

ENVIRONMENTAL SCIENCE & ENGINEERING

Program Guide

2016/2017



جامعة الملك عبد الله
للعلوم والتقنية
King Abdulrahman University of
Science and Technology

BESE Biological and
Environmental Science
and Engineering



Contents

1. Aims and Scope	4
2. Assessment Test	4
3. Master's Degree Coursework	4
3.1 Masters Course Requirements	4
3.1.1 Core Courses	4
3.1.2 Elective Courses	5
3.1.3 Research/Capstone Experience	6
3.1.4 Winter Enrichment Program	6
3.2 M.S. Thesis Option	6
3.2.1 M.S. Thesis Defense Requirements	6
3.2.2 M.S. Thesis Defense Committee	6
3.3 M.S. Non-Thesis Option	7
4. Doctor of Philosophy	7
4.1 Ph.D. Course Requirements	8
4.2 Ph.D. Designation of Dissertation Advisor	8
4.3 Ph.D. Candidacy	8
4.3.1 Subject-based Qualifying Exam	9
4.3.2 Ph.D. Dissertation Proposal Defense Committee	9
4.3.3 Ph.D. Dissertation Proposal Defense	9
4.4 Ph.D. Defense	9
4.4.1 Ph.D. Dissertation Defense Committee	10
4.4.2 Ph.D. Dissertation Defense	10
5. Program Courses and Descriptions	11
6. KAUST University Requirements; Office of the Registrar	15
7. Master's Program	16
7.1 Admissions	16
7.2 Master's Degree Requirements	16
7.2.1 Thesis Requirements	16
7.2.2 Non-Thesis Option	17



8.	Ph.D. Program	18
8.1	Admissions	18
8.2	Ph.D. Degree Requirements	18
8.3	Candidacy	19
8.4	Dissertation Research Credits	19
8.5	Dissertation and Dissertation Defense	19
8.6	Ph.D. Dissertation Defense Committee	19
9.	Program Descriptions	20
9.1	University Wide Courses	21
9.1.1	English as a Second Language	21
9.1.2	Enrichment Program WEP Courses	21
9.1.3	Innovation and Economic Development	
	IED210 Technology Innovation and Entrepreneurship	21
9.1.4	IED220 New Venture and Product Innovation Challenge	21
10.	Grading	22
10.1	Incomplete Grades	22
10.2	In Progress Grades	22
10.3	Research or Seminar Courses	22
10.4	Cumulative Grade Point Average	23
11.	Academic Standing	23
12	Transferring Credits	24
13.	Policy for Adding and Dropping Courses	25
14.	Program Planning	25



1. Aims and Scope

The Environmental Science and Engineering Program (EnSE) prepares students to work on many of the world's most pressing challenges. There is worldwide concern with the availability of clean water; EnSE examines methods to purify and reuse water, as well as to reduce contamination of existing reserves. Focus in the program is on examining the impact of humans on our environment through resource exploitation; including over consumption, land degradation, and pollution of water. The results of these efforts may offer solutions to water scarcity, soil contamination.

2. Assessment Test

Students are admitted to KAUST from a wide variety of programs and backgrounds. In order to facilitate the design of an appropriate study plan for each individual student, all incoming students will be required to take an assessment during orientation week. There is no grade for the assessment.

The purpose of the assessment is to determine whether students have mastered the prerequisites for undertaking graduate-level courses taught in the program. The Advisor uses the results of the assessments to design, if necessary, a remedial study plan with a list of courses aimed at addressing content areas that may impede a student from successful completion of the degree requirements. Students are encouraged to prepare for the assessment by refreshing the general knowledge gained from their undergraduate education before arriving at KAUST. The remedial study plan requirements must be satisfactorily completed in addition to the University degree requirements.

3. Master's Degree Coursework

The Master's Degree (M.S.) is awarded upon successful completion of a minimum of 36 credit hours. A minimum GPA of 3.0 must be achieved to graduate. Individual courses require a minimum of a B- for course credit. Students are expected to complete the M.S. degree in three semesters and one summer session.

The M.S. degree is awarded upon successful completion of a minimum of 36 credit hours. A minimum GPA of 3.0 must be achieved to graduate. Individual courses require a minimum of a B- for course credit. Students are expected to complete the M.S. degree in three semesters and one summer session. Degree requirements are divided into three sections:

3.1 M.S. Course Requirements

- Core courses
- Elective courses
- Research/Capstone Experience. Graduate Seminar 298 (non-credit): All students are required to register and receive a satisfactory grade for every semester the program requires they attend

3.1.1 Core Courses (9 credits) – Same for all tracks.

Choose 3:

- EnSE 201 Water Quality and Environmental Analysis
- EnSE 202 Aquatic Chemistry
- EnSE 203 Fundamentals of Environmental Microbiology
- EnSE 222 Surface Water Hydrology

These core courses are designed to provide a student with the background needed to establish a solid foundation in the program area.



3.1.2 Elective Courses (15 credits) – choose 5 courses based on track selected

Track 1: Water Quality, Chemistry, and Treatment

- EnSE 205 Principles of Environmental Sustainability
- EnSE 310 Colloids, Interfaces, and Surfaces
- EnSE 325 Seawater and Brackish Water Desalination
- EnSE 342 Physical/Chemical Treatment Processes
- CBE 230/330 Physical Chemistry of Macromolecules
- CBE 336 Membrane Science and Membrane Separation Processes
- ChemS 240 Supramolecular Chemistry

Others upon approval of the advisor

Track 2: Environmental Microbiology and Biotechnology

- EnSE 214 Microbiological Aspects of Water Sources, Treatment and Distribution
- EnSE 310 Colloids, Interfaces, and Surfaces
- EnSE 314 Public Health Microbiology
- EnSE 341 Processes in Environmental Biotechnology
- B 313 Advanced Environmental Microbiology
- B 204 Genomics
- B 224 The Cell: Structure, Development and Physiology I
- B 213 The Cell: Structure, Development and Physiology II

Others upon approval of the advisor


Track 3: Environmental Hydrology and Fluid Mechanics

- EnSE 223 Groundwater Hydrology
- CBE 202 Transport Phenomena
- ErSE 205/305 Multiphase Flows in Porous Media
- MarS 235 Oceanography
- MarS 335 Advanced Physical Oceanography
- AMCS 206 Introduction to Numerical Methods for Engineers

Others upon approval of the advisor

Track 4: Materials for Environmental Science and Engineering

- EnSE 205 Principles of Environmental Sustainability
- EnSE 310 Colloids, Interfaces, and Surfaces
- ChemS 210 Material Chemistry I
- ChemS 225 Material Chemistry II

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- ChemS 218 Photo and Electro catalysis
 - ChemS 240 Supramolecular Chemistry
 - ChemS 360 Advanced Physical Chemistry I: Thermodynamics and Kinetics
 - CBE 336 Membrane Science and Membrane Separation Processes
 - MSE 310 Nanomaterials

Others upon approval of the advisor

The elective courses are designed to allow each student to tailor his/her educational experience to meet individual research and educational objectives, with the permission of the student's academic advisor.

