

Program Change Request

Date Submitted: 11/20/18 3:23 pm

Viewing: **BS-BMEN : Biomedical Engineering - BS**

Last approved: 04/10/18 8:42 am

Last edit: 12/07/18 12:52 pm

Changes proposed by: mlyons

Catalog Pages Using [Biomedical Engineering - BS](#)
this Program

Contact(s)

Name	E-mail	Phone
Maria Lyons	mlyons@tamu.edu	9798452312

Academic level Undergraduate

Effective Term 2019-2020

Department Biomedical Engineering

College Engineering

Program type Degree

Degree designation BS - Bachelor of Science

With a major in Biomedical Engineering (BMEN)

Associated Program **Not Applicable**

Catalog Program Title
Biomedical Engineering - BS

CIP and Fund code 14010100

Rationale for Proposal

201931 201831-Change:

These changes are in response to the **Department College of Chemistry Engineering**-updates to the **CHEM ENGR/PHYS** course **numbers requirements** for the **freshman/sophomore freshman**-year. **This also includes the removal of the ENGR 482 requirement in favor of a general core elective for Language, Philosophy, and Culture credit.**

Program hours 128

Is this program eligible for financial aid? Yes

Will program hours change (increase/decrease) due to the proposed curriculum changes? No

Program delivery mode
On-campus

In Workflow

1. **BMEN Department Head**
2. **Curricular Services Review**
3. **EN Committee Preparer UG**
4. **EN Committee Chair UG**
5. **EN College Dean UG**
6. **UCC Preparer**
7. **UCC Chair**
8. **Faculty Senate Preparer**
9. Faculty Senate
10. Provost II
11. President
12. Curricular Services

Approval Path

1. 10/16/18 5:28 pm
Michael McShane (mcshane): Approved for BMEN Department Head
2. 10/18/18 1:47 pm
Angel Mario Carrizales (carr1214): Rollback to BMEN Department Head for Curricular Services Review
3. 11/20/18 11:14 am
Mary McDougall (mpmcdougall): Approved for BMEN Department Head
4. 11/20/18 11:46 am
Angel Mario Carrizales (carr1214): Rollback to Initiator
5. 11/20/18 3:35 pm
Mary McDougall (mpmcdougall): Approved for BMEN Department Head
6. 11/20/18 3:44 pm
Angel Mario Carrizales (carr1214): Approved for Curricular Services Review
7. 11/20/18 5:06 pm
Eileen Hoy (ehoy): Approved for EN Committee Preparer UG
8. 11/20/18 6:16 pm
Prasad Enjeti (enjeti): Approved for EN Committee Chair UG

Catalog Program Requirements

9. 11/20/18 6:16 pm
Prasad Enjeti (enjeti):
Approved for EN
College Dean UG
10. 11/21/18 8:10 am
Sandra Williams
(sandra-williams):
Approved for UCC
Preparer
11. 12/10/18 10:54 am
Terra Bissett (t.bissett):
Approved for UCC Chair

History

1. Mar 7, 2017 by Emily Dykes (edykes)
2. Mar 9, 2017 by Sandra Williams (sandra-williams)
3. Apr 10, 2018 by Maria Lyons (mlyons)

Plan of Study Grid

Second Year

		Semester Credit Hours
Fall		
BMEN 101	Introduction to Biomedical Engineering 8	1
BMEN 207	Computing for Biomedical Engineering	3
ENGR 217/PHYS 217	Experimental Physics and Engineering Lab III - Electricity and Magnetism2	
MATH 251	Engineering Mathematics III	3
or MATH 253	or Engineering Mathematics III	
PHYS 207	Electricity and Magnetism for Engineering and Science	3
VTPP 434	Physiology for Bioengineers I	4
	Semester Credit Hours	16
Spring		
BMEN 211	Biomedical Applications of Circuits, Signals and Systems	3
BMEN 253	Medical Device Design I	1
CHEM 227	Organic Chemistry I	3
MATH 308	Differential Equations	3
VTPP 435	Physiology for Bioengineers II	4
Select one of the following:		3
COMM 203	Public Speaking	
COMM 205	Communication for Technical Professions	
ENGL 203	Writing about Literature	
ENGL 210	Technical and Business Writing	
	Semester Credit Hours	17

