

(For all students admitted in 2017-18 and before)

## Undergraduate Minor Program in Bioengineering

The Minor Program in Bioengineering is designed for undergraduate students interested in applying engineering principles to biological problems. Any undergraduate students at HKUST with a minimum CGA of 2.15 or above may enroll in the Bioengineering Minor Program. Students must declare their intention to enroll in the minor program no earlier than the first regular term of their second year of study but no later than the last day of the add/drop period in the first regular term of their final year of study. Students who wish to withdraw from the minor program should apply before the last day of add/drop period in the last regular term of their study.

### Minor Requirements

To graduate with a minor in Bioengineering, students must be enrolled in the minor program, complete a minimum total of 18 credits and all of the minor requirements, as well as the requirements of the major program of study; and have attained an average grade point of at least 2.15 in courses taken within the minor program.

For credit transfer, students can transfer a maximum total of 6 credits to the minor program. Courses accepted for transfer credits must normally be at a level equivalent to HKUST courses of 2000-level or above.

Out of the total credits required by the minor program, at least 9 credits should be single-counted within the minor and are not used to fulfill any other requirements for graduation except the 120-credit degree requirement.

Students may use no more than 6 credits earned from courses offered in self-paced online delivery mode to satisfy the graduation requirements of a degree program. This 6-credit limit does not apply to credits obtained through the credit transfer procedures of the University.

### Required Course(s)

			<b>Credit(s) attained</b>
BIEN/BMED/ CENG		Note: (BIEN 1010 <u>OR</u> CENG 1600) <u>OR</u> BMED 1100 <u>OR</u> CENG 4620 <u>OR</u> CENG 4660	3
BIEN	1010	Introduction to Biomedical Engineering	3
BMED	1100**	Technologies and World Health	3
CENG	1600	Biotechnology and Its Business Opportunities	3
CENG	4620	Bioproducts and Processing	3
CENG	4660**	Introduction to Biomicrosystem	3
BIEN/LIFS		Note: BIEN 2610 <u>OR</u> LIFS 1020 <u>OR</u> LIFS 2030 <u>OR</u> LIFS 2040 <u>OR</u> LIFS 2210	3
BIEN	2610	Chemical Biology for Engineers	3
LIFS	1020	Biology of Human Health	3
LIFS	2030**	Nature of Biochemistry and Biotechnology	3
LIFS	2040	Cell Biology	3
LIFS	2210	Biochemistry I	3

<b>Elective(s)</b>	<b>Minimum credit(s) required</b>
SENG/SSCI/ IPO	12
Elective for specialised study in Bioengineering (Courses from the specified elective list, of which at least 1 course should be at 4000-level. No more than one course within the same course group can be counted toward the elective requirements of this minor. Course(s) taken as required course(s) of the program may not be counted toward this elective requirement. Students may visit the program website for a summary of electives grouped by areas of concentration.)	
<b>Group 01</b>	
BIEN 2610 Chemical Biology for Engineers	3
LIFS 1020 Biology of Human Health	3
LIFS 2030** Nature of Biochemistry and Biotechnology	3
LIFS 2040 Cell Biology	3
LIFS 2210 Biochemistry I	3
LIFS 2220 Biochemistry II	3
<b>Group 02</b>	
LIFS 4060 Immunobiology	3
LIFS 4150 Plant Biotechnology	3
LIFS 4630 Advanced Topics in Biotechnology	3
<b>Group 03</b>	
COMP 4331 Data Mining	3
LIFS 3150 Biostatistics	3
LIFS 3580 Bioinformatics	3
<b>Group 04 (Students may only use either BIEN 1010 or CENG 1600, but not both, to count towards the minor program)</b>	
BIEN 1010 Introduction to Biomedical Engineering	3
BMED 1100** Technologies and World Health	3
CENG 1600 Biotechnology and Its Business Opportunities	3
CENG 4620 Bioproducts and Processing	3
CENG 4630 Food Processing Technology	3
CENG 4660** Introduction to Biomicrosystem	3
<b>Group 05</b>	
CENG 1500 A First Course on Materials Science and Applications	3
CENG 4520** Electronic Materials Processing for Chemical Engineers	3
CENG 4540 Nanomaterials and Applications in Chemical Engineering	3
MECH 2410 Engineering Materials I	3
<b>Group 06</b>	
CENG 4670 Pharmaceutical Engineering	3
LIFS 4370 Human Genetics and Personalized Medicine	3

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LIFS	4760	Biochemistry of Diseases	3
LIFS	4950	Neurochemistry	3
Group 07			
COMP	1001	Exploring Multimedia and Internet Computing	3
COMP	1022P	Introduction to Computing with Java	3
Group 08			
COMP	4421	Image Processing	3
ELEC	4130	Machine Learning on Images	3
Group 09			
ELEC	2400	Electronic Circuits	4
ELEC	2420	Basic Electronics	3
Group 10			
ELEC	4810	Introduction to Biosensors and Bioinstrumentation	4
Group 11			
ELEC	4820	Medical Imaging	3
Group 12			
IEDA	2510	Engineering Probability and Statistics	4
MECH	4740	Numerical Methods in Engineering	3
Group 13			
MATH	4333	Mathematical Biology	3
Group 14			
BIEN	3010	Biodesign: A Taste of Solving Real-Life Healthcare Problems	3
Group 15			
BIEN	3020	Advanced Biological Physics	3
LIFS	3040	Animal Physiology	3
LIFS	3070	Introduction to Biophysical Instrumentation	3
LIFS	3240	Introduction to Neurobiology	3
LIFS	4140	Cancer Biology	3
Group 16			
MECH	2210	Fluid Mechanics	3
MATH	4326	Introduction to Fluid Dynamics	3