3.1.3 Research/Capstone Experience (12 credit hours):

See sections for thesis and non-thesis options below.

3.1.4 Winter Enrichment Program

Students are required to satisfactorily complete at least one full Winter Enrichment Program (WEP).

3.2 M.S. Thesis Option

Students wishing to pursue the thesis option must apply by the ninth week of their second semester for a thesis and must have at least a 3.2 cumulative GPA.

A minimum of 12 credits of Thesis research (297) is required. Students are permitted to register for more than 12 credits of M.S. thesis research as necessary and with the permission of the Thesis Advisor.

The selected Thesis Advisor must be a full time program-affiliated assistant or associate or full professor at KAUST. The student may also select an advisor from another program at KAUST. This advisor can only become project-affiliated for the specific thesis project upon program level approval. Project-affiliation approval must be completed prior to commencing research.

3.2.1 M.S. Thesis Defense Requirements

An Oral Defense of the M.S. thesis is required although it may be waived by the Deans Office under exceptional circumstances. A requirement of a public presentation and all other details are left to the discretion of the Thesis Committee.

A written thesis is required. It is advisable that the student submits a final copy of the thesis to the Thesis Committee members at least two weeks prior to the defense date.

- Students are required to comply with the university formatting guidelines provided by the library <http://libguides.kaust.edu.sa/theses>
- Students are responsible for scheduling the thesis defense date with his/her Thesis Committee.
- A pass is achieved when the committee agrees with no more than one dissenting vote, otherwise the student fails. The final approval must be submitted at the latest two weeks before the end of the semester.

3.2.2 M.S. Thesis Defense Committee

The M.S. Thesis Defense committee, which must be approved by the student's Dean, must consist of at least three members and typically includes no more than four members.

At least two of the required members must be KAUST faculty. The Chair plus one additional faculty member must be affiliated with the student's program. This membership can be summarized as:



Member Role Program Status:

Member	Role	Program Status
1	Chair	Within Program
2	Faculty	Within Program
3	Faculty or Approved Research Scientist	Outside Program
4	Additional Faculty	Inside or outside KAUST

Notes:

- Members 1 – 3 are required. Member 4 is optional.
- Co-chairs may serve as Member 2, 3 or 4, but may not be a Research Scientist.
- Adjunct Professors and Professor Emeriti may retain their roles on current committees, but may not serve as chair on any new committees.
- Professors of Practice and Research Professors may serve as Members 2, 3 or 4 depending upon their affiliation with the student's program. They may also serve as co-chairs
- Visiting Professors may serve as Member 4

View a list of faculty and their affiliations: <https://www.kaust.edu.sa/en/study/faculty/faculty-advisors-by-program-areas>

3.3 M.S. Non Thesis Option

Students wishing to pursue the Non-Thesis options must complete a minimum of 6 credits of directed research (299). Summer internship credits may be used to fulfil the research requirements provided that the summer internship is research-based. Summer internships are subject to approval by the student's academic advisor.

Students must complete the remaining credits through one or a combination of the options listed below:

- Broadening Experience Courses : Courses that broaden a student's M.S. experience.
- Ph.D.-Level Courses : Courses numbered 300 or greater. Any course in the Ph.D. core requirements that is passed with a minimum grade of B- may be used towards meeting the core Ph.D. requirements of the program if the student chooses to continue for a Ph.D. degree in KAUST.
- Internship: Research-based summer internship (295). Students are only allowed to take one internship.

It should be noted that a student may also combine courses to satisfy the six (6) credit requirement. For example, a student could take one Ph.D.-level course and one graduate-level course in another program. A student may not enroll in two summer internships.

4. Doctor of Philosophy

The Doctor of Philosophy (Ph.D.) degree is designed to prepare students for research careers in academia and industry. It is offered exclusively as a full-time program.

There is a minimum residency requirement at KAUST of 3.5 years for students entering with a B.S. degree and 2.5 years for students entering with an M.S. degree. A minimum GPA of 3.0 must be achieved on all Doctoral coursework. Individual courses require a minimum of a B- to earn course credit.



The Ph.D. degree includes the following steps:

- Securing a Dissertation Advisor.
- Successful completion of program coursework.
- Passing the Qualifying Examination
- Passing the Dissertation Proposal Defense to obtain candidacy status.
- Preparing, submitting and successfully defending a Doctoral dissertation.

4.1 Ph.D. Course Requirements

The required coursework varies for students entering the Ph.D. degree with a B.S. degree or a relevant M.S. degree. Students holding a B.S. degree must complete all program core/mandatory courses and elective courses outlined in the M.S. degree section and are also required to complete the Ph.D. courses below. Students entering with a B.S. degree may also qualify to earn the M.S. degree by satisfying the M.S. degree requirements; however, it is the student's responsibility to declare their intentions to graduate with an M.S.

Students entering the Ph.D. degree with a relevant M.S. degree must complete the requirements below, though additional courses may be required by the Dissertation Advisor.

Ph.D. Courses

- Two 300-level courses
- Graduate Seminar 398 (non-credit): All students are required to register and receive a satisfactory grade for every semester the program requires they attend.
- Winter Enrichment Program: Students are required to satisfactorily complete at least one full Winter Enrichment Program (WEP) as part of the degree requirements. Students who completed WEP requirements while earning the M.S. degree are not required to enrol in a full WEP for a second time in the Ph.D. degree.

Students entering the program with an M.S. degree from KAUST may transfer unused coursework toward the Ph.D. program requirements subject to program level approval. Students transferring from another university's Ph.D. program may receive some dissertation research and coursework credit on a case by case basis for related work performed at the original institution upon approval by the Dean. However, such students must still satisfy the Qualifying Exam and Dissertation Proposal Defense requirements at KAUST. If these milestones were passed at the original institution, the proposal may be the same if approved by the Dissertation Advisor.

4.2 Ph.D. Designation of Dissertation Advisor

The selected Dissertation Advisor must be a full time program-affiliated assistant, associate or full professor at KAUST. The student may also select an advisor from another program at KAUST. This advisor can only become project-affiliated for the specific thesis project with program level approval. Project affiliation approval must be completed prior to commencing research.

