# MATH M37DS: PROBABILITY & STATISTICS FOR DATA SCIENCE

**Originator**
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**Co-Contributor(s)**

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**College**
Moorpark College

**Discipline (CB01A)**
MATH - Mathematics

**Course Number (CB01B)**
M37DS

**Course Title (CB02)**
Probability & Statistics for Data Science

**Banner/Short Title**
Prob & Stats - Data Science

**Credit Type**
Credit

**Honors**
No

**Start Term**
Spring 2022

**Catalog Course Description**
Introduces probability and statistics with linear algebra for data science. Emphasizes probability distributions, inferential statistics, and linear models as well as the ethical use of data. Covers applications of statistical programming for data science.

**Taxonomy of Programs (TOP) Code (CB03)**
1701.00 - Mathematics, General

**Course Credit Status (CB04)**
D (Credit - Degree Applicable)

**Course Transfer Status (CB05) (select one only)**
A (Transferable to both UC and CSU)

**Course Basic Skills Status (CB08)**
N - The Course is Not a Basic Skills Course

**SAM Priority Code (CB09)**
E - Non-Occupational

**Course Cooperative Work Experience Education Status (CB10)**
N - Is Not Part of a Cooperative Work Experience Education Program

**Course Classification Status (CB11)**
Y - Credit Course

**Educational Assistance Class Instruction (Approved Special Class) (CB13)**
N - The Course is Not an Approved Special Class

**Course Prior to Transfer Level (CB21)**
Y - Not Applicable

**Course Noncredit Category (CB22)**
Y - Credit Course

**Funding Agency Category (CB23)**
Y - Not Applicable (Funding Not Used)

**Course Program Status (CB24)**
1 - Program Applicable

**General Education Status (CB25)**
B - Satisfies Math/Quantitative Reasoning req (CSUGE-B B4, IGETC 2, or 4-yr)

**Support Course Status (CB26)**
N - Course is not a support course

**Field trips**
Will not be required

**Grading method**
(L) Letter Graded

**Alternate grading methods**
(O) Student Option- Letter/Pass
(P) Pass/No Pass Grading

**Does this course require an instructional materials fee?**
No

**Repeatable for Credit**
No

**Is this course part of a family?**
No

## Units and Hours

**Carnegie Unit Override**
No

## In-Class

**Lecture**
**Minimum Contact/In-Class Lecture Hours**
52.5
**Maximum Contact/In-Class Lecture Hours**
52.5

**Activity**
**Minimum Contact/In-Class Activity Hours**
0
**Maximum Contact/In-Class Activity Hours**
0

**Laboratory**
**Minimum Contact/In-Class Laboratory Hours**
0
**Maximum Contact/In-Class Laboratory Hours**
0

## Total in-Class

**Total in-Class**
**Total Minimum Contact/In-Class Hours**
52.5
**Total Maximum Contact/In-Class Hours**
52.5

## Outside-of-Class

**Internship/Cooperative Work Experience**

**Paid**
**Minimum Paid Internship/Cooperative Work Experience Hours**
0
**Maximum Paid Internship/Cooperative Work Experience Hours**
0

**Unpaid**
**Minimum Unpaid Internship/Cooperative Work Experience Hours**
0
**Maximum Unpaid Internship/Cooperative Work Experience Hours**
0

