National Tsing Hua University

Department of Biomedical Engineering and Environmental Sciences

Study Regulations of REQUIRED COURSES and CREDITS

for

UNDERGRADUATE and GRADUATE Students

(Version 11, update: 2024.4.26)

Catalogue

1 Preface

The Department of Biomedical Engineering & Environmental Sciences (BMES) of Tsing-Hua University is the youngest department in National Tsing-Hua University, and it has also maintained the most traditional features. BMES was formerly known as the Department of Atomic Sciences, which was itself preceded by the Institute of Atomic Sciences, which was the very first department established by Tsing-Hua University after its resumption in Taiwan.

BMES is a well-established institution in Taiwan that focuses on the field of biomedical engineering. BMES strives to maintain the traditional strengths while also pioneering new advancements in leading position to strengthen interdisciplinary characteristics. Since the first Nobel Prize in Physics was awarded to Wilhelm Röntgen for the discovery of X-rays, the field of medical physics, health physics, and nuclear medicine has been developed and has officially opened up the era of biomedical engineering. In the early stages of BMES, basic physics was the cornerstone and was applied to cutting-edge research and clinical applications in the field of atomic science in medical diagnosis and treatment. With the current trend towards intelligent healthcare, precision medicine, and global environmental change, the biomedical engineering and environmental science industries have flourished, BMES highlights the importance of interdisciplinary academic expertise and research and development direction, while also meeting industry demand for talent cultivation.

Therefore, BMES continues the strong foundation of basic science education for the fields "Biomedical Engineering Science" and "Environmental Molecular Science" following from the Department of Atomic Science. As shown in Figure 1, BMES mainly bases on the foundations of physics and chemistry, and applied to interdisciplinary sciences of biology, medicine, and the environment. In addition, BMES incorporates engineering thinking, core technology implementation, and problem-solving skills training to concentrate on investigating significant issues in biomedicine and the environment, while also promoting precision medicine. BMES aims to cultivate future leaders in the biomedical engineering field with interdisciplinary engineering technology integration abilities,

and to promote the upgrading of national biomedical and environmental industries and strengthen research and development capabilities.

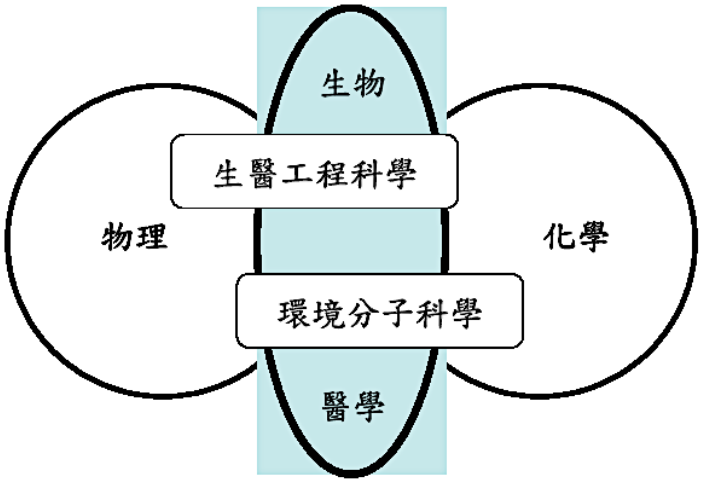


圖 1. 生醫工程與環境科學系的跨領域特色

"Biomedical Engineering Science" Field

The field of biomedical engineering mainly focuses on two important division: "Molecular Biomedical Engineering and Materials" and "Biomedical Imaging Engineering". BMES has interdisciplinary faculty members who have the capability for interdisciplinary collaboration and integration in teaching and research, aiming to cultivate intelligent biomedical engineering talents. BMES offers basic and applied courses in biomedical engineering to implement interdisciplinary education in physics, chemistry, engineering, biology, and medicine, and integrate the relevant courses learned in biomedical engineering for applying these knowledges to important forward-looking issues in clinical medicine.

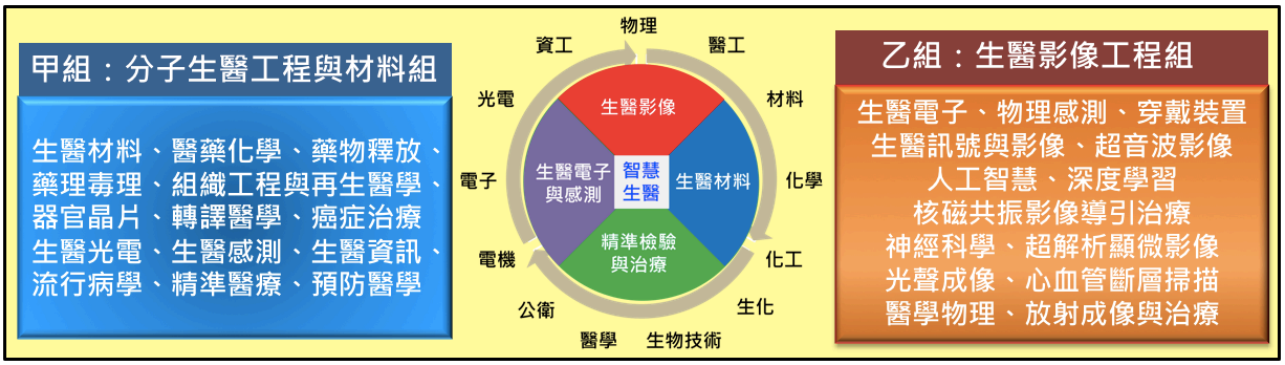
(A) Division of "Molecular Biomedical Engineering and Materials":

Combined with research in medicinal chemistry, drug targeting and release, immunotherapy, and gene and cellular tissue engineering for tumor treatment, preventive medicine, and regenerative medicine in clinical settings. Additionally, nanobiophotonics and molecular sensing technologies are also developed and integrated with pharmacology, toxicology, and epidemiology to achieve disease detection, treatment tracking, and prevention.

(B) Division of "Biomedical Imaging Engineering":

Develop high-precision medical devices and instruments for sensing, diagnosis, and treatment, using techniques such as magnetic resonance imaging, nuclear medicine imaging, ultrasound,

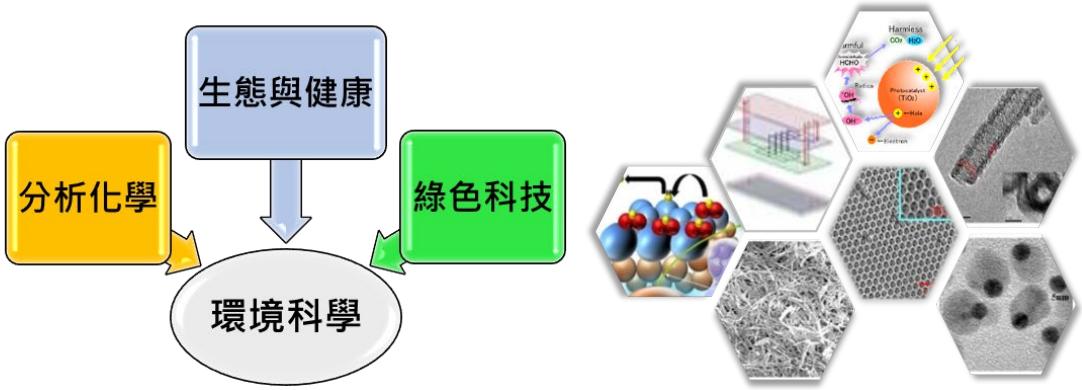
super-resolution microscopy, photoacoustic imaging, artificial intelligence, and electronic circuits. In addition to the design and development of medical devices and instruments, advanced research is also conducted by integrating drug release, animal disease/organ chip models, and pharmacokinetics to develop advanced medical imaging methods and medical sensing technologies.



"Environmental Molecular Science" Field

(C) Division of "Environmental Molecular Science":

Focuses primarily on three main themes: "analytical chemistry," "ecology and health," and "green technology," aiming to provide a molecular-level technology that integrates quantitative and interdisciplinary approaches to study the distribution and reaction characteristics of various substances in the environment. Different from traditional environmental engineering that focuses on developing pollution prevention and treatment technologies, and environmental science that studies environmental problems from a macro perspective. This division mainly focuses on studying the microscopic changes and reaction characteristics of various substances between chemical substances and various interfaces. To meet the development and application of micro-reaction exploration technology, the use of nano- and ultra-trace analysis principles are emphasized as the basis, and novel ultra-trace analysis technology is used to study the physical, chemical, and biological reaction changes of various substances in the environment, combined with practical applications of green chemistry and sustainable development, to develop novel technologies and environmental applications for pollution prevention and clean technology.



