Syllabus for Discrete Mathematics

POINT LOMA NAZARENE UNIVERSITY	Mathematics, Information, and Computer Sciences College of Natural and Social Sciences MTH3043-1 Discrete Mathematics (**3 units**) Pre – requisites: MTH1044 or MTH1064
Fall 2021: August 30 – December 17	

Meeting days: MWF	Instructor: Jesús Jiménez-Reyes, Professor of Mathematics	
Meeting times: 7:25 am – 8:20 am	Phone: 619-849-2634	
Meeting location: RS 295	Email: jjimenez@pointloma.edu	
Final Exam Date	Office hours on ZOOM:	TR 9:00 am – 12:00 pm
12/15/21 (Wednesday) 7:30 am – 10:00 am		MW 1:00 – 3:00 pm

PLNU MISSION: TO TEACH ~ TO SHAPE ~ TO SEND
Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

DEPARTMENT MISSION
The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

COURSE DESCRIPTION
Sets, functions, propositional logic and switching theory, graphs including trees, matrices, induction and proof by contradiction, combinatorics, and probability. Selected applications from computer science included.

COURSE LEARNING OUTCOMES
- Students will be able to write proofs.
- Students will be able to demonstrate facility with algebraic structures.
- Students will be able to apply their mathematical knowledge to solve problems.
- Students will use the theory of algorithms and computation to solve problems.

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES
Discrete and Combinatorial Mathematics: An Applied Introduction
Ralph P. Grimaldi
PEARSON. Fifth Edition. ISBN: 978–0–201–72634–3

COURSE CREDIT HOURS INFORMATION
In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 3-unit class delivered over 15 weeks. Specific details about how the class meets the credit hour is provided below.

Homework	25.00
Reading the text	40.00
Lecture meetings	40.00
Quizzes	10.00
Partial exams	2.00
Final exam	2.50
TOTAL	119.50

GRADE COMPONENTS
The grade components are homework, quizzes, partial exams, discussions, class attendance, and the final examination.

FINAL EXAM POLICY
The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

GRADING SCALE
A passing grade requires getting at least 60% in one of the two exams or on the final exam. Grades are based on the number of points accumulated throughout the course. Approximate cumulative minimal percentages required to obtain a given grade are:

Grading Scale in Percentages				
	A	B	C	D
+		(87.5, 90]	(77.5, 80]	(67.5, 70]
	(92.5, 100]	(82.5, 87.5]	(72.5, 77.5]	(62.5, 67.5]
−	(90, 92.5]	(80, 82.5]	(70, 72.5]	[60, 62.5]

GRADING DISTRIBUTION

Grade Distribution	
Two partial exams at 15% each	40%
Final Exam	30%
Quizzes	10%
Homework	20%
Total	100%

OTHER FACTORS THAT AFFECT GRADES
- Quizzes, partial exams, and the final exam will include problems and questions over material assigned in the text, readings and handouts, as well as material presented in class.
- No examination shall be missed without prior consent or a well-documented emergency beyond your control. A score of zero will be assigned for an examination that is missed without prior consent or a well-documented emergency beyond your control. The examination schedule is included in the daily schedule. This instructor does not intend to accept excuses such as poor communication with parents, benefactors, surf team sponsors and/or travel agents.

INCOMPLETES AND LATE ASSIGNMENTS
All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

STATE AUTHORIZATION
State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on State Authorization to view which states allow online (distance education) outside of California.

PLNU ACADEMIC HONESTY POLICY
Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY
PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

CLASS ENROLLMENT
It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of **F** on the official transcript.

PLNU ATTENDANCE AND PARTICIPATION POLICY
Students taking online courses are expected to attend each week of the course. Attendance is defined as participating in an academic activity within the online classroom which includes posting in a graded activity in the course. (Note: Logging into the course does not qualify as participation and will not be counted as meeting the attendance requirement.)

Students who do not attend at least once in any 3 consecutive days will be issued an attendance warning. Students who do not attend at least once in any 7 consecutive days will be dropped from the course retroactive to the last date of recorded attendance.

