Math 301 – Discrete Mathematics  
Fall 2018, Section Web 1

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Phone: (662) 915-1463  
Office Hours: Monday through Thursday 10:00-11:00, or by appointment  
E-mail: Sheppard@olemiss.edu

Course Overview  
Discrete Mathematics is the study of mathematical objects that take on distinct values, often integer values. This is in contrast to the continuous functions you have encountered in Calculus. This course introduces mathematical reasoning and proof in a discrete context, as well as tools for modeling real world processes. Topics will include elementary counting principles, mathematical induction and other proof methods, relations and functions, and graphs. Our focus will be on logical thinking and problem solving.

Prerequisites  
Math 261- Unified Calculus & Analytic Geometry I with a minimum grade of C.

Department policy for majors  
Grades lower than C in mathematics courses will not be counted toward the mathematics major for the B.A. or B. S. degree.

Text  
Mathematics, A Discrete Introduction, by Edward R. Scheinerman. You may use any of the three editions.

Learning goals  
This course will cover elementary counting principles, mathematical induction and other proof methods, relations and functions, and graphs. This includes selected sections of chapters 1-5 and 9 in the Scheinerman text. Our focus will be on logical thinking and problem solving.

By the end of this course, you should be able to:  
- apply counting methods to solve a variety of problems  
- explain your solutions to someone who understands basic counting methods  
- read and write statements involving standard mathematical notation, including quantifiers, set operations, and “if…then…” structures  
- write simple proofs using direct methods, mathematical induction, or contradiction  
- read and write a variety of notation for relations and functions, and identify standard properties of relations and functions  
- apply equivalence relations and bijective functions in solving counting problems  
- understand standard graph definitions, and identify examples of such items as subgraphs, trees, and independent sets  
- use graphs to model and solve problems

Class format  
Instructional methods used in this course include recorded lectures, online class discussions, reading and writing assignments, hands-on assignments, online communications, and a final written exam proctored through the Distance Education Testing Lab on the Oxford Campus.

Communication policy  
The best way to reach me is via email. Include the course number and section and a meaningful subject in your subject line. I will attempt to respond to emails within 24 hours during the work week. I will respond to weekend email messages on Monday. The phone number above does not have voicemail.

Information in this syllabus is subject to change at the discretion of the instructor. Any alterations will be applied consistently for all students, and with appropriate notification.
Course Conduct and Grading
You will use the Blackboard online course system to get course assignments and supplemental materials, take quizzes, monitor your grades, and communicate with classmates. Login at blackboard.olemiss.edu. You can find basic instructions for using the system at www.olemiss.edu/blackboard.

Class format
The format for this course - both the traditional and the web sections - may be different from what you’ve experienced in Calculus. Your individual participation will be vital to your success.

The course is organized in a series of modules. You will complete these in the order they are presented. Each module will include a reading assignment, a brief reading quiz, and recommended textbook exercises. Many will include short video lectures. Other assignments will vary from one module to another, and will include participating in online discussions, completing hands-on activities, giving and receiving peer feedback, and traditional written problem solving and proofs.

Deadlines
Unless otherwise specified in an individual assignment, all deadlines are firm. Late work will not be accepted. Most assignments will be due at noon on the specified date.

Written homework
Individual written homework will be assigned regularly throughout the semester. These assignments will be graded on both content and presentation. Be sure to follow the presentation guidelines in the Course Expectations section of this document. You may either type your assignments or scan handwritten work. Instructions for using LaTex to typeset mathematics is available in the Resources section on Blackboard.

Tests
There will be three (3) proctored tests. All will be closed book, and no calculators or other electronic devices will be needed or allowed. Your lowest test score will not be included in your grade calculation. Any student who will miss one of the three tests because of an official University function may reschedule and take this test at a time before the scheduled test administration. Other test rescheduling may be offered in rare cases, such as jury duty or military commitments. The final exam will be cumulative and will be closed book with no calculators.

Grade Calculation

<table>
<thead>
<tr>
<th>Assignments and quizzes</th>
<th>100 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best two (2) tests, 100 each</td>
<td>200 points</td>
</tr>
<tr>
<td>Final exam</td>
<td>200 points</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>%</th>
<th>Minimum grade</th>
</tr>
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<tbody>
<tr>
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<td>93%</td>
<td>A</td>
</tr>
<tr>
<td>450</td>
<td>90%</td>
<td>A-</td>
</tr>
<tr>
<td>435</td>
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<td>B+</td>
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<td>415</td>
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<td>80%</td>
<td>B-</td>
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<td>385</td>
<td>77%</td>
<td>C+</td>
</tr>
<tr>
<td>350</td>
<td>70%</td>
<td>C</td>
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<tr>
<td>300</td>
<td>60%</td>
<td>D</td>
</tr>
</tbody>
</table>

Remember that grades lower than C in mathematics courses will not be counted toward the mathematics major for the B.A. or B.S. degree.

