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1. Aims and Scope
The Chemical and Biological Engineering Program (CBE) aims to offer students opportunities to develop real-world solutions to global challenges by performing rigorous coursework studies and cutting-edge research in chemical engineering and biological engineering. These include the development of new materials and processes for gas and liquid separations, for water desalination, catalysis, sustainable energy and nanotechnology as well as the advancement of new ideas in process design and control and reactor design.

2. Assessment Test (If applicable)
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 admitted students are required to take a written assessment exam when they arrive on Campus. The purpose of the assessment is to determine whether students have mastered the prerequisites for undertaking graduate-level courses taught in the program. The Academic Advisor works with admitted students to develop a study plan if needed. 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 Requirements
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.

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. Satisfactory participation in every KAUST’s Summer Session is mandatory. Summer Session courses are credit bearing and apply towards the degree.

The M.S. degree has the following components:
• 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 of the program they attend.

3.1 M.S. Course Requirements

3.1.1 Core Courses (twelve credits)
To complete these twelve credit hours in Chemical and Biological Engineering, the student should register for four Core Courses as listed below.

CBE 201 – Chemical Thermodynamics
CBE 202 – Advanced Transport Phenomena
CBE 203 – Advanced Reaction Engineering
CBE 336 – Membrane Science and Membrane Separation Processes

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 (twelve credits)
The elective courses (which exclude research, internship credits, and IED 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 (twelve credits)
The details of this portion of the degree are uniquely determined by the student with the permission of the student’s academic advisor and will involve a combination of research and other capstone experiences. The student is expected to fulfill this portion of the degree by completing an M.S. Thesis (details below). The M.S. Non-Thesis option may be pursued under exceptional circumstances upon recommendation of the student’s academic advisor and approval of the Program Chair. A student is expected to work weekly a minimum of three hours/week per each research credit he/she is registered for.

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
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 fulltime program-affiliated Assistant, Associate or Full Professor 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 Dean’s 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 [CLICK HERE](#).
- 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:

<table>
<thead>
<tr>
<th>Member</th>
<th>Role</th>
<th>Program Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chair</td>
<td>Within Program</td>
</tr>
<tr>
<td>2</td>
<td>Faculty</td>
<td>Within Program</td>
</tr>
</tbody>
</table>
Notes:

- Members 1-3 are required. Member 4 is optional.
- Co-Chairs may serve as Members 2, 3, or 4, but may not be a Research Scientist.
- Adjunct Professors and Professors 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: [CLICK HERE](#)

### 3.3 M.S. Non-Thesis Option

Students wishing to pursue the non-thesis option must complete a minimum of six credits of Directed Research (299). Summer internship credits may be used to fulfill 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.
- Internship: Research-based Summer Internship (295). Students are only allowed to take one internship.
- PhD Courses: Courses numbered at the 300 level.

### 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 fulltime program.

There is a minimum residency requirement at KAUST of three and a half years for students entering with a B.S. Degree and two and a half years for students entering with a 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**
- At least two 300-level courses.
- Graduate Seminar 398 (non-credit): All students are required to register and receive a Satisfactory grade for every semester of the program 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 enroll in a full WEP for a second time in the Ph.D. Degree.
- Satisfactory participation in every KAUST’s Summer Session is mandatory. Summer Session courses are credit bearing and apply towards the degree.

**4.2 Ph.D. Designation of Dissertation Advisor**
The selected Dissertation Advisor must be a full time program-affiliated 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 dissertation project with program level approval. Project affiliation approval must be completed prior to commencing research.

View a list of faculty and their affiliations: [CLICK HERE](#)

**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 Ph.D. Dissertation Proposal Defense Committee**
The Ph.D. Dissertation Proposal Defense Committee, which must be approved by the student’s Dean, must consist of at least three members and typically includes no more than six members. The Chair, plus one additional Faculty Member must be affiliated with the student’s Program.

<table>
<thead>
<tr>
<th>Member</th>
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<td>Faculty</td>
<td>Within Program</td>
</tr>
<tr>
<td>3</td>
<td>Faculty</td>
<td>Outside Program</td>
</tr>
<tr>
<td>4</td>
<td>Approved Research Scientist</td>
<td>Inside KAUST</td>
</tr>
</tbody>
</table>

**Notes:**
- Members 1-3 are required. Member 4 is optional.
- Co-Chairs may serve as Members 2 or 3.
- Adjunct Professors and Professors 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 or 3 depending upon their affiliation with the student’s program. They may also serve as Co-Chairs.