**\*\*Remarks on course(s):**

- BMED 1100: The course was last offered in 2014-15 and was deleted subsequently.
- CENG 4520: The course was last offered in 2013-14 and was deleted subsequently.
- CENG 4660: The course was last offered in 2015-16 and was deleted subsequently.
- LIFS 2030: The course was last offered in 2013-14 and was deleted subsequently.

(For all students admitted in 2018-19 and after)

## Undergraduate Minor Program in Bioengineering

The Minor Program in Bioengineering is designed for undergraduate students interested in applying engineering principles to biological problems. Any undergraduate students at HKUST with a minimum CGA of 2.15 or above may enroll in the Bioengineering Minor Program. The program is designed for students with fundamental knowledge in life science (e.g. LIFS 1901 or LIFS 2040), but also open to other students for enrollment, given that they may be required to take additional course(s) to acquire relevant foundation. Students must declare their intention to enroll in the minor program no earlier than the first regular term of their second year of study but no later than the last day of the add/drop period in the first regular term of their final year of study. Students who wish to withdraw from the minor program should apply before the last day of add/drop period in the last regular term of their study.

### Minor Requirements

To graduate with a minor in Bioengineering, students must be enrolled in the minor program, complete a minimum total of 18 credits and all of the minor requirements, as well as the requirements of the major program of study; and have attained an average grade point of at least 2.15 in courses taken within the minor program.

For credit transfer, students can transfer a maximum total of 6 credits to the minor program. Courses accepted for transfer credits must normally be at a level equivalent to HKUST courses of 2000-level or above.

Out of the total credits required by the minor program, at least 9 credits should be single-counted within the minor and are not used to fulfill any other requirements for graduation except the 120-credit degree requirement.

Students may use no more than 6 credits earned from courses offered in self-paced online delivery mode to satisfy the graduation requirements of a degree program. This 6-credit limit does not apply to credits obtained through the credit transfer procedures of the University.

### Required Course(s)

			<b>Credit(s) attained</b>
BIEN/CENG		Note: BIEN 1010 <u>OR</u> CENG 1600	3
BIEN	1010	Introduction to Biomedical Engineering	3
CENG	1600	Biotechnology and Its Business Opportunities	3
BIEN/ELEC/ LIFS		Note: BIEN 2310 <u>OR</u> BIEN 3320 <u>OR</u> BIEN 3410 <u>OR</u> ELEC 4810 <u>OR</u> LIFS 4320	3-4
BIEN	2310	Modeling for Chemical and Biological Engineering	3
BIEN	3320	Data Science for Biology and Medicine	3
BIEN	3410	Introduction to Bioinstrumentation and Bioimaging	3
ELEC	4810	Introduction to Biosensors and Bioinstrumentation	4
LIFS	4320	Data Science for Biology and Medicine	3
BIEN/LIFS		Note: BIEN 2410 <u>OR</u> BIEN 2610 <u>OR</u> LIFS 3040	3
BIEN	2410	Cellular and Systems Physiology for Engineers	3
BIEN	2610	Chemical Biology for Engineers	3
LIFS	3040	Animal Physiology	3

<b>Elective(s)</b>			<b>Minimum credit(s) required</b>
SENG/LIFS		Bioengineering Electives (3 courses from the specified list, of which at least one course must be at 4000-level)	9
BIEN	3010	Biodesign: A Taste of Solving Real-Life Healthcare Problems	3
BIEN	3240	Transport Phenomena in Biological Systems	3
BIEN	4110**	Regulatory Science and Engineering	3
BIEN	4310	Statistical Signal Analysis and Applications in Neural Engineering	3
CENG	2110	Process and Product Design Principles	3
CENG	4620	Bioproducts and Processing	3
CENG	4640	Biomolecular Engineering**	3
CENG	4650**	Biomaterials, Drug Delivery and Tissue Engineering	3
CENG	4660**	Introduction to Biomicrosystem	3
CENG	4670	Pharmaceutical Engineering	3
COMP	4211	Machine Learning	3
COMP	4331	Data Mining	3
COMP	4421	Image Processing	3
ELEC	4820	Medical Imaging	3
ELEC	4830	Statistical Signal Analysis and Applications in Neural Engineering	3
ENGG	1300	Design Thinking for Health Innovation	3
ENGG	4930	Design for Global Health	3
LIFS	4370	Human Genetics and Personalized Medicine	3
LIFS	4760	Biochemistry of Diseases	3

**\*\*Remarks on course(s):**

- BIEN 4110: This is a new course subject to approval.
- CENG 4640: The course title will be changed to "Synthetic Biology and Biomolecular Engineering" subject to approval.
- CENG 4650: This is a new course subject to approval.
- CENG 4660: The course was last offered in 2015-16 and was deleted subsequently.