| | | | | |
|---|---|---|---|---|
| **Document:** | Discrete Structures Course Administration | | | |
| **Revised:** | **April 24, 2023** | | | |
| **Course Title:** | Discrete Structures | | | |
| **Course Number:** | CMSC 2123 | | | |
| **Section:** | CRN 20730, 10:00 – 10:50 a.m. Monday, Wednesday, and Friday. MCS 115 | | | |
| **Instructor:** | Dr. Thomas R. Turner; Office: MCS 134; Work Phone: 974-5383, e-mail: trturner@uco.edu | | | |
| **Office Hours:** | **Time** | **Monday** | **Wednesday** | **Friday** |
| | 9:00 – 9:50 a.m. | MCS 134 | MCS 134 | MCS 134 |
| | 4:00 – 5:00 p.m. | MCS 134 | MCS 134 | |
| | Please make an appointment to visit me during my office hours. | | | |
| **Text:** | 1. Rosen, *Discrete Mathematics and Its Applications* 8th Ed. McGraw-Hill Higher Education 2019 ISBN 978-1-259-67651-2. | | | |
| **References:** | 1. Malik and Sen, *Discrete Mathematical Structures: Theory and Applications*, Thomson Course Technology, 2004, ISBN 0-619-21558-5.<br>2. Horstmann and Budd *Big C++* John Wiley & Sons, Inc. 2005 ISBN 0-471-47063-5<br>3. Stroustrup, B. *The C++ Programming Language* 3rd Ed.; Addison-Wesley 1997 ISBN 0-201-88954-4<br>4. Johnsonbaugh, *Discrete Mathematics* 4th Ed. Prentice Hall 1997 ISBN 0-13-518242-5 | | | |
| **Prerequisites:** | 1. One year of High School Algebra II and Trigonometry OR<br>MATH 1513 College Algebra AND<br>MATH 1593 Plane Trigonometry OR<br>MATH 1555 College Algebra and Trigonometry<br>2. CMSC 1613, Programming I | | | |
| **Course due dates:** | All assignments, projects, reports and quizzes are due at the beginning of class on the date given in this document unless otherwise specified. Exams that are administered in class are due at the end of the class period. | | | |
| **Course Scoring:** | **Task** | **Date** | **Value** | |
| | Test 1 | ***2-27*** | **150** | |
| | Test 2 | ***4-5*** | **150** | |
| | Final Test | ***5-12*** | **300** | |
| | Projects | Table 2 | **150** | |
| | Assignments | Table 3 | **100** | |
| | Reports | Table 4 | **50** | |
| | **Total** | | **900** | |
| **Grading:** | **A**: 90% (810-900); **B**: 80-89% (720-809); **C**: 70-79% (630-719); **D**: 60-69% (540-629); **F**: 59% (0-539) and below. | | | |
| **Notice:** | Beepers and cellular phones are prohibited in class. | | | |

| | |
|---|---|
| **Caveat:** | This lecture schedule, projects, reports, quizzes, tests, and due dates are all subject to change. Changes are presented in class ***You*** are responsible for the material presented in class. |
| **Class Web Page:** | The course administration and assignments can be found on URL **http://www.comsc.uco.edu/~trt/cs2123.html** |
| **Course Directory** | The course directory is on the department computer (**cs.uco.edu**). You can find project test data files in the course directory. **~tt/cs2123/** |
| **Student Disabilities:** | Students with disabilities who require accommodations may contact Disability Support Services. **http://bronze.uco.edu/disability_support/** |
| **Absences:** | 1. A **45-point bonus** is awarded to any student having no recorded absences. The attendance bonus will be denied to any student who is absent for any reason. The attendance bonus will not be granted to any student having an excused absence.<br>2. A student may be absent for up to **three (3)** classes without penalty: these three classes are counted as excused absences. No notification or documentation is required except when a test is given.<br>3. **Fifteen (15)** points will be deducted from the student's final score for the **fourth and every subsequent** class for which the student is recorded absent.<br>4. A student will receive a zero on an examination unless written justification is presented to the instructor. Acceptable justification includes university sanctioned travel, military obligation, serious illness or injury, or death or serious illness in the immediate family. Work-related conflicts are not acceptable excuses.<br>5. Please note that **roll is taken** for those students enrolled in the **Interactive Video** section at the time this class is scheduled to meet on campus. **No recording is available for later viewing.** |
| **Academic Honesty and Collaboration:** | Students are encouraged to collaborate. However, each student must make a ***unique*** contribution to any joint effort and that unique contribution must be ***visible*** in the work submitted by the student. Partially or completely copied assignments shall be considered a prima facie case for academic dishonesty. |