## Total Outside-of-Class

**Total Outside-of-Class**
**Minimum Outside-of-Class Hours**
105
**Maximum Outside-of-Class Hours**
105

## Total Student Learning

**Total Student Learning**
**Total Minimum Student Learning Hours**
157.5
**Total Maximum Student Learning Hours**
157.5

**Minimum Units (CB07)**
3
**Maximum Units (CB06)**
3

**Prerequisites**

CS M10DS and MATH M25C and MATH M31 and MATH M15 pr MATH M15H

**Advisories on Recommended Preparation**

MATH M21 or MATH M35

## Entrance Skills

**Entrance Skills**

CS M10DS and MATH M25C and MATH M31 and MATH M15 OR MATH M15H

**Prerequisite Course Objectives**

CS M10DS-deploy basic statistical concepts that data scientists need to know like measure of central tendency, percentiles, probability distributions, dimensionality reduction, over and under sampling, and Bayesian statistics.
CS M10DS-distinguish fundamental aspects of machine learning algorithms.
CS M10DS-frame problems to enable suitable solutions via machine learning.
CS M10DS-train (process of modeling) and evaluate machine learning models.
CS M10DS-deploy machine learning models into operations.
CS M10DS-build prediction, categorization and recommendation APIs (application program interface).
CS M10DS-deploy tools for collaborative and social programming.
CS M10DS-generate high-quality graphical and textual results.
CS M10DS-find similar items, pattern discovery (Neural Network and Machine Learning), mining data streams, frequent itemsets, link analysis, and mining graph data.
CS M10DS-distinguish supervised machine learning algorithms like k nearest neighbors, decision trees, Naive Bayes, regression, and support vector machines.
CS M10DS-distinguish unsupervised machine learning (data mining) algorithms like classification, k-means clustering, evaluation of clustering, hierarchical clustering, spectral (partitional) clustering, and Neural networks.
MATH M15-summarize data graphically by displaying data using methods from descriptive statistics, interpreting data in tables graphically by using histograms, frequency distributions, box-and whisker plots (five-number summary); find measures of central tendency for data sets: mean, median, and mode; find measures of variation for data sets: standard deviation, variance, and range; determine relative positions of data and distinguish among scales of measurements and their implications; distinguish between populations and samples; and identify the standard method of obtaining data and the advantages and disadvantages of each.
MATH M15-find simple probabilities and probabilities of compound events and compute probabilities using the complement, discrete probability distributions; apply concepts of sample space, and the binomial probability distribution.
MATH M15-standardize a normally distributed random variable; use normal distribution tables to find probabilities for normally distributed random variables and the t-distribution; use the Central Limit Theorem to find probabilities for sampling distributions.
MATH M15-construct and interpret confidence intervals for proportions and means.
MATH M15-identify the basics of hypothesis testing and perform hypothesis testing for means, proportions and standard deviations from one population, and difference of means and proportions from two populations, including finding and interpreting p-value and examining Type I and Type II error.
MATH M15-find linear least-squares regression equations for appropriate data sets; graph least-square regression equations on the scatter plot for the data sets; find and apply the coefficient of correlation.
MATH M15-use the chi-square distribution to test independence and to test goodness of fit.
MATH M15-conduct a one-way Analysis of Variance (ANOVA) hypothesis test.
MATH M15-select an appropriate hypothesis test and interpret the result using p-value; use appropriate statistical technique to analyze and interpret applications based on data related to business, social sciences, psychology, life sciences, health sciences or education, and interpret results using technology-based statistical analysis.
MATH M15H-summarize data graphically by displaying data using methods from descriptive statistics, interpreting data in tables graphically by using histograms, frequency distributions, box-and whisker plots (five-number summary); find measures of central tendency for data sets: mean, median, and mode; find measures of variation for data sets: standard deviation, variance, and range; determine relative positions of data and distinguish among scales of measurements and their implications; distinguish between populations and samples; and identify the standard method of obtaining data and the advantages and disadvantages of each.
MATH M15H-find simple probabilities and probabilities of compound events and compute probabilities using the complement, discrete probability distributions; apply concepts of sample space, and the binomial probability distribution. Honors: And the Poisson distribution.
MATH M15H-standardize a normally distributed random variable; use normal distribution tables to find probabilities for normally distributed random variables and the t-distribution; use the Central Limit Theorem to find probabilities for sampling distributions.
MATH M15H-construct and interpret confidence intervals for proportions and means.
MATH M15H-identify the basics of hypothesis testing and perform hypothesis testing for means, proportions and standard deviations from one population, and difference of means and proportions from two populations, including finding and interpreting p-value and examining Type I and Type II error.
MATH M15H-find linear least-squares regression equations for appropriate data sets; graph least-square regression equations on the scatter plot for the data sets; find and apply the coefficient of correlation.
MATH M15H-use the chi-square distribution to test independence and to test goodness of fit.
MATH M15H-conduct a one-way Analysis of Variance (ANOVA) hypothesis test.