See Academic Policies in the Undergraduate Academic Catalog. If absences exceed these limits but are due to university excused health issues, an exception will be granted.

Attendance is expected at each class session. In the event of an absence, you are responsible for the material covered in class and the assignments given that day.
Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10% of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20%, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See the Undergraduate Academic Catalog Class Attendance.

SPIRITUAL CARE
Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the Office of Spiritual Development

COPYRIGHT PROTECTED MATERIALS:
Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

THE FINAL EXAM IS A COMPREHENSIVE EXAMINATION. *DATE: 12/15/2021 (Wednesday) from 7:30 am – 10:00 am*
Successful completion of this class requires taking the final examination on its scheduled day.
The final exam date, time and place is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

DAILY SCHEDULE

Date	Day	Section
8/30/21	**Monday**	**No Classes**
8/31/21	Tuesday	1.1 Sum and Product Rules 1.2 Permutations
9/1/21	Wednesday	1.3 The Binomial Theorem
9/2/21	Thursday	
9/3/21	Friday	1.4 Combinations with repetions
9/6/21	**Monday**	**No Classes**
9/7/21	Tuesday	
9/8/21	Wednesday	2.1 Truth Tables
9/9/21	Thursday	
9/10/21	Friday	2.2 The Rules of Logic
9/13/21	Monday	2.3 Rules of Inference
9/14/21	Tuesday	
9/15/21	Wednesday	2.4 Use of Quantifiers
9/16/21	Thursday	
9/17/21	Friday	2.5 Quantifiers, Definitions and the Proofs of Theorems
9/20/21	Monday	3.1 Sets and Subsets
9/21/21	Tuesday	
9/22/21	Wednesday	3.2 Set Operations and the Laws of Set Theory
9/23/21	Thursday	
9/24/21	Friday	3.3 Counting and Venn Digrams
9/27/21	Monday	3.4 A First Word on Probability
9/28/21	Tuesday	
9/29/21	Wednesday	4.1 Mathematical Induction
9/30/21	Thursday	
10/1/21	Friday	4.2 Recursive Definitions
10/4/21	Monday	4.3 The Division Algorithm: Prime Numbers
10/5/21	Tuesday	
10/6/21	**Wednesday**	**Exam 1**
10/7/21	Thursday	
10/8/21	Friday	4.4 The GCD: The Euclidean Algorithm
10/11/21	Monday	5.1 Cartesian Products and Relations
10/12/21	Tuesday	
10/13/21	Wednesday	5.2 Functions: Plain and One-to-One
10/14/21	Thursday	
10/15/21	Friday	5.3 Onto Functions: Stirling Numbers of the Second Kind
10/18/21	Monday	5.4 Special Functions
10/19/21	Tuesday	
10/20/21	Wednesday	5.5 The Pigeonhole Principle
10/21/21	Thursday	
10/22/21	**Friday**	**No Classes**