| Table 1. Lecture Schedule | | | |
|---|---|---|---|
| **Class** | **Date** | **Topic** | **Reference** |
| 1 | 1-18 | Course administration<br>Administrative Overview<br>Course Overview | Lecture Notes<br>Lecture 0. Lecture notes<br>Lecture 1. Lecture notes |
| 2 | 1-20 | 1.1 Propositional Logic | Lecture 2. Ch. 1. p 1-16 |
| 3 | 1-23 | 1.2 Applications of Propositional Logic<br>**Submit Assignment a01** | Lecture 3. Ch. 1. p 17-25 |
| 4 | 1-25 | 1.3 Propositional Equivalences<br>**Submit Assignment a02** | Lecture 4. Ch. 1. p 26-39 |
| 5 | 1-27 | 1.4 Predicates and Quantifiers<br>**Submit Assignment a03** | Lecture 5. Ch. 1. p 40-59 |
| 6 | 1-30 | 1.5 Nested Quantifiers<br>**Submit Assignment a04**<br>**No class – UCO closed.** | Lecture 6. Ch. 1. p 60-72 |
| 7 | 2-1 | 1.6 Rules of Inference<br>**Submit Assignment a05**<br>**No class – UCO closed.** | Lecture 7. Ch. 1. p 73-83 |
| 8 | 2-3 | 1.7 Introduction to Proofs<br>**Submit Assignment a06** | Lecture 8. Ch. 1. p 84-95 |
| 9 | 2-6 | 2.1 Sets<br>**Submit Assignment a07** | Lecture 9. Ch. 2. p 121-132 |
| 10 | 2-8 | Linux Survival<br>**Submit Assignment a08** | Lecture 10. Lecture notes |
| 11 | 2-10 | Project p01 overview | Lecture 11. Lecture notes |
| 12 | 2-13 | 2.2 Set Operations<br>**Submit Project p01, Tautology** | Lecture 12. Ch. 2. p 147-164 |
| 13 | 2-15 | 2.3 Functions<br>**Submit Assignment a09** | Lecture 13. Ch. 2. p 165-178 |
| 14 | 2-17 | Project p02 Overview<br>**Submit Assignment a10** | Lecture 11. Lecture notes |
| 15 | 2-20 | Project p02 Overview<br>**Submit Report r01** | Lecture 14. Lecture notes. |
| 16 | 2-22 | 2.4 Sequences and Summations<br>**Submit Project p02, Cartesian Product** | Lecture 15. Ch. 2. p 165-179 |
| 17 | 2-24 | Time Complexity: $\boldsymbol{T(n)}$, Counting the Cost<br>Time Complexity: $\boldsymbol{T(n)}$, Examples<br>**Submit Assignment a11** | Lecture 16. Lecture notes<br>Lecture 17. Lecture notes |
| ***18*** | ***2-27*** | ***Test 1*** | ***Chapters 1-2*** |
| 19 | 3-1 | Test 1 Reprise | Chapters 1-2 |
| 20 | 3-3 | Validating $\boldsymbol{T(n)}$<br>Project p03 Overview | Lecture 18. Lecture notes<br>Lecture 19. Lecture notes |
| 21 | 3-6 | $\boldsymbol{O(f(n)), \Omega(g(n)), \Theta(f(n))}$<br>**Submit Assignment a12** | Lecture 20. Lecture notes |

| Table 1. Lecture Schedule (Continued) | | | |
|---|---|---|---|
| **Class** | **Date** | **Topic** | **Reference** |
| 22 | 3-8 | Project p04 Overview<br>**Submit project p03, Code fragment 3** | In class discussion. |
| 23 | 3-10 | $\boldsymbol{O(f(n))}, \boldsymbol{\Omega(f(n))}, \boldsymbol{\Theta(f(n))}$ Examples<br>**Submit project p04 Code fragment 4** | Lecture 21. Lecture notes |
| 24 | 3-20 | 4.1 The Divisibility and Modular Arithmetic | Lecture 22. Ch. 4. p 251-260 |
| 25 | 3-22 | 4.2 Integer Representations and Algorithms<br>**Submit project p05, Code fragment 5**<br>**Submit Assignment a13** | Lecture 23. Ch. 4. p 260-270 |
| 26 | 3-24 | 4.3 Primes and the Greatest Common Divisor<br>**Submit Assignment a14** | Lecture 24. Ch. 4. p 271-289 |
| 27 | 3-27 | 4.4 Solving Congruences<br>**Submit Assignment a15** | Lecture 25. Ch. 4. p 290-302 |
| 28 | 3-29 | 4.5 Applications of Congruences<br>**Submit Assignment a16** | Lecture 26. Ch. 4. p 303-309 |
| 29 | 3-31 | 4.6 Cryptography<br>**Submit Assignment a17** | Lecture 27. Ch. 4. p 310-323 |
| 30 | 4-3 | 5.1 Mathematical Induction<br>**Submit Assignment a18** | Lecture 28. Ch. 5. p 331-353 |
| ***31*** | ***4-5*** | ***Test 2*** | ***Time Complexity, Chapters 4*** |
| 32 | 4-7 | Test 2 reprise | Time Complexity, Chapters 4 |
| 33 | 4-10 | 5.2 Strong Induction and Well-Ordering<br>**Submit Assignment a19** | Lecture 29. Ch. 5. p 354-364 |
| 34 | 4-12 | 5.3 Recursive Definitions and Structural Induction<br>**Submit Assignment a20** | Lecture 30. Ch. 5. p 365-380 |
| 35 | 4-14 | 5.4 Recursive Algorithms<br>**Submit Assignment a21** | Lecture 31. Ch. 5. p 381-392 |
| 36 | 4-17 | 6.1 The Basics of Counting<br>**Submit Assignment a22** | Lecture 32. Ch. 6. p 405-419 |
| 37 | 4-19 | 6.2 The Pigeonhole Principle<br>**Submit Assignment a23** | Lecture 33. Ch. 6. p 420-427 |
| 38 | 4-21 | 6.3 Permutations and Combinations<br>**Submit Assignment a24** | Lecture 34. Ch. 6. p 428-436 |
| 39 | 4-24 | 6.4 Binomial Coefficients and Identities<br>6.5 Generalized Permutations and Combinations<br>**Submit Assignment a25** | Lecture 35. Ch. 6. p 437-444<br>Lecture 36. Ch. 6. p 445-456 |
| 40 | **4-26** | **Margin**<br>**Optionally Submit Assignment a26** | |
| 41 | **4-28** | **Margin** | |