View a list of faculty and their affiliations: <https://www.kaust.edu.sa/en/study/faculty/faculty-advisors-by-program-areas>

4.3 Ph.D. Candidacy

In addition to the coursework requirements, the student must successfully complete the required Ph.D. Qualification Milestones to progress towards Ph.D. candidacy status. These milestones consist of the Subject based Qualifying Examination and Ph.D. proposal defense.



4.3.1 Subject-based Qualifying Exam

The purpose of the Subject-based Qualifying Exam is to test the student's knowledge of the subject matter within the field of study. All students entering the Ph.D. program with a B.S. degree must take this examination within two years of their admission. Students admitted to the program with an M.S. degree must take this exam within one year. Students who fail the Subject-based Qualifying Exam with no retake or fail the retake will be dismissed from the university.

4.3.2 Ph.D. Dissertation Proposal Defense Committee

Formation of Dissertation Proposal Defense Committee must include the following members:

- First member: Dissertation Advisor who acts as committee chair.
- Second member: Program or Program-affiliated faculty member.
- Third member: KAUST faculty member from another program.

The Proposal Dissertation Committee must be approved by the Dean. Once constituted, the composition of the Proposal committee can only be changed with the approval of both the Dissertation Advisor and the Dean.

View a list of faculty and their affiliations: <https://www.kaust.edu.sa/en/study/faculty/faculty-advisors-by-program-areas>

4.3.3 Ph.D. Dissertation Proposal Defense

The purpose of the Dissertation Proposal Defense is to demonstrate that the student has the ability and is adequately prepared to undertake Ph.D. level research in the proposed area. This preparation includes necessary knowledge of the chosen subject, a review of the literature, and preparatory theory or experiment as applicable.

The Dissertation Proposal Defense is the second part of the qualification milestones that must be completed to become a Ph.D. Candidate. Ph.D. students are required to complete the Dissertation Proposal Defense within 1 year after passing the qualifying exam. The Dissertation Proposal Defense includes two aspects: a written research proposal and an oral research proposal defense. Ph.D. students must request to present the Dissertation Proposal Defense to the Proposal Dissertation Committee at the beginning of the semester they will defend their proposal.

There are four possible outcomes from this Dissertation Proposal Defense:

- Pass
- Pass with conditions
- Fail with retake
- Fail without retake

A pass is achieved when the committee agrees with no more than one dissenting vote, otherwise the student fails. In the instance of a Pass with conditions, the entire committee must agree on the required conditions and if they cannot, the Dean decides. The deadline to complete the conditions is one month after the defense date, unless the committee unanimously agrees to change it. In the instance of a Fail without Retake, the decision of the committee must be unanimous. The deadline to complete the retake is six months after the defense date, unless the committee unanimously agrees to reduce it. Students who fail the Dissertation Proposal Defense, or who fail the retake, will be dismissed from the University. A student who successfully passes the Dissertation Proposal Defense is deemed a Ph.D. Candidate.

4.4 Ph.D. Defense

To graduate, a Ph.D. candidate has to finalize the Ph.D. dissertation, form a Ph.D. dissertation defense committee and successfully defend his/her Ph.D. dissertation.



4.4.1 Ph.D. Dissertation Defense Committee

The Ph.D. Dissertation Defense committee, which must be approved by the student's Dean, must consist of at least four members and typically includes no more than six members. At least three of the required members must be KAUST faculty and one must be an examiner who is external to KAUST. The Chair, plus one additional faculty member, must be affiliated with the student's program. The external examiner is not required to attend the defense, but must write a report on the dissertation and may attend the dissertation defense at the discretion of the Program. This membership can be summarized as:

Member Role Program Status:

Member	Role	Program Status
1	Chair	Within Program
2	Faculty	Within Program
3	Faculty	Outside Program
4	External Examiner	Outside KAUST
5	Approved Research Scientist	Inside KAUST
6	Additional Faculty	Inside or outside KAUST

Notes:

- Members 1 – 4 are required. Members 5 and 6 are optional.
- Co-chairs may serve as either Member 2, 3 or 6.
- Adjunct Professors and Professor Emeriti may retain their roles on current committees, but may not serve as chair on any new committees.
- Professors of Practice and Research Professors may serve as Members 2 , 3 or 6 depending upon their affiliation with the student's program. They may also serve as co-chairs.
- Visiting Professors may serve as Member 6, but not as the external examiner.

The only requirement with commonality with the proposal committee is the supervisor, although it is expected that other members will carry forward to this committee. The supervisor is a non-voting member on the committee.

If the student has a co-supervisor this person can be considered one of the above four members required, provided they come under the categories listed (i.e., meets the requirements of position).

It is the responsibility of the student to inform the Dissertation Defense Committee of his/her progress, deadlines for submitting graduation forms, the defense date, etc. It is expected that the student submits her/his dissertation six weeks prior the defense date in order to receive feedback from the committee members in a timely manner.

4.4.2 Ph.D. Dissertation Defense

The Ph.D. degree requires the passing of the defense and acceptance of the Dissertation. The final defense is a public presentation that consists of an oral defense followed by questions and may last a maximum of three hours.

The student must determine the defense date with agreement of all the members of the Dissertation Committee. It is the responsibility of the student to notify and submit the required documents to the Graduate Program Coordinator at the beginning of the semester they intend to defend. It is also expected that the student submits their written dissertation to the committee two months prior to the defense date in order to receive feedback. The written dissertation is required to comply with the university formatting guidelines provided by the library <http://libguides.kaust.edu.sa/theses>



There are four possible outcomes from this Dissertation Final Defense:

- Pass
- Pass with conditions
- Fail with retake
- Fail without retake

A pass is achieved when the committee agrees with no more than one dissenting vote, otherwise the student fails. If more than one member casts a negative vote, one retake of the oral defense is permitted if the entire committee agrees. In the instance of a Pass with conditions, the entire committee must agree on the required conditions and if they cannot, the Dean decides. The deadline to complete the revisions is one month after the defense date, unless the committee unanimously agrees to reduce it. The deadline to complete the retake is four months after the defense date, unless the committee unanimously agrees to reduce it. Students who fail the Dissertation Defense or who fail the retake will be dismissed from the university.

Evaluation of the Ph.D. Dissertation Defense is recorded by submitting the Result of Ph.D. Dissertation Defense Examination form within three days after the defense.



5. Program Courses and Descriptions

EnSE 201 - Water Quality and Environmental Analysis (3-0-3)

The course covers introduction to water quality parameters (with a focus on toxic pollutants), pollutants properties, measurement techniques, and control technologies. Fate and transport of pollutants in relation with their physicochemical properties, risk assessment in relationship to water quality. environmental analytical techniques, drinking water and domestic wastewater treatment are included.

