Introducing Real Life Applications of Mathematics through Group Projects in Lower-Division Mathematics Classes

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Introduction

- Mathematics can be found virtually in anything and everything.
- Mathematics - All around us!
- Mathematics teaches us how to:
  - think and perform basic calculations vital to our daily life.
- Many career paths are based around math:
  - These paths are not just rewarding, but very crucial for the functioning of society (see [1]).

Introduction (Contd.)

- Many students start college without a clear idea what they can do with math:
  - Especially students with disadvantaged background.
- Numerous reasons account for why students do not enjoy learning math:
  1) See math as theoretical and hard to understand.
  2) Think math involves a lot of memorization.
  3) Not sure of how mathematics could be useful to themselves, unless they want to become mathematics teachers.
  4) Little public recognition and peer encouragement for activities and achievements related to applications of math.
- Employment of mathematicians/statisticians is projected to grow 31% from 2021 to 2031 (see [2]).

Introduction (Contd.)

Goals:

1. *To introduce math to non-math freshmen and connect math with their daily lives.*
2. *To motivate freshmen to become promoters of math among their peers and in their communities.*

Objectives:

To use hands-on activities and projects to:

1. *stimulate students' interest in math.*
2. *expose students to various application areas of math.*
3. *connect math with students' daily lives and to real-life scenarios.*
4. *ignite students' interest to study, understand, and apply mathematical concepts appropriately.*

3 Fun Projects in Calculus I

Photo Project: Students are required to take a photo, provide a brief description of the photo, then ask a mathematics related question about the photo with an answer.

Washington Monument

3 Fun Projects in Calculus I (Contd.)

Design Project: Students are asked to make a design of an artwork with a software, where the design must include significant mathematics.

https://www.desmos.com/calculator/lz7k9scgb0

Video

3 Fun Projects in Calculus I (Contd.)

Poster Project: Students are required to make a professional poster of the key material of they learned about the integral.

Integration Poster

Mathematical Reasoning and Modeling Projects

Projects	Objective(s)	Links
Probability-Bayes Theorem	Students will be able to use MS Excel to create a confusion matrix and evaluate the performance of diagnostic tests.	Click me! Excel!
Probability-Expected Value	Students will be able to use MS Excel to evaluate and estimate the risk of choosing between two deductible medical insurance plans.	Click me! Excel!
Statistical Modeling-Linear and Non-Linear Models	Students will be able to use MS Excel to create linear and non-linear models and make predictions.	Click me!

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Mathematical Reasoning and Modeling Projects (Contd.)

Projects	Objective(s)	Links
Finance-Paying off Credit Cards Loans	Students will be able to: 1) use MS Excel dashboard to observe and compare graphs of accumulated interest amounts for a low-risk and high-risk credit cards loan plans. 2) analyze the effect of interest rate & number of payments on accumulated interest. 3) strategize as to how to reduce the accumulated interest.	Click me! Excel!
Geometry-Midpoint	Students will be able to: 1) use a city map to locate points on the map. 2) determine the midpoint between two destinations.	Click me!

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Statistical Reasoning Course Projects

Project	Objective(s)	Link
Visualizing Data	Students will be able to use MS Excel and visualization tools to summarize and describe basic features/characteristics of data.	Click me

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Statistical Reasoning Course Projects (Contd.)

Project	Objective(s)	Link
Visualizing Data	Students will be able to use MS Excel and visualization tools to summarize and describe basic features/characteristics of data.	Click me
Descriptive Statistics	Students will be able to use MS Excel and numerical measures to summarize and describe data.	Click me

Statistical Reasoning Course Projects (Contd.)

Project	Objective(s)	Link
Visualizing Data	Students will be able to use MS Excel and visualization tools to summarize and describe basic features/characteristics of data.	Click me
Descriptive Statistics	Students will be able to use MS Excel and numerical measures to summarize and describe data.	Click me
General Probability & Discrete Probability Distribution	Students will be able to use MS Excel and apply general probability and discrete random variable concepts to solve basic health insurance problems.	Click me

Statistical Reasoning Course Projects (Contd.)

Project	Objective(s)	Link
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Descriptive Statistics	Students will be able to use MS Excel and numerical measures to summarize and describe data.	Click me
General Probability & Discrete Probability Distribution	Students will be able to use MS Excel and apply general probability and discrete random variable concepts to solve basic health insurance problems.	Click me
Inferential Statistics	Students will be able to use MS Excel, random samples, and an inferential tool to draw conclusion about a population parameter.	Click me

Statistical Reasoning Course Projects (Contd.)

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Visualizing Data	Students will be able to use MS Excel and visualization tools to summarize and describe basic features/characteristics of data.	Click me
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General Probability & Discrete Probability Distribution	Students will be able to use MS Excel and apply general probability and discrete random variable concepts to solve basic health insurance problems.	Click me
Inferential Statistics	Students will be able to use MS Excel, random samples, and an inferential tool to draw conclusion about a population parameter.	Click me
Statistical Modeling	Students will be able to use MS Excel to perform basic data modeling.	Click me

References

[1] The Learning Network (2023, March 5). What Students Are Saying About the Value of Math. https://www.nytimes.com/2022/11/10/learning/what-students-are-saying-about-the-value-of-math.html

[2] U.S. Bureau of Labor Statistics (2023, March 4). Mathematicians and Statisticians. https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm

Questions??

THANK YOU!

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