COURSE OUTLINE : MATH 134
D Credit – Degree Applicable
COURSE ID 010582
Created: November 2021

COURSE DISCIPLINE : MATH

COURSE NUMBER : 134

COURSE TITLE (FULL) : Decision Mathematics

COURSE TITLE (SHORT) : Decision Math

ACADEMIC SENATE DISCIPLINE: Mathematics

CATALOG DESCRIPTION

MATH 134 is a one-semester course in quantitative reasoning about decisions. Students learn mathematical techniques including solving algebraic equations and inequalities, Cartesian graphs, probability, and game theory to analyze individual and group decision-making under the conditions of certainty, risk, and uncertainty. Students not only learn these techniques, but also interpret and communicate their results.

Total Lecture Units:3.00

Total Laboratory Units: 0.00

Total Course Units: 3.00

Total Lecture Hours:54.00

Total Laboratory Hours: 0.00

Total Laboratory Hours To Be Arranged: 0.00

Total Contact Hours: 54.00

Total Out-of-Class Hours: 108.00

Prerequisite: Placement is based on an academic background or satisfactory completion of MATH 30 or MATH 90, or equivalent.

ENTRY STANDARDS

	Subject	Number	Title	Description	Include
1	MATH	30	Intermediate Algebra and Pre-Statistics	Solve equations with one radical;	Yes
2	MATH	30	Intermediate Algebra and Pre-Statistics	solve absolute value equations and inequalities;	Yes
3	MATH	30	Intermediate Algebra and Pre-Statistics	solve linear equations and inequalities;	Yes
4	MATH	30	Intermediate Algebra and Pre-Statistics	find the equation of a line and interpret the slope and intercept;	Yes
5	MATH	30	Intermediate Algebra and Pre-Statistics	solve applied problems;	Yes
6	MATH	30	Intermediate Algebra and Pre-Statistics	graph functions (linear, exponential, logarithmic);	Yes
7	MATH	90	Intermediate Algebra for BSTEM	Solve absolute value equations and inequalities;	Yes
8	MATH	90	Intermediate Algebra for BSTEM	solve linear equations and compound inequalities;	Yes
9	MATH	90	Intermediate Algebra for BSTEM	solve rational equations;	Yes
10	MATH	90	Intermediate Algebra for BSTEM	solve equations with radicals;	Yes
11	MATH	90	Intermediate Algebra for BSTEM	solve applied problems;	Yes
12	MATH	90	Intermediate Algebra for BSTEM	solve quadratic equations with real and complex solutions;	Yes
13	MATH	90	Intermediate Algebra for BSTEM	graph functions (linear, quadratic, exponential, logarithmic);	Yes

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EXIT STANDARDS

1 identify optimal values of functions;
2 compute probabilities and expected value;
3 identify optimal strategies in games;
4 determine group choices with voting systems and optimal voting strategies;
5 solve personal finance problems using algebra techniques;

STUDENT LEARNING OUTCOMES

1 Identify optimal choices for individuals under conditions of certainty, risk, and uncertainty using mathematical techniques, including solving algebra equations and inequalities, Cartesian graphs, probability, and game theory.
2 Identify group choices using various voting methods, the pitfalls of each method, and the optimal choices for individuals voting as members of a group.

COURSE CONTENT WITH INSTRUCTIONAL HOURS

	Description	Lecture	Lab	Total Hours
1	Algebra review, and individual choice under the assumption of certainty • algebra equation-solving • personal finance math • graphing of 2-variable equations and inequalities • linear programming via graphing • polynomial factoring • the Extreme Value Theorem for polynomial functions	13	0	13
2	Probability, and individual choice under risk • discrete probability models • techniques for calculating probabilities • expected value and expected utility • variance	19	0	19
3	Game theory, and individual choice under uncertainty • dominated strategies • pure-strategy solution concepts • mixed-strategy solution concepts	11	0	11
4	Voting systems, and group choice • equal-weight voting • weighted voting • impossibility theorems about group choice • strategic voting	11	0	11
				54

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OUT OF CLASS ASSIGNMENTS

1 homework (e.g. problem sets related to course content);
2 reading assignments

METHODS OF EVALUATION

1 projects;
2 quizzes;
3 three or more chapter examinations are required;
4 a comprehensive final examination is required.

METHODS OF INSTRUCTION

- [x] Lecture
- [x] Laboratory
- [ ] Studio
- [x] Discussion
- [x] Multimedia
- [ ] Tutorial
- [ ] Independent Study
- [x] Collaboratory Learning
- [x] Demonstration
- [ ] Field Activities (Trips)
- [x] Guest Speakers
- [ ] Presentations

TEXTBOOKS

Title	Type	Publisher	Edition	Medium	Author	IBSN	Date
Choice Mathematics	Required		1	print and electronic	Allen, Michael	https://bit.ly/choicemathebook	2021