MATH M15H-select an appropriate hypothesis test and interpret the result using p-value; use appropriate statistical technique to analyze and interpret applications based on data related to business, social sciences, psychology, life sciences, health sciences or education, and interpret results using technology-based statistical analysis.
MATH M15H-Honors: find probabilities using Poisson distributions.
MATH M15H-Honors: estimate binomial probabilities.
MATH M15H-Honors: find and use standard deviations.
MATH M25C-apply the basic rules of vector algebra to carry out vector operations in the plane and in space.
MATH M25C-evaluate dot, cross and triple scalar products and projections.
MATH M25C-use the dot product, cross product, and triple scalar product to solve applied problems.
MATH M25C-write the parametric equations and symmetric equations of a line in space and write the standard equation of a plane in space.
MATH M25C-identify the six quadric surfaces.
MATH M25C-convert from rectangular to the cylindrical and spherical coordinates in space.
MATH M25C-evaluate derivatives and integrals of vector-valued functions.
MATH M25C-compute velocity and acceleration vectors for vector-valued functions.
MATH M25C-find the tangential and normal components of an acceleration vector and compute arc length and curvature of a space curve.
MATH M25C-evaluate limits and determine continuity for functions of two variables at a point.
MATH M25C-find the first-order and higher-order partial derivatives of functions of several variables, determine differentiability, and apply the chain rule to find partial derivatives.
MATH M25C-compute the directional derivative and the gradient vector for a function of two or three variables.
MATH M25C-write the equation of a tangent plane at a point on a surface.
MATH M25C-find and classify all critical points for a function of two variables and use Lagrange multipliers to find maxima and minima of functions of two variables subject to side conditions.
MATH M25C-use double integrals to compute areas and volumes and surface areas.
MATH M25C-evaluate double integrals using polar coordinates.
MATH M25C-find the center of mass of a variable density planar lamina.
MATH M25C-evaluate triple integrals using rectangular, cylindrical, or spherical coordinates.
MATH M25C-compute the potential function, curl, and divergence of a vector field.
MATH M25C-evaluate the line integral of a vector field on a curve and surface integrals.
MATH M25C-apply Green's Theorem to compute line integrals in the plane.
MATH M25C-use the Divergence Theorem to compute the flux of a vector field through a surface.
MATH M25C-use Stokes's Theorem to compute line integrals within a vector field around a closed curve.
MATH M31-solve systems of linear equations using various methods including Gaussian and Gauss-Jordan elimination and inverse matrices.
MATH M31-perform matrix algebra, invertibility, and the transpose and understand vector algebra in R n .
MATH M31-determine relationship between coefficient matrix invertibility and solutions to a system of linear equations and the inverse matrices.
MATH M31-define special matrices: diagonal, triangular, and symmetric.
MATH M31-understand determinants and their properties.
MATH M31-understand real vector spaces and subspaces and apply their properties.
MATH M31- understand linear independence and dependence.
MATH M31-find basis and dimension of a vector space,and understand change of basis.
MATH M31-find a basis for the row space, column space and null space of a matrix and find the rank and nullity of a matrix.
MATH M31-compute linear transformations, kernel and range, and inverse linear transformations, and find matrices of general linear transformations.
MATH M31-find the dimension of spaces such as those associated with matrices and linear transformations.
MATH M31-find eigenvalues and eigenvectors and use them in applications.
MATH M31-diagonalize and orthogonally diagonalize symmetric matrices.
MATH M31-evaluate the dot product, norm, angle between vectors, and orthogonality of two vectors in R n .
MATH M31-compute inner products on a real vector space and compute angle and orthogonality in inner product spaces.
MATH M31-create orthogonal and orthonormal bases: Gram-Schmidt process and use bases and orthonormal bases to solve application problems.
MATH M31-prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