EnSE 202 - Aquatic Chemistry (3-0-3)

Chemistry of processes in aquatic systems. Natural water composition, characteristics and analysis (inorganic and organic composition, ionic balance, pH, conductivity, turbidity), acids and bases, carbonate system, chemistry of metals, precipitation, redox chemistry.

EnSE 203 - Fundamentals of Environmental Microbiology

This course is designed to provide introductory concepts on fundamentals of environmental microbiology to students from different engineering and science disciplines. Concepts related to the different molecular biology tools used in microbial ecology will also be introduced. The course will equip students with knowledge to apply these tools to unravel scientific questions relevant to natural and engineered biological processes.

EnSE 205 - Principles of Environmental Sustainability (3-0-3)

Fundamental aspects of sustainability, energy cycles and accounting. Carbon cycle, emissions and sequestration. Concepts of green design. Life-cycle analysis.

EnSE 214 - Microbiological Aspects of Water Sources, Treatment and Distribution

This course addresses microbiological aspects of water sources, drinking water production and distribution. The topics to be covered include: microbiology basics, pathogens, drinking water production, biological stable water, distribution of drinking water (e.g. effect of material types), biofilms, biofouling, biofouling of membranes, biofilm modelling, etc. There will be student seminars, guest lecturers and a research center visit.

EnSE 222 - Surface Hydrology (3-0-3)

Fundamentals of surface hydrology, the hydrologic cycle, hydrologic processes, and water management with an emphasis on arid lands

EnSE 223 - Groundwater Hydrology (3-0-3)

Groundwater hydrology, subsurface flow, geological considerations, aquifers and wells.

EnSE 295 - Internship (variable credit) (Summer semester)

Master-level supervised research.

EnSE 297 - MS Thesis Research (variable credit)

Master-level research leading to a formal written thesis and oral defense thereof.

EnSE 298 - Graduate Seminar (no credit, attendance required)


Master-level seminar focusing on special topics within the field.

EnSE 299 - Directed Research (variable credit)

Master-level supervised research.

EnSE 310 - Colloids, Interfaces, and Surfaces

The course covers a variety of topics in surface science, including surface tension and surface free energy (theory and measurement methods), surface films on liquid substrates (surface potential, monomolecular films, Langmuir-Blodgett layers), capillarity, gecko effect, electrical aspects of surface chemistry (electrical double layer, zeta potential, DLVO theory), surface



of solids, solid-liquid interface, stability of dispersions, stabilization of suspensions, contact angle (theory and measurement methods), emulsions, foams and aerosols, wetting of surfaces by liquids, lotus effect, flotation, aggregation and flocculation, detergency, surfactants, self-assembly, micelles and vesicles, friction, lubrication and adhesion, adsorption, characterization of colloidal particles, etc. Applications of colloid and surface science in petroleum recovery, coating and painting, food, pharmaceutical and cosmetic industry will also be covered. Surface characterization methods will be introduced.

EnSE 314 - Public Health Microbiology (3-0-3)

An introduction to the diversity of microbial agents that can impact the public health and environmental systems. The course is structured to detail the microbial hazards found in waters, soils and air. Molecular biology techniques and the current regulatory methods for investigating pathogens and the surrogate indicators will be discussed. Treatment and engineering strategies are discussed. The latter part of the course serves to provide an introduction to Quantitative Microbial Risk Assessment (QMRA). The concepts related to exposure assessment and risk characterization will be included. Practical lab classes will be incorporated as soon as student laboratories are available.

EnSE 315 - Hydrological Sensing, Monitoring and Modelling (3-0-3)

Prerequisite: EnSE 222 This course will introduce the concepts of spatial information and environmental monitoring and modelling, focusing on the collection and interpretation of environmental data streams and the use of these for simulating common environmental processes. Students will develop knowledge in both in-situ and remote sensing information systems as well as the integration and use of such data for constructing and running process based models describing key hydrological variables such as soil moisture, evapotranspiration and streamflow. An introduction to more complex land surface model descriptions as well as regional and global climate models, and how these may be used in water resources assessments, will also be explored.

EnSE 316 - Advanced Topics in Environmental Science and Engineering (3-0-3)

The course reviews current topics in bioscience, particularly relying on scientific journal publications to provide case studies, illustrative examples, classic studies, and controversial findings pertinent to specific fields within biosciences. The course will feature an emphasis on primary literature searches, reading and assessment of primary literature. It is expected that the student reads no less than 5 scientific papers per week in the prescribed topic area and is capable of presenting and critically discussing the content of these publications. In this level 300 course, the student assessment is based on active participation in the lectures and tutorials.

EnSE 324 - Arid Land Hydrology and Water Management (3-0-3)

This course covers all aspects of water evaluation and management in arid lands. It integrates the technical aspects of the groundwater and surface water hydrology within a framework of water management. All components of integrated water management are covered, including source development, source maintenance, monitoring, water planning, water economics, cultural considerations, conflict management, and others. The course also includes discussions on desalination and reuse of wastewater within the overall context of water management. The impacts of global climate change on water management in arid lands are used to illustrate the larger scale, global aspects of water resources management and planning.

EnSE 325 - Seawater and Brackish Water Desalination (3-0-3)

Pre-requisite: EnSE 342. Theoretical and practical aspects of seawater/brackish water desalination technologies, including thermal-based (MSF, MED, VC) and membrane-based (RO, NF, ED/EDR) desalination processes; process design and system performance; fouling, scaling (including bio-fouling) and cleaning; product water quality and post-treatment.

EnSE 341 - Processes in Environmental Biotechnology (3-0-3)

Prerequisite: B214. A course that introduces students from different engineering and science disciplines to the fundamental principles of microbiology and engineering (quantitative tools) and discusses example applications of microbiological processes (traditional and emerging) for wastewater treatment and energy generation.

EnSE 342 - Physical/Chemical Treatment Processes (3-0-3)

Prerequisite: EnSE 201. Water-treatment processes, membranes, advanced oxidation, principles and techniques of water desalination.



EnSE 350 - Hazardous Waste Management (3-0-3)

Prerequisites: EnSE 201. Legal and technological approaches to control and management of hazardous wastes and contaminated sites to protect human health and the environment; advanced topics in fate and transport of contaminants; storage tanks; landfills; physical, chemical and biological treatment for soil and groundwater remediation.

EnSE 397 - PhD Dissertation Research (variable credit)

PhD-level research leading to a formal written dissertation and oral defense thereof.

EnSE 398 - Graduate Seminar (variable credit)

Doctoral-level seminar focusing on special topics within the field.

