I. COURSE INFORMATION

Meeting times and place: CCH 104 TR 4:00-5:15 pm
Professor: Dr. Jose H. Giraldo
Office Phone: (361) 825 5827
Office: CI 313
E-mail address: jgiraldo@falcon.tamucc.edu
Class Web page address: www.tamucc.edu Click the Online Link
Office Hours: M 11-12:30 pm, R 2-3:30 pm

II. COURSE DESCRIPTION

The main topics to cover in this course include sets, relations, functions (including
Big – O or theta), introduction to Boolean algebra, counting techniques, elementary
graph theory, matrices, proof techniques, induction, recursive relations and
elementary propositional and predicate logic. There will emphasis on mathematical
and computer science applications for these concepts.

III. PREREQUISITES

MATH 1314 (College Algebra) and MATH 1316 (Trigonometry), or MATH 2312, or
placement beyond MATH 2312

IV. TEXT AND OTHER SUPPLIES REQUIRED

The textbook for the course is Mathematical Structures for Computer Science by

V. COURSE OBJECTIVES

There are general and content objectives.

A. GENERAL OBJECTIVES

1. The student will link mathematical concepts to real world situations.

2. The student will strengthen his general academic skills in critical thinking and
writing.

3. The student will improve his ability to translate a word problem into a math
statement, and back again to words.
4. The student will improve the ability to form reasonable descriptions and judgments based on quantitative information

5. The student will develop a broad-base of discrete mathematics concepts knowledge including concepts, basic skills, mathematical senses (quantitative, symbolic), and thinking process (problem-solving, predicting, generalizing)

B. CONTENT GOALS
At the end of the course the student should be able to:
1. Use the basic rules of logic to justify arguments. These include arguments by negation, contrapositive, direct, contradiction, and counter examples.

2. Use graph theoretical arguments in the solutions of problems.

3. Distinguish and use properly the different counting techniques learned in class.

4. Define sequences recursively and determine their closed form.

5. Solve problems using the concept of relations and functions combined with counting techniques.

6. Interpret situations using strings together with the counting techniques.

VI. INSTRUCTIONAL METHODS AND ACTIVITIES.

The class instruction will be based on lecturing and group work. The students will have access to some of the class notes in the Internet. You can supplement the web notes with the textbook. I do expect the students to read the class material before coming to class.

The students will be active participants during class. They will discuss in groups assigned problems. The group discussion will then be carried out to the whole class, under the guidance of the instructor. Throughout the course the student will be participating actively in the learning process.

Keep in mind that you CAN ONLY REMEMBER:

10% of what you read
20% of what you hear
30% of what you see
50% of what you see and hear
70% of what you discuss with others
90% of what you teach someone else

With the class and group discussions I expect you to reach the level to be able to discuss with or teach the concepts to someone else. Writing and explaining are important component of this approach. For this reason, numbers without an accompanying explanation or interpretation are meaningless for me.
VII. EVALUATIONS AND GRADE ASSIGNMENTS
Your final grade will be obtained from quizzes, in class activities, term interview, midterm exams (including test on basics), final exam (with basics). The table below shows the weight of each of these items (out of 100 points) toward your grade.

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>15</td>
</tr>
<tr>
<td>In class activities</td>
<td>10</td>
</tr>
<tr>
<td>Term Interview</td>
<td>10</td>
</tr>
<tr>
<td>Midterms (2 midterms)</td>
<td>50</td>
</tr>
<tr>
<td>Final Exam</td>
<td>15</td>
</tr>
</tbody>
</table>

Quizzes
There will be several quizzes on the web. Most of them will be unsupervised.

In class activities
I expect you to be doing your work with your group in class unless otherwise stated. There are going to be in class activities ranging from working on problems from the book or handouts, to written activities. Please refer to the guidelines on Group Work available on the web.

Midterms
There will be two midterms. Each midterm consists of two parts: Basics, and Essay. The part on Basics will test the basic concepts you are expected to obtain in this class. It is closed notes, closed book, and mostly either multiple choice or short answer test type of questions. This counts as 50% of your test grade. In the Essay part you will have to include full explanation of what you are doing to receive credit. It counts as 50% of your test grade.

For each midterm you will be allowed to bring a standard sheet of paper with information you may need for the test. DO NOT INCLUDE SOLUTIONS TO PROBLEMS. To see what is covered in each midterm and the corresponding dates visit the calendar for the course. Review questions for each of the test will be available to the students.

Term Interview
The week before the last week of classes you will have a 10-minute interview with me. For this interview you will explain a problem chosen randomly from a list of problems given to you two weeks before the end of the semester. Rules for this interview are distributed along with the problems.