2 Undergraduate Program

2-1 Regulations of Course Selection

The total credits needed for graduation for UNDERGRADUATE Students in the Department of Biomedical Engineering & Environmental Sciences (BMES) are 128 credits. Students should take courses and receive credits based on the "Compulsory Courses and Total Graduation Credits" of their admission school year (Table 1 as an example for 108-year admission school year). For information about the "Compulsory Courses and Total Graduation Credits" of each admission school year, please visit the website of Division of Registration (Division of Registration (nthu.edu.tw)).

In addition to the 30 credits of **University Required Courses**, 60 credits of **Department Required Courses** are also needed for graduation (including 26 credits of Required Courses of Departments in the field of science and engineering, and 34 credits of Required Courses of Department of BMES). One of the three specific fields "Molecular Biomedical Engineering and Materials", "Biomedical Imaging Engineering" or "Environmental Molecular Science" is required to choose for the 30 credits of **Professional Optional Courses** including 5 courses of Basic Science Elective Courses (15 credits) and Specialty Elective Courses (15 credits). As the remaining credits are for **Other Optional Courses**, students can choose courses offered by BMES or other Departments according to NTHU regulations. It is recommended that students discuss with their advisors before choosing courses. For other requirements for courses or academic degrees, please refer to "NTHU Regulations of Academic Affairs".

Criteria for the application of early graduation for BMES Students: academic ranking should be within 15 % of the entire BMES year-group. The T score will be the basis of the ranking.

Table 1. Compulsory Courses and Total Graduation Credits of BMES

(as an example, for 108-year admission school year students)

Category	Courses		Credits		Remarks
			First Semester	Second Semester	
University Required (30 credits) 校定必修 (30 學分)	College Chinese 大學中文		2		
	English 英文領域		8		Students who pass the English proficiency test can exempted from 2 credits of English courses
	General Education Courses 通識課程	Core courses required 核心必修	8-12		Select 4 of 6 dimensions, and take one course at lease in each of these 4 selected dimensions.
		Optional courses 選修課程	8-12		At least 2 credits for Social Science and Humanism
		Total 合計	20		
	Physical education 體育		0		Required Courses for 3 academic years
	Student Service 服務學習		0		Required for 60 hours
	Conduct 操行		0		Pass in each semester
Department Required (60 credits) 系定必修 (60 學分)	General Physics (I)(II) 普通物理一、二		4	4	
	General Physics Laboratory (I)(II) 普通物理實驗一、二		1	1	
	Calculus 微積分一、二		4	4	
	General Chemistry (I)(II) 普通化學一、二		3	3	
	General Chemistry Laboratory (I)(II) 普通化學實驗一、二		1	1	
	Engineering Mathematics (I)(II) 工程數學一、二		3	3	
	Introduction to Biomedical Engineering and Environmental Sciences 生醫工程與環境科學導論		2		
	Introduction to Atomic Science 原子科學導論		3		
	Probability and Statistics. 機率與統計		3		
	Electronics (I) 電子學一		3		
	Organic Chemistry (I) 有機化學一		3		
	Introduction to Life Science 生命科學導論		3		
	Biochemistry (I) 生物化學一		3		
	Human Anatomy and Physiology 生理解剖學		3		
	Biomedical Electronics and Instrumentation Laboratory 生醫電子與儀器實驗		2		
	Biology and Biomedical Materials Laboratory 生物與材料實驗		2		
	Seminar 書報討論		1		
Professional Optional Courses (30 credits) 專業選修(30 學分)	Basic Science Elective Courses 基礎科學選修		15		
	Specialty Elective Courses 專長課程		15		
Other Optional Courses (8 Credits) 其餘選修(8 學分)			8		Students can choose courses of BMES or other Departments according to NTHU regulations. It is recommended to discuss with advisors before choosing courses.
Total Credits for Graduation 最低畢業總學分			**128**		

Note **備註**	(1) Students who study BMES as a double major are required to take all of credits of Professional Optional Course of BMES. (2) 12 credits should be added to the total credits for students who graduated from the 5 academic system. For details, please contact the Department office.

2-2 Compulsory courses

Compulsory courses are divided into school-specific compulsory courses and department-specific compulsory courses. Please go to the website of the Registration Section to inquire about the compulsory courses stipulated by the school. The compulsory courses of the department are further divided into two categories: common compulsory courses of science and engineering, and common compulsory courses of departments, as shown in Table 2. If a student needs to study the same (similar) subjects offered by an external department due to relocation or other factors, he/she must fill in the "Application Form for Compulsory Course Credit", which shall be signed by the original professor. Relevant application forms are detailed in Appendix 1.

For the accreditation of course credits gained outside of NTHU, the application form “Application Form for Compulsory Course Credit” must be submitted to BMES for approval, along with the supplementary information: course outline; course credit; grading criteria. The application will require the approval of Dean of Academic Affairs before the final accreditation.

Table 2. Common compulsory courses of science and engineering and common compulsory courses of departments 理工科共同必修與系共同必修課程總覽表

Category 類別		Courses 科目名稱	Credits		Remarks
			First Semester	First Semester	
Department Required (60 credits) 系定必修 (60 學分)	common compulsory courses of science and engineering (26 credits) 理工科共同必修 (26 學分)	General Physics 普通物理	4	4	
		General Physics Laboratory 普通物理實驗	1	1	
		Calculus 微積分	4	4	
		General Chemistry 普通化學	3	3	
		General Chemistry Laboratory 普通化學實驗	1	1	
	common compulsory courses of departments (34 credits) 系共同必修 (34 學分)	Engineering Mathematics (I)(II) 工程數學一、二	3	3	
		Introduction to Biomedical Engineering and Environmental Sciences 生醫工程與環境科學導論	2		
		Introduction to Atomic Science 原子科學導論	3		
		Probability and Statistics 機率與統計	3		
		Electronics (I) 電子學一	3		
		Organic Chemistry (I) 有機化學一	3		
		Introduction to Life Science 生命科學導論	3		
		Biochemistry (I) 生物化學一	3		
		Human Anatomy and Physiology 生理解剖學	3		
		Biomedical Electronics and Instrumentation Laboratory 生醫電子與儀器實驗	2		
		Biology and Biomedical Materials Laboratory 生物與材料實驗	2		
		Seminar 書報討論	1		

2-3 Professional Optional Courses

Professional Optional Courses including 5 courses of (1) Basic Science Elective Courses (15 credits) and 5 courses of (2) Specialty Elective Courses (15 credits).

(1) Basic Science Elective Courses (5 courses, total 15 credits)

All five courses should belong to one of the three specific divisions: "Molecular Biomedical Engineering and Materials", "Biomedical Imaging Engineering" or "Environmental Molecular Science".

1. Molecular Biomedical Engineering and Materials Division

Courses	Credits
Molecular and Cellular Biology 分子細胞生物學	3
Molecular Genetics 分子遺傳學	3
Organic Chemistry 有機化學二	3
Biochemistry (II) 生物化學二	3
Biomedical Materials 生醫材料	3
Physical Chemistry (I) 物理化學一	3
Radiochemistry 放射化學	3
Instrumental Analysis 儀器分析	3
Analytical Chemistry (I) 分析化學一	3

2. Biomedical Imaging Engineering Division

Courses	Credits
Biomedical Signals and Systems 生醫訊號與系統	3
Electromagnetism 電磁學	3
Modern Physics (I) 近代物理一	3
Radiation Physics 放射物理	3
Medical Instrumentation 醫學儀器	3
Introduction to Computer Science and Programming Language 計算機概論與程式語言	3
Numerical Methods 數值方法	3
Optics 光學	3
Radiation Detection and Measurement 輻射度量	3
Introduction of medical imaging 臨床醫學影像概論	3
Electronics II 電子學二	3

3. Environmental Molecular Science Division

Courses	Credits
Analytical Chemistry (I) 分析化學一	3
Instrumental Analysis 儀器分析 【original courses : Analytical Chemistry (II) 分析化學二】	3
Physical Chemistry (I) 物理化學一	3
Physical Chemistry (II) 物理化學二	3
Environmental Science and Engineering 環境科學與工程	3
Environment Chemistry 環境化學	3
Radiochemistry 放射化學	3

(2) Specialty Elective Courses (5 courses, total 15 credits)

The 15 credits are optional for non-general education courses with prefix 4 (inclusive) or above in BMES Department.