EnSE 399 - Directed Research (variable credit)

Doctoral-level supervised research.



6. KAUST University Requirements; Office of the Registrar

King Abdullah University of Science and Technology (KAUST) advances science and technology through bold and collaborative research. It educates scientific and technological leaders, catalyzes the diversification of the Saudi economy and addresses challenges of regional and global significance, thereby serving the Kingdom, the region and the world.

Research and education, as well as their transformative potential, are central to KAUST's mission. KAUST has a three-part mission:

Research at KAUST – both basic and goal-oriented – is dedicated to advancing science and technology of regional and global impact. Research excellence inspires teaching and the training of future leaders in science and technology.

Research and education at KAUST energize innovation and enterprise to support knowledge-based economic diversification.

Through the synergy of science and technology, with a focus on innovation and enterprise, KAUST is a catalyst for transforming people's lives.

In support of this mission, King Abdullah University of Science and Technology offers eleven graduate programs leading to M.S. and Ph.D. degrees.

KAUST Offers the Following two Degrees:

The M.S. degree typically takes three semesters and a summer to complete (18 months). The degree allows flexibility for internships, research, and academics. [Learn more about M.S. degree requirements.](#)

The Ph.D. degree is typically a three- to four-year post-master's degree. The Ph.D., involves original research, culminating in a research dissertation. [Learn more about Ph.D. degree requirements.](#)

There are three academic divisions :

Biological and Environmental Science and Engineering (BESE)

Bioscience (B)

Environmental Science and Engineering (EnSE)

Marine Science (MarS)

Plant Science (PS)

Computer, Electrical and Mathematical Science and Engineering (CEMSE)

Applied Mathematics and Computational Science (AMCS)

Computer Science (CS)

Electrical Engineering (EE)

Physical Science and Engineering Division (PSE)

Chemical and Biological Engineering (CBE)

Chemical Science (ChemS)

Earth Science and Engineering (ErSE)

Materials Science and Engineering (MSE)

Mechanical Engineering (ME)

Each program is administered by a Graduate Committee and a Graduate Chair. Courses for each program will be listed at the 100 (non-credit), 200, 300 or 400 level.



7. Master's Program

7.1 Admissions

Admission to the M.S. program requires the satisfactory completion of an undergraduate B.S. degree in a relevant or related area, such as Engineering, Mathematics or the Physical, Chemical and Biological Sciences.

7.2 Master's Degree requirements

The M.S. degree requires successful completion of 36 credits. Students are expected to complete the M.S. degree in three semesters plus one) summer session. Degree requirements are divided into three sections: Core Curriculum; Elective Curriculum; and Research/Capstone Experience.

Core Curriculum (9-15 credits): This portion of the degree program is designed to provide a student with the background needed to establish a solid foundation in the program area over and above that obtained through undergraduate studies.

Elective Curriculum (9-15 credits): This portion of the degree program is designed to allow each student to tailor his/her educational experience to meet individual research and educational objectives. Depending upon the program and the objectives, this may be met by added coursework or by additional research experience.

Research/Capstone Experience (12 credits): The details of this portion of the degree program are uniquely determined by the student and his/her advisor and will involve a combination of research and other capstone experiences that build on the knowledge gained in coursework.

- Satisfactory participation in KAUST's Summer Session's and Winter Enrichment Program (WEP) are mandatory.
- Summer Session courses are credit bearing and apply toward the degree.
- WEP courses do not earn credit towards the degree.

At least thirty-six (36) degree credits must be completed in graduate-level courses and research projects. These courses should be 200-level or above and must be approved by the student's advisor. Additional non-credit bearing activities, such as graduate seminars, may be required by the Program. Details on the specific program expectations, as well as the difference between the thesis and non-thesis degree options can be found through the link in the Program Guide: View a list of faculty and their : [HERE](#)

7.2.1 Thesis Requirements

Students wishing to pursue a thesis as part of their M.S. degree, must identify a research advisor and must file for thesis status. The application for the thesis option is due to the Registrar's Office by the ninth week of the student's second semester at KAUST. Criteria for Acceptance into the Master's Degree with Thesis program. Students should have a well-constructed thesis proposal that includes a time-line for completion. The thesis proposal must be approved by the research advisor and the Dean of the Division.

In the case of an optional thesis program, the student should have a minimum GPA of 3.2 and at least 12 credit hours completed at the conclusion of the first semester and be registered in at least 12 credit hours during the second semester.

The research advisor must indicate that he/she endorses the thesis topic and scope of work and that it could reasonably be completed by the end of the third semester. Alternatively, the faculty member agrees to a longer time frame, not to exceed the end the fourth semester, and to cover the student and experimental costs that accrue during this period.

The student's program of study should be structured such that the student may change to the M.S. without Thesis option and finish the degree by the end of the student's third semester.

Thesis format requirements are described in the KAUST Thesis and Dissertation Guidelines (<http://libguides.kaust.edu.sa/theses>).



Thesis Defense

Evaluation of satisfactory completion of M.S. thesis work is performed by the M.S. Thesis Defense Committee. The evaluation of M.S. thesis credits comprises of a satisfactory or unsatisfactory grade. The requirement of a public seminar based on the student's work is left to the discretion of the M.S. thesis advisor.

The student is responsible for scheduling the thesis defense date with his/her supervisor and committee members. It is advisable that the student submits a written copy of the thesis to the thesis committee members at least two weeks prior the defense date.

M.S.Thesis Defense Committee

The M.S. Thesis Defense committee, which must be approved by the student's Dean, must consist of at least three members, and typically includes no more than four members. At least two of the required members must be KAUST faculty. The Chair plus one additional faculty member must be affiliated with the student's program. This membership can be summarized as:

Member Role Program Status:

Member	Role	Program Status
1	Chair	Within Program
2	Faculty	Within Program
3	Faculty or Approved Research Scientist	Outside Program
4	Additional Faculty	Inside or outside KAUST

Notes

Members 1 – 3 are required. Member 4 are optional Co-chairs may serve as Member 2, 3 or 4, but may not be a Research Scientist Adjunct Professors and Professor Emeriti may retain their roles on current committees, but may not serve as chair on any new committees Professors of Practice and Research Professors may serve as Members 2, 3 or 4 depending upon their affiliation with the student's program. They may also serve as co-chairs Visiting Professors may serve as Member 4


7.2.2 Non-Thesis Option

Students wishing to pursue the Non-Thesis options must complete a minimum of 6 credits of directed research (299). Summer internship credits may be used to fulfil the research requirements provided that the summer internship is research-based. Summer internships are subject to approval by the student's academic advisor.

