ADVISING BOOKLET

RICE UNIVERSITY
George R. Brown
School of Engineering

FALL 2021

UNDERGRADUATE ADVISING

FALL 2021

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 a student's residential college and who provides academic advising to those considering engineering majors. You should consult with your divisional advisor prior to registering for classes each semester. You must also consult with major advisors before declaring a major. See page 64 for a complete list of advisors.

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 (FWIS). 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. Students interested in an engineering-centric FWIS should consider FWIS 188. For further information about the FWIS requirements, please visit http://pwc.rice.edu/.

Selecting an Engineering Major

The Introduction to Engineering Course (ENGI 101) is a 1 credit course designed to help you learn about the types of problems engineers solve in different disciplines and the tools they use to do it. Throughout the course, faculty members from the different engineering programs offered at Rice will talk about their major and describe the career paths available in their fields.

In addition to registering for this course we encourage you to attend research seminars, join student clubs, and talk to your divisional advisor and faculty in the departments that you are interested in. Spend your first year at Rice learning more about the options available to you, and you will be ready to make this decision.

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 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. See engineering.rice.edu/abroad for more information on the best semester to study abroad depending on your major. Planning ahead of time is essential when you want to take advantage of this opportunity. Keep in mind that there are also summer opportunities available to study abroad. See abroad.rice.edu and visit the study abroad office to help you make arrangements.

There are many international experiences available to engineering students. The Oshman Engineering Design Kitchen (OEDK) offers iSEED as an international study abroad opportunity, to work on community and client-based projects (oedk.rice.edu/iSeed). Engineers Without Borders (ewb.rice.edu) and Rice 360 Institute for Global Health (rice360.rice.edu) offer international opportunities to tackle real-world design challenges in the developing world. There are also study abroad programs and internship programs through CLIC (https://clic.rice.edu/study-abroad). Make sure you take advantage of these opportunities.

DESCRIPTION OF MAJORS

OFFERED BY DEPARTMENTS

Bioengineering

The overall goal of the B.S. degree in Bioengineering (B.S.B) 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 B.S.B 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 (B.S.Ch.E) and Bachelor of Arts (B.A.) degree. Only the program leading to the B.S. degree in Chemical Engineering is accredited by the Engineering Accreditation Commission (EAC) of ABET, 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 disciplines are very broad and address virtually any system or infrastructure related to earth, water, air, or civilization and their processes. 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 to solve 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 and ethical frameworks that affect engineering research and practice. We emphasize design and the development of professional communication skills and strategies, especially those requiring collaboration and teamwork.

Students gain experience and knowledge from domestic and international experts in academia, research and industry. To prepare for the global workplace, service learning experiences are offered, typically during academic breaks. For example, undergraduate members of Rice's nationally recognized chapter of Engineers Without Borders, a student-run organization, work 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 strong emphasis on student leadership, cross-disciplinary application and access to faculty, and our 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, with advanced degrees, academia.

In the CAAM major, 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 engineering (ECE) is the creation, innovation and design of technologies in computing, communications, electronics and machine learning. ECE is at the crossroads of hardware and software—the integration of these tools to create better, faster, safer technologies for things like cars, aircraft, computers, smartphones and surgical robots. We invent and develop technologies and devices for the betterment of humanity.

ECE's flexible programs educate engineers and scientists to be leaders in academia, industry and government. ECE graduates go on to work in almost every field imaginable, including healthcare, energy, law, the space industry, entertainment and security. The opportunities are broad; the major has many avenues for interdisciplinary learning and collaboration.

Undergraduates are encouraged to participate in research by contacting ECE faculty directly or through the Vertically Integrated Projects (VIP) program. Summer internship opportunities are available in ECE labs and with our industrial affiliates. Additional experiential learning is available through study abroad experiences.

At Rice, ECE faculty rewire and study the brain to combat Parkinson's, epilepsy and PTSD. They build lensless cameras, explore oil reservoirs, and bring wireless technology to the underserved. They push the state-of-the-art in national security, healthcare, data science, photonics, neural engineering, communications and nanotechnology.

Materials Science and NanoEngineering

Materials engineering is concerned with the processing, structure, properties and performance of materials used by society. These include metals and their alloys, semiconductors, ceramics, glasses, polymers, composites and nanomaterials.

The materials engineer applies principles of math, physics and chemistry to design, produce, characterize and utilize the materials necessary for today's engineering. The curriculum in the Department of Materials Science and NanoEngineering 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 for them to become a leaders 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.

Operations Research

Operations Research (OR) is the scientific approach to decision making in complex environments. OR is pervasive in nearly every aspect of society, including medicine, finance, logistics, transportation, public policy, manufacturing, and information technology.

OR majors at Rice take introductory sequences in computer science, mathematics, and statistics. The intermediate and advanced OR courses focus on 1) building and calibrating models of decisions arising in various complex environments, 2) analyzing these models mathematically, 3) solving these models using sophisticated algorithms, and 4) interpreting the solutions of these models. OR majors take advanced courses in supply chain management, financial optimization, large-scale optimization, and simulation. They also take three electives drawn from across engineering and economics.

Operations Research graduates are in high demand in all sectors of industry, and the number of OR jobs is projected to grow 25% over the coming decade. Rice OR faculty prize collaborations with undergraduates in their research, some of whom subsequently join top PhD programs.

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, environmetrics, 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 data science, business, finance, biology, medicine, economics, engineering, sociology, defense and environmental science. 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 AND CERTIFICATES

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, one at or above the 300 level.

For details, see

https://www.caam.rice.edu/academics/undergraduate-programs/caam-minor

Minor advisors

Jesse Chan, jesse.chan@rice.edu
Illya V. Hicks, ivhicks@rice.edu
Andrew Schaefer, andrew.schaefer@rice.edu

Data Science

The Data Science (DS) minor is interdisciplinary in nature, accessible to all undergraduate students across campus. The minor will develop critical thinking skills and practical capabilities by teaching students to: formulate questions in a discipline that can be answered with data; use tools and algorithms from statistics, applied mathematics, and computer science for analyses; visualize, interpret, and explain results cogently, accurately, and persuasively; understand the underlying social, political, and ethical contexts that are inevitably tied to data-driven decision-making.

Summary requirements

Required courses include 3 foundational courses (MATH 101, MATH 102, COMP 140) and 6 core courses (DSCI 301, DSCI 302, DSCI 303, DSCI 304, DSCI 305)

For details, see

http:/datascience.rice.edu/data-science-minor

Minor advisors

Arko Barman, arko.barman@rice.edu
Sue Chen, sc131@rice.edu
Rudy Guerra, rguerra@rice.edu
Chris Jermaine, cmj4@rice.edu
Fred Oswald, fred.oswald@rice.edu
Elizabeth Petrick, elizabeth.petrick@rice.edu

Engineering Design

The minor in engineering design prepares students to solve open-ended engineering challenges by giving them myriad opportunities to experience the steps in the design process. The EDES minor capitalizes on strengths in engineering design at Rice – both innovative and successful engineering design courses and unsurpassed facilities that are available for undergraduate engineering students starting in their freshman year. The expertise students gain will complement their academic major and provide a deep understanding and the skill set to successfully embark in engineering design careers.

Summary requirements
Introduction to Engineering Design (ENGI 120/220 or FWIS 188), ENGI 200, ENGI 210, and ENGI 350; two elective courses; participate in 2 different design projects.
For details, see
http://oedk.rice.edu/minor
Minor advisors
Joseph Cavallaro, cavallar@rice.edu
Deirdre Hunter, hunterd@rice.edu
Maria Oden, moden@rice.edu
Matthew Wettergreen, wettergreen@rice.edu
Gary Woods, gary.woods@rice.edu

Energy and Water Sustainability

Sustainability 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 301/ECON 480/ENST 480), three electives, and 1-credit design practicum.
For details, see
https://cee.rice.edu/academics/undergraduate-programs/minor-energy-and-water-sustainability
Minor advisor
Jorge Loyo, jl149@rice.edu

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 advanced quantitative methodologies and the basics of financial markets.
Summary of requirements
Students take three foundation courses in economics and statistics ECON 100; STAT 310 or 315; ECON 310 or STAT 410 and select three elective courses from four selected groups covering quantitative finance and markets.
For details, see
http://ga.rice.edu/programs
Minor Advisor
Katherine Ensor, ensor@rice.edu
John Dobelman, dobleman@rice.edu
Mahmoud A El-Gamal, elgamal@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(Introducton to Global Health), followed by a series of 6 core and elective courses in science/engineering and humanities/social science/policy, culminating in a capstone design course.

For details, see

http://www.rice360.rice.edu/glht-minor

Minor advisors

Meaghan Bond, meaghan.mc.bond@rice.edu
Andrea Gobin, agobin@rice.edu
Yvette Mirabal, ymirabal@rice.edu
Ashley Taylor, ashley.r.taylor@rice.edu

Rice Center for Engineering Leadership (RCEL) Certificate

The difference between a “really smart” engineer and an engineering leader is the ability to communicate, create a guiding vision, build a high performing team, and develop and execute a shared plan. The RCEL Certificate in Engineering Leadership will set you apart from your peers and provide the skills necessary to succeed in your future career. Through a series of 100-400 level RCEL courses, you will discover your personal strengths, motivations, and aspirations as leaders, learn the principles of ethical engineering leadership, and practice the strategic application of advocacy and decision making skills in an engineering team environment, all while acquiring hands-on experience leading a team through engineering challenges. In addition, RCEL students pick specialized tracks based on career interests and learn key project management skills from PMP© certified instructors and industry professionals.

Summary requirements

Required courses included RCEL 100, RCEL 200, RCEL 241, RCEL 300, RCEL 400, RCEL 450. An additional course must be selected from RCEL 410, RCEL 420, RCEL 430, RCEL 440 based on the specialized track selected.

For details, see

http://rcelconnect.org

Certificate advisor

Kaz Karwowski
kazimir.i.karwowski@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

Track A: STAT 310 or 315; STAT 405 and STAT 410 and three STAT electives.

Track B: STAT 280 or 305; STAT 385 and four STAT electives. All electives for either track must be at the 300-level or higher.

For details, see
http://statistics.rice.edu/academics/undergraduate
Minor advisor
Elizabeth McGuffey,
elizabeth.mcguffey@rice.edu

BIOE

Bioengineering

WEB LINKS	https://bioengineering.rice.edu/undergraduate-program/degrees-offered (general website)
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 CAAM 210 before BIOE 252, ELEC 243 before BIOE 383/5 and MECH 202 before BIOE 372. You must take CAAM 210 your first year. Do not push this off.
ADVICE FOR STUDENTS WITH AP CREDIT	Take BIOS 201 or a more advanced math (e.g., MATH 211) during your first year. Consider ENGI 120, ENGI 128 or FWIS 188.
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. The B.S. in Bioengineering (B.S.B.) is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org.
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 featuring guest lecturers will help you find out what bioengineering is all about.