Third Year

Fall		
BMEN 305	Bioinstrumentation	1
BMEN 321	Biomedical Electronics	3
BMEN 341	Biofluid Mechanics	3
BMEN 343	Introduction to Biomaterials	3
BMEN 350	Statistics for Biomedical Engineering	3
University Core Curriculum		3
High Impact Experience 6		0
BMEN 399	Engineering Professional Development	
	Semester Credit Hours	16
Spring		
BMEN 344	Biological Responses to Medical Devices	3
BMEN 345	Biomaterials Lab	1
BMEN 353	Medical Device Design II	1
BMEN 361	Biosolid Mechanics	3
BMEN 420	Medical Imaging	3
Technical elective-7		3
University Core Curriculum		6

	Semester Credit Hours	17
Fourth Year		
Fall		
BMEN 452	Mass and Energy Transfer in Biosystems	3
BMEN 453	Analysis and Design Project I	2
BMEN 465	Biomechanics Experiential Learning Lab	1
Technical electives 7		6
University Core Curriculum 3		3
	Semester Credit Hours	15
Spring		
BMEN 450	Case Studies 8	1
BMEN 454	Analysis and Design Project II	2
ENGR 482/PHIL 482 Ethics and Engineering 8		3
or ANTH 270	or Course ANTH 270 Not Found	
Technical electives 7		9
University Core Curriculum 3		3
	Semester Credit Hours	15
	Total Semester Credit Hours	96

6 All students are required to complete a high-impact experience in order to graduate. A list of possible high-impact experiences is available in the BMEN advising office.

7 Technical electives are to be selected from the course list below. Students must select a one of the following tracks and take 15 hours from within that track:

Bioinstrumentation, Biomaterials, Biomechanics, or Biomolecular & Cellular Engineering. Course selection should be done in consultation with student's advisor and track coordinator.

8 Writing intensive course.

Total Program Hours 128

Course List		Semester Credit Hours
Code	Title	
Bioinstrumentation		
Required courses		9
BMEN 322	Biosignal Analysis	
BMEN 401	Principles and Analysis of Biological Control Systems	
BMEN 428/CSC 461	Embedded Systems for Medical Applications	
Select from the following:		3-6
BMEN 291	Research	
or BMEN 491	or Research	
BMEN 402	Biomedical Optics Laboratory	
BMEN 422	Bioelectromagnetism	
BMEN 425	Biophotonics	
BMEN 427	Magnetic Resonance Engineering	
or ECEN 463	or Magnetic Resonance Engineering	
BMEN 448	Healthcare Technology in the Developing World	
ECEN 411	Introduction to Magnetic Resonance Imaging and Magnetic Resonance Spectroscopy	
ECEN 412	Ultrasound Imaging	
ECEN 414	Biosensors	
ECEN 447	Digital Image Processing	
Biomaterials		
Select from the following:		6-15
BMEN 480	Biomedical Engineering of Tissues	
BMEN 482	Polymeric Biomaterials	
BMEN 483	Polymeric Biomaterial Synthesis	
BMEN 486	Biomedical Nanotechnology	
BMEN 487	Drug Delivery	
Select from the following:		0-9
BMEN 291	Research	
or BMEN 491	or Research	
CHEM 466	Polymer Chemistry	
CHEN 451	Introduction to Polymer Engineering	
MEEN 458	Processing and Characterization of Polymers	
MSEN 410	Materials Processing	
MSEN 420	Polymer Science	
Biomechanics		
Select from the following:		12-15
BMEN 291	Research	
or BMEN 491	or Research	

