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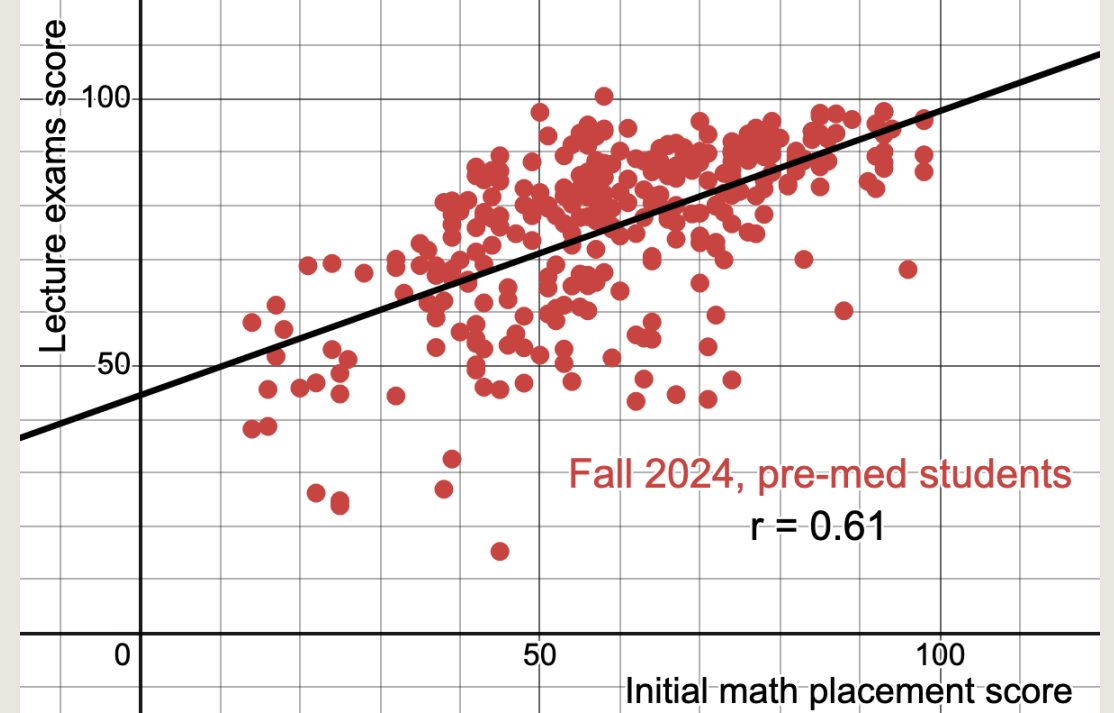
