# CPSC 877-001: Fundamentals of Biometric Systems
# Fall 2010


**Meets:** TR 12:30pm-1:45pm (114 McAdams)
**Instructor:** Damon L. Woodard, Ph.D.
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**Course URL:** http://www.cs.clemson.edu/~woodard/courses/Fall2010/877.html


**Office Hours:** TR: 2:00pm-4:00pm and by appointment

**Required Text:**

*None*

**Course Description:**

As security continues to be a major concern for today's society, a reliable means of personal identification is required by commercial, law enforcement and physical access control applications. Previously, an individual's identity was established utilizing knowledge of a piece of information (password) or the possession of an item (ID card). These methods are subject to circumvention through unauthorized sharing or misplacement. Because of this, biometrics is a far superior approach to personal identification.

Biometrics is the science of identifying or authenticating an individual's identity based on behavioral or physiological characteristics. Government Ids, secure electronic banking, retail sales, and health and social services all have benefited from the use of biometric technology and will continue to do so as biometric research advances.

This course introduces students to the basic principles and methods used for biometric identification. The objective is to provide students with the scientific foundations needed to design, implement, and evaluate large scale biometric identification systems.

**Prerequisites:**

Basic Mathematics – Knowledge and ability to use calculus, probability, and statistics are essential. If you have not used these topics for several years, you should be prepared to spend some time to review them.

Programming Skills – The student should have experience in a high level programming language such as Matlab or C/C++.

**Course Topics**

This course will cover the design of biometric systems based on a number of biometric traits such as face, fingerprint, iris, and hand shape. Topics will include but are not limited to:

- History and Overview of Biometrics
- Biometric applications
- Image Processing for Biometric Applications (Using Matlab)
- Biometric System Modalities
    - Face Recognition
    - Fingerprint recognition
    - Iris Recognition
    - Hand Shape Recognition
- Biometric system design and performance evaluation
- Multi-modal Biometric Systems
- Privacy and ethical issues

**Grading:**

The grading of the course will be based upon 5-6 homework assignments some of which will include a programming portion, a midterm exam, a group project, class participation/quizzes, and a final exam. The following weights will be used to calculate the final grade:

20% - Homework assignments
20% - Midterm
25% - Project
10% - Class participation/Quizzes
25% - Final Exam

A final grade of 90% and above is guaranteed an A, 80% and above a B, 70% and above a C.

**Assignments:**

There will be five to six individual homework assignments some of which will include a programming portion. All assignments (including programming code) are to be submitted electronically in addition to hardcopies. Handwritten assignments will not be accepted. Late assignments will be penalized 10% per day late. All assignments are to be completed individually.

**Computer Usage:**

The programming portion of homework assignments are to be completed using the Matlab or C/C++ programming language. An introduction to Matlab will be provided early in the course. However, the responsibility is yours to learn this language well enough to do the programming assignments. There are many resources available on the web to assist you, including self-tutors

and sample programs. Matlab has been installed on the CS department Linux machines but the student is welcome to use Matlab running in the environment of their choice.

**Project:**

The final course project is a 4-week effort. Project deliverables will include a report and oral presentation. The project will consist of a topic suggested by the student and approved by the instructor.

**Attendance Policy:**

No rigorous attendance policy will be implemented for this course but students are expected to attend classes regularly. Students may leave class after 15 minutes if the instructor does not arrive by that time. If a student cannot attend class, it is his or her responsibility to obtain notes and other information on the material that was missed.

**Academic Honesty:**

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately and expeditiously to charges of violations of academic integrity.

When in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty; the faculty member shall make a formal written charge of academic dishonesty including a description of the misconduct, to the Dean of the Graduate School. At the same time, the faculty member may, but is not required to, inform privately the student charged of the nature of the allegation.

**Disability:**

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities. Students are encouraged to contact Student Disability Services to discuss their individual needs for accommodation.