The University of Texas at Austin
Department of Civil, Architectural & Environmental Engineering

ARE 395R/CE 395R 5-Artificial Intelligence for CEPM - Fall 2005

UNIQUE NUMBER: 14520/15085

INSTRUCTOR: Dr. Carlos H. Caldas
ECJ 5.436
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e-mail: caldas@mail.utexas.edu
http://www.ce.utexas.edu/prof/caldas/

MEETINGS: Tuesday and Thursday – 3:30PM-5:00PM. Room ECJ 3.402
Alternate Room ECJ 5.416

OFFICE HOURS: Tuesday and Thursday – 2:00PM-3:00PM or by appointment.

I encourage students to come see me to address any questions or concerns about
the course material or other issues. I have an open door policy – if my office door
is open, I will see students without an appointment. If I am busy, we will
schedule a convenient time for both of us. If you are unable to come to my office,
the next best method to get in touch with me is by phone. I will respond to all
phone messages left M-F by 5 pm, within 24 hours. Because of the potential for
communication problems, I would prefer that you don’t rely on e-mail as our
primary method of communication. I will respond to most emails, but owing to
problems that can occur in sending and receiving electronic messages, it is much
to better to come to my office or call me.

WEB PAGE: You will find the online materials for this course at the Blackboard web site at:
https://courses.utexas.edu/

COURSE OBJECTIVES: This course will discuss data mining (DM) and knowledge discovery in
databases (KDD). The class will involve lectures, lab sessions, class discussions, homework assignments,
group projects, and student presentations. By taking this class you will be able to:

(1) Understand the fundamentals of data mining and knowledge discovery in databases.
(2) Demonstrate how knowledge discovery in databases can be used to support construction
engineering and project management.
(3) Apply DM/KDD techniques for data classification, prediction, clustering, and mining association
rules.
(4) Recognize the design, analysis, and implementation issues for DM/KDD techniques in civil
engineering.
(5) Analyze, evaluate, and recommend DM/KDD systems for construction owners, contractors,
and/or project managers.

Course objectives will be refined as the course evolves. Each student will therefore be given the
opportunity to influence the direction of the course.
REFERENCE MATERIAL:


TOPICS:

DATA MINING AND KNOWLEDGE DISCOVERY IN DATABASES

- Introduction and Overview
- Basic Concepts

ENGINEERING DATA

- Data Types
- Data Pre-Processing
- Data Exploration
- Visualization

DATA MINING TASKS

- Classification
- Prediction
- Association Rules
- Clustering

MINING COMPLEX DATA TYPES

TRENDS IN DATA MINING

CONSTRUCTION ENGINEERING AND PROJECT MANAGEMENT APPLICATIONS

NOTE ON CONTENT OF THE COURSE

The course is necessarily focused, and therefore selected material is left out. Students may pick up a greater depth as necessary in related courses in MIS, CS, and EE in topics such as artificial intelligence, machine learning, data mining, and pattern recognition.

SOFTWARE DEMONSTRATIONS

In-class demonstrations of software tools will be presented. They are intended to provide students with first introductions to the tools and give them a “jump start”, not to fully train students on the use of tools. Students will require self-study before they will be able to work effectively with the tools.
GRADING:

Grade components will be weighted as follows in the computation of the final course grade:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>25%</td>
</tr>
<tr>
<td>2/3 Term Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Group Project</td>
<td>40%</td>
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</table>

COURSE LETTER GRADES:

The correspondence of letter grade to numerical grade is:

- A: grade $\geq 90$
- B: $80 \leq$ grade $< 90$
- C: $70 \leq$ grade $< 80$
- D: $60 \leq$ grade $< 70$
- F: grade $< 60$

The instructor reserves the right to adjust letter grades, upward only, based on individual attendance and class participation if the numerical grade warrants such consideration.

COURSE/INSTRUCTOR EVALUATIONS:

Each student will be given the opportunity to evaluate the course using the standard course/instructor evaluation form during the last week of classes. Feedback from students will be requested throughout the semester.

POLICIES:

**Exams and Homework Assignments:**

The 2/3 term exam is closed book, closed notes. The exam will include material covered in reading assignments and class discussions. Exam make-ups will be given only in the event of a verified emergency or doctor-verified sickness. No final exam will be given.

The student is responsible for all reading assignments and class handouts whether or not covered in class or listed on the syllabus.

There will be individual and group homework assignments. Their due dates will be posted on the course website. All assignments are due at the beginning of the period assigned and those turned in late will count off 10% per day. (no exceptions! except those listed for the test make-up).

There will be a group project. More information concerning the group project will be given at a later date. I will assign groups.