## Requisite Justification

**Requisite Type**

Prerequisite

**Requisite**

MATH M15 OR MATH M15H

**Requisite Description**

Course not in a sequence

**Level of Scrutiny/Justification**
Required by 4 year institution

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**Requisite Type**
Prerequisite

**Requisite**
MATH M25C

**Requisite Description**
Course not in a sequence

**Level of Scrutiny/Justification**
Required by 4 year institution

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**Requisite Type**
Prerequisite

**Requisite**
MATH M31

**Requisite Description**
Course not in a sequence

**Level of Scrutiny/Justification**
Required by 4 year institution

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**Requisite Type**
Prerequisite

**Requisite**
CS M10DS

**Requisite Description**
Course not in a sequence

**Level of Scrutiny/Justification**
Required by 4 year institution

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**Requisite Type**
Recommended Preparation

**Requisite**
MATH M21 or MATH M35

**Requisite Description**
Course not in a sequence

**Level of Scrutiny/Justification**
Content review

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**Student Learning Outcomes (CSLOs)**

| | Upon satisfactory completion of the course, students will be able to: |
|---|---|
| 1 | use a statistical programming language (e.g., R) to compute the probabilities for various discrete and continuous random distributions and know when to apply the particular distribution to a specific statistical problem. |

| | |
|---|---|
| 2 | use a statistical programming language (e.g., R), read in a "large" data file with missing data, remove NAs as necessary, and then perform multiple linear regression on the data. |
| 3 | explain the difference between ridge and lasso regression and after computing the regression in a statistical language (e.g., R), interpret the results. |

**Course Objectives**

| | **Upon satisfactory completion of the course, students will be able to:** |
|---|---|
| 1 | graph, compute, and use the following discrete probability distributions: uniform, binomial (to include Bernoulli), negative-binomial, geometric, Poisson, and hypergeometric. |
| 2 | graph, compute, and use the following continuous probability distributions: uniform, normal (to include standard normal), Student's t, chi-squared, F, multinomial (Dirichlet),exponential, beta, gamma, log normal, exponential, and Weibull. |
| 3 | perform inferential statistics (confidence intervals and hypotheses tests), after checking the germane assumptions, on the following five parameters: proportions (one and two) and means (one, paired, independent). |
| 4 | perform inferential statistics (confidence intervals and hypotheses tests), after checking the germane assumptions, on the following parameters: one variance/one standard deviation and two variances/two standard deviations. |
| 5 | perform inferential statistics (hypothesis test), after checking the germane assumptions, using single-factor analysis of variance (ANOVA); additionally, if necessary, Tukey's multiple comparison procedure. |
| 6 | compute the descriptive statistics for simple linear correlation and regression, i.e. slope, y-intercept, linear correlation coefficient, and coefficient of determination |
| 7 | perform inferential statistics (hypothesis test, confidence interval, confidence intervals of the mean, and prediction intervals), after checking the germane assumptions, on the slope of a simple linear regression line; draw conclusions about rho from the test on beta. |
| 8 | assess a regression model's adequacy by investigating the standardized residuals, and residual plots |
| 9 | perform regression with transformed variables, e.g., exponential, power, logarithmic, and interpret the results. |
| 10 | perform logistic regression and interpret the results. |
| 11 | perform polynomial regression and interpret the results, to include the adjusted R^2. |
| 12 | perform multiple regression with interaction and interpret the results, to include the adjusted R^2; additionally consider models with both interactions and quadratic predictors. |
| 13 | perform linear regression with a qualitative indicator variable and interpret the results, to include the adjusted R^2. |
| 14 | perform ridge and lasso regression and interpret the results. |
| 15 | perform basic binary/binomial regression and interpret the results. |
| 16 | understand and compute the Maximum Likelihood Estimator (MLE), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC) for a given model as germane and use it to assist with model selection. |
| 17 | understand the ethical issues with data. |
| 18 | use a statistical programming language such as R to perform computations. |

## Course Content

**Lecture/Course Content**

**10% Probability Distributions**

1. Discrete probability distributions
2. Continuous probability distributions

**25% Inferential Statistics**

1. Proportions and means
2. Standard deviations and variances
3. ANOVA
4. Simple Linear Regression
5. (Optional) Two-Factor ANOVA with K_ij = 1.