Final Exam
The final exam will also have the basic and essay part. The section on basics will cover all the topics in class. The essay part will be on particular topics.

The final grade will be based on the following scale:
- A 90%-100%
- B 80%-89%
- C 70%-79%
- D 60%-69%
- F 0%-59%
VIII. TENTATIVE COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Lecture</th>
<th>TOPICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction Grundy’s Game and tower of Hanoi.</td>
</tr>
<tr>
<td>2</td>
<td>Basics on logic: Symbolic representation, connectives and tautologies</td>
</tr>
<tr>
<td>3</td>
<td>Introduction to propositional logic</td>
</tr>
<tr>
<td>4</td>
<td>Introduction to Number Theory. Direct and indirect methods of proof.</td>
</tr>
<tr>
<td>5</td>
<td>Introduction to sets</td>
</tr>
<tr>
<td>6</td>
<td>Introduction to Permutations and Combinations</td>
</tr>
<tr>
<td>7</td>
<td>More on permutations and combinations</td>
</tr>
<tr>
<td>8</td>
<td>Counting techniques: Inclusion-Exclusion principle (addition principle), multiplication principle, and pigeonhole principle.</td>
</tr>
<tr>
<td>9</td>
<td>Permutations and Combinations with repetitions.</td>
</tr>
<tr>
<td>10</td>
<td>The Binomial Theorem. <strong>Review for test</strong></td>
</tr>
<tr>
<td>11</td>
<td><strong>TEST I</strong></td>
</tr>
<tr>
<td>12</td>
<td>Introduction to Graphs. Basic vocabulary</td>
</tr>
<tr>
<td>13</td>
<td>Isomorphic graphs, graph coloring, planar graphs.</td>
</tr>
<tr>
<td>14</td>
<td>Application of counting techniques to graphs</td>
</tr>
<tr>
<td>16, 17, 18</td>
<td>Relations</td>
</tr>
<tr>
<td>19</td>
<td>Review</td>
</tr>
<tr>
<td>20</td>
<td><strong>TEST II</strong></td>
</tr>
<tr>
<td>21, 22</td>
<td>Functions. Big-O</td>
</tr>
<tr>
<td>23, 24</td>
<td>Back to Proofs. Mathematical Induction</td>
</tr>
<tr>
<td>25, 26</td>
<td>Recursive Relations</td>
</tr>
<tr>
<td>27, 28</td>
<td>Quantifiers, Predicates and validity</td>
</tr>
<tr>
<td>29</td>
<td>Boolean Algebra</td>
</tr>
<tr>
<td>30</td>
<td>Review</td>
</tr>
</tbody>
</table>

**An update calendar will be available on the web.**
IX. CLASS POLICIES
The course requires a solid and continuous effort. Since this is a three-credit course, you are expected to devote for each hour of class about TWO hours outside the class on course related things.

I do expect that you come prepared to each class to talk about the homework and any assigned readings. You will have the first five minutes of each class meeting to talk about the homework with your classmates. One of the best ways to learn any subject and specially mathematics is by talking to other people about it.

At the beginning of each class you have the opportunity to ask questions about the homework. Use it wisely. Solutions to most of the homework will be posted on the web, so you can double-check your work.

After you receive your grades you have up to two days to dispute it. I am the only person you can dispute your grade with. If we cannot resolve the discrepancy, there are other channels to follow. After the two days I assume that you accepted your grade.

You are expected to be on time for class. Arriving late or leaving the classroom before the end of the period will be considered unpolite, and unthoughtful to your classmates. BE ON TIME FOR EACH MEETING. Attendance will be taken every meeting at the beginning of the period. Since you sign up for this class I do expect you to attend it and do your work. I CONSIDER ATTENDANCE VERY IMPORTANT IN THIS CLASS. This is the policy with respect to absences:

YOU ARE ALLOWED TO MISS UP TO THREE CLASSES (Two in summer term) WITHOUT ANY PENALTIES. IF YOU MISS MORE THAN THREE (Two for summer) CLASSES YOUR FINAL GRADE WILL BE REDUCED BY ONE FULL GRADE. IT IS, THE MAXIMUM GRADE YOU CAN GET IS A "B" ASSUMING YOU ARE AN "A" STUDENT.

IF YOU MISS MORE THAN FIVE CLASSES (Four in the summer term) I ADVISED YOU TO DROP THE CLASS UNLESS YOU HAVE A VERY SPECIAL CIRCUMSTANCE THAT NEEDS TO BE CONSIDERED.

For any work to be collected this is the policy when it is turned in late. THERE ARE NOT EXCEPTIONS TO THE POLICY.

1 day late 85% of the grade

2 days late 75% of your grade

3 days 65% of the grade

I will not collect your work if it is more than three days late.