A. COURSE INFORMATION

Course number/section: COSC5334
Class meeting time: Tuesday and Thursday from 2:00 to 3:15 PM
Class location: Michael and Karen O’Conner Building, Room 133
Course Website: TBD

B. INSTRUCTOR INFORMATION

Instructor: David R. Thomas
Office location: Center for Instruction Room 319
Office hours: Tuesday and Thursday 12:00- 12:30 PM, 4:30 – 5:30 PM
Wednesday 1:30 – 3:30, or by appointment
Telephone: 361-825-2475
E-mail: david.thomas@tamucc.edu
Appointments: at lecture, through email, by serendipity (please knock)

C. COURSE DESCRIPTION

Catalog Course Description
An advanced course that concentrates on the design and analysis of algorithms used to solve a variety of problems. The methods of design covered include such topics as: divide-and-conquer, the greedy method, dynamic programming, search and traversal techniques, and backtracking.

D. PREREQUISITES AND COREQUISITES

Prerequisites: COSC 5321, MATH 2413, and MATH 2305
Corequisites: none

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)
*Introduction to Algorithms, 3rd edition*
T. H. Cormen, C. E. Leiserson, R. L. Rivest, and Clifford Stein
Published by: MIT Press or McGraw-Hill

Optional Textbook(s) or Other References: none

Supplies: none
F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

By the end of this course, students should be able to:

1. Apply mathematical methods for the analysis, technical discussion, and comparison of algorithms.
2. Explain and analyze the P and NP classes of problems and appreciate some implications of the P vs. NP problem.
3. Demonstrate knowledge of algorithmic optimality theorems and be able to synthesize solutions for selected problems.
4. Exhibit comprehension of other topics to include (as time permits) the halting problem, greedy methods, and graphical algorithms.

G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

Lecture/ and discussion, examination topic review discussions, written examinations

H. **MAJOR COURSE REQUIREMENTS AND GRADING**

Course grades will be determined by three examinations whose contents will be guided by the previously described learning outcomes. The examinations will consist of problems and examples selected from the course textbook, definitions, theorem statements, and related material. A detailed list of examination topics will be distributed in class prior to each examination.

Each examination will contribute equally towards the final grade. The examination average score will be used to assign grades using a traditional 90, 80, 70, 60 percent distribution for “A”, “B”, “C”, and “D”, respectively. The examinations will occur approximately during the fifth week, the tenth week, and during the University-determined final examination period.

I. **COURSE CONTENT/SCHEDULE**

We will proceed *guided* by the outline that follows. The numbers indicate the appropriate text portions, while an item followed by "(?)") may be omitted or greatly abbreviated.

1. **Foundations (weeks 1 - 5)**
   1. Introduction: The Role of Algorithms in Computing
   2. Getting Started-Mathematical Foundations
      2.1 Insertion Sort
      2.2 Analyzing Algorithms
      2.3 Designing Algorithms
3. Growth of Functions
   3.1 Asymptotic Notation
   3.2 Standard Notations and Standard Functions

4. Divide and Conquer-Recurrence Relations
   (4.1 The Maximum Sub-array Problem- Not Covered)
   4.2 Strassen’s Method- overview only
   4.3 The Substitution Method for Solving Recurrences- overview only
   4.4 The Recursion tree method for solving Recurrences
   4.5 The master method for solving Recurrences
   (4.6 Proof of the master method- As Covered)

EXAMINATION #1

II. Sorting and Order Statistics (weeks 5-10)
   6. Heapsort
      6.1 Heaps
      6.2 Heap property
      6.3 Building a Heap
      6.4 Heapsort
      6.5 Priority Queues

   7. Quicksort
      7.1 Description
      7.2 Performance
      7.3 Randomized Quicksort
      7.4 Analysis

   8. Sorting in Linear Time
      8.1 Optimal sorting methods
      8.2 Counting Sort (Brief overview only)
      (8.3 Radix Sort Not Covered)
      (8.4 Bucket Sort-Not Covered)

EXAMINATION #2

III. Selected Topics (weeks 10 - 15)
   9. NP-Completeness
      34.1 Polynomial Time
      34.2 Polynomial-time Verification
      34.3 NP-completeness and reducibility
      34.4 NP-completeness proofs (overview only)
      34.5 NP-complete problems
As time allows:

10. Dynamic programming (Overview only)
11. Greedy Algorithms
   16.1 An Activity-selection Problem
   16.2 Elements of the Greedy Strategy
   16.3 Huffman Codes

EXAMINATION #3

J. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

• Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• Statement of Civility
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.
• **Deadline for Dropping a Course with a Grade of W (University)**
The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

• **Grade Appeals (College of Science and Engineering)**
As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• **Disability Services**
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 believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

[http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

• **Statement of Academic Continuity**
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi;
this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

- **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**K. GENERAL DISCLAIMER**

The course instructor reserves the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. Changes will be announced in a timely manner during regularly scheduled lecture periods.