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| MAT 330 - 010 | **Discrete Mathematics** |  Spring 2023 |
| Time MWF 2:20-3:35. | **Reinhardt University** | Room: Tarpley 312  |

Instructor: Kelley Roberts Office: Tarpley 316

E-mail: kjr@reinhardt.edu Phone: 770-720-5904

Web resources: <https://eagleweb.reinhardt.edu/ics/Campus_Life/Campus_Groups/Math>

**Textbook:** *Discrete Mathematics, 8th Ed*, Johnsonbaugh, Richard, 2017, Pearson. ISBN: 9780321964687

# I. COURSE COVERAGE: Chapters 4-11 selected topics

# II. CATALOG DESCRIPTION: This course focuses on the creation and application of mathematical models involving discrete quantities. Topics include combinatorics, mathematical induction, matrices and coding and graph theory. *Prerequisite: Grade of C or better in MAT 231.*

# III. CONCEPTUAL FRAMEWORK:

# The Mathematics Department at Reinhardt University believes that all students should have an exposure to the ideas of science and the scientific method. This includes exposure to laboratory procedures, familiarity with some of the vocabulary of science and ability to read scientific articles in the newspaper or in popular magazines.

**The Mathematics Department at Reinhardt University believes that all students should be familiar with the systematic development of science through history.** This includes an understanding of the effects that science has had on history and that history has had on scientists.

**The Mathematics Department at Reinhardt University wishes to convey to students that science is a continuing endeavor that will not ever be finished.** This includes an introduction to the interaction of theory and observation.

# IV. COURSE RELATIONSHIP TO CONCEPTUAL FRAMEWORK: This course will be taught using applied problems, exercises, a graphing calculator and softwares like Mathematica, Maple or GeoGebra. Mathematical tools will be introduced as needed in the applications.

**V. MATHEMATICS PROGRAM OBJECTIVES:** The Mathematics Program at Reinhardt University offers courses geared to
**MPO1** Analyze and solve problems by using reasoning, logic and evidence, and by bringing knowledge from a wide range of mathematical areas.

**MPO2** Use effective written and oral expression of mathematical concepts in the creation of a mathematical argument by recognizing a wide range of mathematical terms and vocabulary.

**MPO3** Apply axiomatic systems.

**MPO4** Apply mathematical research methodologies by using libraries, informational technologies, computer programming and numerical methods in order to create solutions to problems.

**MPO5** Apply ethical, legal, and policy issues to Information Technology

**MPO6** Create IT solutions to solve organizational problems.

**VI. MATHEMATICS PROGRAM STUDENT LEARNING OUTCOMES:** Taking this course, students will be able to

**SLO1** Solve a word problem by applying the appropriate mathematical setup, obtaining the mathematical solution, and interpreting this solution in the context.

**SLO2** Solve a theoretical problem by identifying the appropriate mathematical context, interpreting the question and the nature of the solution, and checking that the solution is correct.

**SLO3** Complete a proof or produce a mathematical object that satisfies specific properties.

**SLO4** Solve a problem by consulting various resources, applying appropriate technological tools, and using adequate approximations.

**SLO5** Analyze how information technology affects ethical and legal issues.

**SLO6** Synthesize appropriate solutions to organizations' problems.

**VII. ALIGNMENT TO REINHARDT UNIVERSITY SLO’s:**

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| **Math PO** | **Math SLO** | **RU SLO** |
| 1 | 1 | 1, 2, 4 |
| 2 | 2 | 1-4 |
| 3 | 3 | 1-4 |
| 4 | 4 | 1-4 |
| 5 | 5 | 1-4, 7 |
| 6 | 6 | 1-4 |