2-4 Educational Program

Please find the regulation from Education program center.

2-5 Second Specialty

The students of BMES can choose another specialty from any core courses provided by other departments in NTHU. BMES also provides Biomedical Engineering courses for students from other Departments (courses listed below, as shown in Table 3). 32 credits are required in this part.
When the students complete all of the required courses, they will be granted a bachelor's degree in Science, with the titles of their dual specialties also shown in the graduation certificate. BMES provides a more flexible way for undergraduate students to choose courses.

For more information about the curriculum of each specialty, please visit the website of Division of Curriculum of NTHU: https://curricul.site.nthu.edu.tw/?Lang=en

Table 3 Second Specialty of Biomedical Engineering

Category 類別		Courses 科目名稱	Credit 學分		Remarks
			First Semester	First Semester	
Compulsory courses 必修 (17 credits)		Introduction to Biomedical Engineering and Environmental Sciences 生醫工程與環境科學導論	2		5 optional courses in one category are the minimum requirement 本課程表若已有部分課程先行修習，經抵免後尚不足最低 32 學分者， 得自「選修」欄位課程中選修。
		Electronics (I) 電子學一	3		
		Organic Chemistry (I) 有機化學一	3		
		Engineering Mathematics (I)工程數學一	3		
		Biochemistry (I) 生物化學一	3		
		Human Anatomy and Physiology 生理解剖學		3	
Optional Courses 選修 (15 credits)	Molecular Biomedical Engineering and Materials courses 分子生醫工程與材料類	Molecular and Cellular Biology 分子細胞生物學	3		
		Molecular Genetics 分子遺傳學		3	
		Organic Chemistry 有機化學二		3	
		Biochemistry (II) 生物化學二		3	
		Biomedical Materials 生醫材料		3	
		Physical Chemistry (I) 物理化學一	3		
		Radiochemistry 放射化學	3		
		Probability and Statistics 機率與統計	3		
		Engineering Mathematics (II) 工程數學二		3	
		Instrumental Analysis 儀器分析	3		

		Analytical Chemistry (I) 分析化學一		3
	Biomedical Engineering courses 生醫影像工程類	Biomedical Signals and Systems 生醫訊號與系統	3	
		Electromagnetism 電磁學		3
		Radiation Physics 放射物理	3	
		Medical Instrumentation 醫學儀器	3	
		Introduction to Computer Science and Programming Language 計算機概論與程式語言		3
		Numerical Methods 數值方法	3	
		Optics 光學		3
		Introduction of medical imaging 臨床醫學影像概論	3	
		Electronics II 電子學二		3
		Probability and Statistics 機率與統計	3	
		Engineering Mathematics (II) 工程數學二		3
Total Credits 總學分			32	

2-6 Double minor

Table 4 Required courses and credits for students from external departments who study the Department of Biomedical Engineering and Environmental Sciences as a Supplementary Department.

Table 4 Required courses and credits of double minor

Courses 課程名稱	Credits 學分數	Remarks 備註
Introduction to Biomedical Engineering and Environmental Sciences (I) 生醫工程與環境科學導論一	3	
Engineering Mathematics (I) 工程數學一	3	
Engineering Mathematics (II) 工程數學二	3	
Probability and Statistics 機率與統計	3	
Electronics (I) 電子學一	3	
Organic Chemistry (I) 有機化學一	3	
Introduction to Life Science 生命科學導論	3	
Biochemistry (I) 生物化學一	3	
Biomedical Electronics and Instrumentation Laboratory. 生醫電子與儀器實驗	2	
Biology and Biomedical Materials Laboratory 生物與材料實驗	2	
Specialty Elective Courses 系專長選修	6	**Take two courses from Basic Science Elective Courses**
Total Credits 總學分數	**34**	

2-7Double major

Students who are double majoring in this department are required to complete all the credits of the department's common compulsory courses, basic science, and specialty elective courses. The relevant regulations are the same as those of students in this department, and you can refer to the above-mentioned course selection regulations.

2-8 Five-Year Bachelor's and Master's Degree

National Tsing Hua University Department of Biomedical Engineering and Environmental Sciences
Regulations for Five-Year Bachelor's and Master's Degree Application

Approved at 5th departmental meeting of academic year 2009 on Jan 15, 2010

Amended and approved at 2nd departmental meeting of academic year 2019 on Oct 25, 2019

1. These Regulations are prescribed to give our outstanding students the opportunity to earn a Bachelor's and Master's degree within five years of fulfilling the provisions of the University's degree conferral regulations.
2. The application is restricted to students with good academic performance in their third year of study at the College of Nuclear Science.
3. Eligibility: Applicants who have been ranked within the top 30% of their class in their first three years of study, or who have specific and exceptional research potential with documented evidence.
4. Specified documents to be submitted:
    1) Academic transcripts from previous years
    2) Autobiography and study plan
    3) Two letters of recommendation
    4) Any other materials that may be useful to the application (e.g. research reports, academic papers, etc.)
5. Interested applicants should apply to the department office by August 31 each year by

completing the application form and furnishing their basic information (see Article 4).

6. Review: The department head convenes a departmental review committee to examine the documents and conduct interviews before forwarding them to a departmental meeting for deliberation and publication of the admission list.
7. Admission quota: up to one-third of the places available from the screening test for the Master's program in the year.
8. Those who have passed the review are required to apply for a screening test for the department's Master's program in the year. Those who are accepted should decide on their advisor within one month of the release of the admission list, complete the Master's advisor record form and hand it to the department office for record.
9. These Regulations shall come into operation upon approval by the departmental meeting and the same applies to any subsequent amendments hereto.

3 Master and Ph.D. Programs

3-1 Master Program

The curriculum plan for Master programs at BMES is based on the principle of expertise classification to design Professional Core Courses and Specialty Elective Courses, respectively, for the requirements of “Molecular Biomedical Engineering and Materials”, and “Biomedical Imaging Engineering”.

3-1-1 Course Requirement for Master Degree Program

1. Minimum Requirement Credits for Graduation: 24 credits (excluding thesis credits) including Basic Required Courses (6 credits), Professional Core Courses (at least 9 credits for 3 courses), and Specialty Elective Courses. For other requirements for courses or academic degrees, please refer to "NTHU Regulations of Academic Affairs".
2. Professional Core Courses: Students should select at least one Division of the Professional Core Courses and 3 courses from the selected Division.
3. Specialty Elective Courses: Students should select courses with a prefix of 4 or higher which are related to their own thesis research field. A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses, and General Education Courses are excluded. If the courses outside the department are taken as "Specialty Elective Courses", they need to be approved by the advisor through the application form (Appendix 2) with the advisor signature to the Department office.
4. Internship in Hospital is offered in summer vacation. Students who intend to take the internship course need to submit the application before the end of March for every academic year. After approved by the Department Chair, they can be admitted into the internship training course.
5. Students should complete the course “Academic Research Ethics Education” in the first school year. This course is offered online, and students should pass the examination before graduation.

Compulsory Courses

Academic Research Ethics Education (0 credit × 1 semester, should complete in the first school year)

Seminar(I): Molecular Biomedical Engineering and Materials or Seminar: Biomedical Imaging Engineering (1 credit × 2 semesters)

Seminar(II): Molecular Biomedical Engineering and Materials or Seminar: Biomedical Imaging Engineering (1 credit × 2 semesters)

Colloquium (0 credit ×4 semesters)

MS Graduate Research (I) (1 credit × 1 semester)

MS Graduate Research (II) (1 credit × 1 semester)

* Foreign master students can take Ph.D. Seminar (offered in English, 1 credit, 4 semesters) to substitute the credit of Seminar(I) and Seminar(II).