Once constituted, the composition of the Proposal Committee can only be changed with the approval of both the Dissertation Advisor and the Dean.
4.3.2 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 one year after passing the qualifying examination. 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 students 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 form a Ph.D. Dissertation Defense Committee, finalize the Ph.D. dissertation 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.
### 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, meet deadlines for submitting graduation forms and inform the committee of his/her progress. It is the responsibility of the student to 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 at least two months prior to the defense date in order to receive feedback.

The written dissertation is required to comply with the University Formatting Guidelines which are on the library website: [CLICK HERE](#)

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 up to one month after the defense date, unless the committee unanimously agrees to reduce it. The deadline to complete the retake is as decided by the defense committee with a maximum of six months after the defense date, unless the committee unanimously agrees to reduce it. Students who fail without retake 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 to the Registrar’s Office.

5. Program Courses and Descriptions

Course Notation:

Each course is listed prefaced with its unique number and post fixed with (L-C-R) where:

L = the lecture hours to count towards fulfilling the student workload during the semester.
C = the recitation or laboratory hours
R = the credit hours towards fulfilling a degree course requirement.

E.g. CS220 Data Analytics (3-0-3) has a total of three hours of lectures per week, has no labs and earns three credits for the semester.

100-level courses are preparatory in nature and do not count towards the MS or PhD degrees.

CBE 199 – Directed Study in CBE (3-0-0) (variable credit up to a maximum of 12 credits)
A course of self-study in a particular topic as directed by faculty and approved by the division.

CBE 201 – Chemical Thermodynamics (3-0-3)
Prerequisites: Undergraduate thermodynamics course.
The primary goal of chemical thermodynamics is the physical explanation of the fundamental principles governing the variety of chemical phenomena taking place in the world around us. The goal of this course is to give students a conceptual understanding of the main principles of thermodynamics. Topics include: the concept of entropy; the Clausius, Gibbs, Boltzmann and Shannon definition of entropy; entropy and information; Maxwells demon; the Boltzmann distribution law; the Maxwell-Boltzmann speed distribution; Gibbs and Helmholtz free energy; the chemical potential; Gibbs-Duhem and Euler equation; the Gibbs phase rule; entropy of mixing and Gibbs paradox; phase diagrams, the Flory-Huggins phase diagram; spontaneous and non-spontaneous processes; thermodynamics of chemical reactions; thermodynamics of osmosis and reverse osmosis, entropy and irreversible phase transitions; introduction in thermodynamics of irreversible processes; introduction in statistical thermodynamics.

CBE 202 – Advanced Transport Phenomena (3-0-3)
Prerequisites: Basic knowledge of fluid mechanics, heat & mass transfer, vector analysis, and differential equations.
The aim of this course is to enable students to i) derive appropriate differential balances for specific material properties, including momentum, thermal energy, and mass species, accounting appropriately for property flux by convective and diffusive (molecular-scale) processes, along with property generation or loss in the material continua; ii) write the Thermal Energy Equation, the Species Continuity Equation, and the Navier-Stokes Equations and pose (simplify) them appropriately for specific transport problems; iii) know appropriate boundary conditions that can be applied to specific transport problems; iv) conduct scale or dimensional analyses of transport problems, using the analyses to help simplify or enhance understanding of underlying transport processes; v) solve and physically interpret one (1)-dimensional steady state conduction and species diffusion problems in rectangular, cylindrical, and spherical geometries, with and without zero-order and first-order generation/ loss; vi) use separation of variables technique to solve and physically interpret two (2)-dimensional steady-state conduction and species diffusion problems; vii) use similarity methods to solve and physically interpret unsteady state conduction and diffusion problems in unbounded material regions; viii) use the finite Fourier transform method to solve and interpret unsteady state conduction and diffusion problems in bounded material regions; ix) solve and physically interpret unidirectional steady and unsteady viscous flows in unbounded regions and in bounded regions (i.e. flow
conduits or ducts); and x) solve and physically interpret simultaneous convection and diffusion (conduction) problems involving the interaction of thermal or concentration boundary layers with developing or developed velocity profiles.

**CBE 203 – Advanced Reaction Engineering (3-0-3)**
The objective of this course is to impart and to continue the rigorous study of reaction engineering. In this course, particular emphasis will be given to chemical kinetics and transport phenomena, review of elements of reaction kinetics, rate processes in heterogeneous reacting systems, design of fluid-fluid and fluid-solid reactors, scale-up and stability of chemical reactors and residence time analysis of heterogeneous chemical reactors.