Students must complete the remaining credits through one or a combination of the options listed below:

- Broadening Experience Courses : Courses that broaden a student's M.S. experience.
- Ph.D.-Level Courses : Courses numbered 300 or greater. Any course in the Ph.D. core requirements that is passed with a minimum grade of B- may be used towards meeting the core Ph.D. requirements of the program if the student chooses to continue for a Ph.D. degree in KAUST.
- Internship: Research-based summer internship (295). Students are only allowed to take one internship.

It should be noted that a student may also combine courses to satisfy the six (6) credit requirement. For example, a student could take one Ph.D.-level course and one graduate-level course in another program. A student may not enroll in two summer internships.



Students may select a KAUST faculty member from another program to act as a research advisor (for either thesis or directed research), but must provide a one -page description of the research and an explanation of how such research would be relevant to the degree program. Upon approval by the program and the Dean, the faculty member would be allowed to act as an affiliated faculty member and advisor for the student.

Please Note: Degree Programs may have additional requirement to those listed above.

View a list of faculty and their affiliations: <https://www.kaust.edu.sa/en/study/faculty/faculty-advisors-by-program-areas>

8. Ph.D. Program

8.1 Admissions

Ph.D. students apply for and enter a specific degree program. A faculty advisor is either immediately designated (in the case of a student being recruited by a specific faculty member) or temporarily assigned; in the latter case, the student is expected to identify a research advisor by (at the latest) the end of the first year.

There are three phases and associated milestones for Ph.D. students:

- Passing a qualifying exam
- Passing an oral defence of the dissertation proposal
- Dissertation phase with a final defense milestone.

8.2 PhD Degree Requirements

There is a minimum residency requirement (enrolment period at KAUST) of 2.5 years for students entering with an M.S. degree, 3.5 years for students entering with a B.S. degree. Qualification and advancement to candidacy are contingent upon: (i) successfully passing Ph.D. coursework, (ii) designating a research advisor, (iii) successfully passing a qualifying exam, and (iii) writing and orally defending a research proposal. Possible outcomes include pass, failure with complete retake, failures with partial retake, and failure with no retake. Students not permitted to retake the exam, or who fail the retake, will be dismissed from the University. The maximum allotted time for advancement to candidacy for a student entering with a M.S. degree is two years; three years for students entering with a B.S.

Satisfactory participation in KAUST's Summer Session and Winter Enrichment Period (WEP) is mandatory. Summer Session courses are credit bearing and apply toward the degree. WEP courses do not earn credit towards the degree.

The required coursework is outlined below and see program for specific program course requirements:

M.S. Degree


- Core courses
- Elective courses

Ph.D. Degree

- Two or more courses (6 credits of coursework) at 300 level
- Graduate seminar if required by the program.

Students entering the program with a relevant M.S. from another institution may transfer coursework toward the requirements of the M.S. degree listed above upon approval of the program.

Students entering the program with a M.S. from KAUST may transfer coursework toward both the M.S. and Ph.D. requirements listed above upon approval of the program and based on their program of study at KAUST.



Students entering with a B.S. from another institution may transfer in up to 9 credits of graduate level coursework towards the above requirements upon approval of the program. In addition, students entering with a B.S. may also qualify to earn a M.S. degree by satisfying the M.S. degree requirements as part of the Ph.D. program.

Some degree programs may require a diagnostic entrance exam as a basis for admission, and students may be required to complete additional coursework depending on their degree-granting institution. If the M.S. degree is from a subject other than the Ph.D. degree program, there may be additional courses required and specified by the advisor.

8.3 Candidacy

Achieving Ph.D. candidacy is contingent upon successfully passing a qualifying examination, acceptance by the research advisor of a written research proposal and successfully passing an oral examination. Details should be confirmed in the individual degree program material. For a list of eligible faculty advisors for any degree program. View a list of faculty and their : <https://www.kaust.edu.sa/en/study/faculty/faculty-advisors-by-program-areas>

Passing the qualification phase is achieved by acceptance of all committee members of the written proposal and a positive vote of all but, at most, one member of the oral exam committee. If more than one member casts a negative vote, one retake of the oral defense is permitted if the entire committee agrees. A conditional pass involves conditions (e.g. another course in a perceived area of weakness) imposed by the committee, with the conditional status removed when those conditions have been met. Once constituted, the composition of the qualification phase committee can only be changed upon approval by both the faculty research advisor and the division dean.

8.4 Dissertation Research Credits

Besides coursework (6 or more credit hours), dissertation research (course number 397) must be earned during the first (proposal preparation and defense) and second phases of the Ph.D. program. A full-time workload for Ph.D. students is considered to be 12 credit hours per semester (courses and 397) and 6 credit hours in summer (397 only). There is a minimum residency requirement (enrolment period at KAUST) of 2.5 years for students entering with an M.S. degree, 3.5 years for students entering with a B.S. degree. Ph.D. students typically complete the degree in 5 years.

8.5 Dissertation and Dissertation Defense

The Dissertation Defense is the final exam of the Ph.D. degree. It involves a public presentation of the results of the dissertation research followed by a question and answer session by the Ph.D. Dissertation Defense Committee. It is the responsibility of the student to inform the dissertation committee of his/her progress and meet deadlines for submitting defense date and graduation forms. It is expected that students will submit their dissertations to their committee six (6) weeks prior to the defense date in order to receive feedback from the committee members in a timely manner. However, the advisor may approve exceptions to this expected timeline. The dissertation format requirements are described in the KAUST Thesis and Dissertation Guidelines. <http://libguides.kaust.edu.sa/theses>

The result of the defense will be made based on the recommendation of the committee. There are four possible results: Pass: the student passes the exam and the dissertation is accepted as submitted; Pass with revisions: the student passes the exam and the student is advised of the revisions that must be made to the text of the dissertation; Failure with retake: normally this means the student must do more research to complete the dissertation. The student must revise the dissertation and give another oral examination within six months from the date of the first defense; and Failure: the student does not pass the exam, the dissertation is not accepted, the degree is not awarded, and the student is dismissed from the University.

8.6 PhD Dissertation Defense Committee

The Dissertation Defense is the final exam of the Ph.D. degree. It involves a public presentation of the results of the dissertation research followed by a question and answer session by the PhD Dissertation Defense Committee. It is the responsibility of the student to inform the dissertation committee of his/her progress and meet deadlines for submitting defense date and graduation forms. It is expected that students will submit their dissertations to their committee six (6) weeks prior to the defense date in order to receive feedback from the committee members in a timely manner. However, the advisor may approve exceptions to this expected timeline. The dissertation format requirements are described in the KAUST Thesis and Dissertation Guidelines. <http://libguides.kaust.edu.sa/theses>



The result of the defense will be made based on the recommendation of the committee. There are four possible results: Pass: the student passes the exam and the dissertation is accepted as submitted; Pass with revisions: the student passes the exam and the student is advised of the revisions that must be made to the text of the dissertation; Failure with retake: normally this means the student must do more research to complete the dissertation. The student must revise the dissertation and give another oral examination within four (4) months from the date of the first defense; and Failure: the student does not pass the exam, the dissertation is not accepted, the degree is not awarded, and the student is dismissed from the University.

