COSC4324 - Image Processing
Department of Computer Science
Fall Semesters

A. COURSE INFORMATION
   Course number/section: COSC4324
   Class meeting time: TR 12:30-1:45 PM
   Class location: CI 107
   Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION
   Instructor: Dr. Maryam Rahnemoonfar
   Office location: CI-332
   Office hours: TR 2:00-4:30 PM
   Telephone: 361-825-2448
   e-mail: maryam.rahnemoonfar@tamucc.edu
   Appointments: Available by email

C. COURSE DESCRIPTION
   This course introduces concepts and techniques for image processing. The objective of this course is to introduce the fundamental techniques and algorithms used for processing and extracting useful information from digital images. Particular emphasis will be placed on covering methods used for image sampling and quantization, image transforms, image enhancement and restoration, image segmentation, mathematical morphology, 3D vision and object recognition. In addition, the students will learn how to apply the methods to solve real-world problems in several areas including UAVs, medical, remote sensing and surveillance and develop the insight necessary to use the tools of digital image processing to solve any new problem.

D. PREREQUISITES AND COREQUISITES
   Prerequisites
   COSC 2437

   Corequisites
   None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
   Required Textbook(s)

   Optional Textbook(s) or Other References
1- Shapiro and Stockman, Computer vision, Prentice Hall, 2001

Supplies
None

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:
1- Describe basic principles of digital image processing;
2- Design and implement algorithms that perform basic image processing (e.g., noise removal and image enhancement);
3- Design and implement algorithms for image analysis (e.g., object recognition, image segmentation & image representation);
4- Apply image processing algorithms in practical applications.
5- Develop image processing tools and software in opencv.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

This course will be a mixture of lectures and discussions. The student is expected to actively participate in all class activities. The student is also expected to do outside work on assignments and reading.

H. MAJOR COURSE REQUIREMENTS AND GRADING

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>25%</td>
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<tr>
<td>Assignments</td>
<td>30%</td>
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<tr>
<td>Final exam</td>
<td>25%</td>
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<tr>
<td>Quizzes*</td>
<td>5%</td>
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<tr>
<td>Final Project</td>
<td>15%</td>
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*There will be several announced and unannounced quizzes during the semester.

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Introduction</td>
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<tr>
<td>Week 2</td>
<td>Digital Image fundamentals</td>
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<tr>
<td></td>
<td>Assignment 1</td>
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<tr>
<td>Week 3</td>
<td>Digital Image fundamentals</td>
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<tr>
<td>Week 4</td>
<td>Spatial Filtering</td>
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<td>Week 5</td>
<td>Spatial Filtering</td>
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<tr>
<td></td>
<td>Assignment 2</td>
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<tr>
<td>Week 6</td>
<td>Spatial Filtering</td>
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<tr>
<td></td>
<td>Midterm exam</td>
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<td>(October 3rd)</td>
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<td>Week 7</td>
<td>Image restoration</td>
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<td>Week 8</td>
<td>Color Image Processing</td>
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<td>Assignment 3</td>
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<tr>
<td>Week 9</td>
<td>Color Image Processing</td>
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<td>Week 10</td>
<td>Morphological Image Processing</td>
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<td>Assignment 4</td>
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<td>Week 11</td>
<td>Image segmentation</td>
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<td>Week 12</td>
<td>Object recognition</td>
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<td></td>
<td>Assignment 5</td>
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<td>Week 13</td>
<td>3D vision- Object tracking</td>
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<td>Week 14</td>
<td>Final exam (Nov 30th)</td>
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<td>Week 15-16</td>
<td>Final Project presentations</td>
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Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness

Success in this course depends on your attendance and participation. Attendance and active participation is included as part of your grade and are essential to successfully completing this course.

Late Work and Make-up Exams

Late work penalty: 25% if one day late; 50% if two days late; zero credit if more than two days.

No makeup exam without adequate doctor's excuse explaining your absence. Makeup exams will not be the same exam. If for any reason you have a conflict you must see me as soon as you know about the conflict!
Cell Phone Use

Please refrain from the use of electronic devices during class, as it is distracting to not only you, but also to your instructor and peers. Turn off all cell phones and beepers when you enter the classroom!

Laptop Use

Please refrain from the use of electronic devices during class, as it is distracting to not only you, but also to your instructor and peers. Laptops will be permitted for particular activities as deemed appropriate. No electronic devices are allowed during exam time.

Food in Class

No food is allowed.

K. 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)**
  I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic 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, and the College of Science and Engineering Grade Appeals webpage at 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/
• **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.

L. **OTHER INFORMATION**

• **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.

**GENERAL DISCLAIMER**  
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.