**CBE 210 – Materials Chemistry I (3-0-3)**
A presentation of present fundamental concepts in materials chemistry. The main topics to be covered include structure and characterization, macroscopic properties and synthesis and processing.

**CBE 225 – Materials Chemistry II (3-0-3)**
An introduction to electron microscopy based techniques: Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Electron diffraction (ED), Scanning transmission electron microscopy (STEM), Energy-filtered TEM (EFTEM), Energy dispersive X-ray analysis (EDX), and Electron energy loss spectroscopy (EELS). On-site demonstration of the electron microscope will be given. Nanoporous materials including zeolites and mesoporous materials will be another topic of this course.

**CBE 226 – Process Modeling and Control (3-0-3)**
This course aims at building knowledge in process systems modeling/control. This unit will also enable you to develop a systematic approach to process modeling, control design and controller development and analysis. The course aims at: developing an appreciation for the importance of process models and process control in a chemical plant/process, to see the significance of these in real life and to relate the theory learnt to practice; developing an appreciation for the importance of process models in the development of control theory and practice.

**CBE 230/330 – Physical Chemistry of Macromolecules (3-0-3)**
Conformation and configuration; Solution Thermodynamics; Phase separation (theory and experimental aspects), polymer fractionation; Mechanisms and kinetics of phase separation; Miscibility of polymer blends and compatibilization; Micro phase separation and self-assembly; Rheology of polymer solutions; Viscosity of diluted and concentrated solutions, polymer gels; Rheology of polymer melts and composites, relevance for polymer processing; Amorphous state, glass-rubber transition, plasticizers; Elasticity and Viscoelasticity; Thermal analysis, dynamic mechanical analysis; Crystalline state, liquid-crystalline state; Mechanical properties.

**CBE 294 – Contemporary Topics in CBE (3-0-0)**
A course of current interest. Topics are not permanent and the content of the course will change to reflect recurring themes and topical interest. The content will be approved by the division.

**CBE 295 – Internship (6 credit)**
Master-level supervised research.

**CBE 297 – MS Thesis Research (variable credit)**
Master-level supervised research.

**CBE 298 – Graduate Seminar (non-credit)**
Master-level seminar focuses on special topics within the field.

**CBE 299 – Directed Research (variable credit)**
Master-level supervised research.
CBE 305 – Sustainable Engineering (3-0-3)
Engineers face growing pressure to incorporate sustainability objectives into their practice. In comparing two (2) products/designs it is often not apparent which one (1) is more sustainable. The course introduces concepts and method for determining the net environmental, economic, and social impacts of an engineering technology or process. Specific topics include life cycle assessment, cost/benefits analysis, energy auditing, materials accounting, and environmental assessment. These methods are examined and applied to current engineering issues such as global climate change, alternative-fueled vehicles, water and wastewater treatment, urban development, renewable energy (solar, wind, and biomass), and waste mitigation. Each student will be required to apply tools learned to assess the sustainability of a specific engineering system. This is a research-based course and is suitable for students interested in researching in-depth a particular topic. By the end of the course, students will have an awareness of analytical tools/resources for evaluating sustainability employing a systems perspective.

CBE 317 – Clean Fossil Fuels and Biofuels (3-0-3)
The different types of biofuels will be presented and discussed in this course. Topics include biomass feedstocks, first, second and third generation of biofuels, fuel from cellulose, catalytic conversion of biomass to liquid, energy balance of biofuels, biological production of hydrogen, biodiesel, microbial fuel cells. The Clean Fossil Fuel part of this course deals with gasification processes including IC&G power plants, Fischer Tropsch synthesis, clean coal technologies, desulfurization and carbon dioxide capture and storage.

CBE 336 – Membrane Science and Membrane Separation Processes (3-0-3)