Academic Honesty
You are expected to abide by the guidelines for academic honesty given in the M-Book. Sanctions for academic misconduct may include grade reduction, extra work, failure of the course, suspension, expulsion, or a combination of the above. Academic misconduct includes presenting for grading anything which is not your own original work, using unapproved sources for any assignment or test, allowing someone else to copy your work for a graded assignment, or asking for a re-grade of a paper that has been altered from its original form. If you study with other students or a tutor, do not look at notes from that study when you write individual homework to be graded. If you have any doubts about whether something is proper, ask.

Information in this syllabus is subject to change at the discretion of the instructor. Any alterations will be applied consistently for all students, and with appropriate notification.
Course Expectations

General expectations

- You are expected to read the textbook.
- You are expected to make a reasonable attempt at all textbook practice problems and to ask questions about those you cannot do. You may see these problems on tests.
- You will have to effectively communicate your ideas to do well in this course. You will be asked to explain how you arrived at answers to numeric problems. You will write proofs.
- You should plan to spend about 9 hours a week on this course.

Tips for success

- Keep up. You will need to be comfortable with the material from the beginning of the course to be successful in the end.
- For a regular lecture-based class you should expect to spend about two (2) hours outside class for every nominal hour in class. For this 3-hour web-based course, expect to spend about 9 hours a week of study time.
- Use your textbook. It has a good index, a glossary, solutions for chapter self-tests, and hints for the practice problems. If you come across an unfamiliar term in your reading, try looking it up in the index.
- Do not turn to internet searches when you feel challenged. The exercises in this course are designed to lead you through a learning process. If you focus on ‘getting the answer’ alone, you are skipping that process. Using outside resources is fine for aiding your understanding, but only after you’ve given yourself a real chance to try things on your own.
- Ask questions and participate in group discussions. The point of the course is for you to learn something. I am here to help you do that, not to judge you. I can provide much more effective help if I know where you need it.

Homework hints

- Read the problem carefully. Make sure you actually answer all the questions being asked.
- You are free to use the hints in the appendix.
- Read the textbook, including the examples. Some of them are very closely related to the assigned problems.
- If you’re writing a proof or explanation, try reading it aloud. Are the sentences complete? Have you put on paper what you really meant?
- Check the reasonableness of your answers. If you write a proof that assumes both a < 0 and a > 2 at the same time, for example, something’s wrong!

Presentation guidelines

The homework assignments in this course are intended to reinforce both your understanding and your good habits in presentation. Your work is graded based on both content and presentation. You should follow the procedures stated below strictly.

- State each problem before its solution. (Use your best judgment in omitting long explanations.)
- Multiple pages must be stapled.
- Your papers must be neat. If you use sheets from a spiral bound notebook, you should tear off the scraps along the perforation.
- Your handwriting should be legible. Assignments with illegible handwriting will not be graded. If you have this problem, take extra time to make it more readable, or type your paper.
- If you have a continuation of an equation, make sure you write down the equality or other appropriate sign.
- Explain your steps. Either use well-known conventions as used in class or use plain and concise English such as "because so and so, we must have so and so".
- If you present a correct solution but also make incorrect statements, deductions will be taken.
Required Materials

Text
Mathematics, A Discrete Introduction, by Edward R. Scheinerman. You may use any of the three editions.

Technology

Internet access
You must have access to the Internet, preferably high speed Internet, for the duration of this course.

Software
You must have access to a computer with the following software installed:

• **I need to decide whether to require word processing software or TeX. **

Browsers, plug-ins, players and viewers
In order to take full advantage of all the features in this course, be sure you have the right technology at your fingertips. This includes:

  o Blackboard-supported browser: Firefox 31+, Chrome 36+, Safari 6+ (Mac only), Edge 20+, and Internet Explorer 9+ (Windows only) are compatible with the current version of Blackboard (9.1 201510 as of January 2017). Firefox is preferred on all computers.
  
  o Acrobat Reader
  
  o Flash Player
  
  o QuickTime

I recommend running the Blackboard Browser Check to verify installed plug-ins on your computer.