Professional Core Courses

Molecular Biomedical Engineering and Materials Division		
Fundamentals of Biophotonics (3)	The Biotechnology and Application of Photoelectronics (3)	Introduction to Molecular Biomedicine (3)
Radiation Biology (3)	Bioconjugated Chemistry (3)	Molecular Imaging Pharmaceuticals (3)
Gene Chips and Its Biomedical Applications (3)	Biomedical Epidemiology and Environmental Toxicology (3)	Stem Cell and Tissue Engineering (3)
Drug Controlled Release (3)	Introduction to Nanobiotechnology (3)	Design and Application of Organ on a Chip and Bioartificial Organ (3)
Biomedical Sensors (3)	Polymer for Bio-Applications (3)	

Biomedical Imaging Engineering Division		
Radiation Physics (3)	Biomedical Image Processing (3)	Principles of Medical Ultrasonics (3)
Magnetic Resonance Imaging Principles and Applications (3)	Biomedical Signal Processing (3)	Physiological Magnetic Resonance Imaging (3)
Deep Learning in Biomedical Image Analysis (3)	Advanced microscopy technologies (3) (original courses : Digital Biomedical Microscopy Technology)	Fundamentals of Biophotonics (3)
Ultrasound and Optics: Biomedical Imaging Techniques and applications (3)	Development of Medical Imaging Instruments (3)	Design of Wearable Biomedical Electronic Device (3)
Biomedical Electronics (3)		

Specialty Elective Courses

Students should select courses with a prefix of 4 or higher which are related to their own thesis research field. A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses, and General Education Courses are excluded. If the courses outside the department are taken as "Specialty Elective Courses", they need to be approved by the advisor through the application form (Appendix 2) with the advisor signature to the Department office.

3-1-2 Selection and Change of Advisors Decided by Master's Students

1. Incoming Master's students must decide on an advisor for their thesis within two months of their admission in accordance with Chapter 4-2 "Regulations Governing the Selection of Thesis Advisors by Graduate Students" of this Handbook, and submit the completed Appendix 3, signed by the advisor, to the department office for record.
2. After deciding on an advisor, students may change their advisor pursuant to Chapter 4-2 of this Handbook. Upon receipt of the consent of the current advisor and the new advisor, students may retrieve Appendix 3 from the department office and have it signed by the current and incoming advisors and return it to the department office for reference.

3-1-3 Master's Degree Examination

The examination is conducted in compliance with the "Operational Rules for the Master's Degree Examination at National Tsing Hua University." Starting from the 2019 academic year, incoming students should turn in the "Thesis Checklist" in Appendix 8 and the "Explanation of Thesis Checklist" in Appendix 9 for the examination committee's reference before the Master's degree examination. In principle, the thesis similarity should not be higher than 25%, and a list of published research should be included in the Master's and Ph.D. degree thesis, as well as a description of the participants and their contributions in the Master's and Ph.D. degree thesis (e.g. Acknowledgements). If there is specific reason that the score is higher than 25% percent, the author should provide reasons in Appendix 9, along with the advisor's approval.

3-2 Ph.D. Program

The curriculum plan for Ph.D. programs at BMES is based on the principle of expertise classification to design Professional Core Courses and Specialty Elective Courses, respectively, for the requirements of “Molecular Biomedical Engineering and Materials”, and “Biomedical Imaging Engineering”.

3-2-1 Requirement for Ph.D. Candidates

To become a Ph.D. candidate, the student must fulfill the following requirements:

1. Completed the required courses and credits for Ph.D. program.
2. Passed the Ph.D. Qualifying Exam.

3-2-1-1 Course Requirement for Ph.D. Program

Students should select at least one Division of the Professional Core Courses and take 3 courses from the selected Division. Students with MS Degree from BMES, NTHU may be exempted from this requirement after discussion with their thesis advisor.

1. Minimum Credits Requirement for Graduation: 24 credits (excluding thesis credits), 36 credits (excluding thesis credits) for BS students who study straight into Ph.D. degree.
2. Professional Core Courses: Students should select at least one Division of the Professional Core Courses, and take 3 courses in the selected Division.
3. Specialty Elective Courses: Students should select courses with a prefix of 4 or higher which are related to their own thesis research field. A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses, and General Education Courses are excluded. If the courses outside the department are taken as "Specialty Elective Courses", they need to be approved by the advisor through the application form (Appendix 2) with the advisor signature to the Department office.
4. Internship in Hospital is offered in summer vacation. Students who intend to take the internship course need to submit the application before the end of March for every academic year. After approved by the Department Chair, they can be admitted into the internship training course.

5. Students should complete the course “Academic Research Ethics Education” in the first school year. This course is offered online, and students should pass the examination before graduation.

Basic Required Courses

Academic Research Ethics Education (0 credit × 1 semester, should complete in the first school year)

Seminar (1 credit × 4 semesters)

Colloquium (0 credit × 4 semesters)

Ph.D. Graduate Research (I) (1 credit × 1 semester)

Ph.D. Graduate Research (II) (1 credit × 1 semester)

Professional Core Courses

Molecular Biomedical Engineering and Materials Division		
Fundamentals of Biophotonics (3)	The Biotechnology and Application of Photoelectronics (3)	Introduction to Molecular Biomedicine (3)
Radiation Biology (3)	Bioconjugated Chemistry (3)	Molecular Imaging Pharmaceuticals (3)
Gene Chips and Its Biomedical Applications (3)	Biomedical Epidemiology and Environmental Toxicology (3)	Stem Cell and Tissue Engineering (3)
Drug Controlled Release (3)	Introduction to Nanobiotechnology (3)	Design and Application of Organ on a Chip and Bioartificial Organ (3)
Biomedical Sensors (3)	Polymer for Bio-Applications (3)	

Biomedical Imaging Engineering Division		
Radiation Physics (3)	Biomedical Image Processing (3)	Principles of Medical Ultrasonics (3)
Magnetic Resonance Imaging Principles and Applications (3)	Biomedical Signal Processing (3)	Physiological Magnetic Resonance Imaging (3)
Deep Learning in Biomedical Image Analysis (3)	Advanced microscopy technologies (3) (original courses : Digital Biomedical Microscopy Technology)	Fundamentals of Biophotonics (3)

Ultrasound and Optics: Biomedical Imaging Techniques and applications (3)	Development of Medical Imaging Instruments (3)	Design of Wearable Biomedical Electronic Device (3)
Biomedical Electronics (3)		

* Students, whose thesis advisor are mainly affiliated with the Institute of Analysis and Environmental Sciences NTHU, are allowed to select the Professional Core Courses offered by the Institute of Analysis and Environmental Sciences NTHU.

Specialty Elective Courses

Students should select courses with a prefix of 4 or higher which are related to their own thesis research field. A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses. General Education Courses are excluded.

3-2-1-2 Course Requirement for Industrial Ph.D. Students

Students should select at least one Division from the Professional Core Courses and take 3 courses from the selected Division. Students with MS Degree from the Department of Biomedical Engineering & Environmental Sciences, NTHU may be exempted from this requirement after discussion with their thesis advisor.

1. Minimum Credits Requirement for Graduation: 24 credits (excluding thesis credits), 36 credits (excluding thesis credits) for BS students who study straight into Ph.D. degree.
2. Professional Core Courses: Students should select at least one Division of the Professional Core Courses, and take 3 courses in the selected Division.
3. Specialty Elective Courses: Students should select courses with a prefix of 4 or higher which are related to their own thesis research field.-A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses, and General Education Courses are excluded. If the courses outside the department are taken as "Specialty Elective Courses", they need to be approved by the advisor through the application form (Appendix 2) with the advisor signature to the Department office.
4. Internship in Hospital is offered in summer vacation. Students who intend to take the internship course need to submit the application before the end of March for every academic year. After approved by the Department Chair, they can be admitted into the internship training course.
5. Students should complete the course “Academic Research Ethics Education” in the first school year. This course is offered online, and students should pass the examination before graduation.

Basic Required Courses

Academic Research Ethics Education (0 credit × 1 semester, should complete in the first school year)

Seminar (1 credit × 4 semester)

Colloquium (0 credit × 4 semester)

Ph.D. Graduate Research (I) (1 credit × 1 semester)

Ph.D. Graduate Research (II) (1 credit × 1 semester)

Professional Core Courses

Molecular Biomedical Engineering and Materials Division		
Fundamentals of Biophotonics (3)	The Biotechnology and Application of Photoelectronics (3)	Introduction to Molecular Biomedicine (3)
Radiation Biology (3)	Bioconjugated Chemistry (3)	Molecular Imaging Pharmaceuticals (3)
Gene Chips and Its Biomedical Applications (3)	Biomedical Epidemiology and Environmental Toxicology (3)	Stem Cell and Tissue Engineering (3)
Drug Controlled Release (3)	Introduction to Nanobiotechnology (3)	Design and Application of Organ on a Chip and Bioartificial Organ (3)
Biomedical Sensors (3)	Polymer for Bio-Applications (3)	

Biomedical Imaging Engineering Division		
Radiation Physics (3)	Biomedical Image Processing (3)	Principles of Medical Ultrasonics (3)
Magnetic Resonance Imaging Principles and Applications (3)	Biomedical Signal Processing (3)	Physiological Magnetic Resonance Imaging (3)
Deep Learning in Biomedical Image Analysis (3)	Advanced microscopy technologies (3) (original courses : Digital Biomedical Microscopy Technology)	Fundamentals of Biophotonics (3)
Ultrasound and Optics: Biomedical Imaging Techniques and applications (3)	Development of Medical Imaging Instruments (3)	Design of Wearable Biomedical Electronic Device (3)

Biomedical Electronics (3)		

Specialty Elective Courses

Students should select courses with a prefix of 4 or higher which are related to their own thesis research field. A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses, and General Education Courses are excluded. If the courses outside the department are taken as "Specialty Elective Courses", they need to be approved by the advisor through the application form (attached Table 2) with the advisor signature to the Department office.

