AE 6381-SOFTWARE DEVELOPMENT FOR ENGINEERING APPLICATIONS

CATALOG DATA: AE 6381: Software Development for Engineering Applications.
(2-3-4). Introduction to the development of engineering analysis and visualization software for UNIX workstations with emphasis on rapid prototyping, information modeling, distributed processing, and client/server architectures.

TEXTBOOK: Class notes; web material and references below.

REFERENCES: M. Waite, D. Martin, and S. Prata, *The Waite Group's UNIX Primer Plus*, SAMS, 1991

J. Ousterhout, *Tk/Tcl*, Addison-Wesley, 1994

R. Schwartz, *Learning Perl*, O'Reilly & Assoc.

other programming references

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GOALS: The course enhances the productivity of researchers using UNIX workstations and teaches the skills required to support advanced courses in engineering design. The general objectives of the course are described below. Also included is a more detailed course schedule that provides a topic by topic list of the material to be covered. The objectives are:

a)   to familiarize the student with UNIX, X Windows, their programming tools, and underlying workings,
b)   to provide an introduction to engineering software development techniques for numerical analysis, visualization, and information management
c)   to survey emerging engineering design theories for decision support and their supporting integration technologies

These topics span many disciplines. The purpose here is to enhance existing engineering training with strategic computer science awareness and experience. Students will be involved compiling the most current and tractable support material.

PREREQUISITES BY TOPIC:
1.   Familiarity with a programming language (C++, C, FORTRAN, BASIC, etc.).
2.   Proficiency with personal computing applications.
3.   Previous development of analysis or information program and access to source code.
4.   Active research on UNIX workstations.

PROPOSED SCHEDULE:
1.   Course Overview; demonstrate example application and conduct class survey (2 classes)
2.   UNIX Review; shells, gawk, sed, telnet, and underlying services (2 classes)
3.   X Windows Review; window managers, Xlib calls, example widgets, and remote display (2 classes)
4.   Tk Introduction; included widgets, extensions (3 classes)
5.   Tk/tcl Scripting; basic application functionality (3 classes)
6.   WWW Introduction; HTML syntax, file conversion (3 classes)
7.   Perl introduction (3 classes)
8.   Application Construction; develop blueprint for individual project proposals (3 classes)
9.   Core Languages Review; how to read F77, C, C++ (3 classes)
10.   Special Topics; based on individual projects (3 classes)
11.   Introduction to CAE integration and collaborative technologies (6 classes)

COMPUTER USAGE:

All classes will include online examples to supplement lecture material and will be conducted using a projected workstation in the CAE/CAD Laboratory. Lab projects will require access to UNIX workstations. Students will use their existing OIT accounts for lab work and the workstation lab in Mason will be scheduled for interactive labs. A class account will contain all the required development tools beyond standard UNIX and X.

LABORATORY PROJECTS:
1.   Setup tools for communication and exploration: EMail, News, WWW (5%)

2. Customize UNIX/X environment: remote execution (rsh), file parsing (gawk) (10%)
3. Simple Application: text editor, plotter, or calculator (15%)
4. Personal WWW Home Page: picture, sound, resume (5%)
5. Project Proposal Presentations: description, sketches, resources (10%)
6. Collaborative Project: teams of 2 or 3 to develop hybrid application (5%)
7. Individual Project Demos: source code, online documentation (25%)
8. Collaborative Project Demos (10%)