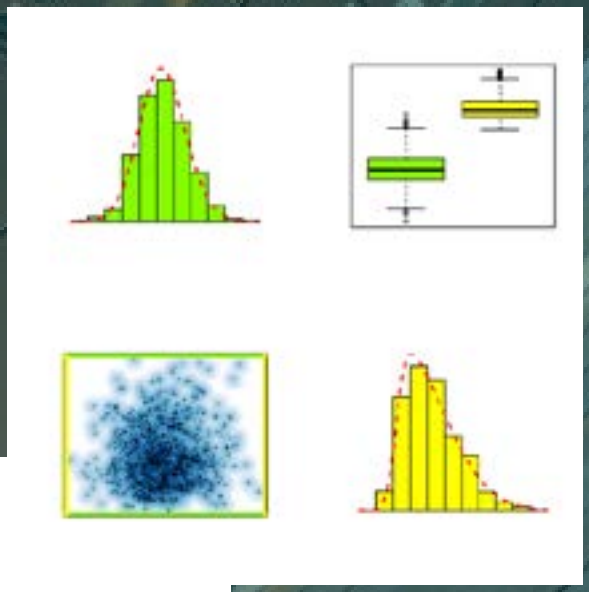
Statistics Program



Program Guide
2017-2018

Table of Contents

1. Aims and Scope

The Statistics (STAT) program educates students to analyze and model complex real-world problems arising in modern Statistical Data Science. Two degrees are offered: the M.S. degree (under either a Thesis or a Non-Thesis option) and the Ph.D. degree. Admission to one degree does not guarantee transfer to another. All students in the M.S. and Ph.D. programs are guided by a Faculty Advisor to develop their program of study.

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 admitted students are required to take a written assessment exam when they arrive on Campus. The exam will focus on mathematics and basic sciences. 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.

3.1 M.S. Course Requirements

- Core Courses
- Elective Courses
- 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 (12 credits)

Students enrolled toward the M.S. degree are required to complete the following 12 credits of core courses:

- STAT 220: Probability and Statistics
- STAT 230: Linear Models
- STAT 240: Bayesian Statistics
- STAT 250: Stochastic Processes

The core courses are designed to cover the basic skills and competence that are expected of any student holding an advanced degree. These 4 courses are part of the Ph.D. Qualifying Exam.

3.1.2 Elective Courses (12 credits)

This portion of the degree is 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. Students enrolled toward the M.S. degree are required to complete 12 credits of elective courses from the STAT, AMCS, CS, EE, ErSE list in Section 5.

3.1.3 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 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:

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: 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.

It should be noted that a student may also combine courses to satisfy the six 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 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 four 300-level courses of which at least two must be from the STAT 300 level course list.
- 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 enroll 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.

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: 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 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 a 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: CLICK HERE

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 one 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 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.

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.

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 the position).

It is the responsibility of the student to inform the Dissertation Defense Committee of his/her progress, meet deadlines for submitting Graduation Forms, the defense date, etc. It is expected that the student submits his/her dissertation at least six weeks prior to 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 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 prior to the defense date.

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 one month after the defense date, unless the committee unanimously agrees to reduce it. The deadline to complete the retake is one month 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 to the Registrar's Office,

5. Program Courses and Descriptions

5.1 STAT Program

STAT 210. Applied Statistics and Data Analysis (3-0-3) (Equivalent to AMCS 110)

Prerequisites: Advanced and multivariate calculus. For students outside STAT wishing to obtain an introduction to statistical method. No degree credits for STAT or AMCS majors.
Provides fundamentals of probability and statistics for data analysis in research. Topics include data collection, exploratory data analysis, random variables, common discrete and continuous distributions, sampling distributions, estimation, confidence intervals, hypothesis tests, linear regression, analysis of variance, two-way tables and data analysis using statistical software.

STAT 220. Probability and Statistics (3-0-3)
Prerequisites: Advanced and multivariable calculus, linear algebra.
This course is an introduction to probability and statistic for students in statistics, applied mathematics, electrical engineering and computer science. This core course is intended to provide a solid general background in probability and statistics that will form the basis of more advanced courses in statistics. Content: Probability; Random variables; Expectation; Inequalities; Convergence of random variables. Statistical inference: Models, statistical inference and learning; Estimating the CDF and statistical functionals; The bootstrap; Parametric inference; Hypothesis testing and p-values; Bayesian inference; Statistical decision theory. Statistical models and methods: Multivariate models; Inference about independence.