3-2-1-3 Selection and Change of Advisors Decided by Ph.D.'s Students

Approved at 8th departmental meeting of academic year 2002 on May 16, 2003

Amended and approved at 6nd departmental meeting of academic year 2013 on Feb 21, 2014

1. Ph.D. students must decide on an advisor for their dissertation prior to the qualifying examination in accordance with Chapter 4-2 "Regulations Governing the Selection of Thesis Advisors by Graduate Students" of this Handbook, and submit the completed Appendix 5, signed by the advisor, to the department office for record.
2. After deciding on an advisor, students may change their advisor pursuant to Chapter 4-2 of this Handbook. Upon receipt of the consent of the current advisor and the new advisor, students may retrieve Appendix 5 from the department office and have it signed by the current and incoming advisors and return it to the department office for reference.

3-2-1-4 Academic Ph.D. Qualifying Examination

The examination is conducted in accordance with the provisions of the Regulations Governing the Ph.D. Qualifying Examination in the Department of Biomedical Engineering and Environmental Sciences, as set out below:

Regulations Governing the Ph.D. Qualifying Examination in the Department of Biomedical Engineering and Environmental Sciences

Amended and approved at the departmental meeting on June 16, 2011
Amended and approved at the departmental meeting on June 22, 2012
Amended and approved at the departmental meeting on Jan 18, 2013
Amended and approved at the departmental meeting on Nov 21, 2014
Amended and approved at 4th departmental meeting of 2018 academic year on Dec 21, 2018
Amended and approved at 2nd departmental meeting of 2019 academic year on Oct 25, 2019
Amended and approved at 4nd departmental meeting of 2023 academic year on Dec 15, 2023

1. Purpose: To confirm the knowledge base of thesis research expected of Ph.D. students in the department.
2. Eligibility: Academic Ph.D. students in the department.
3. Format: The examination is divided into basic subjects and specialized subjects, with the former being taken as a course and the latter as an oral examination. Students are required to choose a group for study after discussion with and approval by the advisor. They must get a pass in the basic subjects before they can enroll in the specialized subjects, with two chances given to each student.
4. Rules for taking basic subjects
   1) The basic subjects are classified into three groups: A, B and C.
   2) Course format

      Group A: Molecular Biomedical Engineering and Materials

      (1) Two of the following Professional Core Courses should be chosen.

      (2) Professional Core Courses

Molecular Biomedical Engineering and Materials Division		
Fundamentals of Biophotonics (3)	The Biotechnology and Application of Photoelectronics (3)	Introduction to Molecular Biomedicine (3)
Radiation Biology (3)	Bioconjugated Chemistry (3)	Molecular Imaging Pharmaceuticals (3)
Gene Chips and Its Biomedical Applications (3)	Biomedical Epidemiology and Environmental Toxicology (3)	Stem Cell and Tissue Engineering (3)
Drug Controlled Release (3)	Introduction to Nanobiotechnology (3)	Design and Application of Organ on a Chip and Bioartificial Organ (3)

Biomedical Sensors (3)	Polymer for Bio-Applications (3)	

Group B: Biomedical Imaging Engineering

(1) Two of the following Professional Core Courses should be chosen.

(2) Professional Core Courses

Biomedical Imaging Engineering Division		
Radiation Physics (3)	Biomedical Image Processing (3)	Principles of Medical Ultrasonics (3)
Magnetic Resonance Imaging Principles and Applications (3)	Biomedical Signal Processing (3)	Physiological Magnetic Resonance Imaging (3)
Deep Learning in Biomedical Image Analysis (3)	Advanced microscopy technologies (3) (original courses : Digital Biomedical Microscopy Technology)	Fundamentals of Biophotonics (3)
Ultrasound and Optics: Biomedical Imaging Techniques and applications (3)	Development of Medical Imaging Instruments (3)	Design of Wearable Biomedical Electronic Device (3)
Biomedical Electronics (3)		

Group C: Doctor of Medicine

Two of the Professional Core Courses from Group A or Group B should be chosen.

3) Passing standards: Passing grade of A- (80 points) or higher in both courses.

5. Rules for oral examinations in specialized subjects

1) Examination time

The duration of the oral examination for each subject is 1 to 2 hours.

2) Passing criteria

Each oral exam committee member shall tick the result in an anonymous manner: (1) pass or (2) fail; pass if one-half or more of the members tick the pass box, fail if less than one-half of the members tick the pass box.

3) Examination content

Oral examiners will pose questions to the student based on their "Personal Profile and Research Proposal Outline" submitted.

4) Composition of the oral examination committee:

The oral examination committee shall consist of the department's five professors (including full-

time, adjunct, and jointly employed), who shall be appointed by the department head after consultation with the advisor. The advisor shall be an ex-officio member of the oral examination committee but shall not act as the convener of the committee. If the number of professors of specialties is inadequate, no more than two members may be appointed from outside the department to serve on the committee. At least one full professor shall be among the members.

Regulations for the Preparation of "Personal Profile and Research Proposal Outline"

1. Students applying for the specialized subject examination are required to submit a up-to-three-page A4-size typescript of the "Personal Profile and Research Proposal Outline" written using a computer.
2. The "Personal Profile and Research Proposal Outline" should contain the following information:
   (1) A brief description of personal education and work experience (university, graduate school, and related work).
   (2) A brief description of subject specialization (major, minor, and specialized courses taken).
   (3) Outline of research proposal (advisor, research summary, main research content).
   (4) Other information that may be useful for the oral examiners to pose questions.

3-2-1-5 Industrial Ph.D. Qualifying Examination

The examination is conducted in accordance with the provisions of the Regulations for Graduate Admissions and Studies in the Biomedical Engineering Industrial Ph.D. Program in the Department of Biomedical Engineering and Environmental Sciences under the College of Nuclear Science at National Tsing Hua University, as set out below:

National Tsing Hua University College of Nuclear Science
Department of Biomedical Engineering and Environmental Sciences, Biomedical Engineering Industrial Ph.D. Program
Regulations for Graduate Admissions and Studies

Established at Departmental Curriculum Committee meeting on Sept 9, 2016
Approved at departmental meeting on Oct 21, 2016
Amended and approved at 3rd departmental meeting of 2019 academic year on Dec 20, 2019
Amended and approved at 4nd departmental meeting of 2023 academic year on Dec 15, 2023

1. Purpose: To confirm the knowledge base of thesis research expected of Ph.D. students in the department.
2. Eligibility: Industrial Ph.D. students in the department
3. Format: The examination is divided into basic subjects and specialized subjects, with the former being taken as a course and the latter as an oral examination. Students are required to choose a group for study after discussion with and approval by the advisor. They must get a pass in the basic subjects before they can enroll in the specialized subjects, with two chances given to each student.
4. Rules for taking basic subjects
    1) The basic subjects are classified into three groups: A, B and C.
    2) Course format

Group A: Molecular Biomedical Engineering and Materials

(1) Two of the following Professional Core Courses should be chosen.

(2) Professional Core Courses

Molecular Biomedical Engineering and Materials Division		
Fundamentals of Biophotonics (3)	The Biotechnology and Application of Photoelectronics (3)	Introduction to Molecular Biomedicine (3)
Radiation Biology (3)	Bioconjugated Chemistry (3)	Molecular Imaging Pharmaceuticals (3)
Gene Chips and Its Biomedical Applications (3)	Biomedical Epidemiology and Environmental Toxicology (3)	Stem Cell and Tissue Engineering (3)
Drug Controlled Release (3)	Introduction to Nanobiotechnology (3)	Design and Application of Organ on a Chip and Bioartificial Organ (3)
Biomedical Sensors (3)	Polymer for Bio-Applications (3)	

Group B: Biomedical Imaging Engineering

(1) Two of the following Professional Core Courses should be chosen.

