

# BIOE

## Bioengineering

<b>WEB LINKS</b>	<p><a href="http://bioe.rice.edu/">http://bioe.rice.edu/</a> (general website) <a href="http://bioengineering.rice.edu/undergrad/degree_requirements.aspx">http://bioengineering.rice.edu/undergrad/degree_requirements.aspx</a></p>
<b>FRANK ADVICE</b>	<p>Don't try to rush through this 4-year program. Prerequisites are very important for BIOE classes; since some courses are offered once a year, failure to get the correct prerequisites can put you behind an entire year. You must take ELEC 243 before BIOE 383/5, and MECH 211 before BIOE 372. Get involved in research.</p>
<b>ADVICE FOR STUDENTS WITH AP CREDIT</b>	<p>Take BIOC 201 or a more advanced math (e.g., MATH 211) during your first year. Consider ENGI 120 or ENGI 128.</p>
<b>ALTERNATIVE CURRICULA</b>	<p>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.</p>
<b>BS VERSUS BA</b>	<p>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, <a href="http://www.abet.org">www.abet.org</a>.</p>
<b>NOT REQUIRED BUT HIGHLY RECOMMENDED COURSES</b>	<p>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.</p>



<p><b>RESEARCH</b></p>	<p>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 credit as BIOE 400 or BIOE 401, or they can be paid. Students conduct research during the school year as well as during the summer. Contact a faculty member directly if you are interested in working in his/her laboratory.</p>
<p><b>INTERNSHIPS</b></p>	<p>Internships in industry and other universities are available for all levels of students. Rice BIOE also offers several summer research internship opportunities.</p>
<p><b>STUDY ABROAD</b></p>	<p>The best time to study abroad is during the spring semester of the sophomore year; a few students go during the spring semester of the junior year. Typically, students complete technical coursework while abroad. Consult a BIOE adviser early if you are interested in study abroad opportunities.</p>
<p><b>PROFESSIONAL ORGANIZATIONS</b></p>	<p>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. bmes.rice.edu</p>
<p><b>INTERESTING COURSES FOR NON-MAJORS</b></p>	<p>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.</p>

# 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 ADVISER TO CUSTOMIZE YOUR DEGREE PLAN.*

FALL				SPRING			
FRESHMAN		17 credits		FRESHMAN		17 credits	
MATH 101	Single Variable Calculus I	3		MATH 102	Single Variable Calculus II	3	
PHYS 101•	Mechanics w/Lab	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		16 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	
BIOC 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	3		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	
BIOC 341	Cell Biology	3		BIOE 332	Thermodynamics	3	
MECH 211	Engineering Mechanics	3		DIST	Distribution elective	3	
OPEN	Open elective	3		OPEN	Open elective	3	
SENIOR		17 credits		SENIOR		18 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	3		TECH	BIOE technical elective	3	
TECH	BIOE technical elective	3		DIST	Distribution elective	3	
DIST	Distribution elective	3		OPEN	Open elective	3	
OPEN	Open elective	2		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.

- 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	37
	Core courses in major	49
Elective requirements	BIOE technical electives	9
	Open electives and LPAP	18
	FWIS and distribution courses	21
Minimum credit required for the B.S.		134

Of the 134 total degree credits, the B.S. in Bioengineering requires 95 credits in general math and science courses and core and elective engineering courses.

## Major Requirements

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