Engineering (Spring)
CHBE 281	Engineering Sustainable Communities (Spring)
COMP 140	Computational Thinking (Fall)
COMP 160	Introduction to Computer Game Creation (Fall)
COMP 162	Introduction to Game Content Creation (Fall)
ELEC 220	Fundamentals of Computer Engineering (Spring)
MSNE 201	Introduction to NanoEngineering (Fall)
STAT 100	Data, Models and Reality: An Introduction to the Scientific Method

THESE COURSES HAVE MINIMAL PREREQUISITES:

CAAM 210	Introduction to Engineering Computation (Fall/Spring)
ELEC 241	Fundamentals of Electrical Engineering I (Fall)
MECH 200	Classical Thermodynamics (Spring)
MECH/CEVE 211	Engineering Mechanics (Fall/Spring)
STAT 305	Introduction to Statistics for Biosciences (Fall)
STAT 310	Probablity and Statistics (Fall/Spring)
STAT 312	Probability and Statistics for CEVE (Fall)
STAT 331	Applied Probability (Spring)


RICE