(2) Professional Core Courses

Biomedical Imaging Engineering Division		
Radiation Physics (3)	Biomedical Image Processing (3)	Principles of Medical Ultrasonics (3)
Magnetic Resonance Imaging Principles and Applications (3)	Biomedical Signal Processing (3)	Physiological Magnetic Resonance Imaging (3)
Deep Learning in Biomedical Image Analysis (3)	Advanced microscopy technologies (3) (original courses :	Fundamentals of Biophotonics (3)

	Digital Biomedical Microscopy Technology)	
Ultrasound and Optics: Biomedical Imaging Techniques and applications (3)	Development of Medical Imaging Instruments (3)	Design of Wearable Biomedical Electronic Device (3)
Biomedical Electronics (3)		

Group C: Doctor of Medicine

Two of the Professional Core Courses from Group A or Group B should be chosen.

3) Passing standards: Passing grade of A- (80 points) or higher in both courses.

5. Rules for oral examinations in specialized subjects

1) Examination time

The duration of the oral examination for each subject is 1 to 2 hours.

2) Passing criteria

Each oral exam committee member shall tick the result in an anonymous manner: (1) pass or (2) fail; pass if one-half or more of the members tick the pass box, fail if less than one-half of the members tick the pass box.

3) Examination content

Oral examiners will pose questions to the student based on their "Personal Profile and Research Proposal Outline" submitted.

4) Composition of the oral examination committee:

The oral examination committee shall consist of the department's five professors (including full-time, adjunct, and jointly employed), who shall be appointed by the department head after consultation with the advisor. The advisor shall be an ex-officio member of the oral examination committee but shall not act as the convener of the committee. If the number of professors of specialties is inadequate, no more than two members may be appointed from outside the department to serve on the committee. At least one full professor shall be among the members.

Regulations for the Preparation of "Personal Profile and Research Proposal Outline"

1. Students applying for the specialized subject examination are required to submit a maximum of three A4-size pages of the "Personal Profile and Research Proposal Outline" written using a computer.
2. The "Personal Profile and Research Proposal Outline" should contain the following information:

(1) A brief description of personal education and work experience (university, graduate school, and related work).

(2) A brief description of subject specialization (major, minor, and specialized courses taken).

(3) Outline of research proposal (advisor, research summary, main research content).

(4) Other information that may be useful for the oral examiners to pose questions.

3-2-1-6 Foreign Language Proficiency

Amended and approved at 8th departmental meeting of 2024 academic year on Apr. 26, 2024

Prior to the Ph.D. oral examination, students should pass an English proficiency test, which is based on the following criteria:

1. Passing the “General English Proficiency Test” (GEPT) at the high-intermediate first and second stage with a score of 80.
2. A score of 550 or above on the TOEFL Institutional Testing Program (ITP) or 79 or above on the TOEFL Internet-Based Test (iBT).
3. A score of 750 or above on the TOEIC Listening and Reading Test.
4. IELTS Academic test average band 5.5 or above (including listening, speaking, reading, and writing).
5. A pass in the elective " Technical and Scientific English Writing" course (subject no. starting at 5; 3 credits) offered by the University's Center for Language Education, subject to the standards of the Graduate Courses.
6. Present a certificate of a Bachelor's degree or higher from an English-speaking country and have it validated

3-2-2 Publications

3-2-2-1 Academic Ph.D. Program

Prior to the oral examination, Ph.D. students should have published at least two papers (or accepted to be published, with appropriate documentation, which is deemed to have been published) on the subject on which their dissertation is written in reputable international journals, and should satisfy the following requirements:

Article 1 Ph.D. students must publish at least two first-authored papers in SCI international journals, with the department's name indicated as the association. Their advisor must be a co-author to both publications, and for at least one should be the corresponding author (or co-corresponding author).

Article 2 Papers for which the Ph.D. students are not named as the first author may be treated as first-authored papers if they are credited as the second author and their advisors as the first author, but subject to a maximum of one paper.

Article 3 For articles published as notes or letters, Ph.D. students may turn them in to the departmental meeting to decide whether they should be counted.

Article 4 Students from the Department of Biomedical Engineering and Environmental Sciences who are accepted by the Institute of Analytical and Environmental Sciences (IAES) faculty members will be directly supervised by IAES faculty members as advisors, without through co-advising. However, the student must indicate the department's name when co-authoring a paper published in an international journal, while the advisor may act as a corresponding author and indicate the IAES name.

3-2-2-2 Industrial Ph.D. Program

The examination is conducted in accordance with the provisions of the Regulations for Graduate Admissions and Studies in the Biomedical Engineering Industrial Ph.D. Program in the Department of Biomedical Engineering and Environmental Sciences under the College of Nuclear Science at National Tsing Hua University, as set out below:

National Tsing Hua University College of Nuclear Science
Department of Biomedical Engineering and Environmental Sciences
Biomedical Engineering Industrial Ph.D. Program
Regulations for Graduate Admissions and Studies

Prior to the oral examination, Ph.D. students should have published at least two papers (or accepted to be published, with appropriate documentation, which is deemed to have been published) on the subject on which their dissertation is written in reputable international journals, and should satisfy the following requirements:

Article 1 Ph.D. students must publish at least two first-authored papers in SCI international journals, with the department's name indicated as the association. Their advisor must be a co-author to both publications, and for at least one should be the corresponding author (or co-corresponding author).

Article 2 Papers for which the Ph.D. students are not named as the first author may be treated as first-authored papers if they are credited as the second author and their advisors as the first author, but subject to a maximum of one paper.

Article 3 For articles published as notes or letters, Ph.D. students may turn them in to the departmental meeting to decide whether they should be counted.

Article 4 A Ph.D. student who obtains a domestic or foreign patent for an invention during his or her studies may substitute up to one SCI paper, provided that the content is not similar to that of the accepted paper.

3-2-3 Ph.D. Degree Examination

3-2-3-1 Qualifications

The purpose of the degree examination is to assess the accuracy of the research findings and the student's ability to conduct independent research and innovation. Students may apply for an oral examination when they have fulfilled the requirements in sections 3-2-1 to 3-2-2.

3-2-3-2 Oral Examination

Once a student has met the requirements for the oral examination, he/she may, with the consent of the advisor and the department head, submit an application form accompanied by the transcript of the previous years, a draft of the dissertation and a synopsis, a dissertation similarity report, and a letter of recommendation from the advisor, and turn them in for approval as a doctoral candidate. Within six months, in accordance with the University's Operational Rules for the Ph.D. Degree Examination, the applicant shall submit a list of the oral examination committee members to be appointed, and upon the approval of the qualification review committee, the department head shall file a request to the President for appointment. Section 4-5 "Operational Rules for the Ph.D. Oral Examination in the Department of Biomedical Engineering and Environmental Sciences at National Tsing Hua University" shall apply.

3-2-3-3 Restrictions

Prior to the oral examination, the department will arrange for the doctoral candidate to give a public lecture to its faculty. If a candidate fails the oral examination and has not yet completed his or her extended years of study, he or she may retake the examination the following semester, limited to one retake.

3-2-4 Doctoral qualifications

After meeting the requirements in section 3-2-3, students must hand in a transcript, a typescript and seven photocopies of their dissertation, two copies of their advisor's recommendation letter, seven

copies of the committee's approval letter containing the committee's signature, and the dissertation publication materials to the department office for vetting.

4 Other Related Requirements

4-1 Regulations on Credit Waivers for Graduate Students

1. Graduate students in the department may apply for credit waivers for Master's or Doctoral courses with subject no. starting at 5 taken with a grade of 70 or more in the department or in a related department/institute, if the credits have not been included in the minimum number of credits for graduation and if they hold a certificate.
2. A request for credit waivers should be filed with the department office two weeks prior to registration and enrollment in the courses of the semester with an application form (please obtain a copy from the Research and Teaching Section), transcripts of previous years and credit certificates.
3. The department's curriculum committee is responsible for the assessment of the credit waivers and may conduct oral/written examinations where necessary.
4. The number of credits that can be offset for graduate students is limited to two-thirds of the number of credits that should be earned for graduation.