RESEARCH	Over 70 percent 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 course credit by taking either BIOE 400 or BIOE 401. 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 junior year; a few students go during the spring of sophomore 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. Visit bmes.rice.edu for more details.
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			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**17 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
PHYS 101•	Mechanics w/Lab	4*	PHYS 102••	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	CAAM 210	Intro. to Eng. Computation	3*
OPEN	Open elective	3	DIST	Distribution elective	3
SOPHOMORE		**17 credits**	**SOPHOMORE**		**17 credits**
MATH 211	Ord Diff Eqs & Linear Algebra	3	MATH212	Multivariable Calculus	3
CHEM 211§	Organic Chemistry I	3	BIOE 391	Numerical Methods	3
BIOS 201	Introductory Biology	3	ELEC 243	Intro. to Electronics	4*
BIOE 440	Statistics for Bioengineers	1	BIOE 320	Systems Physiology Lab	1
BIOE 252	Bioengineering Fundamentals	4	BIOE 322	Fund Systems Physiology	3
DIST	Distribution elective	3	DIST	Distribution elective	3
JUNIOR		**16 credits**	**JUNIOR**		**16 credits**
BIOE 383	Biomed Eng Instrumentation	3	BIOE 330‡	Bioreaction Engineering	3
BIOE 385	Biomed Eng Instr Lab	1	BIOE 342	Tissue Culture Lab	1*
BIOE 370	Biomaterials	3	BIOE 372	Biomechanics	3
BIOS 341#	Cell Biology	3	BIOE 332‡	Thermodynamics	3
MECH 202	Mechanics/Statics	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SENIOR		**16 credits**	**SENIOR**		**15 credits**
BIOE 420‡	Transport Phenomena in BIOE	3	BIOE 452	Bioengineering Design II	3
BIOE 442-9	Adv BIOE Labs (2 required)	2	TECH	BIOE technical elective	3
BIOE 451	Bioengineering Design I	4	TECH	BIOE technical elective	3
TECH	BIOE technical elective	3	DIST	Distribution elective	3
DIST	Distribution elective	3	OPEN	Open elective	3
LPAP	Lifetime Physical Activity elective	1			

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

 # Students may take BIOE 341 (Cell and Molecular Biology for Engineers) in place of BIOS 341.

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

‡Students may choose to replace one and only one of these courses with one or more additional approved technical electives that account for the engineering points assigned to that course. Please speak to an academic advisor prior to doing so.

Basic requirements	General math & science courses	37
	Core courses in major	51
Elective requirements	BIOE technical electives	9
	Open electives and LPAP	13
	FWIS and distribution courses	21
	Minimum credit required for the B.S.	131

Of the 131 total degree credits, the B.S. in Bioengineering requires 97 credits in general math and science courses and core and elective engineering courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•/111/125	4*	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
CHEM 211§	3	Organic Chemistry
CAAM 210	3*	Introduction to Engineering Computation (pre-req to BIOE 252)
MECH 202	3	Mechanics/Statics (pre-req to BIOE 370 and 372)
ELEC 243	4*	Introduction to Electronics (pre-req to BIOE 383)
BIOS 201	3	Introductory Biology
BIOS 341	3	Cell Biology
BIOE 252	4	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	Transport Phenomena in Bioengineering
BIOE 440	1	Statistics for Bioengineers
BIOE 44X	2	Advanced Bioengineering Labs (2 of 7, see GA)
BIOE 451	4	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 and/or discussion session that must fit into your schedule.*

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

‡Students may choose to replace one and only one of these courses with one or more additional approved technical electives that account for the engineering points assigned to that course. Please speak to an academic advisor prior to doing so.

CHBE

Chemical and Biomolecular Engineering

WEB LINKS	https://chbe.rice.edu/academics/undergraduate-programs
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 B.S. program can use their electives to create a specialization or focus area in one of four disciplines: Biomolecular Engineering, Computational Engineering, Materials/Nanotechnology, or Energy/Sustainability. The more flexible B.A. program allows students to pursue a double major.
BS VERSUS BA	Our department offers two undergraduate degrees: the Bachelor of Science in Chemical Engineering (B.S.Ch.E.) and Bachelor of Arts (B.A.) degree. Only the program leading to the B.S.Ch.E. degree is accredited by the Engineering Accreditation Commission (EAC) of ABET, http://www.abet.org. The B.S.Ch.E. degree is the more appropriate path for students wanting to pursue a professional career in the field of chemical and biomolecular engineering. The B.A. 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	BIOS chemistry, 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, CHBE 498, 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.

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		**15 credits**	**FRESHMAN**		**17 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
PHYS 101• or 111	Mechanics w/Lab	4*	PHYS 102•• or 112	Electricity & Magnetism w/Lab	4*
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	Lab	1	CHEM 124	Lab	1
FWIS	Freshman Writing	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1	OPEN	Open elective	3
SOPHOMORE		**14 credits**	**SOPHOMORE**		**15 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*
CHBE 243	Chemical Engineering Lab I	2	CHBE 310	Fund of Biomolecular Eng	3
CHBE 301	Chemical Eng Fundamentals	3	CHBE 411	Thermodynamics I	3
CHBE 302	Comp Prog Chem Engineers	3	DIST	Distribution elective	3
JUNIOR		**15 credits**	**JUNIOR**		**14 credits**
CHEM 301 or CHEM 302	Physical Chemistry I	3	CHBE 344	Chemical Engineering Lab II	2
CHBE 401	Transport Phenomena I	3	CHBE 390	Kinetic and Reactor Design	3
CHBE 412	Thermodynamics II	3	CHBE 402	Transport Phenomena II	3
OPEN	Open elective	3	CHBE 410 or CHBE 415	Applied Biomolecular Engineering	3
OPEN	Open elective	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 and/or discussion session that must fit into your schedule.*

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

BASIC REQUIREMENTS	General math & science courses	34
	Core courses in major	38
ELECTIVE REQUIREMENTS	Open electives and LPAP	27
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Chemical Engineering requires 72 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I / AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•/111	4*	Mechanics w/Lab
PHYS 102••/112	4	Electricity and Magnetism w/Lab
CHEM 111/121	3	General Chemistry I
CHEM 123	1	Lab
CHEM 112/122	3	General Chemistry II
CHEM 124	1	Lab
CHEM 211§	3	Organic Chemistry
CHEM 301	6	Physical Chemistry I
CHBE 243	2	Chemical Engineering Lab I
CHBE 301	3	Chemical Engineering Fundamentals
CHBE 302	3	Comp Prog Chem Engineers
CHBE 305	3*	Computational Methods in Chemical Engineering
CHBE 310	3	Fundamentals of Biomolecular Eng
CHBE 344	2	Chemical Engineering Lab II
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 410	3	Applied Biomolecular Engineering
or CHBE 415		
CHBE 411	3	Thermodynamics I
CHBE 412	3	Thermodynamics II

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

B.S. In Chemical Engineering

Specializations: Biomolecular Engineering
Materials/Nanotechnology
Energy/Sustainability
Engineering Breadth
Computational Engineering

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
MATH 101 or 105	Single Variable Calculus I	3
PHYS 101• or 111	Mechanics w/Lab	4*
CHEM 121	General Chemistry I	3
CHEM 123	Lab	1
FWIS	Freshman Writing	3
DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		17 credits
MATH 211	Ordinary Diff Eqs & Linear Alg	3
CHEM 211§	Organic Chemistry	3
CHBE 243	Chemical Engineering Lab I	2*
CHBE 301	Chemical Engineering Fund	3
CHBE 302	Comp Prog Chemical Eng	3
DIST	Distribution elective	3

JUNIOR		15 credits
CHEM 301 or CHEM 302	Physical Chemistry I	3
CHBE 401	Transport Phenomena I	3
CHBE 412	Thermodynamics II	3
SPEC	CHBE Specialization area elec	3
OPEN	Open elective	3

SENIOR		16 credits
CHBE 403	Design Fundamentals	4*
CHBE 443	Chemical Engineering Lab III	3*
CHBE 470	Process Dynamics and Control	3
SPEC	CHBE specialization area elec	3
OPEN	Open elective	3

SPRING

FRESHMAN		17 credits
MATH 102 or 106	Single Variable Calculus II	3
PHYS 102•• or 112	Electricity and Magnetism w/Lab	4*
CHEM 122	General Chemistry II	3
CHEM 124	Lab	1
DIST	Distribution elective	3
DIST	Distribution elective	3

SOPHOMORE		15 credits
MATH 212	Multivariable Calculus	3
CHBE 305	Comp Methods Chem Eng	3*
CHBE 310	Fund of Biomolecular Eng	3
CHEM 411	Thermodynamics I	3
DIST	Distribution elective	3

JUNIOR		15 credits
CHBE 344	Chemical Engineering Lab II	2*
CHBE 350	Process Safety in Chem Eng	1
CHBE 390	Kinetic and Reactor Design	3
CHBE 402	Transport Phenomena II	3
CHBE 410	Applied Biomolecular Engineering	3
OPEN	Open elective	3

SENIOR		16 credits
CHBE 404	Product and Process Design	4*
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3
SPEC	CHBE specialization area elec	3

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

BASIC REQUIREMENTS	General math & science courses	34
	Core courses in major	49
ELECTIVE REQUIREMENTS	Specialization area courses	12
	Open electives and LPAP	11
	FWIS and distribution courses	21
	Minimum credit required for the B.S.	127

Of the 127 total degree credits, the B.S. in Chemical Engineering requires 83 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101	3	Single Variable Calculus I/AP or other credit in Calculus I
or 105	3	
MATH 102	3	Single Variable Calculus II/AP or other credit in Calculus II
or 106	3	
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•/111	4	Mechanics w/Lab
PHYS 102••/112	4	Electricity and Magnetism w/Lab
CHEM 111/121	3	General Chemistry I
CHEM 123	1	Lab
CHEM 112/122	3	General Chemistry II
CHEM 124	1	Lab
CHEM 211§	3	Organic Chemistry
CHEM 301	3	Physical Chemistry I
CHBE 243	2*	Chemical Engineering Lab I
CHBE 301	3	Chemical Engineering Fundamentals
CHBE 302	3	Computer Programming in Chemical Engineering
CHBE 305	3•	Computational Methods in Chemical Engineering
CHBE 310	3	Fundamentals of Biomolecular Engineering
CHBE 344	2*	Chemical Engineering Lab II
CHBE 350	3	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 404	4*	Product and Process Design
CHBE 410	3	Applied Biomolecular Engineering
CHBE 411	3	Thermodynamics I
CHBE 412	3	Thermodynamics II
CHBE 443	3*	Chemical Engineering Lab III
CHBE 470	3	Process Dynamics and Control
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 and/or discussion session that must fit into your schedule.*

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

CEE

Civil and Environmental Engineering

WEB LINKS	https://ceve.rice.edu/undergraduate-program
FRANK ADVICE	Make a 4-year plan early on to know what the major entails and update as you go. 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 15-18 credits per semester. Take suggested elective, CEVE 101 in the freshman year to get a broad overview of courses and research in the department. Take CEVE 481 in the fall term and CEVE 480 in the spring of your senior year. Try studying in groups, after your own reviews, to enhance learning 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.
GRADUATION REQUIREMENTS	Students are responsible for making certain that their plan of study meets all degree and major requirements. These requirements are found in the General Announcements. Students have the option of following either their matriculation or graduation year requirements.
BS VERSUS BA	The B.S. program is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org. The B.S. is recommended for those interested in graduate studies or careers as licensed professional engineers. The B.A. degree is recommended to students interested in graduate studies outside of engineering such as policy, law or medicine, or those interested in pursuing a double major or a minor, such as the one in energy and water sustainability.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	CEVE 101 Fundamentals of Civil and Environmental Engineering, CEVE 325 Structural Analysis & Modeling, (required for 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. Explore research opportunities early by talking to professors and expressing interest in their work. CEVE 101 will introduce you to CEE faculty and their research areas.
INTERNSHIPS	Students are encouraged to apply for summer internships.The ASCE student chapter and the Center for Career Development's job fairs are great resources. Internships are not limited to engineering firms, but have more leverage when related to your career focus.
STUDY ABROAD	While challenging, study abroad is possible for engineers. Required Rice courses may not be offered at universities abroad. Plan to travel in the spring of the sophomore year or fall of the junior year. Consider joining Engineers Without Borders and implement engineering projects in developing countries. Travel is typically during scheduled breaks.
PROFESSIONAL ORGANIZATIONS AND STUDENT CLUBS	ASCE (American Society of Civil Engineers) student chapter, EWB (Engineers Without Borders), Chi Epsilon Honor Society, Concrete Canoe Club, Earthquake Engineering Research Institute (EERI), and the Society of Women Engineers, among many others. Visit https://studentcenter.rice.edu/student-activities/clubs/club-listings.
EXPLORATORY 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 Intro Environmental Law, CEVE 313 Uncertainty and Risk in Urban Infrastructures.