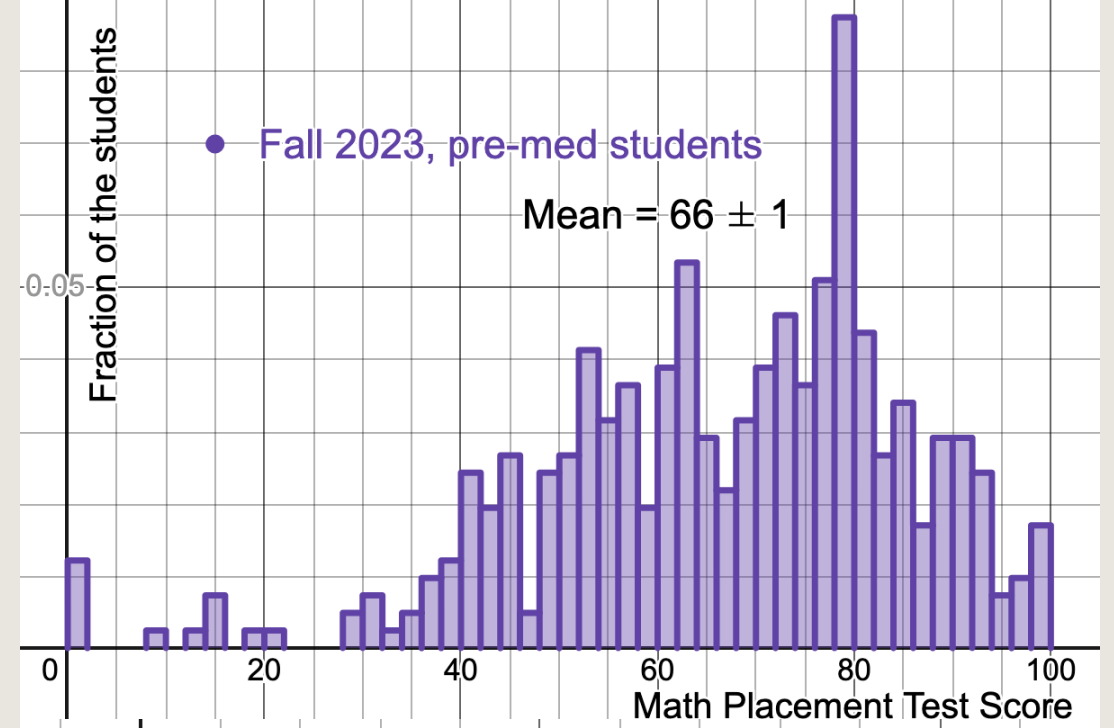
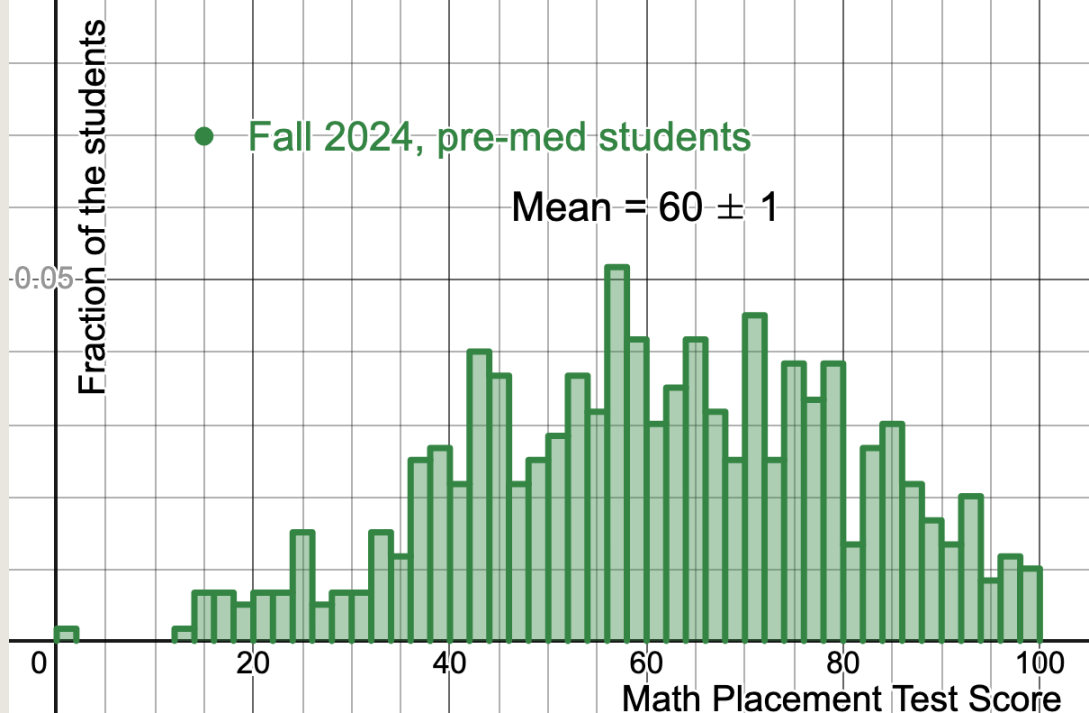
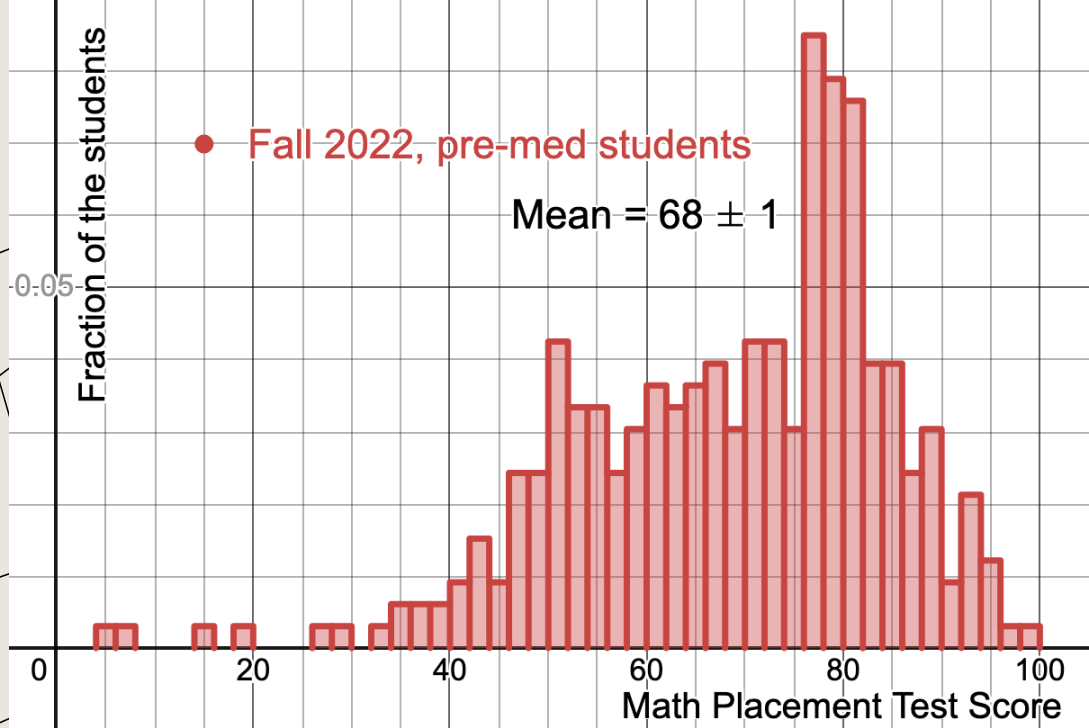