4-2 Regulations Governing the Selection of Thesis Advisors by Graduate Students

Article 1 Incoming Master's students are required to decide on an advisor within two months of admission to the department, and incoming doctoral students within one semester of admission. Each new graduate student may not request a change of advisor until the commencement of the second semester of study. No graduate student in the department may change his or her advisor without the consent of the advisor after he or she has chosen the advisor.

Article 2 The department's full-time faculty will supervise two to three incoming Master's students each academic year (with a maximum of one student supervised by a jointly employed external faculty member not employed by the department). The number of places to be

allocated each year shall be decided at the departmental meeting before March of the previous year.

Article 3 A minimum of one year and two years for the duration of supervision by an advisor decided on over the course of the Master's program and the Ph.D. program respectively.

Article 4 These Regulations shall come into operation upon deliberation and approval by the departmental meeting and the same applies to any subsequent amendments hereto.

4-3 Regulations Governing the Department Transfer for Master's and Doctoral Programs in the Department of Biomedical Engineering and Environmental Sciences

1. Applications for transferring out of the department's Master's or Ph.D. degree program must be approved by the departmental meeting before being submitted to the Office of Academic Affairs.
2. The number of students who may be transferred out of the department will be reviewed and approved by the departmental meeting.
3. Applicants for transfer to the Master's and Doctoral programs of the department must hand in the following documents:
   (1) A copy of each of the transcripts of the undergraduate, Master's and doctoral programs,
   (2) A research proposal (briefly stating the motivation for transferring to the department and the future research area envisaged).
4. Upon receipt of applications from graduate students for the transfer into the department, the departmental meeting will review the applications and decide on the approved candidates through oral interviews.
5. The subjects to be taken and the number of credits to be earned by graduate students transferring to the department will be determined by the departmental meeting.
6. These Regulations shall come into operation upon approval by the departmental meeting and the same applies to any subsequent amendments hereto.

4-4 Regulations Governing Direct Admission of Master's Students' to Ph.D. Program at National Tsing Hua University

Article 1 Master's students who have completed at least one year of study with outstanding academic performance and research potential may apply for direct admission to a doctoral program in their department/institute or in another department/institute upon the recommendation of at least two professors from their department/institute or relevant departments/institutes.

Article 2 Applications by Master's students for direct entry to the doctoral program should be filed with the target department/institute before July 31 of each year. Late applications will not be accepted. However, in exceptional cases, applications may be made at the end of the first semester, provided that there are still vacancies in the school year.

Article 3 Applicants in the Master's program for direct entry to the Ph.D. program must turn in the following documents:

1. A copy of the application form for direct entry to the Ph.D. program,
2. A copy of the academic transcripts of the Master's program,
3. Two or more letters of recommendation from professors, and
4. Documents to be submitted as specified by the department/institute.

Article 4 Each department or institute shall have the Master's students under the direct entry program approved by the department or institute's meeting, and shall turn the list in to the Office of Academic Affairs for approval by the President by August 31 and submit it to the Ministry of Education for record. The number of approved places shall be one-third of the enrollment of general students (excluding in-service students) in the doctoral program of the department or institute for the current academic year, with the decimal places, if any, rounded up to the nearest integer, but if the enrollment is less than six, two may be allowed.

Article 5 From the approved academic year onwards, Master's students who have been approved for direct entry to the doctoral program shall be subject to the same regulations on courses, years of study and evaluation of the performance as those for first-year doctoral students.

Article 6 A Master's student under the direct entry program who has completed his or her doctoral studies, passed the qualifying examination but not the Ph.D. degree examination, and whose doctoral thesis has been determined by the Ph.D. degree examination committee to be up to the standard for a Master's degree, may be awarded a Master's degree.

Article 7 If a Master's student who is directly admitted to a doctoral program fails to pass the qualifying examination or applies for suspension for any reason, he/she may apply for transferring back to the Master's program by submitting an application form. Upon the agreement at the department or institute meeting of the current doctoral program and the previous Master's program and the approval of the President, he/she may return to the Master's program. The time spent in the doctoral program will not count towards the maximum number of years of study in the Master's program, and if the student returns in the middle of the semester, the semester will be counted as if he/she was enrolled in the Master's program. After transferring back to the Master's program, the student may not apply for a direct admission to the doctoral program.

Article 8 These Regulations shall come into effect upon approval by the academic affairs meeting and the same applies to any subsequent amendments hereto.

4-5 Operational Rules for the Ph.D. Oral Examination in the Department of Biomedical Engineering and Environmental Sciences at National Tsing Hua University

1. If a student is eligible for the oral examination, he/she may, with the consent of the advisor and the department head, file an application form with his/her academic transcript of previous years, a draft of the thesis and a synopsis, together with a letter of recommendation from the advisor, to the University for approval as a doctoral candidate.
2. Starting from the 2019 academic year, incoming students should turn in the "Thesis Checklist" in Appendix 8 and the "Explanation of Thesis Checklist" in Appendix 9 for the examination committee's reference before the Ph.D. degree examination. In principle, the thesis similarity should not be higher than 25%, and a list of published research should be included in the Master's and Ph.D. degree thesis, as well as a description of the participants and their contributions in the Master's and Ph.D. degree thesis (e.g. Acknowledgements).
3. Within six months of passing the oral and written qualifying examinations, the doctoral candidate should submit a list of the proposed oral examination committee members for scrutiny. Once the vetting process has been completed, the members will be notified, and the candidate is expected to report regularly to the members on the direction and progress of the thesis research.
4. The appointment of oral examination committee members for doctoral candidates of the department is governed by the University’s Operational Rules for the Ph.D. Degree Examination. The advisor shall nominate the candidates, and then the qualification review committee of the department shall assess the candidates before the head of the department puts in a request to the President for appointment.
5. The examiners shall possess one of the following qualifications:
   (1) A former professor.
   (2) An Academia Sinica academician or a former research fellow of Academia Sinica.
   (3) A former associate professor or associate research fellow of Academia Sinica who has achieved academic excellence.
   (4) Doctoral degree holders who have achieved academic excellence.
   (5) Those who specialize in a rare or special discipline and who have achieved academic or professional success.
6. The number of nominees for an advisor must exceed the number of candidates to be appointed by at least two, and the order of preference may be specified for reference, but should include at least one for the doctoral candidate's secondary specialty.
7. The department's qualification review committee examines the nominations submitted by the advisor in accordance with the University's relevant qualifications regulations and decides on the list of candidates to be appointed from among the excess number of candidates who meet the requirements. If the required number of candidates does not meet the requirement of an excess of two, additional nominations must be made by the advisor. At least one of the names on the

appointment list must have experience for the secondary specialty of Ph.D. candidates.

8. Five to nine members of the oral examination committee shall be appointed by the University upon the approval of the Ministry of Education, with over one-third of the members from outside the University, and the convenor shall be elected from among the members. The advisor is an ex-officio member but shall be barred from acting as the convenor.
9. Examinations will be conducted primarily by oral means and, if necessary, in written form.
10. Examinations will be held at a time and place to be arranged by the University. Candidates are required to submit 12 copies each of their first draft thesis and abstract to the department office three weeks before the scheduled examination date.
11. Examinations should be two hours in length. Candidates should coordinate equipment needed for the examination.
12. No examination shall be held until at least five or more members are present, of whom more than one-third shall be external members.
13. The result of the examination shall be determined by averaging the marks awarded by the members present in a single assessment in an anonymous manner, and a pass shall be given at 70 points, but if one third or more of the members have given a failing grade, the examination shall be deemed to be a fail.
14. For the instances where thesis corrections are deemed necessary, the final revised work should be approved by the thesis committee. The examination shall be nullified if this is not completed by the next semester registration date.
15. The results of the examination shall be signed by the members and forwarded to the department office within three days of the examination. Where necessary, the committee may request orally or in writing that the candidate's first draft of the dissertation be revised as appropriate.
16. After passing the examination, students may revise their dissertation as suggested by the committee and hand in the final typescript for signature by the committee members.
17. These Rules shall come into effect upon approval by the departmental meeting and the same applies to any subsequent amendments hereto.