# VIII. COURSE OBJECTIVES: As a result of passing MAT 330 a student should be able to

1. understand the basic elements of set theory (SLO1, SLO2, and SLO4),
2. understand the basic elements of propositional logic) (SLO1, SLO2, and SLO4),
3. be able to use Boolean algebras to analyze combinatorial circuits) (SLO1, SLO2, and SLO4),
4. be able to construct a simple mathematical proof using truth tables, direct proof, indirect proof and mathematical induction) (SLO1, SLO2, and SLO4),
5. be able to perform basic operations with summation and product notation) (SLO1, SLO2, and SLO4),
6. be able to solve recurrence relations by the method of backtracking) (SLO1, SLO2, and SLO4),
7. be able to solve and apply simple recurrence relations (SLO1, SLO2, and SLO4),
8. be familiar with the basic counting techniques using permutations and combinations continuing with more advanced counting problems including the binomial theorem (SLO1, SLO2, and SLO4),
9. know the basic elements of matrix algebra including addition, subtraction, multiplication, inverse, row-echelon form, Gaussian elimination, Gauss-Jordan elimination, join, meet and Boolean product (SLO1, SLO2, and SLO4),
10. know the basic properties of relations including reflexive, symmetric, anti-symmetric and transitive, and how these relate to various types of functions and other relations (SLO1, SLO2, and SLO4),
11. be able to analyze the complexity of an algorithm given as a formula or as pseudocode (SLO1, SLO2, and SLO4),
12. be able to analyze the properties of a simple graph, including a knowledge of Hamiltonian circuits, Euler paths, Euler circuits and graph coloring (SLO1, SLO2, SLO3 and SLO4),
13. be able to analyze trees including preorder search, post order search, left-root-right search and minimum spanning trees (SLO1, SLO2, and SLO4),

**IX. POLICES:**

**Cell Phone Policy:** Please turn off or turn all cellular phones on silent. Do not use them in class without prior permission by your instructor.

**Attendance:** Students are expected to attend each session. If you miss a class, you are responsible for finding out what was covered and getting the work done.
**Late Policy:**

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| Days Late | Percent Penalty |
| 1-3 | 10% |
| 4-7 | 20% |
| 8-14 | 30% |
| 15 or more | 50% |

**Academic Dishonesty:** The Reinhardt University academic dishonesty policy will be followed. You will earn a zero for the assignment or exam in which you are found cheating.

**Quality of Student Work**: Use of proper grammar, correct spelling, and writing principles are expected in all work. Full credit will not be granted for work that contains grammar or spelling errors.
**Expectations**: You are expected to read and study our textbook. Reading a section before it is covered in class is a great habit!

**Communications:** All written communications will be through Reinhardt email.

**X. GRADE DETERMINATION:** Your grade will be the one reported on EagleWeb. Your grade will be based on exams, a final, and homework, with the following weights:

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| Exams + Final | 60% |
| Homework | 40% |
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**Homework:** You will be assigned “Lessons”, as scheduled below at point XIII. You need to complete each assignment by its due date, usually a **Sunday night at midnight**. The goal of these assignments is to help you better understand the material explained in class. This is the number-one-way to get a good grade in this class – do your homework each day and then you will be ready to learn the new information. It is much more difficult to catch up then to keep up! Please, use all the tools available to you in order to succeed in this course. Late homework will be penalized. It is suggested that you start homework about a section the same day this section has been covered in class. Homework can be completed before its due date.

**Exams:** No make-up exams will be given. *For University related absences on a test day*, it is possible to schedule an *earlier date for the test*: **it is student's responsibility to make arrangements at least a week before the scheduled absence**. The Final Exam will be comprehensive.

**XI. GRADING SCALE:** A=[90, ∞), B=[80, 90), C=[70, 80), D=[60,70), F=[0, 60)

**XII. CSS:** The Center for Student Success (CSS) is located at the lower floor of Lawson, room 035. **CSS offers free peer and faculty tutoring for all subjects**. For appointments, go to Reinhardt webpage and click Center for Student Success.

**XIII. ADA and ASO:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a documented disability requiring an accommodation, please contact the Academic Support Office (ASO).

Reinhardt University is committed to providing reasonable accommodations for all persons with disabilities. Therefore, if you are seeking classroom accommodations under the Americans with Disabilities Act, you are required to register with the Academic Support Office (ASO). ASO is located in the basement of Lawson Building. Phone is 7707205567. To receive academic accommodations for this class, please obtain the proper ASO letters/forms. Students with disabilities needing accommodations must contact the **A**cademic **S**upport **O**ffice prior to contacting me. The ASO will then inform me about your (free of charge) arrangements.

**XIV. OFFICE HOURS AND SCHEDULE:**

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| Days | Courses | Office |
| MW  |  2:20 – 3:35 MAT 330 Discrete Math | 12:30 – 2:00 |
| TR   |  9:30 – 10:45 MIT 245 Intro Networking11:00 – 1:25 MIT 346 Cyber Defense | 8:30 – 9:301:30 – 3:00 |
| F |  | By appointment |
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