Hardware

  o Computer Speakers

Tech support
The IT Helpdesk, centrally located in Weir Hall, is open Monday through Friday, 8 a.m. to 5 p.m. The helpdesk offers assistance to Ole Miss students and employees with technology-related issues involving software, hardware and networking. It provides support for email, Wi-Fi, Microsoft Office and other campus-wide applications. Come by Weir Hall or call us at 662-915-5222. Email helpdesk@olemiss.edu or visit their website for more information.
University of Mississippi Policies

Testing Policy

This course has at least one proctored assessment. It is the student’s responsibility to schedule the appointment(s) for any proctored assessment(s). Please note that your instructor has limited the date and time that the assessment(s) is available. Please check the course schedule for specific information about the proctored assessment(s).

To schedule an appointment, follow the link below: http://www.online.olemiss.edu/testing.html

If you have questions regarding proctored testing at a regional campus (Desoto, Grenada, Booneville, Tupelo) contact that campus directly.

The Oxford testing lab (DETL) cannot assist you in making regional campus testing appointments or schedule/reschedule your appointments for you. You must use the link provided.

If you do not show up for your exam or reschedule your appointment online at least two hours before the testing time, you will not be able to reschedule and I will be notified. Treat these appointments just as you would if you were testing with me.

The contact information for the UM testing centers are:

<table>
<thead>
<tr>
<th>Campus</th>
<th>Name</th>
<th>Phone 1</th>
<th>Phone 2</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desoto</td>
<td>Twyla Loftiss</td>
<td>(662) 393-1674</td>
<td><a href="mailto:twyla@olemiss.edu">twyla@olemiss.edu</a></td>
<td></td>
</tr>
<tr>
<td>Tupelo</td>
<td>Sherry Miller</td>
<td>(662) 844-5622</td>
<td><a href="mailto:smiller3@olemiss.edu">smiller3@olemiss.edu</a></td>
<td></td>
</tr>
<tr>
<td>Booneville</td>
<td>Kim Gray</td>
<td>(662) 720-7781</td>
<td><a href="mailto:kimgray@olemiss.edu">kimgray@olemiss.edu</a></td>
<td></td>
</tr>
<tr>
<td>Grenada</td>
<td>LaTonya Pittman</td>
<td>(662) 227-2348</td>
<td><a href="mailto:lspittma@olemiss.edu">lspittma@olemiss.edu</a></td>
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</tbody>
</table>

It is important that you report to the testing center at least 10 MINUTES BEFORE your appointment. If you are late, you will not be allowed to test.

You must have a valid Ole Miss ID, state issued driver’s license, or passport in order to take your exam. THERE ARE NO EXCEPTIONS!

If you are unable to take your proctored assessments at UM or a UM regional campus, your other option is to use ProctorU, an online proctoring service.

http://www.online.olemiss.edu/proctoru.html

Use the link above to access the Online at Ole Miss testing page to learn more about ProctorU and schedule an exam.

Students with Disabilities

The University of Mississippi is committed to the creation of inclusive learning environments for all students. If there are aspects of the instruction or design of this course that result in barriers to your full inclusion and participation or to accurate assessment of your achievement, please contact the course instructor as soon as possible. Barriers may include, but are not necessarily limited to, time limits, difficulty with the acquisition of lecture content, inaccessible web content or the use of non-captioned or non-transcribed video and audio files. Students must also contact the Office of Student Disability Services so that office can 1) explore if barrier removal is necessary; 2) provide you, if approved, with Instructor Notification forms; 3) facilitate the removal of curricular barriers; and 4) ensure you have equal access to the same opportunities for success that are available to all students. Office of Student Disability Services: 234 Martindale, 662-915-7128 (Phone), 662-915-7907 (TTY Phone), sds@olemiss.edu
Copyright Notice
Materials used in connection with this course may be subject to copyright protection under Title 17 of the United States Code. Under certain Fair Use circumstances specified by law, copies may be made for private study, scholarship, or research. Electronic copies should not be shared with unauthorized users. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability as well as disciplinary action under University policies.

IT Appropriate Use Policy
This policy sets forth the privileges of and restrictions on students, faculty, staff, and other users with respect to the computing and telecommunications systems offered by the University of Mississippi (UM). This policy is designed to protect the University community from illegal or damaging actions by individuals, either knowingly or unknowingly. Inappropriate use exposes the University to risks, including virus attacks, compromise of network systems and services, and legal issues. This policy directly addresses copyright issues related to illegal downloads and peer-to-peer file sharing. For Appropriate Use Policy questions, send an email to aup@olemiss.edu.