5 Appendix

Appendix 1

生醫工程與環境科學系必選修課程抵免申請表

BMES course waiver application form

(update: 112.12)

Student Name：_____ School ID number：_____

Application date：_____Year_____Month_____Day

◎ Application categories 申請抵免課程類別：

☐ Common compulsory courses of science and engineering

☐ Basic Science Elective Courses

☐ Specialty Elective Courses

Course offered by BMES (to be waivered) 醫環修習課程：

Course ID 科號：_____ Course name 名稱：_____ Credits 學分：____

Course for waiver 申請抵免課程：

Course ID 科號：_____ Course name 名稱：_____ Credits 學分：____

Prior accreditation application for external course (please refer to notes below for more information)

Course ID 科號：_____ Course name 名稱：_____ Credits 學分：____

◎ Reason for credit waiver (Required):

☐ School transfer ☐ Retake course ☐ Take course in advance

☐ Course schedule conflict，other Course ID:_____

☐ Not offering in BMES

☐ Others:_____

The courses are NOT authorized for credit waiver (course syllabus is required)

1. BMES course Teacher's signature：

2. Opinion from course teacher in BMES：

3. Signature from Course Committee：

※Note

1. Application deadline：The application of course waiver has to be done prior to the end of course add-or-drop selection.
2. Please see the Regulations of Required Courses and Credits, section 2-1~2-3 for more information.
3. This form is not required for enrolling in Calculus, General Physics, General Chemistry, General Physics Experiments, or General Chemical Experiments courses.
4. For the accreditation of course credits gained outside of NTHU, the application form "Application Form for Compulsory Course Credit" must be submitted to BMES for approval, along with the supplementary information: course outline; course credit; grading criteria. The application will require the approval of Dean of Academic Affairs before the final accreditation.

Appendix 2

生醫工程與環境科學系 碩博士班『專長選修課程』修習系外課程申請表
Application Form for Ex-Department Courses for Master's and Doctoral Programs in the Department of Biomedical Engineering and Environmental Sciences "Specialty Elective Courses"

學生姓名 Student Name:_____

學　　號 Student ID No.:_____

請填寫修習**系外課程**之課程名稱 (學生自行填寫)
Please fill in the name of the courses taken outside the department (Fill in by yourself)

科號 Course No.	開課科系 Department of Course	課程名稱 Name of Course	預計修習學期 (如：109 學年上學期) Semester Year

※備註：
根據生醫工程與環境科學系**學位手冊(第六版)**規定

1. 『專長選修課程』為『基礎必修課程』和『專業核心課程』以外之剩餘最低畢業學分。
2. 『專長選修課程』為系內或系外課程中選修與**論文研究領域相關**之 4（含）字頭以上非通識課程，4 字頭課程以二門為上限。
3. 唯修習**系外課程**作為『專長選修課程』，需指導教授認可。請填妥此申請表，經指導教授簽名後送交系辦公室存查。
4. 繳交期限：學期開始至加退選結束前。

1. "Specialty Elective Courses" are the minimum remaining graduation credits other than "Basic Required Courses" and "Professional Core Courses".
2. Students should select "Specialty Elective Courses" with a prefix of 4 or higher which are related to their own thesis research field. A maximum of 2 courses with prefix 4 are allowed to include into the Specialty Elective Courses, and General Education Courses are excluded.
3. If the courses outside the department are taken as "Specialty Elective Courses", they need to be approved by the advisor through this application form with the advisor signature to the Department office.
4. Application deadline: from the beginning of the semester to before the end of the addition or withdrawal.

指導教授簽名 Signature of Advisor：_____

學　生　簽名 Signature of student：_____

日　　期 Date：_____

Appendix 3

Record of Thesis Advisors for the Master's program in the Department of Biomedical Engineering and Environmental Sciences

Student Name: _____ Student ID No.: _____,

Admission Date: _____

1. Chosen thesis advisor (to be reported to the department office within 2 months of admission)

Major advisor (signature / date): _____

Student (signature /date): _____

Research area or thesis topic (tentative): _____

_____

2. Change of Advisor

Original major advisor (signature, date): _____

New major advisor (signature, date): _____

Student (signature/date): _____

Research area or thesis topic (tentative): _____

_____

Department head (signature / date): _____

Appendix 5

Record of Thesis Advisors for the Ph.D. program in the Department of Biomedical Engineering and Environmental Sciences

Student Name: _____ Student ID No.: _____,

Admission Date: _____

1. Chosen thesis advisor (to be reported to the department office by the end of the first semester after admission)

Major advisor (signature / date): _____

Student (signature /date): _____

Research area or thesis topic (tentative): _____

_____

2. Change of Advisor

Original major advisor (signature, date): _____

New major advisor (signature, date): _____

Student (signature/date): _____

Research area or thesis topic (tentative): _____

_____

Department head (signature / date): _____

Appendix 6

Record of Research Proposal Oral Examination for the Ph.D. Program in the Department of Biomedical Engineering and Environmental Sciences

Student Name: _____ Student ID No.: _____,

Date of Oral Exam: _____

Research Proposal Title: _____

_____

Research Proposal Oral Exam Committee:

	Name, Title, and Affiliation	Signature
Convenor:	_____	_____
Members:	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

(Once approved, the original will be handed over to the department office for filing and a photocopy will be given to the student and the advisor.)

Appendix 8

國立清華大學學位論文符合學術倫理聲明書

National Tsing Hua University Thesis/Dissertation Affidavit

本人已確認所提交之學位論文＿＿＿＿＿＿＿＿＿＿＿＿＿＿（論文名稱）已符合所屬系、所、專班、學位學程所訂的論文相似度比對標準，且保證論文絕無違反學術倫理情事，若有造假、變造、抄襲、由他人代寫或其他舞弊情事等，概由本人負責，絕無異議。

I hereby attest that my thesis or dissertation _____(thesis/dissertation's title)has met the standard for the thesis/dissertation originality check set by the department(institute, class or program) and doesn't contain fabricated, altered, plagiarized material or other form of fraud or was written by someone else. In case there is plagiary, fraud, altering or other violation of academic ethics found in my thesis/dissertation, I will be totally responsible for it without any objections.

聲明人(親簽)：
Signature of student:

學　　號：
Student ID No.:

身分證字號/居留證號：
ID No./ARC No.:

此　致
系、所、專班、學位學程：
To Department (Institute, Class or Program):

中華民國　　年　　月　　日

Date: _____(YYYY/MM/DD)

備註：
本聲明書應於取得考試委員審定書前完成簽署，並繳送至所屬系、所、專班、學位學程存查，未簽署繳交者，不得領取學位證書。
Note:
The affidavit shall be signed by students before getting "Thesis/Dissertation Oral Defense Form" and be sent to the Department (institute, class or program) for records. The degree diploma won't be awarded if students fail to sign this affidavit.

Appendix 9

Thesis Checklist for Master's and Doctoral Programs in the Department of Biomedical Engineering and Environmental Sciences at National Tsing Hua University

Date of application:

Name		Student ID No.		Admission Year	
Advisor			Oral Exam Date	/ /	
Title of Thesis	(In Chinese)				
	(In English)				

List of Published Works (Specify)

List of Participants in this Thesis and Description of their Contribution (names in Chinese and English)

Results of Thesis Similarity

Date of Submission	/ /	Submission Code	
Written in:	☐ Chinese ☐ English	Word Count for Full Text:	
Manuscript File	☐ Word ☐ LaTex ☐ PDF ☐ Other:_____	**Similarity Index**[1] **_____ %** ✓Internet Sources[2] _____ % ✓Publications[3] _____ % ✓Student Manuscripts[4] _____ % ✓**Maximum similarity for a single source**[5]**____ %** **Source:**_____	

Non-Plagiarism Declaration

1. If the similarity index exceeds 25%, please provide a detailed justification this section, and if not, enter "not exceed 25%" with the signature of the advisor added for substantiation.
2. This thesis is the result of my own research and is written personally, without committing plagiarism or any other fraudulent acts. I accept full responsibility for any breach of the above.

Please submit this form together with the Originality Comparison Report to the department office when applying for the oral examination to facilitate the subsequent vetting process.

Signature:_____

Advisor's Signature:_____

Turnitin's Thesis Text Matching System:

1. To apply for an account, please go to **our Computing & Communication Center's website→Teaching Services→Article plagiarism detection tool Turnitin** and then register in the Turnitin matching system at https://www.turnitin.com/ upon activation of your account.
2. Click on the course title and then submit the full thesis file. When you have completed your submission, an electronic reply slip will appear. Please remember the "**Submission Code**" and enter it into the "**Thesis Similarity Checklist**" on the previous page.

3. Open Similarity and download the Originality Comparison Report in PDF format, and fill in the similarity data in the report on the "**Thesis Similarity Checklist**" on the previous page. If the **similarity index** ① is higher than 35%, you must provide a detailed justification in Appendix 9.