Code	Title	Semester Credit Hours
BMEN 432	Molecular and Cellular Biomechanics	
BMEN 457	Orthopedic Biomechanics	
BMEN 458	Motion Biomechanics	
BMEN 461	Cardiac Mechanics	
BMEN 463	Soft Tissue Mechanics and Finite Element Methods	
BMEN 468	Advanced Biomechanics	
BMEN 471	Numerical Methods in Biomedical Engineering	
MEEN 363	Dynamics and Vibrations	
MEEN 368	Solid Mechanics in Mechanical Design	
MEEN 440	Bio-inspired Engineering Design	
MEEN 441	Design of Mechanical Components and Systems	
MEEN 442	Computer Aided Engineering	
MEEN 444	Finite Element Analysis in Mechanical Engineering	
Biomolecular and Cellular Engineering		
Required courses		6
BMEN 431	Biomolecular Engineering	
BMEN 433	Biomolecular and Cellular Engineering Laboratory	
Select from the following:		6-9
BMEN 291	Research	
or BMEN 491	or Research	
BMEN 471	Numerical Methods in Biomedical Engineering	
or BIOL 350	or Computational Genomics	
BMEN 432	Molecular and Cellular Biomechanics	
Select up to one course from the following:		
BMEN 480	Biomedical Engineering of Tissues	
BMEN 486	Biomedical Nanotechnology	
BMEN 487	Drug Delivery	
Select from the following to apply to any of the tracks above:		0-3
ACCT 640	Accounting Concepts and Procedures I	
BMEN 400/VTPP 401	History of Human and Veterinary Medicine in Europe	
BMEN 404	FDA Good Laboratory and Clinical Practices	
BMEN 406	Medical Device Path to Market	
BMEN 469	Entrepreneurial Pathways in Medical Devices	
ENGR 181	Engineering Honors Seminar I	
ENGR 281	Engineering Honors Mentoring and Team Building Seminar	
ENGR 381	Engineering Honors Leadership and Project Management Seminar	
ENGR 385	Problems for Co-Op Students	
CHEM 228	Organic Chemistry II	
VTPB 410	Cell Mechanisms of Disease	
VTPP 401/BMEN 400	History of Human and Veterinary Medicine in Europe	
400-Level BMEN with department approval		

Additional information	<p>In response to Angel's comments:</p> <ol style="list-style-type: none"> 1. This has been done. 2. MATH 253 has been added as an alternative to MATH 251. VTPP 435 was included in spring of the second year. 3. 3 hours of technical elective credit has been added to spring of the fourth year.
Required Proposal Forms	<p>201831-Degree-Eval-Changes.pdf</p> <p>012218-President-Approval-Memo.pdf</p> <p>BMEN - 201931 Catalog Curriculum Changes-01.pdf</p>
Reviewer Comments	<p>Angel Mario Carrizales (carri1214) (10/18/18 1:47 pm): Rollback: Please address the following: 1) Remove documents that applied to the previous submission. 2) MATH 253 (supporting coursework) and VTPP 435 (life and physical sciences) are listed in the evaluation; however, they are not listed in the catalog. If these courses are listed in the evaluation they must also be listed in the catalog program requirements. 3) The degree evaluation states that 15 hours of Technical Electives are required (and the footnotes also indicate 15 hours), however only 12 hours are listed in the Plan of Study grid. The catalog entries currently account for 125 hours (32 from the First Year Curriculum and 93 for the 2nd, 3rd and 4th years) A Technical elective entry needs to be added for the missing 3 hours.</p> <p>Angel Mario Carrizales (carri1214) (11/20/18 11:46 am): Rollback: Previous comments have not been addressed. Please view reviewer comments dated 10/18/2018.</p> <p>Angel Mario Carrizales (carri1214) (11/20/18 3:44 pm): Initial concerns addressed.</p> <p>Terra Bissett (t.bissett) (12/10/18 10:53 am): UCC approved December 2018.</p>

unofficial evaluation

Area : Biomedical Engineering (15.000 credits) - Not Met

Description : Minimum of 6 hours at 300-400 level.
Must complete 12hrs from one area of concentration.
See BMEN academic advisor for admission criteria.
See BMEN academic advisor for complete list of technical electives.