| Table 1. Lecture Schedule (Continued) | | | |
|---|---|---|---|
| **Class** | **Date** | **Topic** | **Reference** |
| **42** | **5-1** | **Margin** | |
| **43** | **5-3** | **Margin** | |
| **44** | **5-5** | **Summary Score Sheets.** | |
| ***45*** | ***5-12*** | ***Final Exam, 9:00 – 10:50 a.m., Friday, May 12, 2023*** | ***Comprehensive*** |

| Table 2. Projects | | | |
|---|---|---|---|
| **Project** | **Due** | **Value** | **Description** |
| **p01** | ***2-13*** | **30** | Logic |
| **p02** | ***2-22*** | **30** | Cartesian Product |
| **p03** | ***3-8*** | **30** | Code Fragment 3 Time Complexity |
| **p04** | ***3-10*** | **30** | Code Fragment 4 Time Complexity |
| **p05** | ***3-22*** | **30** | Code Fragment 5 Time Complexity |
| **Total** | | **150** | |

| Table 3. Assignments | | | |
|---|---|---|---|
| **Assignment** | **Due** | **Value** | **Description** |
| **1** | ***1-23*** | **4** | **1.1 Propositional Logic** |
| **2** | ***1-25*** | **4** | **1.2 Applications of Propositional Logic** |
| **3** | ***1-27*** | **4** | **1.3 Propositional Equivalences** |
| **4** | ***1-30*** | **4** | **1.4 Predicates and Quantifiers** |
| **5** | ***2-1*** | **4** | **1.5 Nested Quantifiers** |
| **6** | ***2-3*** | **4** | **1.6 Rules of Inference** |
| **7** | ***2-6*** | **4** | **1.7 Introduction to Proofs** |
| **8** | ***2-8*** | **4** | **2.1 Sets** |
| **9** | ***2-15*** | **4** | **2.2 Set Operations** |
| **10** | ***2-17*** | **4** | **2.3 Functions** |
| **11** | ***2-24*** | **4** | **2.4 Sequences and Summations** |
| **12** | ***3-6*** | **4** | **Computing $T(n)$** |
| **13** | ***3-22*** | **4** | **4.1 The Divisibility and Modular Arithmetic** |
| **14** | ***3-24*** | **4** | **4.2 Integer Representations and Algorithms** |
| **15** | ***3-27*** | **4** | **4.3 Primes and the Greatest Common Divisor** |
| **16** | ***3-29*** | **4** | **4.4 Solving Congruences** |
| **17** | ***3-31*** | **4** | **4.5 Applications of Congruences** |
| **18** | ***4-3*** | **4** | **4.6 Cryptography** |
| **19** | ***4-10*** | **4** | **5.1 Mathematical Induction** |
| **20** | ***4-12*** | **4** | **5.2 Strong Induction and Well-Ordering** |
| **21** | ***4-14*** | **4** | **5.3 Recursive Definitions and Structural Induction** |
| **22** | ***4-17*** | **4** | **5.4 Recursive Algorithms** |
| **23** | ***4-19*** | **4** | **6.1 The Basics of Counting** |
| **24** | ***4-21*** | **4** | **6.2 The Pigeonhole Principle** |
| **25** | ***4-24*** | **4** | **6.3 Permutations and Combinations** |
| **26** | ***4-26*** | **4** | **6.4 Binomial Coefficients and Identities (optional)** |
| **Total** | | **100** | **(For required assignments)** |

| Table 4. Reports | | | |
|---|---|---|---|
| **Report** | **Due** | **Value** | **Description** |
| r01 | *2-20* | 50 | Library research report |
| Total | | 50 | |