CBE 390 – Special Topics: Chemical Kinetic Modelling and Simulation
Prerequisite: Advanced Reaction Engineering (CBE 203), Advanced Transport Process (CBE 202), Chemical Thermodynamics (CBE 201) or similar courses in other programs.
Understanding the oxidation and pyrolysis chemistry of hydrocarbons can aid in developing thermal conversion processes and in improving combustion applications. Optimization of engine performance requires an understanding of how a fuel’s molecular structure affects important combustion properties. The course presents the current state-of-the-art in comprehensive chemical kinetic modeling for gas-phase and liquid-phase reacting flows. The course will cover the development of large databases of chemical reaction pathways with associated kinetic rate parameters, as well as thermochemical and transport properties for all reactant, intermediate, and product species. First, the mapping out of detailed reaction pathways at the temperatures and pressures relevant to chemical reactors and combustion applications will be discussed. Next the art of assigning rate constants using chemical intuition and quantum chemical modeling will be covered. The determination of thermochemical and transport properties is achieved using both molecular modeling tools and empirical methods. The comprehensive models are then validated against data from well-defined experimental configurations using zero-dimensional and one-dimensional reacting flows whose physics can be simulated exactly. These models are finally employed to determine the thermal degradation and oxidation pathways relevant to the prediction of combustion performance in practical applications.

CBE 390B – Special Topics: Heterogeneous Catalysis
Catalysis in itself is a multi-disciplinary subject. It is considered to be part of physical chemistry, organometallic chemistry, surface sciences, or chemical engineering. In the world of the chemical engineer, catalysis is an enabling technology that is crucial for the application of chemistry in a modern society. This applies to the design and operation of modern plants, but also to the reduction of the environmental impact of mankind. This work treats the subject of catalysis from the point of view of the chemical engineer. This course focuses on heterogeneous chemocatalysis.
CBE 394 – Contemporary Topics in CBE (3-0-0)
A course of current interest. Topics are not permanent and the content of the course will change to reflect recurring themes and topical interest. The content will be approved by the division.

CBE 397 – Ph.D. Dissertation Research (variable credits)
Doctoral-level research. Leading to a formal written dissertation and oral defense.

CBE 398 – Graduate Seminar (non-credit)
Doctoral-level seminar focuses on special topics within the field.

CBE 399 – Directed Research (variable credits)
Doctoral-level supervised research.

6. 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 experience or to provide supplemental preparation to support students in their degree.

These are listed below:

6.1 English as a Second Language
These courses are designed to provide English language training for students who do not fully meet the University's English language entrance requirements. Students will be assigned courses based on their 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 coursework.

ESL 102 English as a Second Language II (3-0-0)
ESL 102 is a pre-English skills course for reading, listening, speaking and writing. The course continues to focus on building academic writing and grammar skills and also have 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 coursework.

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 coursework.

6.2 Enrichment Program – WEP Courses
The Winter Enrichment Program (WEP) takes place in January each year and is designed to broaden students’ horizon. WEP is an essential and core requirement of the degree programs at KAUST. Satisfactory completion of at least one WEP is required of all M.S. students as part of the completion of the degree requirements. Ph.D. students who did not receive their M.S. 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.
6.3 Innovation and Economic Development
Innovation and Economic Development (IED) courses are meant as a broadening experience and are not technical electives. Students should consult with their program to ensure credits can be applied toward their degree.

6.3.1 IED 210 – Technology Innovation and Entrepreneurship (3-0-3)
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 M.S. students as an elective and to Ph.D. students with permission of their academic advisors.

6.3.2 IED 220 – New Venture and Product Innovation Challenge (6-0-6)
This intensive 8 week module will give a small select group of students, the opportunity and time to develop a detailed value proposition for a product based on an existing piece of intellectual property. This technology may be from the KAUST IP portfolio or potentially from a corporate partner. As part of the program, students will be provided with an overview of key creative subjects related to new product development including; key aspects of intra/entrepreneurship, innovation management including new product development, Go-to-Market strategies as part of commercialization roadmaps, as well as general knowledge on relevant creativity and design thinking. It will also enable students to develop these skills in a full time, heavily mentor-led and experiential learning environment that includes regular pitches and feedback from a wide range of pre-selected mentors from both inside and outside KAUST including international experts.

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>C+</td>
<td>2.33</td>
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<tr>
<td>C</td>
<td>2.00</td>
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<tr>
<td>C-</td>
<td>1.67</td>
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<td>D+</td>
<td>1.33</td>
</tr>
<tr>
<td>D</td>
<td>1.00</td>
</tr>
<tr>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>F</td>
<td>0.00</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete</td>
</tr>
<tr>
<td>IP</td>
<td>In-Progress</td>
</tr>
<tr>
<td>W</td>
<td>Withdrew</td>
</tr>
<tr>
<td>S</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>WF</td>
<td>Withdrew-Failed</td>
</tr>
</tbody>
</table>

7.1 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 Failing (F) 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.

7.2 In-Progress Grades
Thesis Research (297) or Dissertation Research (397) should be graded as In-Progress (IP) or Unsatisfactory (U) for each semester. 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.

