GEORGIA COLLEGE
GEORGIA'S PUBLIC LIBERAL ARTS UNIVERSITY

TWELTH ANNUAL CAPSTONE DAY
Department of Mathematics
Georgia College

November 17, 2023
2 pm – 3:30 pm
A&S 2-70

Department of Mathematics
Georgia College

Earning a college degree is a significant achievement and requires dedication and tremendous effort by each student. Several programs have been developed to help students majoring in mathematics to succeed. The First Year Academic Seminar provides an introduction to department faculty, departmental and university expectations, policies, resources and opportunities following graduation. The department conducts informal social activities and presentations by faculty and guest speakers to encourage faculty and student interaction. The department webpage serves to inform, acknowledge and encourage student majors to become involved in activities related to the major such as mathematics competitions and professional meetings. The academic honor society Kappa Mu Epsilon has been organized to encourage and provide a supporting network for the student body.

Professional schools, businesses, government and industry recognize that mathematics majors are problem solvers and are highly skilled in the use of logic and reasoning. A degree in mathematics opens many careers that are closed to those without quantitative skills. Actuarial science stands as one major example. Moreover, the demand for mathematics in education-especially in secondary schools-is tremendous. In fact, the chronic nationwide shortage of mathematics teachers is due in part to the demand in so many other areas for talented mathematics majors.

2023 Capstone Day Schedule

2 – 2:05 pm Opening Remarks **A&S 2-70**

2:05 – 3:25 pm Session **A&S 2-70**

The Effect of Students' Performance on the Scores from Rate My Professor, Caroline Hegwood

How Accurately Can the NBA Combine Statistics Predict Players' Performance in the NBA?, Jonas McClelland

Productive Struggle in the Mathematics Classroom, MaKenna Dent

An Application of Galois Fields: BCH Codes, Monica Lichtenwalner

3:25 – 3:30 pm Closing Remarks **A&S 2-70**

2023 Capstone Day Abstracts

MaKenna Dent
Productive Struggle in the Mathematics Classroom
When students struggle, they are actively working to make sense of the situation which leads them to construct interpretations more connected to what they already know. As a result, content and skills are learned more deeply. Teaching designed to provide opportunities for productive struggle has been identified as one of the key components of improving students' conceptual understanding of mathematics (Hiebert & Grouws, 2007). Since researchers have found productive struggle to be beneficial for students, this study looks to see if the practices said to promote it are being used in the mathematics classroom. This study documents the types of struggle, as well as, the types of teaching strategies and student indicators of productive struggle seen in the high school mathematics classroom based on research by Warshauer.

Caroline Hegwood
The Effect of Students' Performance on the Scores from Rate My Professor
When students register for their classes, they often form predictions about the potential grades they will earn in the course. Factors such as RateMyProfessor scores, the class level, and the department offering the course influence these expectations. The question arises: are these just assumptions or sound projections? This project takes data from Georgia College & State University and RateMyProfessor and studies the association between the grades students earn and RateMyProfessor scores. Utilizing the software RStudio and its statistical tools, we analyzed the data collected on the courses, grades, and professor ratings. This project allows for a deeper understanding of the dynamics between student grades, professor ratings, and course characteristics.

Monica Lichtenwalner
An Application of Galois Fields: BCH Codes
At the core of all technological function is the task of relaying information from one location to another. Since errors can occur when transmitting data, efficient methods for detecting and correcting errors are very important. In the area of algebraic coding theory, these methods are called codes, and they are often designed using algebraic tools such as polynomial rings and finite fields, also known as Galois fields. In this project, we explore the construction of Galois fields and their applications to coding theory. In particular, we describe Bose-Chaudhuri-Hocquenghem (BCH) codes, which are a class of cyclic codes that are constructed using polynomials over Galois fields. BCH codes are particularly useful because the method of construction allows us to build a code that has the capability to correct a specific number of errors. They are used in applications such as bar codes, DVDs, and computer drives.

Jonas McClelland

How Accurately Can the NBA Combine Statistics Predict Players' Performance in the NBA?

The National Basketball Association (NBA) hosts an event known as the Combine each year where college and international basketball players come to show off their skills/strengths to the coaches so that the coaching staff can strategically plan which player(s) they will pick at the NBA draft. There are numerous things that are measured in each player, including some measurements that seem unnecessary, but can actually play a role in the success of an NBA player. This project will be a deep dive into how the anthropometric characteristics and agility statistics of players entering the NBA affect player performance at the professional level. The predictors used in my analysis will not only include players' height (which its advantage in basketball is quite obvious), but also their wingspan ratio, vertical reach, weight, body fat percentage, hand width/length, vertical leap, and 3-quarter court sprint. A player's "per game" statistics including points, rebounds, assists, blocks, and steals will be used to determine the necessity and strength of certain predictors, along with number of championships, All-Star game appearances, and drafted status. This project will also divide the players into the five major positions of basketball in order to observe trends within each position.

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