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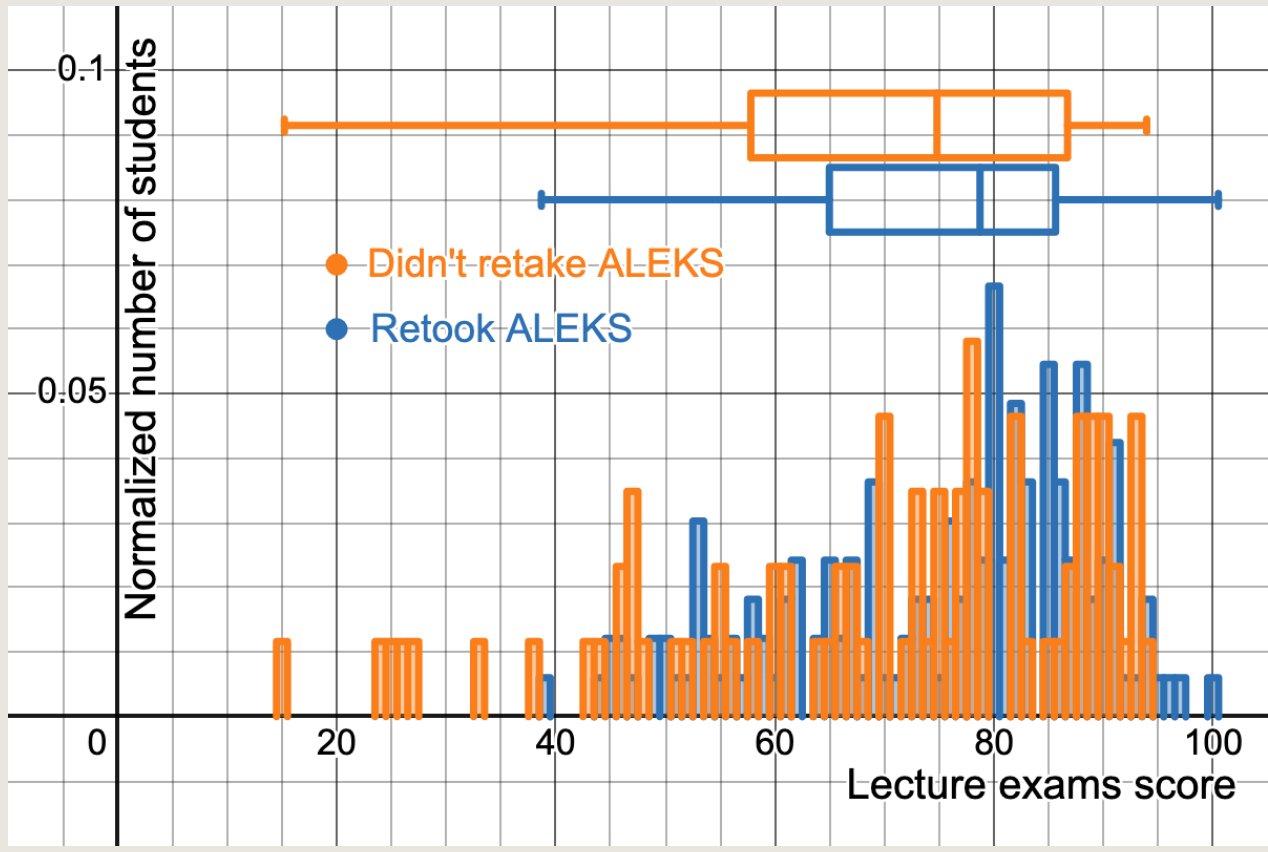