The PhD Dissertation Defense committee, which must be approved by the student’s Dean, must consist of at least four members, and typically includes no more than six members. At least three of the required members must be KAUST faculty and one must be an examiner who is external to KAUST. The Chair plus one additional faculty member must be affiliated with the student’s program. The external examiner, is not required to attend the defense, but must write a report on the dissertation and may attend the dissertation defense at the discretion of the Program. This membership can be summarized as:

Member Role Program Status:

Member	Role	Program Status
1	Chair	Within Program
2	Faculty	Within Program
3	Faculty	Outside Program
4	External Examiner	Outside KAUST
5	Approved Research Scientist	Inside KAUST
6	Additional Faculty	Inside or outside KAUST

Notes

Members 1 – 4 are required. Members 5 and 6 are optional. Co-chairs may serve as either Member 2, 3 or 6. Adjunct Professors and Professor Emeriti may retain their roles on current committees, but may not serve as chair on any new committees. Professors of Practice and Research Professors may serve as Members 2, 3 or 6 depending upon their affiliation with the student’s program. They may also serve as co-chairs. Visiting Professors may serve as Member 6, but not as the external examiner.

It is the responsibility of the student to inform the dissertation committee of his/her progress and meet deadlines for submitting defense date and graduation forms. It is expected that students will submit their dissertations to their committee six (6) weeks prior to the defense date in order to receive feedback from the committee members in a timely manner. However, the advisor may approve exceptions to this expected timeline. The dissertation format requirements are described in the KAUST Thesis and Dissertation Guidelines. <http://libguides.kaust.edu.sa/theses>

9. Program Descriptions

The Master’s and Doctoral degree program requirements listed above represent general university-level expectations. The specific details of each degree requirements are outlined in the descriptions of the individual degree programs.



Course Notation

Each course is listed prefaced with its unique number and post fixed with (l-c-r) where:
l is the lecture hours, to count toward fulfilling the student workload during a semester.
c is the recitation or laboratory hour
r is the credit hours toward fulfilling a degree course requirement.

Eg CS 220 Data Analytics (3-0-3) has a total of three hours of lectures per week, has no labs and earns 3 credits for the semester

9.1 University Wide Courses

University-wide courses are courses in areas not tied to any specific degree program. They are designed to meet institutional requirements, provide broadening experiences or to provide supplemental preparation to support students in support of their degree. These are listed below.

9.1.1 English as a Second Language

These courses are designed to provide English language training for student who do not fully meet the university's English language entrance requirements and students will be assigned based on the student's level of English or proficiency.

ESL 101 English as a Second Language I (6-0-0)

ESL 101 is a foundational English skills course for reading, listening, speaking and writing. The course has a strong focus on teaching students the basics of academic writing and grammar structures in preparation for thesis work. Course materials are typically A2 level to help students acquire basic academic English skills required for graduate course work.

ESL 102 English as a Second Language II (3-0-0)

ESL 102 is a pre-intermediate English skills course for reading, listening, speaking and writing. The course continues to focus on building academic writing and grammar skills and also more emphasis on reading for academic purposes. Course materials are typically B1 level to help students further develop pre-intermediate English skills required for graduate course work.

ESL 103 English as a Second Language III (3-0-0)

ESL 103 is an upper-intermediate English skills course for reading, listening, speaking and writing. The course helps to further develop academic English skills necessary to successfully complete research and thesis work. Course materials are typically B2 level to help students refine upper-intermediate English skills required for graduate course work.

9.1.2 Enrichment Program WEP Courses

The Winter Enrichment Program (WEP) takes place in January each year and is designed to broaden student's horizons. WEP is an essential and core requirement of the degree programs at KAUST. Satisfactory completion of at least one WEP is required of all MS students as part of completion of the degree requirements. PhD students who did not receive their MS degree at KAUST are also required to satisfactorily complete at least one WEP. To satisfy this mandatory requirement, full participation must occur within a single WEP period.

9.1.3 Innovation and Economic Development

IED 210 Technology Innovation and Entrepreneurship (3-0-0)

This course introduces students to using an entrepreneurial and design thinking view to solving real world challenges including the pathway to commercializing research. It is about changing methods of thinking and equipping graduate students to be able to understand and manage innovation in the corporate world. This course is open to all MS students as an elective and to PhD Eg

9.1.4 IED 220 New Venture and Product Innovation Challenge (6-0-0)

This is an experiential, industry mentor-led program: this course will enable students to 'learn-by-doing' through the development a fully formed business proposition for real intellectual property that has been developed in the Kingdom. The objective is to create a plan for commercialization and launch of a new product and/or new venture. The process will include students learning how to Creatively View Technology Opportunities; the Identification and Assessment of Opportunity; the Structuring and Packaging of a Validated Commercial Idea. In addition students will learn key skills including the development of real-world Strategy, Planning & Team Building; Integrating Continuous Feedback and Communicating Key Concepts to Different Audiences.



10. Grading

The KAUST grading system is a 4.0 scale utilizing letter grades, and these are the only grades that will be assigned.

A	=	4.00	C	=	2.00
A-	=	3.67	C-	=	1.67
B+	=	3.33	D+	=	1.33
B	=	3.00	D	=	1.00
B-	=	2.67	D-	=	0.67
C+	=	2.33	F	=	0.00

I	=	Incomplete
IP	=	In Progress
W	=	Withdrew
S	=	Satisfactory
U	=	Unsatisfactory
WF	=	Withdrew-Failed

10.1 Incomplete Grades

Students who complete the majority of the requirements for a course but are unable to finish the course may receive an incomplete (I) grade. A grade of Incomplete will be assigned only with the consent of the instructor of the course after the instructor and the student have agreed on the academic work that needs to be completed and the date it is due (but no later than the end of the second week of the following semester or session). When the requirements for the course are completed, the instructor will submit a grade that will replace the incomplete grade on the student's academic record. Incompletes not completed by the end of the second week of the following semester or session will be changed to F (failing) grades.

Grades for students that are due to graduate:

Note that any incomplete grades (as well as fail grades) will mean a student will not graduate or receive a diploma during the Commencement ceremony.