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 https://ceve.rice.edu/undergraduate-program)

FALL

FRESHMAN		17 credits
CHEM 121	General Chemistry I	3
CHEM 123	General Chemistry I Lab	1
MATH 101	Single Variable Calculus I	3
PHYS 101	Mechanics w/Lab	4
PHYS 103	Mechanics Discussion	0
DIST	D1 Distribution elective	3
FWIS	First-Year Writing-Intensive Seminar	3

SOPHOMORE		18 credits
MATH 212	Multivariable Calculus	3
CEVE 211	Engineering Mech.	3
CEVE 310	Pr. of Envi. Eng.	3
CEVE XXX	Focus Area I	3***
CEVE XXX	Focus Area III	3***
DIST	D1 Distribution elective	3

JUNIOR		17 credits
STAT 310	Prob. & Statistics	3
CEVE XXX	Focus Area II	3***
CEVE XXX	Focus Area IV	3***
DIST	D2 Distribution Elective	3
DIST	D2 Distribution Elective	3
OPEN	Open elective	2

SENIOR		17 credits
MATH 355	Linear Algebra	3
CEVE 471	Soil Mech. and Foundations	3
CEVE 472	Soil Mech. and Foundations Lab	1
CEVE 481	Intro. Senior Design	1
CEVE XXX	Focus Area I, II, III or IV	3
OPEN	Open Elective	3
OPEN	Open Elective	3

SPRING

FRESHMAN		17 credits
CHEM 122	General Chemistry II	3
CHEM 124	General Chemistry II Lab	1
MATH 102/106	Single Variable Calculus II	3
MATH 211	Ord Differential Equations	3
PHYS 102	Electricity and Mag. w/ Lab	4
PHYS 104	Electricity and Mag. Dis.	0
DIST	D1 Distribution elective	3

SOPHOMORE		17 credits
CAAM 210	Intro to Eng. Computation	3
CEVE 311	Mechanics of Solids	3
CEVE 312	Mech. of Solids Lab	1
CEVE XXX	Focus Area II	3***
CEVE XXX	Focus Area IV	3***
LPAP	Lifetime Physical Activity Program	1
OPEN	Open elective	3

JUNIOR		16 credits
ESCI 115	Intro. to the Earth	4
CEVE 315	Urban Water Systems	3
CEVE 363	Applied Fluid Mechanics	3
CEVE XXX	Focus Area I	3
CEVE XXX	Focus Area III	3

SENIOR		15 credits
CEVE 480	Senior Design	3
CEVE XXX	Focus Area I, II, III or IV	3****
OPEN	Open Elective	3
OPEN	Open Elective	3
DIST	D1/D2 Distribution elective	3

**For Area I & II Focus, CEVE 316 and 401 are required and 471/472 is an Area IV Elective.*
***For Areas III and IV Focus, CEVE 471/472 is a requirement and CEVE 401 is an Area I elective.*
****FAC-8 CEVE courses (2 in each focus area I-IV) required for breadth*
*****FAS-2 additional CEVE courses in one focus area (I-IV) required for specialization*

BASIC REQUIREMENTS	General math & science courses	40-41
	Core courses	24
	Focus area courses	24
	Focus specialization courses	6
ELECTIVE REQUIREMENTS	Open electives, FWIS and LPAP	21
	Distribution courses	18*
	Minimum credit required for the B.S.	133–134

Of the 133–134 credits, the B.S. in Civil Engineering requires 94 credits in general math and science, core, and specialization area courses.

*Our B.A. required Math & Science includes (3) Distribution III courses, so only 18 additional hours are needed.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210	3	Introduction to Engineering Comp
CAAM 335 or MATH 354 or MATH 355	3	Matrix Analysis/Honors Linear Algebra/Linear Algebra (or approved equivalent)
CHEM 121/123	4*	General Chemistry I w/Lab
CHEM 122/124	4*	General Chemistry II w/Lab
ESCI 115 or any ESCI course or BIOS 201	3	Earth Structure & Deformation/Earth System Evolution & Cycles/Global BIOShemical Cycles & Ecologyt
MATH 101 or 105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102 or 106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations
MATH 212	3	Multivariable Calculus
PHYS 101/103	4*	Mechanics w/Lab
PHYS 102/104	4*	Electricity and Magnetism w/ Lab
STAT 310	3	Probability and Statistics or equivalent
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 315	3	Urban Water Systems
CEVE 316	1	Urban Water Systems Lab
CEVE 363	3	Applied Fluid Mechanics
CEVE 316*	1	Urban Water Systems Lab*
& CEVE 401** or CEVE 471/472***	3	Environmental Chemistry* Principles of Soil Mechanics**
CEVE 480	3	Senior Design
CEVE 481	1	Introduction to Senior Design
FAC	24	8 courses (2 courses in each of the four focus areas)
FAS	6	2 additional courses from one focus area preferred for specialization

** The Engineering BS is broken down into 4 focus areas.*

[1] Environmental Engineering - CEVE 302, 307, 308, 404, 406, 411, 434, 442, 444 or other approved course.

[2] Hydrology and Water Resources - CEVE 314, 412, 418, 420, 512, 518 or other approved course.

[3] Structural Engineering and Mechanics - CEVE 325, 400, 427, 431, 432, 441, 476, 496 or other approved course.

[4] Urban Infrastructure, Reliability and Management - CEVE 301, 313, 320, 424, 452, 460, 492 or other approved course.

**For Area I & II Focus, CEVE 316 and 401 are required and 471/472 is an Area IV Elective.*

***For Areas III and IV Focus, CEVE 471/472 is a requirement and CEVE 401 is an Area I elective.*

****FAC-8 CEVE courses (2 in each focus area I-IV) required for breadth*

*****FAS-2 additional CEVE courses in one focus area (I-IV) required for specialization*

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		**16 credits**	**FRESHMAN**		**17 credits**
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry w/ Lab	1	CHEM 124	General Chemistry w/ Lab	1
MATH 101	Single Variable Calculus	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics w/ Lab	4	PHYS 102	Electricity and Mag. w/ Lab	4
PHYS 103	Mechanics Discussion	0	PHYS 104	Electricity and Mag. Disc.	0
OPEN	Open elective	2	OPEN	Open elective	3
FWIS	First Year Writing Intensive Seminar	3	OPEN	Open elective	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**15 credits**
CAAM 210	Intro to Eng Computation	3	CEVE 307	Energy and the Environment	3
CEVE 310	Pr. of Env. Eng.	3	SPEC	Specialty focus any dept.	3
DIST	D1 Distribution elective	3	SPEC	Specialty focus any dept.	3
DIST	D1 Distribution elective	3	DIST	Distribution Elective	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		**15 credits**	**JUNIOR**		**14 credits**
SPEC	Specialty focus any dept.	3	CEVE 315	Urban Water Systems	3
SPEC	Specialty focus any dept.	3	CEVE 316	Urban Water Systems Lab	1
OPEN	Open elective	3	CEVE 412	Hydrology and Water Resorc. Eng.	3
OPEN	Open elective	3	DIST	D2 Distribution elective	3
OPEN	Open elective	3	LPAP	Lifetime Physical Activity Program	1
			OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
SPEC	Specialty focus any department	3	CEVE 401	Environmental Chemistry	3
DIST	D2 Distribution Elective	3	SPEC	Specialty focus any department	3
OPEN	Open elective	3	SPEC	Specialty focus any department	3
OPEN	Open elective	3	DIST	D2 Distribution Elective	3
OPEN	Open elective	3	OPEN	Open Elective	3

BASIC REQUIREMENTS	General math & science courses	25
	Core courses in major	16
ELECTIVE REQUIREMENTS	Specialization area courses	21
	Open electives FWIS and LPAP	42
	Distribution courses	18*
	Minimum credit required for the B.A.	122

Of the 122 credits, the B.A. in Civil and Environmental Engineering requires a minimum of 62 credits in general math and science, core and specialization area courses.

*Our B.A. required Math & Science includes (3) Distribution III courses, so only 18 additional hours are needed.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210 or 335 or COMP 110/NSCI 230	3	Introduction to Engineering Computation/Matrix Analysis/ Computation in Science and Engineering/ Computation in Science and Engineering
CHEM 121/123	4*	General Chemistry I w/Lab
CHEM 122/124	4*	General Chemistry II w/Lab
MATH 101 or 105	3	Single Variable Calculus I / AP or other credit in Calculus I
MATH 102 or 106	3	Single Variable Calculus II /AP or other credit in Calculus II
PHYS 101/103 or	4	Mechanics w/Lab
PHYS 102/104	4*	Electricity and Magnetism w/Lab
CEVE 307	3	Energy and the Environment
CEVE 310	3	Principles of Environmental Engineering
CEVE 315	3	Urban Water Systems
CEVE 316	1	Urban Water Systems Lab
CEVE 401	3*	Environmental Chemistry
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

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		14 credits
CHEM 121	General Chemistry I	3
CHEM 123	General Chemistry I Lab	1
MATH 101 or 105	Single Variable Calculus I	3
PHYS 101	Mechanics w/ Lab	4
PHYS 103	Mechanics Discussion	0
FWIS	First-Year Writing Intensive Seminar	3

SOPHOMORE		15 credits
CAAM 210	Intro to Engr. Computation	3
CEVE 211	Engineering Mechanics	3
CEVE 310	Pr. of Env. Eng.	3
DIST	D1 Distribution elective	3
OPEN	Open elective	3

JUNIOR		15 credits
CEVE 325	Structural Analysis and Modeling	3
SPEC	Specialty focus any dept.	3
DIST	D1 Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SENIOR		15 credits
SPEC	Specialty focus any dept.	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SPRING

FRESHMAN		17 credits
CHEM 122	General Chemistry II	3
CHEM 124	General Chemistry II Lab	1
MATH 102 or 106	Single Variable Calculus II	3
PHYS 102	Electricity and Mag. w/ Lab	4
PHYS 104	Electricity and Mag. Dis.	0
OPEN	Open elective	3
OPEN	Open elective	3

SOPHOMORE		16 credits
CEVE 311	Mechanics of Solids	3
CEVE 312	Strength of Materials Lab	1
SPEC	Specialty focus any dept.	3
SPEC	Specialty focus any dept.	3
DIST	D1 Distribution elective	3
DIST	D2 Distribution elective	3

JUNIOR		16 credits
CEVE 315	Urban Water Systems	3
SPEC	Specialty focus any dept.	3
OPEN	Open elective	3
OPEN	Open elective	3
DIST	D2 Distribution elective	3
LPAP	Lifetime Physical Activity Program	1

SENIOR		14 credits
SPEC	Specialty focus any dept.	3
SPEC	Specialty focus any dept.	3
DIST	D2 Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	2

BASIC REQUIREMENTS	General math & science courses	25
	Core Courses in Major	19
ELECTIVE REQUIREMENTS	Specialization area courses	21
	Open electives, FWIS and LPAP	42
	Distribution courses	18*
	Minimum credit required for the B.A.	122

Of the 122 credits, the B.A. in Civil and Environmental Engineering requires a minimum of 62 credits in general math and science, core, and specialization area courses.