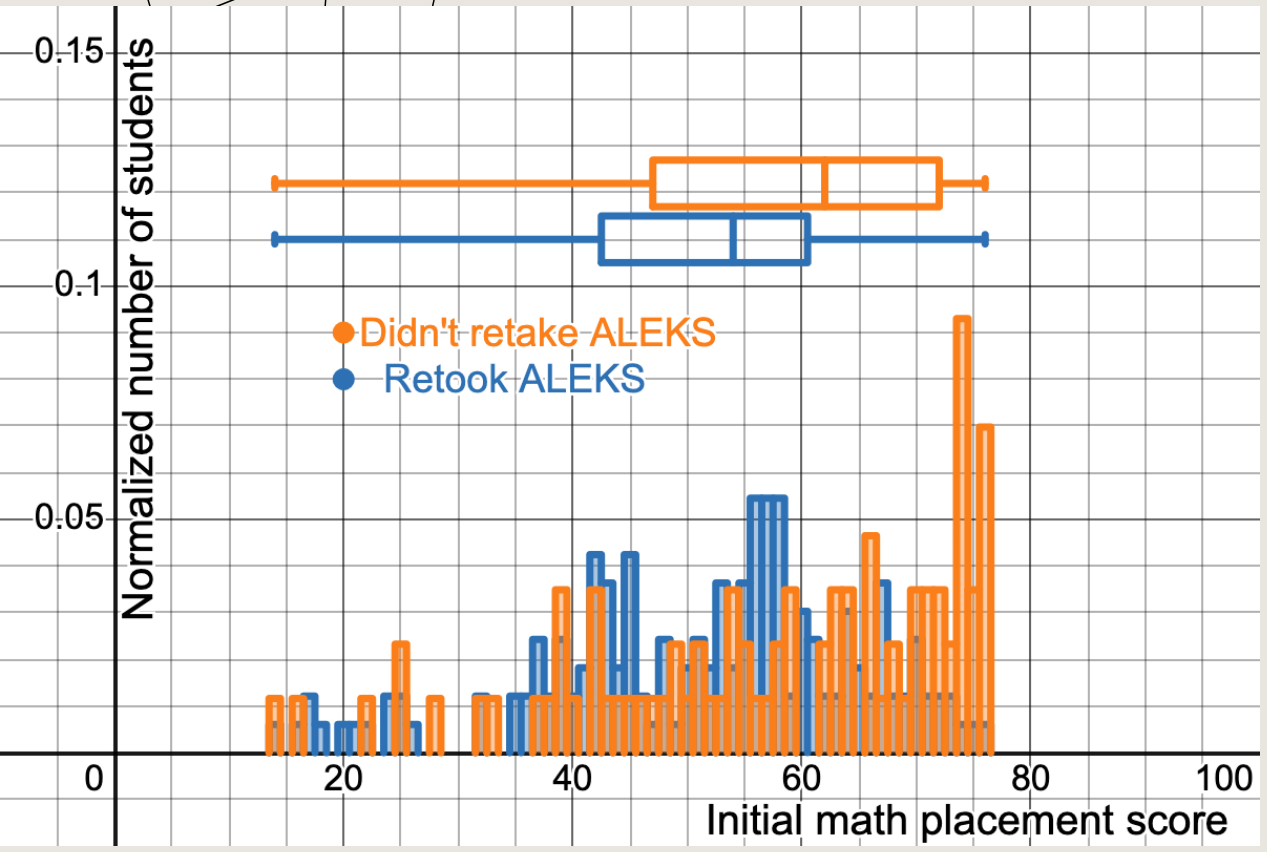
# APPLIED ALGEBRA COURSE AS AN INTRODUCTORY SCIENCE CLASS FOR PRE-HEALTH STUDENTS