10/25/21	**Monday**	**5.6 Function Composition and Inverse**
10/26/21	**Tuesday**	
10/27/21	**Wednesday**	**8.1 The Principle of Inclusion and Exclusion**
10/28/21	**Thursday**	
10/29/21	**Friday**	**8.2 Generalizations of the Principle**
11/1/21	Monday	8.3 Derangements: Nothing Is in Its Right Place
11/2/21	Tuesday	
11/3/21	Wednesday	10.1 First Order Linear Recurrence Relation (Bubble Sort)
11/4/21	Thursday	
11/5/21	Friday	10.2 The Second Order Linear Homogeneous Recurrence Relation with Constant Coefficients
11/8/21	**Monday**	**10.3 The Nonhomogeneous Recurrence Relation**
11/9/21	**Tuesday**	
11/10/21	**Wednesday**	**Exam 2**
11/11/21	**Thursday**	
11/12/21	**Friday**	**11.1 Definitions and Examples**
11/15/21	Monday	11.2 Subgraphs, Complements, and Graph Isomorphism
11/16/21	Tuesday	
11/17/21	Wednesday	11.3 Vertex Degree: Euler Trails and Circuirts
11/18/21	Thursday	
11/19/21	Friday	11.4 Planar Graphs
11/22/21	**Monday**	**12.1 Definitions, Properties, and Examples**
11/23/21	**Tuesday**	
11/24/21	**Wednesday**	**No Classes**
11/25/21	**Thursday**	
11/26/21	**Friday**	**No Classes**
11/29/21	Monday	12.2 Rooted Trees
11/30/21	Tuesday	
12/1/21	Wednesday	12.3 Trees and Sorting
12/2/21	Thursday	
12/3/21	Friday	12.4 Weighted Trees and Prefix Codes
12/6/21	**Monday**	**13.1 Dijkstra's Shortest Path Algorithm**
12/7/21	**Tuesday**	
12/8/21	**Wednesday**	**13.2 Minimal Spanning Trees**
12/9/21	**Thursday**	
12/10/21	**Friday**	**13.3 Transport Networks: The Max-Min-Cut Algorithm**
12/13/21	Monday	
12/14/21	Tuesday	
12/15/21	Wednesday	
12/16/21	Thursday	
12/17/21	Friday	

HOMEWORK

	Section	Page(s)	Problems	Due Date
1	1.2	11	9, 11, 20, 20, 25, 26, 28, 33, 34, 35	9/8/21
2	1.3	24	8, 9, 20, 25(a, e)	9/8/21
3	1.4	34	7(b, c), 12(a), 24	9/8/21
4	2.1	54	8(c – h), 9, 10, 11	9/13/21
5	2.2	66	1 – 4, 6, 7(a), 14, 18	9/13/21
6	2.3	84	2, 3, 4, 7, 8, 9(a), 10(c – h)	9/20/21
7	2.4	100	1, 2, 4, 5, 8	9/20/21
8	2.5	116	5, 8, 10	9/20/21
9	3.1	134	8, 10, 12, 13	9/27/21
10	3.2	146	1, 2, 4, 8, 11, 16, 17	9/27/21
11	3.3	150	6	9/27/21
12	3.4	156	11, 12, 14, 15	10/4/21
13	4.1	208	1, 2, 8, 14, 15, 19	10/11/21
14	4.2	219	1, 12, 14, 15, 16	10/11/21
15	4.3	230	8, 12, 14, 15, 16, 17, 18, 19	10/11/21
16	4.4	236	1, 2, 5, 6	10/11/21
17	5.1	252	1, 2, 3, 4, 10, 12	10/18/21
18	5.2	258	1 (a, b, c), 4, 5, 7, 8, 9, 15, 16	10/18/21
19	5.3	265	3, 4, 7, 8, 12	10/18/21
20	5.4	272	1, 2, 8, 14	10/25/21
21	5.5	277	2, 3, 5, 7, 10, 13	10/25/21
22	5.6	288	1, 2, 4, 9, 10, 15	11/1/21
23	8.1	396	5, 13, 16	11/1/21
24	8.2	401	1, 3, 4, 5	11/1/21
25	8.3	403	1, 5, 11	11/8/21
26	10.1	455	1, 2, 3, 4, 5, 6	11/15/21
27	10.2	518	1(a, b, c), 4	11/15/21
28	10.3	481	1, 3	11/15/21
29	11.1	518	2, 3, 6, 7, 10	11/15/21
30	11.2	528	1, 2, 3, 8, 9, 11(b),15	11/22/21
31	11.3	537	1, 5, 6, 8, 20, 21, 22, 23, 25	11/22/21
32	11.4	553	2, 3	11/29/21
33	12.1	585	8, 13	11/29/21
34	12.2	603	3, 5, 23	12/6/21
35	12.3	609	2, 3	12/6/21
36	12.4	614	1, 2, 3	12/6/21
37	13.1	638	2, 3	12/10/21
38	13.2	643	1, 4, 7	12/10/21
39	13.3	658	1, 3	12/17/21