*Our B.A. required Math & Science includes (3) Distribution III courses, so only 18 additional hours are needed.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210 or 335 or COMP 110/NSCI 230	3	Introduction to Engineering Computation/Matrix Analysis/ Computation in Science and Engineering/ Computation in Science and Engineering
CHEM 121/123	4	General Chemistry I w/Lab
CHEM 122/124	4	General Chemistry II w/Lab
MATH 101 or 105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102 or 106	3	Single Variable Calculus II /AP or other credit in Calculus II
PHYS 101/111	4	Mechanics w/Lab /Honors Mechanics w/Lab
PHYS 102/112	4	Electricity and Magnetism w/Lab /Honors Electricity and Magnetism w/Lab
CEVE 211	3	Engineering Mechanics
CEVE 310	3	Principles of Environmental Engineering
CEVE 311	3	Mechanics of Solids and Structures
CEVE 312	1	Structural Analysis and Modeling
CEVE 315	3	Urban Water Systems
CEVE 325	1	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
SPEC	3	Specialization Elective

CAAM

Computational and Applied Mathematics

WEB LINKS	https://www.caam.rice.edu/academics/undergraduate-programs
FRANK ADVICE	CAAM 210 (Introduction Engineering Computation) develops important MATLAB skills and is recommended for students considering majoring in CAAM. Most future CAAM classes require more mathematical analysis and less programming. Students considering Operations Research should take COMP 140 and COMP 182 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	Double majors can coordinate some of the CAAM or OR majors "specialization electives" with classes from their other majors. Students completing a senior design project in another engineering major can usually use that to replace the CAAM or OR senior design requirement. Please consult a major advisor to work out a program of study as soon as possible.
BS VERSUS BA	CAAM only offers B.A. degrees in CAAM or OR.
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); Students who will pursue graduate study in operations research should take further pure mathematics courses, CAAM 565 (Convex Optimization) and CAAM 570 (Graph Theory).

RESEARCH	Many CAAM or OR 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. CAAM faculty find that mathematical maturity and/or computational skills ease the transition into research positions.
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.
ORGANIZATIONS	CAAM majors are encouraged to join the Society for Industrial and Applied Mathematics (SIAM), which has an active Rice student chapter (https://www.caam.rice.edu/~siamchapter/). OR majors are encouraged to join the Institute for Operations Research and Management Science (INFORMS).
INTERESTING COURSES FOR NON-MAJORS	CAAM 210: Intro to Engineering Computation (mathematical modeling and MATLAB programming) CAAM 334 or 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 382: Stochastic Models: (good for STAT majors) CAAM 519: Computational Science I (scientific programming with advanced math libraries) CAAM 570: Graph Theory (good for COMP and MATH majors)

B.A. In Computational and Applied Mathematics

Specializations: CAAM Majors must complete four quantitative elective courses at the 300 level or above. Two must be at the 400 level or above. Two must be CAAM courses; the others must be drawn from a list of approved elective courses maintained by the Undergraduate Committee. That list, and other information on approved and disallowed elective courses can be found in the Undergraduate Handbook available on the department's web site.

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		**16 credits**	**FRESHMAN**		**15 credits**
MATH 101† or 105	Single Variable Calculus I	3	MATH 102 or 106	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 credits**	**SOPHOMORE**		**15 credits**
CAAM 335	Matrix Analysis	3	CAAM 336	Diff Eqs in Science & Eng	3
MATH 212	Multivariable Calculus	3	STAT 310 or ECON 307	Probability and Statistics	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		**15 credits**	**JUNIOR**		**15 credits**
CAAM 378	Intro to Oper Res & Optim	3	SPEC	Specialization elective	3
MATH 302 or MATH 321	Elements of Analysis	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
SENIOR		**14–16 credits**	**SENIOR**		**14–15 credits**
CAAM 453	Numerical Analysis I	3	CAAM 454 or CAAM 471	Numerical Analysis II	3
CAAM 495	Senior Design Project I	2†	CAAM 496	Senior Design Project II	2
SPEC	Specialization elective	2	OPEN	Open elective	3
DIST	Distribution elective	3	OPEN	Open elective	3–4
OPEN	Open elective	3–4	OPEN	Open elective	3

** In addition to class hours, these courses have a regularly scheduled lab and/or discussion session 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	9–12
	Core courses in major	28
ELECTIVE REQUIREMENTS	Specialization electives	12
	Open electives and LPAP	47–50
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Computational and Applied Mathematics requires 37–40 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101†/105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus I
MATH 212 or 221 and 222	3-6	Multivariable Calculus or Honors Calculus III and Honors Calculus IV
MATH 302/321	3	Elements of Analysis/Introduction to Analysis I
STAT 310 or ECON 307	3	Probability and Statistics
CAAM 210	3*	Introduction to Engineering Computation
CAAM 334 or 335	3	Matrix Analysis
CAAM 336	3	Differential Equations in Science and Engineering
CAAM 378	3	Intro to Operations Research & Optimization
CAAM 453	3	Numerical Analysis I
CAAM 454/471	3	Numerical Analysis II/Into to Linear and Integer Programming
CAAM 495	2	Senior Design Project I
CAAM 496	2	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 and/or discussion session 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.)

B.A. In Operations Research (OPRE) major

Specializations: OR majors must complete three quantitative electives from a list of approved elective courses maintained by the Undergraduate Committee. That list, and other information on approved and disallowed elective courses can be found in the Undergraduate Handbook available on the department's website. Also note that one may not major in OR while also majoring or minoring in CAAM.

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		16 credits
COMP 140	Computational Thinking	4	COMP 182	Algorithmic Thinking	4*
MATH 101†	Single Variable Calculus	3	MATH 102	Single Variable Calculus II	3
DIST	Distribution elective	3	DIST	Distribution elective	3
FWIS	Freshman Writing	3	OPEN	Open elective	3
OPEN	Open elective	3	OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		16 credits	SOPHOMORE		15 credits
CAAM 378	Intro to Operations Research	3	CAAM 382	Stochastic Models	3
COMP 215	Introduction to Program Design	4*	MATH 302	Elements of Aalysis	3
MATH 212	Multivariable Calculus	3	MATH 355	Linear Algebra	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		15 credits	JUNIOR		15 credits
CAAM 467	Financial Optimization	3	CAAM 421	Log and Sup Chain Management	3
CAAM 471	Numerical Analysis II	3	CAAM 476	Large-Scale Optimization	3
STAT 310	Probablity and Statistics	3	SPEC	Specialization elective	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SENIOR		15 credits	SENIOR		16 credits
CAAM 485	Discrete-Event Simulation	3	DSCI 435	Data Science Projects	4
SPEC	Specialization elective	3	SPEC	Specialization 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

BASIC REQUIREMENTS	General math & science courses	34-37
	Core courses in major	21
ELECTIVE REQUIREMENTS	Specialization electives	9
	Open electives and LPAP	32
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Operations Research requires 55-58 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
COMP 140	4	Computational Thinking
COMP 182	4	Algorithmic Thinking
COMP 215	4	Introduction to Program Design
MATH 101	3	Single Variable Calculus
MATH102	3	Single Variable Calculus II
MATH 212 or MATH 221 and MATH 222	3-6	Multivariable Calculus or MATH 221 Honors Calculus III and MATH 222 Honors Calculus IV
CAAM 378	3	Introduction to Operations Research and Optimization
CAAM 382	3	Stochastic Models
MATH 302 or MATH 321	3	Elements of Analysis or Real Analysis I
MATH 355 or MATH 354	3	Linear Algebra or Honors Linear Algebra
STAT 310/ECON 307	3	Probability and Statistics
CAAM 421	3	Logistics and Supply Chain Management
CAAM 467	3	Financial Optimization
CAAM 471	3	Linear and Integer Programming
CAAM 476	3	Large-Scale Optimization
CAAM 485	3	Discrete-Event Simulation
DSCI 435/COMP 449	4	Data Science Projects
Specialization elective	3	300 or above
Specialization elective	3	300 or above
Specialization elective	3	300 or above

COMP

Computer Science

WEB LINKS	https://cs.rice.edu/academics/undergraduate-program
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, 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 B.S. provides more depth than the B.A. The only difference in courses in the first two years is the physics requirements for a B.S. 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 330, 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.
PROFESSIONAL ORGANIZATIONS	Rice University Computer Science Club 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, 160,182, 435, 448

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

FRESHMAN		14 credits
MATH 101 or 105	Single Variable Calculus I	3
COMP 140	Comp Thinking or 160	4*
FWIS	Freshman Writing	3
OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		16 credits
MATH 211 or 212 or 221 or 222	Ordinary Differential Equations	3
COMP 215	Introduction to Program Design	4*
DIST	Distribution elective	3
DIST	Distribution elective	3
OPEN	Open elective	3

JUNIOR		16 credits
COMP 310	Adv Object-Oriented Prog & Design	4*
MATH 355 or 354, CAAM 334 or 335	Linear Algebra/ Matrix Analysis	3
COMP 382	Reasoning About Algorithms	4*
DIST	Distribution elective	3
OPEN	Open elective	3

SENIOR		16 credits
COMP 411 or 412	Advanced Prog Languages	4
CORE	COMP elective course	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	2

SPRING

FRESHMAN		14 credits
MATH 102 or 106	Single Variable Calculus II	3
COMP 182	Algorithmic Thinking	4*
ELEC 220	Fund of Computer Engineering	4*
DIST	Distribution elective	3

SOPHOMORE		14 credits
COMP 321	Intro to Computer Systems	4*
COMP 322	Principles of Parallel Prog	4*
DIST	Distribution elective	3
OPEN	Open elective	3

JUNIOR		13 credits
COMP 421	Operating Sys & Concurrent Prog	4
STAT 310 or ELEC 303, STAT 312, STAT 315/DSCI 301	Probability and Statistics	3
CORE	COMP elective course	3
OPEN	Open elective	3

SENIOR		15 credits
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 and/or discussion session that must fit into your schedule.*

BASIC REQUIREMENTS	General math & science courses	16
	Core Courses in Major	40
ELECTIVE REQUIREMENTS	Specialization electives	8
	Open electives and LPAP	36-38
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	121

Of the 121 total degree credits, the B.A. in Computer Science requires a minimum 61 credits in general math and science courses, core courses and specialization electives.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I / AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II / AP or other credit in Calculus II
MATH 211/212/ 221/222	3	Ordinary Differential Equations & Linear Algebra/Multivariable Calculus Honors Calculus III/Honors Calculus IV
MATH 354/355 or CAAM 334/335	3	Honors Linear Algebra/Linear Algebra/Matrix Analysis Matrix Analysis Data Science (select one)
STAT 310/312	3-4	Probability & Statistics/Probability & Statistics for Engineers
STAT 315/DSCI 301		Applied Probablity/Statistics for Data Science
ELEC 303		Random Signals in Electrical Engineering Systems
ELEC 220	4*	Fundamentals of Computer Engineering
COMP 130 or COMP 140/160	4*	Elements of Algorithms Computational Thinking/Intro to Game Programing in Python (select one)
COMP 182	4*	
COMP 215	4*	Algorithmic Thinking
COMP 310	4*	Introduction to Program Design
COMP 321	4*	Advanced Object - Oriented Programming And Design
COMP 322	4*	Intro to Computer Systems
COMP 382	4	Principles Of Parallel Programming
COMP 411/412	4	Reasoning About Algorithms
COMP 421	4	Principals of Programming Languages/Compiler Construction
COMP Elective	3–4	Operating Systems and Concurrent Programming
COMP Elective	3–4	COMP 300 or above

** In addition to class hours, these courses have a regularly scheduled lab and/or discussion session 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.