STAT 230. Linear Models (3-0-3)
Prerequisites: Advanced and multivariable calculus, linear algebra.
This course is an introduction to the formulation and use of the general linear model, including parameter estimation, inference and the use of such models in a variety of settings. Emphasis will be split between understanding the theoretical formulation of the models and the ability to apply the models to answer scientific questions.

STAT 240. Bayesian Statistics (3-0-3)
Prerequisites: Advanced and multivariable calculus, linear algebra.
This course will provide an introduction to the theory and methods of Bayesian statistics. In Bayesian statistics, one's inference about parameters and hypotheses are updated, using Bayes rule, as evidence/data accumulates. We will discuss the theory and how to do Bayesian data analysis. Computational aspects will also be discussed, and we will make use of R, JAGS/Stan, to do the inference.

STAT 250. Stochastic Processes (3-0-3)
Prerequisites: Advanced and multivariate calculus, linear algebra.
Introduction to probability and random processes. Topics include probability axioms, sigma algebras, random vectors, expectation, probability distributions and densities, Poisson and Wiener processes, stationary processes, autocorrelation, spectral density, effects of filtering, linear least-squares estimation and convergence of random sequences.

STAT 260. Nonparametric Statistics (3-0-3)
Prerequisites: AMCS 241, STAT 220, 230, 240, or permission of instructor.
This course is an introduction to nonparametric function estimation. Topics include kernels, local polynomials, Fourier series, spline methods, wavelets, automated smoothing methods, cross-validation, large sample distributional properties of estimators, lack-of-fit tests, semiparametric models, recent advances in function estimation.

STAT 295. Internship

STAT 297. Thesis Research (variable credit)

STAT 298. Graduate Seminar (variable credit)
Master-level seminar focusing on special topics within the field.

STAT 299. Directed Research (variable credit)
Prerequisite: Sponsorship of advisor and approved prospectus. Master-level supervised research.

STAT 310. Environmental Statistics (3-0-3)
Prerequisites: STAT 220, 230, 240, 250.

This course is an introduction to statistical methods for environmental data, with a focus on applications. Learn, discuss and apply statistical methods to important problems in environmental sciences. Topics include sampling, capture-recapture methods, regression, toxicology, risk analysis, time series, spatial statistics and environmental extremes.

STAT 320. Advanced Statistical Inference (3-0-3)

Prerequisite: STAT 220, 230, 240, 250.
Statistical inference in a wide range of problems at an advanced level. It covers the general theory of estimation, tests and confidence intervals by deriving in particular the asymptotic properties of the maximum likelihood estimator and the likelihood ratio, Wald and scores tests (and their generalizations) and the calculus of M-estimation. Selected modern topics such as Bayesian and permutation inference, rank tests, the jackknife and the bootstrap.

STAT 330. Multivariate Statistics (3-0-3)

Prerequisite: STAT 220, 230, 240, 250.
An introduction to multivariate statistical models, well balancing three equally important elements: the mathematical theory, applications to real data, and computational techniques. Traditional multivariate models and their recent generalizations to tackle regression, data reduction and dimensionality reduction, classification, predictor and classifier instability problems. Tools for analyzing unstructured multivariate data.

STAT 340. Computational Statistics (3-0-3)

Prerequisites: STAT 220, 230, 240, 250.
In this course we will discuss computational techniques for Bayesian inference, including exact recursions for hidden Markov chains, Gaussian Markov random fields and its applications in latent Gaussian models, inference for latent Gaussian models using Markov chain Monte Carlo using block-sampling and auxiliary variables, and deterministic approximations using nested Laplace approximations. We will also discuss how to construct Markov approximations of continuous time and space processes, using finite element methods.

STAT 350. Time Series Analysis (3-0-3)

Prerequisites: STAT 220, 230, 240, 250.
This course will cover models for analyzing time series data from both time and frequency domain perspectives. The emphases will be a balance of theory and applications. The course is intended to prepare the student for methodological research in this area and to train the students on cutting-edge data analytic methods for time series. The primary topics include ARMA/ARIMA models; spectral and coherence estimation; transfer function modeling; and classification and discrimination of time series. The course will conclude with advanced topics on non-stationary time series, time-frequency analysis and state-space models.

STAT 360. Functional Data Analysis (3-0-3)

Prerequisites: STAT 220, 230, 240, 250, 260.
This course will be a broad overview of the analysis of data of multiple curves that may be considered to arise from smooth functions. The course is intended to prepare the students for methodological research in this area and to train them on cutting-edge methods for analyzing functional data. The primary topics covered include visualization of curves and data exploration, nonparametric smoothing (including splines and wavelets), functional principal components analysis, mixed effects models and functional mixed effects models.

