MATH 373 – Applied Numerical Analysis

The following is intended to be an approximate guide to the topics we will cover and the amount of time that will be devoted to each topic. The topics or the time on each may vary somewhat to accommodate the class but the exams will be given when scheduled.

TEXT
Applied Numerical Methods with MATLAB® for Engineers and Scientists, 3rd ed., Steven C. Chapra
A free, online text is available at http://showard.sdsmt.edu. The student may also wish to purchase an optional additional numerical analysis or applied numerical methods book to provide supplementary and alternative explanations of the methods used in this course. Such books are typically available for under $10 on EBay or Amazon; however, they usually do not include the material on all of the covered topics, most particularly:
> 1) Modeling Engineering Systems with Differential Equations,
> 2) Solution of Partial Differential Equations (PDQ's) using Spreadsheets and MATLAB

SOFTWARE
MATLAB is available on the SDSM&T server.
Microsoft Excel with VBA will be used in this course.

INSTRUCTOR
Dr. S. M. Howard   MI 114   Ph. 394 -1282
stanley.howard@sdsmt.edu   Open Office Policy (appointments available if required)

TOPICS (order may vary slightly)
Approximations of Derivatives
Mean Value Theorem and Approximation Errors
Modeling Engineering Systems with Differential Equations
      Heat Conduction in Solids
      Velocity Gradients in Laminar Flow, Well Draw Down Profiles
Solution of Partial Differential Equations (PDQ's) using Spreadsheets
      Explicit Methods: Steady State
      Gradient and other Boundary Conditions
      Explicit Methods, Unsteady State, Implicit Methods
Excel® Solver and Linear Programming Problems
      Optimization & Objective Functions and Excel® Solver
      Linear Programming
      Data Adjustment
      Curve Fitting by Least Squares Regression
Root Finding Methods: Bisection, False Position, Secant, Newton, One-Point Iteration, Jacobian
Gauss Elimination: Systematic Solution of Linear Equations
Numerical Integration: Rectangular Rule, Trapezoid Rule, Simpson's 1/3
      Rule, Gauss Quadrature
Numerical Solutions to Ordinary Partial Differential Equations
      One Step Methods: Milne's Method, Runge-Kutta Methods
Ordinary Differential Equations (ODE's) Solutions and Solvers (MATLAB/MathCad/ -)
Student Projects and Reports

ADA STATEMENT
Students with special needs or requiring special accommodations should contact the instructor, Dr. Howard at 394 1282 or the campus ADA coordinator at 394-2416 at the earliest opportunity.

COURSE WEB SITE
Important course information will be posted at this address:
http://showard.sdsmt.edu

GRADES

Homework	10 points each	~150*
3 Hour Exams	100 points each	~300⁺
Final Project		100
Class Participation/peer rating		50
Final Exam (optional)		
* These are approximate numbers.		

The final grade is based directly on the total points achieved. There is no additional weighting. **Percentages are not the basis of final grade assignments – only relative Rank In Class and overall section performance.** On rare occasions a student's grade may be raised (but never lowered) for subjective considerations such as an excellent homework file. The final grade section average is normally between 2.9 and 3.2 but could be higher for exceptional classes. Personalized grade summaries are emailed periodically to each student. Final exams, when optional, are used only to determine if the student has reached a performance level higher than indicated by the tentatively assigned grade. An element of peer evaluation of participation may be used to determine grade.

FREEDOM IN LEARNING
The following statement is not that of the faculty member but is that of the AAC/BOR and is being imposed on all course syllabi throughout the State of South Dakota as a response to past and future threats they perceive in response to recent legislative concerns.

"Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be evaluated solely on an academic basis and students should be free to take reasoned exception to the data or views offered in any course of study. Students who believe that an academic evaluation is unrelated to academic standards but is related instead to judgment of their personal opinion or conduct should contact the dean of the college which offers the class to initiate a review of the evaluation."

POLICIES
Illness *Students who are ill should not attend class or come to the instructor's office to report illness. Go home and use email to communicate.*

Office Hours are posted on my door (MI 114). If no office hours are specifically listed then all unscheduled hours are available to students for help. Students are encouraged to get help from the instructor. Students are welcome to call the instructor (394-1282) or email him (showard@silver.sdsmt.edu). Phone messages might not be replied to punctually. If there is a need to contact the instructor on an urgent matter (including help on course content) and you have not received a reply call the secretary at 394-2341 and have her leave a message on my door to call you.

Assignments will be announced in class or posted on the web site.

Late Assignments Usually assignments are made two class periods in advance so that there is time to complete them and to ask questions in class about them. **No assignments will be accepted if they are more than one week late except in exceptional circumstances as approved by the instructor. Assignments not submitted on time are given a maximum of ½ full credit.**

Short Quizzes will be announced in class at least two days in advance and on the web site at least one day in advance.

Format of all Submitted Work All exam, quiz, and homework sheets provided by the instructor MUST be stapled on top of each student submittal. If no sheet is provided, staple an entire sheet of paper on top of the homework with your name, date and assignment topic **CLEARLY PRINTED** (by hand is ok) on the top right of the front of each sheet (to guard against loss) and on the back of the last page (to facilitate confidential return).

Homework is graded. Repeated failure to submit homework can be cause for the early assignment of an F for the Final Grade in the course.

Attendance Students are expected to attend class unless otherwise excused.

Excused Absences from short quizzes will result in the assignment of an estimated grade for the missed quiz. Unexcused absences will result in a zero. All quizzes, homework, and exams count towards the final grade. Short quizzes cannot be made up. However, if your absence is excused the replacement grade will be estimated based on your normal performance and your peers' performance on the missed quiz.

Missed Exams Students who miss an hour exam for an excused reason will be given a make-up exam that will be designed to be more difficult and longer than the missed exam. Unexcused exam absences will result in an exam grade of zero. Students must *make arrangements* on the first day of class after their return to take the missed exam and coordinate with other students who missed the exam as directed by the instructor.

Final Exam The final exam is optional unless otherwise stated in class and posted on the class web site by the 12th class day.   The time of the exam is determined by the campus schedule for final exams published on the SDSM&T web site: http://registrar.sdsmt.edu/docs/157789.pdf .