Incomplete grades are granted to individual students on a case-by-case basis. Incomplete grades should not be used as a mechanism to extend the course past the end of the semester. Students are allowed only one incomplete grade while in a degree program at KAUST.

10.2 In Progress Grade

(These IP grades will be converted by the Registrar's Office to "S" grades for all semesters, once the Office has been notified that the thesis or dissertation has been submitted to the Library).

10.3 Research or Seminar courses

Use the following grades for these research or seminar courses:

297	Thesis Research	Either IP or U
397	Dissertation Research	Either IP or U
295/395	Internship (summer)	Either S or U
298/398	Seminar	Either S or U
299/399	Directed Research	Either S or U

Summer Session and Winter Enrichment Program:

Satisfactory participation in KAUST's Summer Session and Winter Enrichment Period (WEP) is mandatory. Summer Session courses are credit bearing and apply toward the degree. WEP courses do not earn credit towards the degree.



10.4 Cumulative Grade Point Average

A minimum GPA of 3.0 must be achieved in all coursework. Individual courses require a minimum of a B- for course credit.

11. Academic Standing

A student's academic standing is based on his/her cumulative performance assessment and a semester performance based on the number of credits earned and GPA during the most recently completed semester.

Academic standing classifications are divided into four (4) categories of decreasing levels of academic performance: Good Standing; Academic Notice; Academic Probation; and Academic Dismissal.

Cumulative Assessment

GPA	Academic standing
3.00 – 4.00	Good Standing
2.67 – 2.99	Academic Notice
2.33 – 2.66	Academic Probation
Below 2.33	Academic Dismissal

S/U Performance	Academic Standing
0 – 2 credits	GPA Standing
3 – 5 credits	GPA Standing less one category
6 – 8 credits	GPA Standing less two categories
9+ credits	Academic Dismissal

Semester Assessment

Registered in 12 credits	
Credits Earned	Academic Standing
12+credits	GPA Standing
9-11credits	GPA Standing less one category
6- 8 credits	GPA Standing less two category
0- 5 credits	Academic Dismissal

Semester Assessment

Registered in 9 credits	
Credits Earned	Academic Standing
9 + credits	GPA Standing
6 – 8 credits	GPA Standing less one category
3 – 5 credits	GPA Standing less two category
0 – 2 credits	Academic Dismissal

Summer Session Assessment

Credits Earned	Academic Standing
6 credits	GPA Standing
3 – 5 credits	GPA Standing less one category
0 – 2 credits	GPA Standing less two categories



Definitions

Good Standing

Student is making satisfactory academic progress toward the degree.

Academic Notice:

Student is not making satisfactory progress toward the degree. A student placed on Academic Notice will be monitored in subsequent semesters to ensure satisfactory progress toward the degree (see Good Standing). If the student's performance does not improve in the following semester, the student will be placed on academic probation.

Academic Probation

Student is not making satisfactory progress toward the degree. A student placed on Academic Probation will be monitored in subsequent semesters to ensure satisfactory progress toward the degree (see Good Standing). If the student's performance does not improve in the following semester, the student will be academically dismissed.

Academic Dismissal

Student is not making satisfactory progress toward the degree and is unlikely to meet degree requirements. Dismissed students will be required to leave the University. If deemed eligible, dismissed students will have one week from receiving notice of dismissal to file an appeal.

Appeal Process for Students Academically Dismissed

If the student is eligible to appeal, he/she must submit a written explanation why the dismissal should be rescinded along with any supporting documentation. The Committee on Academic Performance will hear the appeal and make a decision to grant or deny the appeal based on the appeal and documentation, the student's past performance, and the likelihood that the student is capable of successfully completing his/her academic program. If the appeal is denied, the student will be required to leave the University. The decision of the Committee is final; no additional appeals are permitted.

S/U Protection

Due to the significant impact of U grades, a faculty member giving a U grade for a course involving 6 or more credits must obtain concurrence of the Dean prior to submitting the grade. If the grade is given for only a single class (including research credit) the number of credits will be capped at 6 when using the academic standing table displayed above.

Returning to Good Standing

A student not in good standing due to a GPA deficiency may return to Good Standing by improving his/her cumulative GPA such that it meets or exceeds 3.00. A student not in good standing due to U grades may return to Good Standing by completing at least 12 credits during the subsequent semester with no U grades and a semester GPA of at least 3.00 in traditionally graded courses.


12. Transferring Credits

A student may petition to transfer graduate credits from another university, upon approval of the Program Chair and the Registrar. Each student's application will be reviewed on a case-by-case basis. The following rules apply:

Up to three graduate-level courses not to exceed nine credits may be transferred for credit. Courses transferred for credit cannot have been counted as credits for another granted degree.

The course grade for any course to be transferred must be a B or above. Courses transferred for degree credit must have been taken within three years prior to admission to KAUST.

The student must submit a completed KAUST Transfer of Credit form and include the Course syllabus and course description.

- 
- The student is responsible for supplying an official transcript:
 - The transcript may be no more than three months old.
 - The transcript must be in English or accompanied by a certified English translation.
 - The grading key must be included with the transcript.
 - The transcript must include the course name, level, grade and credit value.
 - The credit value of the course must be equivalent to a minimum of three KAUST credit hours.

Course Transfer and Equivalency:

Graduate credit hours taken from any KAUST program may be applied to other KAUST graduate programs under the guidelines of the degree program to which the student is admitted. Graduate courses taken from another university or KAUST program that are equivalent in level and content to the designated courses in a major track may be counted toward meeting the major track requirement if their equivalence is confirmed by the program chair.

Students transferring from other Ph.D. programs may receive some dissertation research and coursework credit units, on a case-by-case basis, for related work performed at their original institution. However, such students must satisfy the written and oral requirements for a research proposal (if the proposal had been submitted and approved at the original institution, the proposal may be the same, if approved by the research advisor). The minimum residency requirement for enrolment of such students at KAUST is two years.

13. Policy for Adding and Dropping Courses

A course may be added during the first week of the semester. Students may add courses after the first week with the permission of the instructor. Instructors have the right to refuse admission to a student if the instructor feels that the student will not have the time to sufficiently master the material due to adding the course late. A course may be dropped without penalty at any time during the first two weeks of the semester. Between the second and ninth week, students can drop a course but the course will appear on the student's transcript with the grade of "W" (withdraw). After the ninth week of a full semester, courses may be dropped only under exceptional circumstances and with the approval of the Course Instructor, the Program Chair and the Registrar.

14. Program Planning

It is the sole responsibility of the student to plan her/his graduate program in consultation with her/his advisor. Students are required to meet all deadlines. Students should be aware that most core courses are offered only once per year.