STAT 370. Spatial Statistics (3-0-3)

Prerequisite: STAT 220, 230, 240, 250. Recommended: STAT 320.
This course is an introduction to the concepts and applications of spatial statistics. It covers the following topics. Geostatistical data: Random Fields; Variograms; Covariances; Stationarity; Non-stationarity; Kriging; Simulations. Lattice data: Spatial regression; SAR, CAR, QAR, MA models; Geary/Moran indices. Point

patterns: Point processes; K-function; Complete spatial randomness; Homogeneous/inhomogeneous processes and Marked point processes.

STAT 380. Statistics of Extremes (3-0-3)
Prerequisites: STAT 220, 230, 240, 250. Recommended: STAT 320, 370.
This advanced statistics course aims at providing a rather deep understanding of Extreme-Value Theory results, models, and methods, as well as some experience in the practical application of these tools to real data using the statistical software R. Theoretical and practical aspects will be covered. Topics covered include (a) Univariate Extreme-Value Theory: Extremal-Types Theorem; GEV distribution; return levels; Domains of attraction; Threshold-based methods; GPD distribution; Point process representation; r-largest order statistics approach; Likelihood inference; Modelling of non-stationarity; Dependent time series; Clustering and declustering approaches. (b) Multivariate Extreme-Value Theory: Modelling of componentwise maxima; Spectral representation; Parametric models; Dependence measures; Asymptotic dependence/independence; Threshold methods; Likelihood-based inference. (c) Spatial Extremes: Gaussian processes; correlation functions; Max-stable processes and models.

STAT 395. Internship (variable credit)

STAT 397. Dissertation Research (variable credit)

STAT 398. Graduate Seminar (variable credit)

STAT 399. Directed Research (variable credit)
Prerequisite: Sponsorship of advisor. Supervised research.

5.2 AMCS Program
Courses from the AMCS program can be taken as elective courses as agreed with the academic advisor. Relevant AMCS courses from faculty affiliated to the STAT program are listed below.

AMCS 206. Applied Numerical Methods (3-0-3)
Prerequisites: Advanced and multivariate calculus. No degree credit for STAT majors.
A fast-paced one-semester survey of numerical methods for engineers and scientists, with an emphasis on technique and software. Computer representation of numbers and floating point errors. Numerical solution of systems of linear and nonlinear algebraic equations, interpolation, least squares, quadrature, optimization, nonlinear equations, approximation of solutions of ordinary and partial differential equations. Truncation error, numerical stability, stiffness, and operation and storage complexity of numerical algorithms.

AMCS 211. Numerical Optimization (3-0-3)
Prerequisites: Advanced and multivariate calculus and elementary real analysis.
Solution of nonlinear equations. Optimality conditions for smooth optimization problems. Theory and algorithms to solve unconstrained optimization; linear programming; quadratic programming; global optimization; general linearly and non-linearly constrained optimization problems.

AMCS 308. Stochastic Methods in Engineering (3-0-3)
Prerequisites: Basic probability, numerical analysis, and programming.
Review of basic probability; Monte Carlo simulation; state space models and time series; parameter estimation, prediction and filtering; Markov chains and processes; stochastic control; Markov chain Monte Carlo. Examples from various engineering disciplines.

AMCS 336. Numerical Methods for Stochastic Differential Equations (3-0-3)
Prerequisites: knowledge of basic probability, numerical analysis, and programming.
Brownian motion, stochastic integrals and diffusions as solutions of stochastic differential equations.

Functionals of diffusions and their connection with partial differential equations. Weak and strong approximation, efficient numerical methods and error estimates. Jump diffusions.

AMCS 350. Spectral Methods for Uncertainty Quantification (3-0-3)

Prerequisites: Consent of instructor.
This course is an advanced introduction to uncertainty propagation and quantification in model-based simulations. Examples are drawn from a variety of engineering and science applications, emphasizing systems governed by ordinary or partial differential equations. The course will emphasize a probabilistic framework and will survey classical and modern approaches, including sampling methods and techniques based on functional approximations.

5.3 CS Program

Courses from the CS program can be taken as elective courses as agreed with the academic advisor. Relevant CS courses from faculty affiliated to the STAT program are listed below.

