

### **STR681: Computers and Numerical Analysis**

**Instructor:** Dr. Maha Moddather

**Logistics and Communication:**

Credit hours: One credit hour.

Class Meeting Time: Tuesday 7:30 pm – 9:30 pm.

Prerequisite: Basic courses in mathematics.

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Class Communication: Web site and E-mail

**Course Description:**

This course is an introduction to the numerical analysis. The primary objective of the course is to develop the basic understanding of numerical algorithms and skills to implement algorithms to solve mathematical problems on the computer.

**Course Topics:**

- Systems of Linear Algebraic Equations
- Nonlinear Equations
- Polynomial Approximation & Interpolation
- Numerical Differentiation & Difference Formulas
- Numerical Integration
- Discretization & Finite Difference Methods
- Weighted Residual Approach
- Piecewise Functions
- Finite Element Methods
- Optimization
- Curve Fitting
- Ordinary Differential Equations
- Partial Differential Equations
- Perturbation methods
- Fourier analysis
- Approximations & Round-off Errors

**Textbooks:**

*Numerical Methods for Engineers*, Steven C. Chapra, Raymond P. Canale.

*Classical and Modern Numerical Analysis*, Azmy S. Ackleh, Edward J. Allen, Ralph B. Hearfott, Padmanabhan S.

*Numerical Methods in Engineering with MatLAB*, Jaan Kiusalaas.

**Grading System:**

Homework assignments (5% of grade)

Midterm (15%)

Project (10%)

One final exam (70%)

**Examination Dates:**

Midterm Exam: Tentatively sixth week of classes, allowable time: 90 minutes.

Final Exam: TBD, allowable time: Two hours.

**Attendance:**

Students who do not meet the minimum attendance as per the University regulations are not allowed to take the final exam.

**Examination Policy:**

Closed book exam Attempt as many questions as you can. Prorated partial credit is given for incomplete work. Bonus credit might be available. Only excuses acknowledged by CUFE's academic policies for missing or postponement of exams are accommodated. CUFE academic integrity policy is strictly applied.

**Homework Assignment Policy:**

One homework assignment biweekly. Assignments are due in class within two weeks of date assigned. Late homework is accepted but penalized 30% per *calendar* day of delay. Only selected homework problems might be graded, so attempt all problems. Homework is an individual effort, so solving homework in group is not permitted but collaboration in understanding basic concepts is allowed. Students' discussions regarding troubleshooting course content is encouraged.

**Course Project Policy:**

Teams of no more than four members are permitted. However, single student project receives a bonus of 1.5% of total class credit. The grade of each team member will depend primarily on the collective project grade. Please immediately report any incapacity, shortcoming, conflict or teamwork problem in your team that you think will affect project's overall grade.

**Statement/ Understanding of Academic Integrity (Honor Code):**

"All students taking this course agree, individually and collectively, that they will not give or receive unpermitted aid in examinations or other course work that is to be used by the instructor as a basis for student evaluation."