## TOPICS TO BE COVERED

1. Why math is important
2. Our implementation of pre-calc and early calc material
3. Lessons learned



# WHY MATH IS IMPORTANT PT. I



## WHY MATH IS IMPORTANT PT. II

Covering the same material in several courses (disciplines) has been deemed a very positive experience for students.

For physics majors, math automatically becomes that second angle. While it has its drawbacks, the benefit of such an approach is often unavailable to our pre-health students.

## NEW COURSE STRUCTURE PT. I

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- Replace the 1 credit lab that accompanies lecture with the pre-calc course
- Retain collaborative problem solving as a core pedagogical theme
- Conducted for 4 years (Fall 2021 through Spring 2025)

## NEW COURSE STRUCTURE PT. II

- Administer initial knowledge check at the start of the semester using ALEKS. It determines their individual path to mastery of basics. No weight in the grade.
- Use ALEKS pre-calc (in the Fall) and physics prep (in the Spring) products for individual homework before the class. The products are customized on topics.
- Provide additional videos with relevant content on LMS to supplement ALEKS's learning materials
- Assign weekly group project to a group of 3-4 formed based on their scores
- Work within the class and finish the rest as a group outside the class
- Can be run w/ just 1 additional TA (about 10hr/week if solution with rubric)
- Administer final knowledge check which is a small (10%) part of their final grade.

# NEW COURSE STRUCTURE PT. III

Topics covered in the Fall (all names are assignment links)

Fractions

Properties of Exponents. Radical Expressions

Linear Functions

Functions and Fitting Data

Function Transformations

Quadratic Equations

Systems of Equations

Exponential Functions

Logarithms

Periodic Motion

Measuring Angles. Shifting Identities

The Tangent Function and Right Triangle Trigonometry

Aleks Final Knowledge Test Recap



# NEW COURSE STRUCTURE PT. IV

Topics covered in the Spring (all names are assignment links)

[Law of cosine and sine. Inverse trigonometric functions](#)

[Double Angles. Sum of sines and cosines](#)

[Vectors Pt. I \(basics\)](#)

[Vectors Pt. II \(dot product\) and volumes](#)

[More Vectors \(fundamentals and dot product\)](#)

[Matrices and Their Applications \(vector cross product\)](#)

[Derivatives Pt. I](#)

[Derivatives Pt. II](#)

[Derivatives Pt. III](#)

[Integrals](#)

[Review I \(pivoting to MCAT topics not covered fully in lecture\)](#)

[Review II](#)

[Review III](#)

# Two examples of the actual assignments

An example from the Fall semester (linear functions)

An example from the Spring semester (matrices and cross products)

# Lessons learned and future plans

## Pros

1. It's a good class. It's very flexible, evaluations are very good, once organized it is enjoyable to teach.
2. Learning is solid. The retesting in the Spring shows that the topics previously covered are learned really well.
3. At the end of the second semester, there's a great opportunity to plug in the holes in the main lecture coverage.

## Cons

4. The material is hard to synchronize with a lecture. The lecture comes in roaring with kinematics which mathematically is a mixture of vectors, trigs, some derivatives, all kinds of functions and their transformations, and pre-algebraic fluency.
5. Although MCAT lists an entire "General Mathematical Concepts and Techniques" overarching "skill," a lot of topics in the Spring semester are not met with great enthusiasm. Pivoting to MCAT specific problems keeps the engagement higher.