CS 220. Data Analytics (3-0-3)

Prerequisites: Students who take this course are assumed to be familiar with algorithm runtime analysis (e.g., big O notations), probability theory (e.g., Gaussian distribution and conditional probability), and programming language (e.g., MATLAB or C++).
The course covers basic concepts and algorithms for artificial intelligence, data mining and machine learning. The main contents are: artificial intelligence (task environment, performance measure, and problem solving by searching), data mining (data and patterns, summary statistics and visualization, unsupervised feature selection, and supervised feature selection), and machine learning (cross validation and supervised learning).

CS 229. Machine Learning (3-0-3)

Prerequisites: linear algebra and basic probability and statistics. Familiarity with artificial intelligence recommended.
Topics: linear and non-linear regression, nonparametric methods, Bayesian methods, support vector machines, kernel methods, Artificial Neural Networks, model selection, learning theory, VC dimension, clustering, EM, dimensionality reduction, PCA, SVD and reinforcement learning.

CS 320. Probabilistic Graphical Models (3-0-3)

Prerequisites: Students are expected to be familiar with probability theory, algorithms, machine learning and programming language.
This is a research-oriented graduate-level course on PGMs. The course will cover two main types of PGMs, i.e., directed PGMs and undirected PGMs. For directed PGMs we will cover Bayesian networks with one of its most important variants, hidden Markov models. For undirected PGMs, we will cover Markov networks (or Markov random fields) with one of its most important variants, conditional random fields. Therefore, the course contains four (4) parts: Bayesian networks, hidden Markov models, Markov networks and conditional random fields. In each part, motivations, ideas, definitions, examples, properties, representations, inference algorithms, and applications for the corresponding PGM will be introduced. This is done through lectures by the instructor. In the next two lectures, the students will present recommended research papers and lead in-class discussions. The last lecture of each part will be an in-class quiz, the purpose of which is not to judge their ability of calculation or memorization, but to push them to think more and deeper about the contents introduced in lectures. The course will finish by a final exam lecture and two project presentation lectures. The projects are expected to be a real application or a serious theoretical work of PGMs on real research problems.

CS 340. Computational Methods in Data Mining (3-0-3)

Prerequisites: Probability and scientific computing.
Focus is on very-large-scale data mining. Topics include computational methods in supervised and unsupervised learning, association mining and collaborative filtering. Individual or group applications-oriented programming project. 1 credit without project; 3 credits requires final project.

5.4 EE Program

Courses from the EE program can be taken as elective courses as agreed with the academic advisor. Relevant EE courses from faculty affiliated to the STAT program are listed below.

EE 242. Digital Communications and Coding (3-0-3)

Prerequisite: Probability and Random variables/Basic knowledge of linear Algebra.
Digital transmission of information across discrete and analog channels. Sampling; quantization; noiseless source codes for data compression: Huffman's algorithm and entropy; block and convolutional channel codes for error correction; channel capacity; digital modulation methods: PSK, MSK, FSK, QAM; matched filter receivers. Performance analysis: power, bandwidth, data rate and error probability.

EE 251. Digital Signal Processing and Analysis (3-0-3)

Prerequisite: Adequate background in linear algebra, multivariate optimization, signals and systems, Fourier series, continuous-time Fourier transform (CTFT), discrete-time Fourier transform (DTFT), z-transform and basics of digital filtering.
Introduction to digital signal processing of continuous and discrete signals. The family of Fourier transforms including the discrete Fourier transform (DFT). Development of the fast Fourier transform (FFT). Signal sampling and reconstruction. Design and analysis of digital filters. Correlation and spectral estimation.

EE 252. Estimation, Filtering and Detection (3-0-3)

Prerequisite: AMCS 241
Principles of estimation, linear filtering and detection. Estimation: linear and nonlinear minimum mean squared error estimation and other strategies. Linear filtering: Wiener and Kalman filtering. Detection: simple, composite, binary and multiple hypotheses. Neyman-Pearson and Bayesian approaches.

EE 341. Information Theory (3-0-3)

Prerequisite: AMCS 241 or consent of instructor.
The concepts of source, channel, rate of transmission of information. Entropy and mutual information. The noiseless coding theorem. Noisy channels, the coding theorem for finite state zero memory channels. Channel capacity. Error bounds. Parity check codes. Source encoding.

EE 353. Adaptive Signal Processing (3-0-3)

Prerequisite: AMCS 241, EE 251.
The Theory and applications of adaptive filtering in systems and signal processing. Iterative methods of optimization and their convergence properties: transversal filters; LMS (gradient) algorithms. Adaptive Kalman filtering and least-squares algorithms. Specialized structures for implementation (e.g., least-squares lattice filters, systolic arrays). Applications to detection, noise canceling, speech processing and beam forming.