**60% Linear Models**

1. Model assumptions
2. Regression with transformed variables
3. Logistic regression
4. Polynomial regression

5. Regression with interactions
6. Multiple regression
7. Qualitative indicator regression
8. Binary/Binomial regression
9. Ridge and Lasso regression
10. Model selection (MLE, AIC, BIC)

**5% Ethics**

1. Ethics and data

**Laboratory or Activity Content**

None.

## Methods of Evaluation

**Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):**

Problem solving exercises
Written expression

**Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):**

Computational homework
Group projects
Individual projects
Mathematical proofs
Objective exams
Oral presentations
Problem-solving exams
Quizzes

## Instructional Methodology

**Specify the methods of instruction that may be employed in this course**

Computer-aided presentations
Collaborative group work
Class activities
Class discussions
Distance Education
Guest speakers
Instructor-guided interpretation and analysis
Instructor-guided use of technology
Lecture
Small group activities

**Describe specific examples of the methods the instructor will use:**

- Using whiteboard, iPad, Zoom, or other technology to lecture on the difference and similarities of lasso and ridge regressions.
- Classroom discussion, with student response, such as discussing when to use a particular discrete or continuous distribution.
- In-class activities where students work in small groups to determine the appropriate probability distribution for a given situation.
- Instructor demonstrating how to use a programming language to check the assumptions of a linear model.

## Representative Course Assignments

**Writing Assignments**

- Homework problems selected from the textbook where answers require a written explanation of the solution such as describing a scatterplot.
- A statistical scenario on an exam where the student must chose the correct inferential statistics method for that scenario.
- Graded in-class and/or homework assignments requiring the use of a programming language where the student needs to write the comments for the code and interpret the results using written English.

**Critical Thinking Assignments**

- Elucidate the moral issues that arise with the use of data orally.
- Compare and contrast when different types of regression should be used for a data set.
- Interpret the computer generated output from a computer language that is being applied to statistics.

**Reading Assignments**

- Read and understand the help documents for the programming languages used in the class.
- Read scholarly and/or news articles on using data for the social good.

**Skills Demonstrations**

- Use a programming language, to find the MLE, AIC, and BIC for a given statistical model and interpret those three values.
- Interpret a probability distribution.
- Complete practice exercises on linear models.

## Outside Assignments

**Representative Outside Assignments**

- Group or individual statistics projects, such as performing statistical inference on a large data set with missing data.
- Graded code problems, such as using code to compute probabilities from various probability distributions.
- Assigned reading on the use and misuse of data by Big Tech.

## Articulation

**Equivalent Courses at 4 year institutions**

| University | Course ID | Course Title | Units |
|---|---|---|---|
| UC Los Angeles | MATH 42 | Introduction to Data-Driven Mathematical Modeling | 4 |
| UC San Diego | DSC 40A | Theoretical Foundations of Data Science | 4 |
| UC Davis | STA 32 | Statistical Data Science | 4 |