7.3 Research and Seminar Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>GPA Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>297</td>
<td>Thesis Research</td>
<td>Either ‘IP’ or ‘U’</td>
</tr>
<tr>
<td>397</td>
<td>Dissertation Research</td>
<td>Either ‘IP’ or ‘U’</td>
</tr>
<tr>
<td>295/395</td>
<td>Summer Internship</td>
<td>Either ‘S’ or ‘U’</td>
</tr>
<tr>
<td>298/398</td>
<td>Seminar</td>
<td>Either ‘S’ or ‘U’</td>
</tr>
<tr>
<td>299/399</td>
<td>Directed Research</td>
<td>Either ‘S’ or ‘U’</td>
</tr>
</tbody>
</table>

8. 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 categories of decreasing levels of Academic Performance:

- Good Standing
- Academic Notice
- Academic Probation
- Academic Dismissal

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.

**Cumulative Assessment**

<table>
<thead>
<tr>
<th>GPA</th>
<th>Academic Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.00-4.00</td>
<td>Good Standing</td>
</tr>
<tr>
<td>2.67-2.99</td>
<td>Academic Notice</td>
</tr>
<tr>
<td>2.33-2.66</td>
<td>Academic Probation</td>
</tr>
<tr>
<td>Below 2.33</td>
<td>Academic Dismissal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S/U Performance</th>
<th>Academic Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 Credits</td>
<td>GPA Standing</td>
</tr>
<tr>
<td>3-5 Credits</td>
<td>GPA Standing less one category</td>
</tr>
<tr>
<td>6-8 Credits</td>
<td>GPA Standing less two categories</td>
</tr>
<tr>
<td>9+ Credits</td>
<td>Academic Dismissal</td>
</tr>
</tbody>
</table>

**Semester Assessment (Registered in 12 Credits)**

<table>
<thead>
<tr>
<th>Credits Earned</th>
<th>Academic Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>12+ Credits</td>
<td>GPA Standing</td>
</tr>
<tr>
<td>9-11 Credits</td>
<td>GPA Standing less one category</td>
</tr>
</tbody>
</table>
6-8 Credits GPA Standing less two categories
0-5 Credits Academic Dismissal

**Semester Assessment (Registered in 9 Credits)**

<table>
<thead>
<tr>
<th>Credits Earned</th>
<th>Academic Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9+ Credits</td>
<td>GPA Standing</td>
</tr>
<tr>
<td>6-8 Credits</td>
<td>GPA Standing less one category</td>
</tr>
<tr>
<td>3-5 Credits</td>
<td>GPA Standing less two categories</td>
</tr>
<tr>
<td>0-2 Credits</td>
<td>Academic Dismissal</td>
</tr>
</tbody>
</table>

**Summer Session Assessment**

<table>
<thead>
<tr>
<th>Credits Earned</th>
<th>Academic Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Credits</td>
<td>GPA Standing</td>
</tr>
<tr>
<td>3-5 Credits</td>
<td>GPA Standing less one category</td>
</tr>
<tr>
<td>0-2 Credits</td>
<td>GPA Standing less two categories</td>
</tr>
</tbody>
</table>

**Definitions:**

**Good Standing**
Student is making satisfactory academic progress towards the degree.

**Academic Notice**
Student is not making satisfactory progress towards the degree. A student placed on Academic Notice will be monitored in subsequent semesters to ensure satisfactory progress towards 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 towards the degree. A student placed on Academic Probation will be monitored in subsequent semesters to ensure satisfactory progress towards 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 towards 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 Unsatisfactory (U) Grades, a Faculty Member giving a ‘U’ Grade for a course involving six or more credits must obtain concurrency 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 six 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 3.0. A student not in Good Standing due to 'U' Grades may return to Good Standing by completing at least twelve credits during the subsequent semester with no 'U' grades and a semester GPA of at least 3.0 in traditionally graded courses.

9. Transferring Credits
A student may petition to transfer graduate credits from KAUST or another University upon approval of the Program Director and the Registrar.

Each student’s application will be reviewed on a case-by-case basis.

The following rules apply:
• 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.
• Up to three graduate-level courses not to exceed nine credits may be transferred for credit. Courses already used for another degree cannot be used as transferred credits.
• 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 towards meeting the major track requirement if their equivalence is confirmed by the Program Director.

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.

10. 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 Withdraw (W). 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 Director and the Registrar.
11. 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.