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject Course Title	Attribute	Credits	Grade	Source
No		A.	VIBS 243	2hrs										
No	AND	B	BMEN 101 or 253 or 450	1hr										
No	AND (	C	Biomechanics	12hrs										
<p><i>Take BMEN 341, 361; Select 6 hrs from biomechanics technical electives (chosen in consultation with academic advisor).</i></p>														
No	)OR(	D	Biomaterials	12hrs										
<p><i>Take BMEN 343, 344; Select 6 hours from biomaterials technical electives (chosen in consultation with academic advisor).</i></p>														
No	)OR(	E	Bioinstrumentation	12hrs										
<p><i>Take BMEN 207, 321, 420; Select 3 hrs from bioinstrumentation technical elective (chosen in consultation with academic advisor).</i></p>														

I. BMEN 341
II. BMEN 361 or CVEN 305 or MEEN 360
III. Select 6 hours from BMEN 432, 457, 458, 461, 463, 471; (MEEN 363 or 440 or 441 or 442 or 444)

I. BMEN 343 or MEEN/MSEN 222
II. BMEN 344
III. Select 6 hours from BMEN 480, 482, 483, 486, 487; (CHEN 466 or CHEN 451 or MEEN 458 or MSEN 410 or MSEN 420)

I. BMEN 321 or ECEN 214 or 215
II. BMEN 420
III. Select 6 hours from BMEN 322, 401, 422, 425, (BMEN 427 or ECEN 463), (BMEN 428 or C SCE 461), 448; (ECEN 411 or 412 or 414 or 447)

Total Credits and GPA 0.000 .00

unofficial evaluation

Area University Writing Requirement - Not Met

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject Course Title	Attribute	Credits	Grade	Source
No		A.	Writing Requirement											
<p>Two courses required. <i>101 or 450</i> Only sections of BMEN 450, ENGR 482 or PHIL 482 with the Writing attribute [UWRT] may be used to satisfy this requirement.</p>														

Total Credits and GPA 0.000 .00

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Area Int'l & Cult Diversity - Not Met

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject Course Title	Attribute	Credits	Grade	Source
No		A.	Int'l & Cultural Diversity	6hr										
<p>Select from courses with the International and Cultural Diversity attribute [UICD] (except sections of BUSN 289 with the UWRT attribute).</p>														

Change to reflect new ICD/CD requirements:
3 HRS FROM INTERNATIONAL AND CULTURE DIVERSITY COURSES
3 HRS FROM CULTURAL DISCOURSE COURSES

Total Credits and GPA 0.000 .00

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Area Foreign Language - Not Met

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject Course Title	Attribute	Credits	Grade	Source
No		A.	Foreign Language Rqmt											
<p>Complete one of the following: 1. Two years of the same foreign language in High School. 2. A two semester sequence of the same foreign language for University credit.</p>														

Total Credits and GPA 0.000 .00

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Area : Residence Requirement - Not Met

Description : A minimum of 36 hours of 300-400 level coursework must be completed at Texas A&M University. 12 hours must be in the major field.

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course Title	Attribute	Credits	Grade	Source
No		A.	Residence-Major	12hrs				Select from BMEN 300-499.							
No	AND	B.	Residence 300-499	24hrs				Select any courses level 300-499.							
													Total Credits and GPA	0.000	.00

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Area GPR-Major - Not Met

Met	Condition	Rule	Subject	Attribute	Low	High	Required Credits	Required Courses	Term	Subject	Course Title	Attribute	Credits	Grade	Source
No		A.	Major GPR	25+hrs				Must maintain a GPR of 2.000 in all courses taken.							
													Total Credits and GPA	0.000	.00

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