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		**15 credits**	**FRESHMAN**		**14 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
PHYS 101• or 111 or 125	Mechanics w/Lab	4*	COMP 182	Algorithmic Thinking	4*
COMP 140 or 160	CompThinking	4*	ELEC 220	Fund of Comp Engineering	4*
FWIS	Freshman Writing	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**18 credits**
MATH 211 or 212 or 221 or 222	Ordinary Differential Equations	3	PHYS 102•• or 112 or 126	Electricity and Magnetism	4*
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		**16 credits**	**JUNIOR**		**17 credits**
COMP 310	Adv Object-Oriented Prog & Design	4*	COMP 421	Operating Sys & Concurrent Prog	4
MATH 355 or 354 or CAAM 335 or 334	Linear Algebra	3	STAT 310 or 312 or ELEC 303 or STAT 315/DSCI 301	Probability and Statistics	3
COMP 382	Reasoning About Algorithms	4*	CORE	COMP elective course	4
CORE	COMP elective course	4	DIST	Distribution elective	3
OPEN	Open elective	1	OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**17 credits**
COMP 412 or 411	Compiler Construction	4	SPEC	COMP cap course elective	4
COMP 413 or 410 or 460	Distributed Program Construction	4	SPEC	COMP cap course elective	4
SPEC	COMP cap course elective	4	OPEN	Open 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 and/or discussion session that must fit into your schedule.*

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

BASIC REQUIREMENTS	General math & science courses	23
	Core courses in major	40
ELECTIVE REQUIREMENTS	Computer science electives	6–8
	Engin spec (COMP design & "cap" courses)	15
	Open electives and LPAP	23
	FWIS and distribution courses	21
	Minimum credit required for the B.S.	128

Of the 128 total degree credits, the B.S. in computer science requires 84–86 credits in general math and science courses, core courses, CS electives, and design and "cap" courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I/AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II/AP or other credit in 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 335/334	3	Linear Algebra/Honors Linear Algebra/ Matrix Analysis Data Science
STAT 310/312/315 or ELEC 303	3	Probability & Statistics/Probability & Statistics for Engineers/ Applied Probability
PHYS 101•/111/125	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 140/130/160	4*	Computational Thinking/Elements of Algorithms and Computation/ 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	Principals of 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 and/or discussion session that must fit into your schedule.*

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

ELEC

Electrical and Computer Engineering

WEB LINKS	https://ece.rice.edu/
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 first year, such as ELEC 220, but often ELEC 241, 242, and 261 are best taken in the sophomore year. See the ECE department undergraduate web page and the IEEE student branch 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 first year, but depending on one's math background, ELEC 241 and ELEC 242 may be better taken in the sophomore year.
ALTERNATIVE CURRICULA	ECE has four specialization areas: computer engineering (CE); data science/systems (DS/SYS); neuroengineering (NEURO); and photonics, electronics and nanodevices (PEN). CE focuses on hardware design within computer systems, covering computer architecture, security and storage. DS/SYS seeks to extract meaningful, actionable information from diverse data sources. Applications include wireless communications, digital signal processing, computer vision and networking. NEURO seeks to understand and manipulate neural networks, as well as treat diseases and disorders. PEN seeks to more fully understand the interaction of light and matter and apply that knowledge to develop novel devices and technologies.
BS VERSUS BA	ECE offers the traditional B.S. degree for students interested in engineering careers. The program leading to the B.S. is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org. The program leading to the BA degree is not accredited by the EAC and is often pursued by students as a component of a double major or dual degree program.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	ELEC 262 Introduction to Waves and Photonics ELEC 447 Introduction to Computer Vision ELEC 475 Learning from Sensor Data

RESEARCH	There are many opportunities for undergraduate independent and team research in ECE, including ELEC 490: Undergraduate Research Projects. Several faculty have started the large-scale Vertically Integrated Projects program (VIP) open to all levels. Summer research opportunities are available through Research Experiences for Undergraduates (REU). Contact faculty directly for more information. ECE has a Corporate Affiliates program, ececad.rice.edu, and encourages students to attend the annual event held in spring 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. See http://engineering.rice.edu/abroad.
PROFESSIONAL ORGANIZATIONS	The Institute for Electrical and Electronics Engineers (IEEE) has an active student chapter and an Eta Kappa Nu honor society at Rice. See http://ieee.rice.edu/ for details on the Friday lunch talk schedule. The IEEE student chapter co-presidents for 2021-2022 are Samantha Fuentes (sf26@rice.edu) and Tyler Montague (tjm5@rice.edu). Also, the ECE Department has an active colloquium series, 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 Introduction to Physical Electronics I

B.A. In Electrical Engineering

Specializations: Computer engineering
Data science/Systems
Neuroengineering
Photonics, electronics, and nano-devices

Sample Degree Plan

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

FALL

FIRST YEAR		15 credits
COMP 140*	Computational Thinking	4
MATH 101 or 105	Single Variable Calculus I	3
PHYS 101	Mechanics w/Lab	4
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		14 credits
ELEC 240	Fund of Electrical Engr I Lab	1
ELEC 241	Fund of Electrical Engineering I	3
ELEC 261	Intro to Physical Electronics I	3
DIST	Distribution elective	3
OPEN	Open elective	4

JUNIOR		15 credits
ELEC 303	Random Signals	3
ELEC 326	Digital Logic Design	3
DIST	Distribution elective	3
OPEN	Open elective	3
SPEC	ECE specialization elective	3

SENIOR		16 credits
SPEC	ECE specialization elective	3
SPEC	ECE specialization elective	3
DIST	Distribution elective	3
OPEN	Open elective	4
OPEN	Open elective	3

SPRING

FIRST YEAR		14 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

SOPHOMORE		16 credits
MATH 354 or CAAM 334 or 335 (Matrix Analysis)	Linear Algebra	3
ELEC 242	Fund of Electrical Engineering II	3
ELEC 244	Fund of Electrical Engr II Lab	1
MATH 212	Multivariable Calculus	3
DIST	Distribution elective	3
OPEN	Open elective	3

JUNIOR		15 credits
ELEC 305	Intro to Physical Electronics II	3
ELEC	ECE Design Lab elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SENIOR		15 credits
SPEC	ECE specialization elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

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

BASIC REQUIREMENTS	General math & science courses	26
	Core courses in major	25
ELECTIVE REQUIREMENTS	Engineering specialization electives	12
	Open electives and LPAP	36
	FWIS and distribution courses	21
	Minimum credits required for the B.A.	120

Of the 120 total degree credits, the B.A. in Electrical Engineering requires at least 63 credits in general math and science courses, core courses including design lab and 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 240	1	Fundamentals of Electrical Engineering I Lab
ELEC 241	3	Fundamentals of Electrical Engineering I
ELEC 242	3	Fundamentals of Electrical Engineering II
ELEC 244	1	Fundamentals of Electrical Engineering II Lab
ELEC 261	3	Introduction to Physical Electronics I
ELEC 303	3	Random Signals
ELEC 305	3	Introduction to Physical Electronics II
ELEC 326	3	Digital Logic Design
MATH 101/105	3	Single Variable Calculus I /AP or Other Credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or Other Credit in Calculus II
MATH 212	3	Multivariable Calculus
MATH 354 or 355 or CAAM 334 or 335	3	Honors Linear Algebra/Linear Algebra or Matrix Analysis Data Science/Matrix Analysis
PHYS 101/111	4	Mechanics w/Lab
PHYS 102/112	4	Electricity and Magnetism w/Lab
SPEC	3–4	Specialization elective
SPEC	3–4	Specialization elective
SPEC	3–4	Specialization elective
SPEC	3–4	Specialization elective

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

B.S. In Electrical Engineering

Specialization Areas: Computer engineering
Data science/Systems
Neuroengineering
Photonics, electronics, and nano-devices

Sample Degree Plan

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

FALL

FIRST YEAR		18 credits
CHEM 121 or 111	General Chemistry I w/Lab	4
MATH 101	Single Variable Calculus I or 105	3
COMP 140*	Computational Thinking	4
PHYS 101	Mechanics w/Lab	4
FWIS	Freshman Writing	3

SOPHOMORE		16 credits
ELEC 240	Fund of Elec Engr I Lab	1
ELEC 241	Fund of Elec Engineering I	3
ELEC 261	Intro to Physical Electronics I	3
MATH 212	Multivariable Calculus	3
DIST	Distribution elective	3
OPEN	Open Elective	3

JUNIOR		16 credits
ELEC 301	Introduction to Signals	3
ELEC 303	Random Signals	3
ELEC 326	Digital Logic Design	3
OPEN	Open elective	3
OPEN	Open elective	3
LPAP	Lifetime Phys Activity elective	1

SENIOR		18 credits
ELEC 494	ECE Senior Design	3
SPEC	ECE specialization elective	3
SPEC	ECE specialization elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SPRING

FIRST YEAR		17 credits
ELEC 220	Fund of Computer Engineering	4
MATH 102 or 106	Single Variable Calculus II	3
PHYS 102	Electricity & Magnetism w/Lab	4
DIST	Distribution elective	3
OPEN	Open Elective	3

SOPHOMORE		16 credits
MATH 354	Linear Algebra or 355 or CAAM 334 or 335 (Matrix Analysis)	3
ELEC 242	Fund of Electrical Engineering II	3
ELEC 244	Fund of Electrical Engr II Lab	1
ELEC 305	Intro to Physical Electronics II	3
ELEC**	ECE math and science elective	3
DIST	Distribution elective	3

JUNIOR		18 credits
ELEC	ECE Design Lab elective	3
SPEC	Specialization elective	3
SPEC	Specialization elective	3
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

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

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

***Typically approved courses: BIOS 201, CAAM 336, CAAM 378, CHEM 122 with lab, MATH 211, and MATH 222*

BASIC REQUIREMENTS	General math & science courses	33
	Core courses in major	34
ELECTIVE REQUIREMENTS	Engineering specialization electives	18–24
	Open electives and LPAP	22–28
	FWIS and distribution courses	21
	Minimum credits required for the B.S.	134

Of the 134 total degree credits, the B.S. in Electrical Engineering requires at least 85 credits in general math and science courses, core courses including the design lab and senior design, and specialization electives.

Major Requirements

NUMBER	CREDIT	TITLE
CHEM 121/111	4	General Chemistry I w/Lab/AP or Other Credit Gen. 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	Introduction to Physical Electronics I
ELEC 301	3	Introduction to Signals
ELEC 303	3	Random Signals
ELEC 305	3	Introduction to Physical Electronics II
ELEC 326	3	Digital Logic Design
ELEC 494 (x2)	4	Senior Design
ELEC 327/332/364	3	ECE Design Lab elective
MATH 101/105	3	Single Variable Calculus I /AP or Other Credit Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or Other Credit Calculus II
MATH 212 or 221	3	Multivariable Calculus/Honors Calculus III
MATH 354 or 355 or CAAM 334 or 335	3	Honors Linear Algebra/Linear Algebra or Matrix Analysis Data Science/Matrix Analysis
PHYS 101/111	4	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

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

***Typically approved courses: BIOS 201, CAAM 336, CAAM 378, CHEM 122 with lab, MATH 211, and MATH 222.*

MSNE

Materials Science and NanoEngineering

WEB LINKS	https://msne.rice.edu
FRANK ADVICE	Many MSNE students pursue graduate degrees in top graduate schools after earning their B.S. 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 B.S. degree instead of the B.A. degree, especially those who plan to pursue a graduate degree or practice engineering.