My goal is to return all exams and homework assignments to students within two course-weeks from the date submitted.
Class Participation and Attendance:

It is important that you are familiar with the course material as the course evolves. Your ability to answer questions and discuss the material will be part of the overall participation evaluation. Therefore, you should review class material ahead of time. Regular attendance is expected and encouraged. **Your attendance will be used to evaluate your participation grade.** I consider a student missing more than one week of class lectures without excuse to be a serious participation problem. In some cases, I will petition the Office of Student Affairs to drop students from the course who have excessive absences and may withhold the entire participation grade at my discretion for participation problems. Each student is responsible for all material and administrative instructions given during the lecture period.

Personal Problems:

If you have illness or personal problems that will affect your performance during the course of the semester, please let me know as soon as possible. “After the fact” provides little protection unless there are extreme circumstances. I have an answering machine, a fax machine, and an e-mail address if you need to get in touch with me after hours. Do not hesitate to use them.

Scholastic Dishonesty:

**IMPORTANT!** Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and dismissal from The University. Since dishonesty harms the individual, all students, and the integrity of The University, policies on scholastic dishonesty will be strictly enforced. For further information, visit the Student Judicial Services web site http://deanofstudents.utexas.edu/sjs/. Remember, individual assignments are not group projects and do not build on the efforts of others without due reference.

Students with Disabilities:

The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities. Any student with a documented disability (physical or cognitive) who requires academic accommodations should contact the Services for Students with Disabilities area of the Office of the Dean of Students at 471-6259 as soon as possible to request an official letter outlining authorized accommodations. For more information, contact that Office, or TDD at 471-4241, or the College of Engineering Director of Students with Disabilities at 471-4321.

Privacy – Web Based Class Sites:

Web-based, password-protected class sites may be associated with all academic courses taught at the University. Syllabi, handouts, assignments and other resources are types of information that may be available within these sites. Site activities could include exchanging email, engaging in class discussions and chats, and exchanging files. In addition, electronic class rosters will be a component of the sites. Students who do not want their names included in these electronic class rosters must restrict their directory information in the Office of the Registrar, Main Building, Room 1. For information on restricting directory information, see: http://www.utexas.edu/student/registrar/catalogs/gi00-01/app/appc09.html.

Dropping the Class:

Undergraduate Students: From the 1st through the 4th class day, an undergraduate student can drop or add a course on ROSE or TEX. From the 5th through the 12th class day, a student can drop through
ROSE or TEX; adds must be done in the department offering the course. For any drops beginning with the 13th class day, a student must initiate the drop process in the office of the Dean (ECJ 2.200). Departmental advisor and instructor approval may be required.

Graduate Students: From the 1st through the 4th class day, graduate students can drop or add a course on Rose or TEX. Beginning with the 5th class day, graduate students must initiate any adds or drops in their department. Graduate students can drop a class until the last class day with permission from the departmental Graduate Advisor and the Dean. Graduate students with GRA/TA/Grader positions or with Fellowships may not drop below 9 hours in a long session.

Computer Usage:

Students are expected to be proficient on a personal computer, to have a very basic knowledge of the JAVA programming language, and to be able to use word processing and spreadsheet programs such as Word and Excel. Familiarity with the Civil Engineering Learning Resources Center (LRC) is assumed. Students need to get an ENGR account in order to access and log in to ECJ 3.402 computers. ENGR account requests may be submitted online on http://www.engr.utexas.edu/itg/students/index.cfm. The web-based UT Blackboard system will be used extensively to coordinate class assignments and disseminate course information, including class notes.

IMPORTANT DATES:

No classes on September 13 due to the CPI Conference. No classes on November 24 due to Thanksgiving Holiday. September 16 is the last day to drop a class for a possible refund. September 28 is the last day to drop a class without a possible academic penalty. October 26 is the last day to change the course to/from credit/no credit or pass/fail. December 9 is the last day a graduate student may, with the approval of the instructor, the graduate adviser, and the graduate dean, drop a course. Midterm: Thursday, November 15.

SCHEDULE:

*Note: The course schedule is subject to changes. Any changes in the course schedule will be communicated in advance and posted in the course Blackboard web page.*

<table>
<thead>
<tr>
<th>Week</th>
<th>Lect.</th>
<th>Date</th>
<th>Topic</th>
<th>Reference Material</th>
<th>Assignment Due</th>
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<tr>
<td>1</td>
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<td>Sep 01</td>
<td>Introduction; Data Mining Overview</td>
<td>TSK Ch. 1</td>
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* Away date – this class will be rescheduled.