EE 354. Introduction to Computer Vision (3-0-3)

Prerequisite: Multivariable calculus and linear algebra.
The course gives an introductory overview of concepts (e.g. photometric and multi-view stereoscopy, epipolar geometry, interest point detection and description), problems (e.g. image-to-image matching and alignment, image classification, clustering/ segmentation, face recognition) and methodology (e.g. linear/nonlinear image filtering, RANSAC for robust fitting, discriminative and generative models) in the field of computer vision. It is intended to provide a solid background for students, who are planning to do research in visual computing.

EE 392A. Compressed Sensing (3-0-3)

Prerequisite: Consent of instructor.
This is a special topics course.

EE 392B. Statistical Learning With Application to Computer Vision (3-0-3)

Prerequisite: AMCS 241 or consent of instructor.

This is a research (advanced topics) course in computer vision and statistical learning. The goal of computer vision is to produce an artificial machine that is able to perform visual tasks in much the same way that humans are able to understand and act on a scene from image data. We will be particularly focus on the problem of visual recognition (automatic recognition of objects from images). Although there have been recent successes to this problem, a machine that performs at the level of humans remains elusive. Furthermore, research in visual recognition seems to be in the "wild west", that is, many diverse and sometimes ad-hoc techniques are used and the fundamentals are not well understood. This course aims to build foundations through the framework of statistical learning theory. Statistical learning theory deals with the problem of learning and generalizing from examples. After introduction to some basic foundations, we will study various attempts at building a theory for visual recognition that exist in the literature. We will study not-so recent as well as the most recent attempts/concepts of source, channel, rate of transmission of information. Entropy and mutual information. The noiseless coding theorem. Noisy channels, the coding theorem for finite state zero memory channels. Channel capacity. Error bounds. Parity check codes. Source encoding.

5.5 ErSE Program

Courses from the ErSE program can be taken as elective courses as agreed with the academic advisor. Relevant ErSE courses from faculty affiliated to the STAT program are listed below.

ErSE 213. Inverse Problems (3-0-3)

Prerequisite: Linear algebra, probability theory, multivariate calculus, strong programming skills in Matlab. This course will introduce the principles of Inverse theory and data assimilation with applications to geophysics and other sciences. Both deterministic and stochastic viewpoints will be covered. Subjects studied will include topics such as least squares, generalized inverses, regularization, Kalman filter, adjoint method, etc. Techniques for solving nonlinear inverse and data assimilation problems will be also covered.

ErSE 253. Data Analysis in Geosciences (3-0-3)

Prerequisite: Undergraduate statistics and some Matlab programming experience.

Processing of multidimensional data, spatial statistics including variogram, covariance analysis and modeling, multipoint estimation, spatial interpolation including statistical methods (kriging) and dynamical methods (Kalman filter), uncertainty assessment, cross validation, multivariate analysis including principal component analysis and canonical analysis.

ErSE 353. Data Assimilation (3-0-3)

Prerequisite: ErSE 253

Data assimilation (DA) is the process of optimally combining observations with the predictions of numerical models to make the best possible estimate of the time-varying state of the phenomenon under study. In particular, DA forms a basis for the forecast of the future and reanalysis of the past. In the last 20 years, DA has gained center stage in many computational disciplines at both universities and research centers starting with geoscience applications. DA is a subject that requires a balanced understanding of statistics and applied mathematics as well as the relevant geophysical systems. This course introduces the concepts of data assimilation derived in the context of the statistical estimation theory and the deterministic inverse theory. The course covers a variety of assimilation methods for numerical weather prediction, ocean forecasting, reservoir history matching, 4D seismic inversion, and hydrology assimilation. These include, but not limited to, optimal interpolation and threedimentsonal variational (3D VAR) methods, Kalmanfiltering, smoothing and fourdimensional variational (4DVAR) methods, lowrank Kalman filtering, ensemble Kalman filtering and ensemble square-root filters. Advanced topics based on the fully nonlinear Bayesian estimation theory, such as the particle filter and the GaussianMixture filters, and the stateofart data assimilation systems will also be discussed.

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 thirteen 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 Session to complete (18 months). The Degree allows flexibility for Internships, Research and Academics.
- 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.