RESEARCH	Many 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, as well as universities abroad. Many students also pursue industrial or government lab internships as well. Notices are posted to the MSNE undergrad email list.
STUDY ABROAD AND INTERNSHIPS	Study abroad and full-time off-campus internships need to be scheduled in the spring semester of the sophomore or junior years. This minimizes conflicts with lab classes and the year-long senior design sequence.
PROFESSIONAL ORGANIZATIONS	American Ceramic Society (ACerS) ceramics.org Association for Iron & Steel Technology (AIST) aist.org ASM International asminternational.org The Minerals, Metals, and Materials Society (TMS) tms.org Rice Undergraduate Materials Science and NanoEngineering Society materialsociety.blogs.rice.edu Rice Center for Engineering Leadership(RCEL) rcelconnect.org
INTERESTING COURSES FOR NON–MAJORS	MSNE 201 Introduction to NanoEngineering MSNE 301 Materials Science for Engineers MSNE 402 Mechanical Properties of Materials MSNE 406 Physical Properties of Solids MSNE 435 Crystallography and Diffraction

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		15 credits
PHYS 101•	Mechanics w/Lab or PHYS 111	4*
MATH 101 or 105	Single Variable Calculus I	3
CHEM 121 or CHEM 151	General Chem I w/Lab	4*
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

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

JUNIOR		15 credits
MSNE 304	Materials Sci Junior Laboratory	3
MSNE 401	Thermodynamics in Materials Sci	3
MSNE 406 or MSNE 411	Physical Properties of Materials Materials Characterization	3
DIST	Distribution elective	3
ELEC 261 or BIOE 370 or MSNE 417 or MSNE 415***		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 or 106	Single Variable Calculus II	3
PHYS 102•• or PHYS 112	Electr & Magnetism w/Lab	4*
CHEM 122	General Chemistry II w/Lab	4*
MSNE 201	Introduction to NanoEngineering	3

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

JUNIOR		16 credits
MSNE 302	Materials Processing	3
MSNE 311	Materials Selection and Design	3
MSNE 389	Ehics and Safety for Mat. Engrs.	1
DIST	Distribution elective	3
OPEN	Open elective	3
OPEN	Open elective	3

SENIOR		15 credits
MSNE 435	Crystallography & Diffraction	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 and/or discussion session that must fit into your schedule.*

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

**** MSNE 415 is offered in the spring*

BASIC REQUIREMENTS	General math & science courses	28
	Core courses in major	31
ELECTIVE REQUIREMENTS	Open electives and LPAP	40
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Materials Science and NanoEngineering requires 59 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•/111	4*	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 for Engineers
MSNE 302	3	Materials Processing
MSNE 304	3	Materials Science Junior Lab
MSNE 311	3	Materials Selection and Design
MSNE 389	1	Ethics & Safety for Materials Engineers
MSNE 401,402,406,411*	9	Thermodynamics in Materials Science, Mechanical Properties of Materials, Physical Properties of Solids, Materials Characterization (choose 3 of 4)
MSNE 415/417	3	Ceramics and Glasses/Polymer Electronics/
ELEC 261/BIOE 370		Intro to Physical Electronics I/Biomaterials (choose 1 of 4)
MSNE 435	3	Crystallography and Diffraction

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.
•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

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 three electives for a total of 9 hours of credit approved by a department academic advisor. One basic Math & Science selected elective at the 200 level or higher (no MSNE or Engineering selected electives), one engineering selected elective (no MSNE) and one Technical selected elective (MSNE or Engineering selected elective).

Sample Degree Plan

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

FALL

FRESHMAN		15 credits
MATH 101 or 105	Single Variable Calculus I	3
PHYS 101• or 111	Mechanics w/Lab	4*
CHEM 121	General Chem I w/Lab	4*
FWIS	Freshman Writing	3
LPAP	Lifetime Phys Activity elective	1

SOPHOMORE		15 credits
MECH 202	Mechanics/Statics	3
MATH 211	Ord Diff Eqs & Linear Algebra	3
PHYS 201 or CHEM 211/ 311	Waves & Optics	3
MSNE 301	Materials Science for Engineers	3
DIST	Distribution elective	3

JUNIOR		16 credits
MSNE 304	Materials Science Junior Lab	3
MSNE 401	Thermodynamics in Mat Sci	3
MSNE 406 or MSNE 411*	Physical Properties of Solids Materials Characterization	3
MSNE 451	Materials Science Seminar	1
OPEN	Open elective	3
OPEN	Open elective	3

SENIOR		16 credits
MSNE 402	Mechanical Properties of Materials	3
MSNE 407	Capstone Design I	4
MSNE 450	Materials Science Seminar	0
SPEC	Engineering selected elective	3
SPEC	Math and Sci selected elective	3
DIST	Distribution elective	3

SPRING

FRESHMAN		17 credits
MATH 102 or 106	Single Variable Calculus II	3
PHYS 102• or 112	Electr & Magnetism w/Lab	4*
CHEM 122	General Chem II w/Lab	4*
MSNE 201	Introduction to NanoEngineering	3
DIST	Distribution elective	3

SOPHOMORE		15 credits
CAAM 210	Intro to Eng Computation	3
MATH 212	Multivariable Calculus	3
DIST	Distribution elective	3
DIST	Distribution elective	3
SPEC	Technical selected elective	3

JUNIOR		16 credits
MSNE 302	Materials Processing	3
MSNE 311	Materials Selection and Design	3
CAAM 334 or Math 355 or CAAM 335***	Matrix Analysis for Data Science	3
MSNE 389	Ehics and Safety for Mat. Engrs.	1
MSNE 415	Ceramics and Glasses	3
DIST	Distribution elective	3

SENIOR		16 credits
MSNE 408	Capstone Design II	3
MSNE 435	Crystallography and Diffraction	3
MSNE 437	Materials Science Senior Lab	1
OPEN	Open elective	3
OPEN	Open elective	3
OPEN	Open elective	3

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

**** CAAM 335 is offered in the fall*

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

BASIC REQUIREMENTS	General math & science courses	40
	Core courses in major	40
ELECTIVE REQUIREMENTS	Specialization electives	9
	Open electives and LPAP	16
	FWIS and distribution courses	21
	Minimum credit required for the B.S.	126

Of the 126 total credits, the B.S. in Materials Science and NanoEngineering requires 80 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations & Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•/111	4*	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 334/CAAM 335/ MATH 355***	3	Matrix Analysis
MECH 202	3	Mechanics/Statics
PHYS 201/CHEM 211/301	3	Waves and Optics/Organic Chemistry/Physical Chemistry
MSNE 201	3	Introduction to NanoEngineering
MSNE 301	3	Materials Science for Engineers
MSNE 302	3	Materials Processing
MSNE 304	3	Materials Science Junior Lab
MSNE 311	3	Materials Selection & Design
MSNE 389	1	Ethics & Safety for Materials Engineers
MSNE 401,402,406,411*	9	Thermodynamics in Materials Science, Mechanical Properties of Materials, Physical Properties of Solids, Materials Characterization (choose 3 of 4)
MSNE 407	4	Capstone Design I
MSNE 408	3	Capstone Design II
MSNE 415	3	Ceramics and Glasses
MSNE 435	3	Crystallography and Diffraction
MSNE 437	1	Crystallography & Diffraction Lab
MSNE 450	0	Materials Science Seminar
MSNE 451	1	Materials Science Seminar
Elective	3	1 approved Math and Science selected elective (no MSNE or Engineering selected electives)
Elective	3	1 approved technical selected elective (MSNE or Engineering selected electives)
Elective	3	1 approved Engineering selected elective (no MSNE)

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

§ When registering for CHEM 211, you must also register for CHEM 213, the discussion section for 211.

MECH

Mechanical Engineering

WEB LINKS	https://mech.rice.edu/academics/undergraduate-programs
FRANK ADVICE	Students interested in pursuing a degree in Mechanical Engineering are encouraged to declare their major early. See an advisor to create your 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 B.S.M.E. degree. Students intending to double major should consult an advisor to develop an appropriate program of study.
BS VERSUS BA	Only the B.S. degree is accredited by the Engineering Accreditation Commission (EAC) of ABET, www.abet.org, and is the most direct route toward becoming a licensed professional engineer (PE). The B.A. is recommended for students who will pursue professional careers in medicine, law, or business immediately after their undergraduate education.

RESEARCH	Students are encouraged to speak with their professors directly regarding undergraduate research opportunities. To learn more about faculty research go to https://mech.rice.edu/research.
INTERNSHIPS	Most students participate in summer internships in industry, especially after sophmore and junior years. Students should register with the Center for Career Development (ccd.rice.edu/) and explore further opportunities on the CCD's RICElink, where potential employers post open positions and internships.
STUDY ABROAD	Study abroad is most feasible in the fall semesters of the sophomore and junior years. This can avoid conflicts with lab classes (MECH 331, 332) and avoids conflicts with the year-long senior design sequence (MECH 407/408).
PROFESSIONAL ORGANIZATIONS	The American Society of Mechanical Engineers (https://owlnest.rice.edu/organization/asme) hosts industry representatives and organizes outreach, service and design projects. The American Institute of Aeronautics and Astronautics (http://aiaa.rice.edu/) organizes activities for students interested in aerospace engineering. Many mechanical engineering students are also active in the Rice Engineers Without Borders chapter (https://ewb.rice.edu/). Leadership positions are often available to freshmen and sophomores in 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**		**16 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
CHEM 121	General Chemistry I w/Lab	4*	PHYS 102••	Electricity & Magnetism w/Lab	4*
PHYS 101•	Mechanics w/Lab	4*	CAAM 210 or MECH 210	Intro to Eng Computation	3
FWIS	Freshman Writing	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SOPHOMORE		**16 credits**	**SOPHOMORE**		**15 credits**
MATH 211	Ordinary Differential Equations	3	MATH 212	Multivariable Calculus	3
MECH 202	Mechanics/Statics	3	MECH 200	Classical Thermodynamics	3
MECH 203	Mech. Eng. Design Tools	3	MECH 310	Rigid Body Dynamics	3
DIST	Distribution elective	3	MECH 315	Stress Analysis	3
OPEN	Open elective	3	DIST	Distribution elective	3
LPAP	Lifetime Phys Activity elective	1			
JUNIOR		**16 credits**	**JUNIOR**		**15 credits**
CAAM 335	Matrix Analysis	3	CAAM 336	Diff Eqs in Science & Eng	3
MECH 343	Modeling of Dynamic Systems	4*	MECH 350	Mechanical Elements	3
DIST	Distribution elective	3	MECH 420	Fundamentals of Control Systems	3
OPEN	Open elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SENIOR		**14 credits**	**SENIOR**		**15 credits**
MECH 371	Fluid Mech. I	3	MECH 481	Heat Transfer	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	2	OPEN	Open elective	3

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

BASIC REQUIREMENTS	General math & science courses	33
	Core courses in major	31
ELECTIVE REQUIREMENTS	Open electives and LPAP	35
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Mechanical Engineering requires 64 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210	3	Introduction to Engineering Computation or MECH 210
CAAM 335	3–4	Matrix Analysis
CAAM 336	3–4	Diferential Equations in Science & Engineering
CHEM 121	4*	General Chemistry I w/Lab
MATH 101/105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations & Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•	4*	Mechanics w/ Lab
PHYS 102••	4*	Electricity and Magnetism w/Lab
MECH 200	3	Classical Thermodynamics
MECH 202	3	Mechanics/Statics
MECH 203	3	Mechanical Engineering Design Tools
MECH 310	3	Rigid Body Dynamics
MECH 315	3	Stress Analysis
MECH 343	4*	Modeling of Dynamic Systems
MECH 350	3	Mechanical Elements
MECH 371	3	Fluid Mechanics I
MECH 420	3	Fundamentals of Control Systems
MECH 481	3	Heat Transfer