Academic integrity
The University of Mississippi is dedicated to supporting and sustaining a safe and scholarly community of learning dedicated to nurturing excellence inside and outside of the classroom. Each student has a duty to become familiar with University values and standards reflected in University policies, and each student has a duty to honor University values and standards reflected in University policies. These policies are outlined in the M Book. For a complete listing of policies, please visit the University Policy Directory.

Verification of Student Attendance Policy
The University must abide by federal guidelines to verify the participation of online students. For all course types, including thesis, internships, labs, online courses, etc., the instructor must verify your participation based on some type of participation. This may include submission of an online assignment or other course related contact with the instructor. (However, simply logging into Blackboard will not count as an academically related activity.) Attendance Policy for Online Education

Student Identity Policy
Federal regulations, our accrediting agency (SACS) and university policies require that safeguards are used to ensure that the student who receives the academic course credit is actually the person doing the work. You will need to present your student ID before taking proctored exams and your instructor may verify your identity through live or virtual meetings, or by using an identity verification program.

Student Privacy Policy
The University of Mississippi protects the privacy of all students, including online and distance learning students, through adherence to the Family Educational Rights and Privacy Act of 1974 (FERPA) through compliance with other institutional policies and procedures governing the management and security of protected information of faculty, staff, and students, and by outlining the expectations of privacy for the university community as regards to electronic information. Student Privacy Policy
Assignments and Schedule

Note that each module includes a **reading quiz** in addition to the listed activities. You are also expected to work the recommended practice exercises from the textbook. Unless otherwise specified, items are **due at noon** on the date listed.

<table>
<thead>
<tr>
<th>Module</th>
<th>Reading</th>
<th>Activities</th>
<th>Due Dates</th>
</tr>
</thead>
</table>
| 1.0    | Course Introduction | Syllabus ● Video reading exercise  
|        |                  | ● Discussion board - reading exercise                                    | Quiz: Wed 8/22  
|        |                  |                                                                    | Discussion: Th 8/23 |
| 1.1    | Mathematical reasoning definitions & proof | 1-5 ● Written Homework  
|        |                  |                                                                     | Quiz: Wed 8/22  
|        |                  |                                                                    | HW: Mon 8/27 |
| 1.2    | Counting ordered selections lists and factorials | 7-8 ● Written Homework  
|        |                  |                                                                     | Quiz: Mon 8/27  
|        |                  |                                                                    | HW: Mon 9/3 |
| 1.3    | The language of sets subsets, sets, quantifiers | 9-10 ● Written Homework  
|        |                  |                                                                     | Quiz: Mon 9/3  
|        |                  |                                                                    | HW: Mon 9/10 |
| 1.4    | Operations on sets | 11 ● Written Homework  
|        |                  |                                                                     | Quiz: Mon 9/10 |
|        |                  | ● Discussion board - Examples of relations                              |                           |
| 2.1    | The language of relations | 13-14 ● Discussion board - Examples of relations  
|        |                  |                                                                     |                           |
| 2.2    | Using relations in counting Partitions and the division principle | 15 ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
| 2.3    | Counting unordered selections Binomial Coefficients and the Binomial Theorem | 16 ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
| 2.4    | Proof by counting Combinatorial Proof | 12 ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
| 2.5    | Counting with repeated elements Multiset counting | 17 ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
| 2.6    | Counting the complement Inclusion/Exclusion | 18 ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
|        |                  | ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
|        |                  | ● Discussion board on alternative solution methods  
|        |                  |                                                                     |                           |
| 3.1    | Writing proofs Contrapositive, Contradiction, and Mathematical Induction | 19, 21 ● Peer feedback  
|        |                  |                                                                     |                           |
|        |                  | ● Written homework                                                      |                           |
| 3.2    | Function properties and applications | 23-24 ● Peer feedback  
|        |                  |                                                                     |                           |
|        |                  | ● Written homework                                                      |                           |

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<tr>
<th>Functions, Pigeonhole Principle</th>
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<tbody>
<tr>
<td>3.3 <strong>Modeling the world with Graphs</strong>&lt;br&gt;Graph basics and Subgraphs</td>
<td>46-47</td>
<td>• Discussion board – graph examples</td>
</tr>
<tr>
<td>3.4 <strong>Graph properties</strong>&lt;br&gt;Connection, Trees, Euler tours</td>
<td>48-50</td>
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</tr>
<tr>
<td>3.5 <strong>Graph Coloring</strong></td>
<td>51</td>
<td>TEST</td>
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