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)
- Statistics (STAT)

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 or 300 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 and/or mandatory Courses; 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 on 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 Sessions and Winter Enrichment Program (WEP) is mandatory.
- Summer Session courses are credit bearing and apply towards the degree.
- WEP Courses do not earn credit towards the degree.

At least 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.

View a list of Faculty and their affiliations CLICK 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 twelve credit hours completed at the conclusion of the first Semester and be registered in at least twelve 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 timeframe, not to exceed the end of 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: CLICK HERE

Thesis Defense

The evaluation of M.S. Thesis credits comprises of a Satisfactory (S) or Unsatisfactory (U) 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 to the defense date.

Thesis Defense Committee

Evaluation of satisfactory completion of M.S. Thesis Work is performed by the 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 include 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.

7.2.2 Non-Thesis Option

Students wishing to pursue the non-thesis options must complete a minimum of six 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. Courses: Courses numbered at the 300 level.

It should be noted that a student may also combine courses to satisfy the six 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 Chair 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 requirements to those listed above.

View a list of Faculty and their Affiliations: CLICK HERE

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 Defense of the Dissertation Proposal.
- Dissertation phase with a final Defense milestone.

8.2 Ph.D. Degree Requirements

There is a minimum residency requirement (enrolment period at KAUST) of two and a half years for students entering with a M.S. Degree, three and a half years for students entering with a B.S. Degree. Qualification and advancement to candidacy are contingent upon: successfully passing Ph.D. coursework, designating a Research Advisor, successfully passing a Qualifying Exam and writing and orally defending a research proposal. Possible outcomes include Pass, Failure with complete Retake, Failure 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 one year after passing of qualifying exam; two years for students entering with a B.S. Degree.

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

The required coursework is outlined below and refer to Paragraph 5 (Program Courses and Descriptions) for specific program course requirements:

M.S. Degree

- Mandatory and/or Core courses (depending on program).
- Elective courses

Ph.D. Degree

- Two or more courses (six credits of coursework) at 300 level

- Graduate Seminar (if required by the Program)

Students entering the program with a relevant M.S. Degree from another institution may transfer coursework towards the requirements of the M.S. Degree upon approval of the Program Chair.

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

Students entering with a B.S. degree from another institution may transfer in up to nine credits of graduate level coursework towards the above requirements upon approval of the Program Chair. In addition, students entering with a B.S. Degree 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. program, there may be additional courses required as 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 see: **CLICK HERE**

Passing the qualification phase is achieved by acceptance by all the committee members of the written proposal and 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 (six 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 fulltime workload for Ph.D. students is considered to be twelve credit hours per semester (courses and 397) and six credit hours in summer (397 only). There is a minimum residency requirement (enrolment period at KAUST) of two and a half years for students entering with an M.S. Degree and three and a half years for students entering with a B.S. Degree. Ph.D. students typically complete the degree in five 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 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: CLICK HERE

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 Conditions:** The student passes the exam but 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 one month from the date of the first defense.
- **Failure:** The student does not pass the exam and the dissertation is not accepted therefore the degree is not awarded and the student is dismissed from the University.

8.6 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 on 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 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. CLICK HERE

9. Program Descriptions

The M.S. and Ph.D. Degree program requirements listed above represent general university-level expectations. The specific details of each degree's 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 = 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.

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

These are listed below:

9.1.1 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.

ESL101 English as a Second Language I (6-0-0):

ESL101 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.

ESL102 English as a Second Language II (3-0-0):

ESL102 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.

ESL103 English as a Second Language III (3-0-0)

ESL103 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.

9.1.2 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 require to satisfactorily complete at least one WEP. To satisfy this mandatory requirement, full participation must occur within a single WEP period.

9.2 Innovation and Economic Development

9.2.1 IED 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.

9.2.2 IED220 – New Venture and Product Innovation Challenge (6-0-6)

This is an experiential, industry mentor-led program: This course will enable students to 'learn-by-doing' through the development of 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 products and/or new venture. The process will include students learning how to creatively view technology opportunities; the identification and assessment of opportunity and the structuring and packaging of a validated commercial idea. In addition, students will learn key skills including the development of real-world strategy, planning and teambuilding, 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 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.

10.2 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.

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	=	Summer Internship	-	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 towards 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 categories of decreasing levels of Academic Performance:

- Good Standing
- Academic Notice

- Academic Probation
- 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
9-11 Credits	GPA Standing less one category
6-8 Credits	GPA Standing less two categories
0 -4 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 categories
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 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.

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 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 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 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 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.