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

B.S. In Mechanical Engineering

Specializations: Mechanics/Dynamics, Thermal Fluids, Computational Engineering, Breadth in Mechanical 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**		**16 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
PHYS 101•	Mechanics w/Lab	4*	PHYS 102••	Electricity & Magnetism II w/Lab	4*
CHEM 121	General Chemistry I w/Lab	4*	CAAM 210 or MECH 210	Intro to Engineering Computation	3
FWIS	Freshman Writing	3	DIST	Distribution elective	3
OPEN	Open elective	3	OPEN	Open elective	3
SOPHOMORE		**16 credits**	**SOPHOMORE**		**17 credits**
MATH 211	Ordinary Differential Equations	3	MATH 212	Multivariable Calculus	3
MECH 202	Mechanics/Statics	3	MECH 200	Classical Thermodynamics	3
MECH 203	Mech. Eng. Design Tools	3	MECH 231	Sophomore Lab	1
MECH 340	Industrial Processing Lab	1	MECH 310	Rigid Body Dynamics	3
OPEN	Open elective	3	MECH 315	Stress Analysis	3
DIST	Distribution elective	3	MECH 331	Junior Laboratory I - Mechanics	1
			DIST	Distribution elective	3
JUNIOR		**17 credits**	**JUNIOR**		**15 credits**
CAAM 335	Matrix Analysis	3	CAAM 336	Diff Eqs in Science & Eng	3
MECH 332	Junior Lab II - Fluids	1	MECH 350	Mechanical Elements	3
MECH 343	Modeling of Dynamic Systems	4*	MECH 420	Fund of Control Systems	3
MECH 371	Fluid Mechanics I	3	MECH 481	Heat Transfer	3
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3			
SENIOR		**14 credits**	**SENIOR**		**15 credits**
MECH 407	Mechanical Design Project I	4	MECH 408	Mechanical Design Project II	3
300+ STAT/MATH/CAAM/DSCI		3	SPEC	MECH elective #2	3
LPAP	Lifetime Phys Activity elective	1	SPEC	MECH elective #3	3
DIST	Distribution elective	3	OPEN	Open elective	3
SPEC	MECH elective #1	3	OPEN	Open elective	3

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

BASIC REQUIREMENTS	General math & science courses	36
	Core courses in major	42
ELECTIVE REQUIREMENTS	MECH specialization electives	9
	Open electives and LPAP	19
	FWIS and distribution courses	21
	Minimum credit required for the B.S.	127

Of the 127 total degree credits, the B.S. in Mechanical Engineering requires at least 87 credits in general math and science courses and core courses.

Major Requirements

NUMBER	CREDIT	TITLE
CAAM 210 or MECH 210	3	Introduction to Engineering Computation
CAAM 335	3	Matrix Analysis
CAAM 336	3	Differential Equations in Science and Engineering
CHEM 121	4*	General Chemistry I w/Lab
MATH 101/105	3	Single Variable Calculus I /AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II /AP or other credit in Calculus II
MATH 211	3	Ordinary Differential Equations and Linear Algebra
MATH 212	3	Multivariable Calculus
PHYS 101•	4*	Mechanics w/Lab
PHYS 102••	4*	Electricity and Magnetism w/Lab
STAT/MECH/CAAM/DSCI 300+	3	Limited Elective
MECH 200	1	Sophomore Lab
MECH 202	3	Mechanics/Statics
MECH 203	3	Classical Thermodynamics
MECH 231	3	Mechanical Engineering Design Tools
MECH 310	3	Rigid Body Dynamics
MECH 315	3	Stress Analysis
MECH 350	3	Mechanical Elements
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 407	4	Mechanical Design Project I
MECH 408	3	Mechanical Design Project II
MECH 420	3	Fundamentals of Control Systems
MECH 481	3	Heat Transfer
SPECIALIZATION ELECTIVE	3	Mech Area of Specialization #1
SPECIALIZATION ELECTIVE	3	Mech Area of Specialization #2
SPECIALIZATION ELECTIVE	3	Mech Area of Specialization #3

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

• When registering for PHYS 101, you must also register for PHYS 103, the discussion section for 101.

•• When registering for PHYS 102, you must also register for PHYS 104, the discussion section for 102.

STAT

Statistics

WEB LINKS	http://statistics.rice.edu/academics/undergraduate
FRANK ADVICE	STAT 310 is our core theory course in probability and statistics and is a prerequisite for almost all advanced courses; learn it as best you can. Alternatives to STAT 310 are STAT 311 (honors version) and STAT 315 (more data analytic). Statistics majors are strongly encouraged to take STAT 310 or 311 over 315. Majors should take STAT 310 (or 311 or 315), 405 and 410 as soon as possible. Many courses use the statistical computing package, R, which you learn in STAT 405. Linear algebra background is useful for STAT 410, a course on regression. Students without AP credit should consider STAT 280 or STAT 305 prior to STAT 310. Science and/or pre-med students should consider STAT 305, but be aware that STAT 305 does not satisfy prerequisite requirements as do STAT 310/311/315 for most advanced STAT courses.
ADVICE FOR STUDENTS WITH AP CREDIT	AP credits are respected at the level of STAT 280 (introductory statistics course). Engineering students with AP credits should consider taking STAT 310, 311, or 315. Be sure and satisfy the MATH prerequisites before STAT 310/311/315.
ALTERNATIVE CURRICULA	Statistics is a very useful and marketable double-major. Double majors can coordinate some of the STAT "specialization electives" (e.g., finance or biostatistics) with classes from their other majors. Talk with an advisor about electives if interested in double-majoring.
BS VERSUS BA	STAT offers both a B.A. degree and a B.S. degree. The B.S. is better suited for those intending to pursure graduate study in statistics, or for those who are more generally interested in statistical theory.
NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES	Non-statistics majors interested in data analytics or data science should consider STAT 405, 410 and 413, as well as the Data Science minor. Students with biostatistics, bioinformatics or systems biology interests should consider STAT 423 and 453 (contact Profs. Kimmel, Guerra, or Vannucci). Students with computational finance interests should consider STAT 421, 449, 482 and 486 (contact Profs. Ensor or Dobelman), as well as the Financial Computation and Modeling (FCAM) minor.

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. Having an R or Python background and a few statistics courses (especially 310/311/315 and 410) will greatly improve your chances of starting statistical research as an undergraduate student. Faculty research interests can be found at https://statistics.rice.edu/research/research-focus-areas. Summer research opportunities on and off campus are also possible. Talk with an advisor for more information. Deadlines for summer opportunities may be as early as Nov–Feb. The Rice Data Science Club (https://datasci.rice.edu/) also provides useful workshops for statistical research, as well as information on research and internship opportunities.
INTERNSHIPS	Summer internships are often available. These may or may not be paid. Talk with an advisor for more information or visit the department's undergraduate opportunities page: https://statistics.rice.edu/academics/undergraduate/research-job-opportunities. Deadlines for summer opportunities may be as early as Nov-Feb.
PROFESSIONAL ORGANIZATION	Houston Area Chapter of American Statistical Association (HACASA) welcomes student participants at their meetings. See https://community.amstat.org/houston/home/ for details.
INTERESTING COURSES FOR NON–MAJORS	General STAT 305 Statistics for Biosciences STAT 315 Statistics for Data Science STAT 385 Methods of Data Analysis Data Science STAT 405 R for Data Science STAT 413 Machine Learning DSCI 435 Data Science Projects Biomedical/Environmental STAT 423 Probability in Bioinformatics and Genetics STAT 453 Biostatistics STAT 485 Environmental Statistics and Decision Making Financial Statistics STAT 449 Quantitative Financial Risk Management STAT 482 Quantitative Financial Analytics STAT 486 Market Models STAT 421 Applied Time Series and Forecasting STAT 499 Quantitative Finance Topics

B.A. Statistics

Specializations: Finance, biostatistics/bioinformatics, environment, data science.

Students interested in statistics should consider taking STAT 280, 305 or 385 as early as freshman year. These courses are less mathematical than STAT 310, 311 and 315, 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. THIS EXAMPLE ASSUMES A FRESHMAN WITHOUT CALCULUS I (MATH 101) AND WITHOUT AN INTRODUCTORY STATISTICS COURSE, INCLUDING AP STATISTICS. SOME FRESHMEN MATRICULATE WITH CREDIT FOR MATH 101 AND 102 AND AN INTRODUCTORY STATISTICS COURSE OR AP STATISTICS. IN THIS CASE, CONSULT A STATISTICS DEPARTMENT UNDERGRADUATE ADVISOR.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**16 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
STAT 280	Elementary Applied Statistics	4*	COMP 140 OR 130/182 or CAAM 210 (3hr)	Computational Thinking	4
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 credits**	**SOPHOMORE**		**16 credits**
MATH 212	Multivariable Calculus	3	STAT 405	R for Data Science	3
STAT 310 or 311***	Probability and Statistics or 315	3	STAT 410	Linear Regression	4*
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		**12 credits**	**JUNIOR**		**15 credits**
SPEC	Specialization Elective	3	SPEC	Specialization elective	3**
MATH 354/355 or CAAM 334/335	Lin. Alg./Honors Lin. Alg.	3	SPEC	Specialization elective	3
DIST	Distribution elective	3	DSCI 302 or COMP 215/322/330/382 or CAAM 378/440/453/471/519	Intro to Data Sci Tools and Models	3
SPEC	Specialization elective	3	DIST	Distribution elective	3
			OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
SPEC	Specialization elective	3	STAT 450 or DSCI 435	Senior Capstone Project	3
SPEC	Specialization elective	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 and/or discussion session that must fit into your schedule.*

*** STAT 305, 310, 311, 315 and 385 may not count as electives for the statistics major. Students may request approval for up to one statistics-related course from other departments to count toward the specialization electives.*

****Note that MATH 212 is a prerequisite for STAT 311*

BASIC REQUIREMENTS	General math & science courses	12 or 15
	Core courses in major	19-23
ELECTIVE REQUIREMENTS	Specialization electives	18
	Open electives and LPAP	43-50
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Statistics requires 49-56 credits in general math and science, core, and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I/AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II/AP or other credit in Calculus I
MATH 212	3 or 6	Multivariable Calculus
or MATH 221 & 222		Honors Calculus III & IV
MATH 354/355	3	Linear Algebra/Honors Linear Algebra
CAAM 334/335		Matrix Analysis for Data Science/Matrix Analysis
STAT 310/311/315	3-4	Probability and Statistics*/Honors Statistics*/Statistics for Data Science*
STAT 410	4	Linear Regression
STAT 405	3	R for Data Science
STAT 450 or DSCI 435	3-4	Senior Capstone Project or Data Science Projects
COMP 130/140/182	3-4	Elements of Algorithms and Computation/ Computational
or CAAM 210		Thinking/Principles of Computing/ Algorithmic Thinking or Intro to Eng Computation
COMP	3–4	Introduction to Program Design /Principles of Parallel
215/322/330/382		Programming/ Tools and Models-Data Science/Reasoning
or CAAM		About Algorithms or Intro to Operations Research and Optimization/
378/440/453/471/519		Applied Matrix Analysis/ Numerical Analysis I/ Linear and Integer
or DSCI 302		Programming/Computational Science I
		or Intro to Data Science Tools and Models
SPEC*	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective

At least three electives must be chosen from the following list of courses.

- *STAT 411 Advanced Statistical Methods*
- *STAT 413 Introduction to Statistical Machine Learning*
- *STAT 418 Probability*
- *STAT 419 Statistical Inference*
- *STAT 421 Time Series*
- *STAT 425 Introduction to Bayesian Inference*
- *STAT 453 Biostatistics*
- *STAT 502 Neural Machine Learning I*
- *STAT 541 Multivariate Statistics*
- *STAT 545 Generalized Linear Models*

**305, 310, 311, 315 and 385 may not count as electives.*
One statistics-related course from other departments may qualify as an elective. If the course appears on the O-group list, it is automatically approved. Otherwise, obtain advisor approval.