## District General Education

## A. Natural Sciences

## B. Social and Behavioral Sciences

## C. Humanities

## D. Language and Rationality

## E. Health and Physical Education/Kinesiology

## F. Ethnic Studies/Gender Studies

**Course is CSU transferable**
Yes

**CSU Baccalaureate List effective term:**
S2022

## CSU GE-Breadth

## Area A: English Language Communication and Critical Thinking

## Area B: Scientific Inquiry and Quantitative Reasoning

## Area C: Arts and Humanities

## Area D: Social Sciences

## Area E: Lifelong Learning and Self-Development

## Area F: Ethnic Studies

## CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

## UC TCA

**UC TCA**
Proposed

**Date Proposed:**
6/15/2021

## IGETC

## Area 1: English Communication

## Area 2A: Mathematical Concepts & Quantitative Reasoning

## Area 3: Arts and Humanities

## Area 4: Social and Behavioral Sciences

## Area 5: Physical and Biological Sciences

## Area 6: Languages Other than English (LOTE)

## Textbooks and Lab Manuals

**Resource Type**
Textbook

**Classic Textbook**
No

**Description**
Peck, Roxy, Tom Short, and Chris Olsen. *Introduction to Statistics and Data Analysis*. 6$^{th}$ ed., Cengage, 2020.

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**Resource Type**
Textbook

**Classic Textbook**
No

**Description**
Deisenroth, Marc Peter, A. Aldo Faisal, and Cheng Soon Ong. *Mathematics for Machine Learning*. Cambridge UP, 2020.

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**Resource Type**
Software

**Description**
*Anaconda Navigator*, includes both Jupyter Notebook for Python and R Studio for R. https://docs.anaconda.com/anaconda/navigator/

## Library Resources

**Assignments requiring library resources**
Research using the Library's print and online resources. If the student does not have their own computer, then possible use of the Library's for programming.

**Example of Assignments Requiring Library Resources**
Using Library's print, online, and computer resources to locate readings on the use and misuse of data by Big Tech.

## Distance Education Addendum

## Definitions

**Distance Education Modalities**
Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

## Faculty Certifications

**Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.**
Yes

**Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.**
Yes

## Regular Effective/Substantive Contact

**Hybrid (1%–50% online) Modality:**

| Method of Instruction | Document typical activities or assignments for each method of instruction |
|---|---|
| Asynchronous Dialog (e.g., discussion board) | Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups. |
| E-mail | Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class. |
| Face to Face (by student request; cannot be required) | Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures. |
| Other DE (e.g., recorded lectures) | Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet. |
| Synchronous Dialog (e.g., online chat) | Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests. |

**Hybrid (51%–99% online) Modality:**

| Method of Instruction | Document typical activities or assignments for each method of instruction |
|---|---|
| Asynchronous Dialog (e.g., discussion board) | Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups. |
| E-mail | Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class. |
| Face to Face (by student request; cannot be required) | Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures. |
| Other DE (e.g., recorded lectures) | Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet. |
| Synchronous Dialog (e.g., online chat) | Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests. |

**100% online Modality:**

| Method of Instruction | Document typical activities or assignments for each method of instruction |
|---|---|
| Asynchronous Dialog (e.g., discussion board) | Use of student discussion boards to discuss concepts from the material, solutions to homework problems, general discussion of techniques in solving problems, study skills, or arranging study groups. |
| E-mail | Responding to student queries about material, grade information, course policies and procedures, scheduling and due dates, submitting homework assignments, or making general announcements to the class. |
| Face to Face (by student request; cannot be required) | Students requesting to speak to instructor in person for personal help on material, grade information, or discussion of policies and procedures. |
| Other DE (e.g., recorded lectures) | Posting of recorded lectures either by the instructor, recorded lessons available through campus resources, or use of public online resources available on the internet. |
| Synchronous Dialog (e.g., online chat) | Active live discussion with the instructor on material concepts, techniques for problem solving, feedback on solutions to problems, general chat on study skills, or answers to homework problems, quizzes or tests. |

## Examinations

**Hybrid (1%–50% online) Modality**

Online
On campus

**Hybrid (51%–99% online) Modality**

Online
On campus

**Primary Minimum Qualification**

MATHEMATICS

## Review and Approval Dates

**Department Chair**

01/20/2021

**Dean**

01/20/2021

**Technical Review**
03/25/2021

**Curriculum Committee**
04/06/2021

**DTRW-I**
04/08/2021

**Curriculum Committee**
MM/DD/YYYY

**Board**
05/11/2021

**CCCCO**
MM/DD/YYYY

**DOE/accreditation approval date**
MM/DD/YYYY