Course: CSC 464/564 (3 credits)
Title: Introduction to Digital Image Processing and Computer Vision
Prerequisite: CSC 300 Data Structures and MATH 125 Calculus II
Room: McLaury 313
Time: MWF 9:00-9:50AM
Website: http://www.mcs.sdsmt.edu/csc464

Instructor: Dr. Weiss
Office: McLaury 311
Phone: 394-6145
Email: John.Weiss@sdsmt.edu
Office Hours: MTWTh 11:00-11:50AM, or by appointment

SDSM&T Course Catalog Description
CSC 464/564 Introduction To Digital Image Processing And Computer Vision
(3-0) 3 credits. Prerequisites: CSC 300 and MATH 125. Introduction to digital image processing and computer vision, including image digitization and display, image enhancement and restoration, frequency domain techniques using the Fourier transform, image encoding, segmentation, and feature detection. Students enrolled in CSC 564 will be held to a higher standard then those enrolled in CSC 464.

Prerequisites
Students taking this class should have a firm grounding in C/C++ programming, including a course in data structures. Students should also have a solid mathematics background, with at least a year of calculus. Although there will be some discussion of programming topics, my lectures will concentrate largely on image processing and computer vision topics.


Topics
1) image digitization and display
2) image enhancement and restoration
3) image encoding
4) image segmentation and feature detection

Course Requirements
1) programs (2) 25%
2) group project 25%
3) midterm 20%
4) final exam 30%
Software
Programs will be compiled with the GNU C++ compiler, using the Qt GUI framework and an image processing library (ImageLib) written by the instructor. This software is freely available for your home Linux or Windows PC, and has been installed on the Linux Lab computers in McLaury 215. All students enrolled in CSC 464/564 will be given an account to use in the Linux Lab. Further instructions and handouts will be given in class as the semester progresses.

Grading
CSC 464/564 is a project-oriented class, and your final grade will be determined to a large extent by the successful completion of the programming assignments. To pass the course, you must successfully complete these programs, as well as pass the exams. You will be allowed to work in teams of two on the first two programming assignments, and you must work as part of a team on the final group project. For the final project, in addition to implementing a fundamental image processing technique, you will be asked to give an oral presentation of your work to the class, and submit a written report.

There is no “late policy” in this class. All assignments must be turned in by the due date, otherwise they will not be accepted. To receive full credit, programs must not only be correct, but must adhere to good programming style guidelines (standard formatting, meaningful identifiers, modular code, good documentation, etc.). Program grading policies are further discussed in the Programming Guidelines document on the course Website.

Academic Integrity
Although you may exchange ideas with your classmates, you must complete these assignments by yourself (or with members of your team, in the case of group projects). In particular, it is forbidden under any circumstances whatsoever to exchange source code with your classmates. COPYING CODE IS A SERIOUS INFRINGEMENT UPON THE SDSM&T ACADEMIC INTEGRITY POLICY, AND WILL BE TREATED ACCORDINGLY. Academic integrity is further discussed in the Academic Integrity policy statement on the course Website.

Attendance
Attendance is required for all courses at SDSM&T. You are responsible for the lecture material as well as the assigned readings in the textbooks. The lectures may diverge significantly from the assigned readings, so good attendance is particularly important in this class. Attendance is further discussed in the Classroom Conduct policy statement on the course Website.

Electronic Devices Policy
Notebook computers may be used to take notes, but not for answering email, browsing the Web, or other non-course-related activities. No other electronic devices may be used during class time. Please be sure to turn off cell phones and pagers before class starts.
Objectives
CSC 464/564 is an upper-level elective undergraduate/graduate student course in the computer science major, designed to teach students the fundamentals of digital image processing on the computer. The primary objective of this course is to introduce students to basic principles of digital images, image data structures, and image processing algorithms.

Outcomes
Upon completion of this course, students will obtain the following outcomes:
- understanding of digital image fundamentals
- understanding of image digitization
- understanding of image display hardware and software
- ability to understand and apply image enhancement and restoration techniques
- understanding of image encoding techniques
- understanding of image segmentation approaches
- introduction to pattern recognition and feature detection approaches
- ability to apply image processing techniques in both the spatial and frequency (Fourier) domains
- ability to write image processing programs in a high-level language such as C++
- ability to use the Linux operating system for software development
- experience working in teams
- experience in technical communication

The following statements must appear on all SDSM&T course syllabi:

ADA Statement
Students with special needs or requiring special accommodations should contact the instructor (Dr. John Weiss, 394-6145) and/or the campus ADA coordinator (Jolie McCoy, 394-1924) at the earliest opportunity.

Freedom in Learning Statement
Under Board of Regents and University policy, student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact the dean of the college which offers the class to initiate a review of the evaluation.