B.S. Statistics

Specializations: Finance, biostatistics/bioinformatics, environment, data science.

Students interested in statistics should consider taking STAT 280, 305 or 385 as early as freshman year. These courses are less mathematical than STAT 310, 311 and 315, 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. THIS EXAMPLE ASSUMES A FRESHMAN WITHOUT CALCULUS I (MATH 101) AND WITHOUT AN INTRODUCTORY STATISTICS COURSE, INCLUDING AP STATISTICS. SOME FRESHMEN MATRICULATE WITH CREDIT FOR MATH 101 AND 102 AND AN INTRODUCTORY STATISTICS COURSE OR AP STATISTICS. IN THIS CASE, CONSULT A STATISTICS DEPARTMENT UNDERGRADUATE ADVISOR.

FALL			SPRING		
FRESHMAN		**17 credits**	**FRESHMAN**		**16 credits**
MATH 101 or 105	Single Variable Calculus I	3	MATH 102 or 106	Single Variable Calculus II	3
STAT 280	Elementary Applied Statistics	4*	COMP 140 or 130/182 or CAAM 210 (3hr)	Computational Thinking	4
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 credits**	**SOPHOMORE**		**16 credits**
MATH 212	Multivariable Calculus	3	STAT 405	R for Data Science	3
STAT 310 or 311*** or 315	Probability and Statistics	3	STAT 410	Linear Regression	4*
DIST	Distribution elective	3	DIST	Distribution elective	3
OPEN	Open elective	3	MATH 302 or 321/331/427	Elements of Analysis	3
OPEN	Open elective	3	OPEN	Open elective	3
JUNIOR		**12 credits**	**JUNIOR**		**15 credits**
STAT 418	Probability	3	SPEC	Specialization elective	3**
MATH 354/355 or CAAM 334/335	Lin. Alg./Honors Lin. Alg.	3	STAT 419	Statistical Inference	3
DIST	Distribution elective	3	DSCI 302 or COMP 215/322/330/382 or CAAM 378/440/453/471/519	Intro to Data Sci Tools and Models	3
SPEC	Specialization elective	3	DIST	Distribution elective	3
			OPEN	Open elective	3
SENIOR		**15 credits**	**SENIOR**		**15 credits**
SPEC	Specialization elective	3	STAT 450 or DSCI 435	Senior Capstone Project	3
SPEC	Specialization elective	3	SPEC	Specialization elective	3
DIST	Distribution elective	3	SPEC	Specialization 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 and/or discussion session that must fit into your schedule.*

*** STAT 305, 310, 311, 315 and 385 may not count as electives for the statistics major. Students may request approval for up to one statistics-related course from other departments to count toward the specialization electives.*

****Note that MATH 212 is a prerequisite for STAT 311*

BASIC REQUIREMENTS	General math & science courses	12 or 15
	Core courses in major	28-32
ELECTIVE REQUIREMENTS	Specialization electives	18
	Open electives and LPAP	34-41
	FWIS and distribution courses	21
	Minimum credit required for the B.A.	120

Of the 120 total degree credits, the B.A. in Statistics requires 58-65 credits in general math and science, core, and specialization area courses.

Major Requirements

NUMBER	CREDIT	TITLE
MATH 101/105	3	Single Variable Calculus I/AP or other credit in Calculus I
MATH 102/106	3	Single Variable Calculus II/AP or other credit in Calculus I
MATH 212	3 or 6	Multivariable Calculus
or 221 & 222		Honors Calculus III & IV
MATH 302	3	Elements of Analysis
or MATH 321/331/427		
MATH 354/355	3	Linear Algebra /Honors Linear Algebra
CAAM 334/335		Matrix Analysis for Data Science/Matrix Analysis
STAT 310/311/315	3-4	Probability and Statistics*/Honors Statistics*/Statistics for Data Science*
STAT 410	4	Linear Regression
STAT 405	3	R for Data Science
STAT 418	3	Probability
STAT 419	3	Statistical Inference
STAT 450 or DSCI 435	3-4	Senior Capstone Project or Data Science Projects
COMP 130/	3-4	Elements of Algorithms and Computation/ Computational Thinking/
140/182 or CAAM 210		Algorithmic Thinking or Intro to Engineering Computation
COMP 215/322/330/382	3–4	Introduction to Program Design /Principles of Parallel
or CAAM		Programming/ Tools and Models-Data Science/Reasoning
378/440/453/471/519		About Algorithms or Intro to Operations Research and Optimization/
or DSCI 302		Applied Matrix Analysis/ Numerical Analysis I/ Linear and Integer Programming/ Computational Science I or Intro to Data Science Tools and Models
SPEC*	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective
SPEC	3	Specialization elective

At least three electives must be chosen from the following list of courses.

- *STAT 411 Advanced Statistical Methods*
- *STAT 413 Introduction to Statistical Machine Learning*
- *STAT 418 Probability*
- *STAT 419 Statistical Inference*
- *STAT 421 Time Series*
- *STAT 425 Introduction to Bayesian Inference*
- *STAT 453 Biostatistics*
- *STAT 502 Neural Machine Learning I*
- *STAT 532 Foundations of Statistical Inference I*
- *STAT 533 Foundations of Statistical Inference II*
- *STAT 541 Multivariate Statistics*
- *STAT 545 Generalized Linear Models*
- *STAT 550 Nonparametric Function Estimation*
- *STAT 581 Mathematical Probability I*
- *STAT 582 Mathematical Probability II*
- *STAT 650 Stochastic Control and Stochastic Diff. Eq.*

**305, 310, 311, 315 and 385 may not count as electives.*

One statistics-related course from other departments may qualify as an elective. If the course appears on the O-group list, it is automatically approved. Otherwise, obtain advisor approval.

MAJOR ADVISORS

Bioengineering

Bilal Ghosn (transfers)	bghosn@rice.edu	Ext. 2648
Sabia Adibi	sabia.z.abidi@rice.edu	Ext. 8362
Rebekah Drezek	drezek@rice.edu	Ext. 3011
Ka-Yiu San	ksan@rice.edu	Ext. 5361
Renata Ramos	rfr1@rice.edu	Ext. 2203

Chemical and Biomolecular Engineering

Ken Cox (transfers)	krcox@rice.edu	Ext. 3529
Marya Cokar	marya.cokar@rice.edu	Ext. 4907
Walter Chapman	wgchap@rice.edu	Ext. 4900
Thomas Senftle	tsentfle@rice.edu	Ext. 4714
Gerald McGlamery	gm35@rice.edu	Ext. 4242
Kyriacos Zygourakis	kyzy@rice.edu	Ext. 5208
Amanda Marciel	am152@rice.edu	Ext. 7231
Ross Thyer	ross.thyer@rice.edu	

Civil and Environmental Engineering

Phil Bedient	bedient@rice.edu	Ext. 4953
Leonardo Dueñas-Osorio	leonardo.duenas-osorio@rice.edu	Ext. 5292
Satish Nagarajaiah	nagaraja@rice.edu	Ext. 6207
Mason Tomson	mtomson@rice.edu	Ext. 6048

Computational and Applied Mathematics

Jesse Chan	jesse.chan@rice.edu	Ext. 6113
Illya Hicks	ivhicks@rice.edu	Ext. 5667
Andrew Schaefer	andrew.schaefer@rice.edu	Ext. 4178

Computer Science

Alan Cox	alc@rice.edu	Ext. 5730
Scott Cutler	cutler@rice.edu	Ext. 2526
Risa Myers	risamyers@rice.edu	Ext. 2065
David Johnson	dbj@rice.edu	Ext. 3063
Swarat Chaudhuri	swarat.chaudhuri@rice.edu	Ext. 6314
Stephen Wong	swong@rice.edu	Ext. 3814
Rebecca Smith	rjs@rice.edu	Ext. 7546
Devika Subramanian	devika@rice.edu	Ext. 5661

Electrical and Computer Engineering

Joseph Cavallaro (transfers)	cavallar@rice.edu	Ext. 4719
Caleb Kemere	caleb.kemere@rice.edu	Ext. 6089
Santiago Segarra	segarra@rice.edu	Ext. 3561
Ray Simar	ray.simar@rice.edu	Ext. 2257
Peter Varman	pjv@rice.edu	Ext. 3990
Gary Woods	gary.woods@rice.edu	Ext. 3598
Chong Xie	chongxie@rice.edu	Ext. 8737

Materials Science and NanoEngineering

Hanyu Zhu	hanyu.zhu@rice.edu	Ext. 2582
Peter Loos	ploos@rice.edu	Ext. 4681

Mechanical Engineering

Matthew Elliott	me26@rice.edu	Ext. 2082
Fathi Ghorbel	ghorbel@rice.edu	Ext. 3738
Peter Lillehoj	lillehoj@rice.edu@rice.edu	Ext. 7344

Statistics

Elizabeth McGuffey	elizabeth.mcguffey@rice.edu	Ext. 6032

DIVISIONAL ADVISORS

Baker		
Matthew Elliott	me26@rice.edu	Ext. 2082
Brown		
Elizabeth McGuffey	elizabeth.mcguffey	Ext. 6032
Duncan		
Mac Joyner	mjoyner@rice.edu	Ext. 4397
Hanszen		
Matthew Wettergreen	mwettergreen@rice.edu	Ext. 2043
Jones		
Gene Frantz	genf@rice.edu	Ext. 2839
Lovett		
Lisa Biswall	biswal@rice.edu	Ext. 6055
Martel		
Ray Simar	ray.simar@rice.edu	Ext. 2257
McMurtry		
Gary Woods	gary.woods@rice.edu	Ext. 3598
Sid Rich		
Rafael Verduzco	rafaelv@rice.edu	Ext. 6492
Wiess		
Renata Ramos	renata.ramos@rice.edu	Ext. 2203
Will Rice		
Marya Cokar	marya.cokar@rice.edu	Ext. 4073

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 https://ga.rice.edu/undergraduate-students/academic-policies-procedures/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 writing and communication 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://courses.rice.edu.

THERE ARE NO PREREQUISITES FOR THESE COURSES:

ELEC 220	Fundamentals of Computer Engineering (Fall & Spring)
ENGI 101	Introduction to Engineering (Fall)
ENGI 120	Introduction to Engineering Design (Fall/Spring)
ENGI 140	Engineering Leadership Development (Fall/Spring)
ENGI 150	Survey of Engineering Disciplines (Fall)
ENGI 242	Communication for Engineers (Fall/Spring)
BIOE 202	Careers in Bioengineering (Spring)
CEVE 101	Fundamentals of Civil and Environmental Engineering (Fall)
CEVE 307	Energy and the Environment (Spring)
CEVE 322	Engineering Economics (Spring)
COMP 140	Computational Thinking (Fall)
COMP 130	Elements of Algorithms and Computation (Fall)
COMP 160	Introduction to Computer Game Creation (Fall)
COMP 162	Introduction to Game Content Creation (Fall)
MSNE 201	Introduction to NanoEngineering (Spring)
STAT 280	Elementary Applied Statistics (Fall & Spring)
DSCI 101	Itroduction to Data Science

THESE COURSES HAVE MINIMAL PREREQUISITES:

CAAM 210	Introduction to Engineering Computation (Fall/Spring)
ELEC 240	Fundamentals of Electrical Engineering I Lab (Fall)
ELEC 241	Fundamentals of Electrical Engineering I (Fall)
MECH 200	Classical Thermodynamics (Spring)
MECH 202	Mechanics/Statics (Fall)
MECH/CEVE 211	Engineering Mechanics (Fall/Spring)
STAT 305	Introduction to Statistics for Biosciences (Fall)
STAT 310	Probablity and Statistics (Fall/Spring)
STAT 315	Statistics for Data Science (Fall/Spring)


RICE