MECH 6390 001: Computational Mechanics II

Class Reference Number: 16854

Computational Tools: Excel, MathCAD, Thermo-Calc, PyCalphad, Mathematica, MATLAB, Webplot Digitizer, Nutonian Eureqa, HeuristicLab, NESSUS, ANSYS, Tensorflow

Continuum Mechanics, D.S. Chandrasekharaih

Class/Lab Meeting: MW, 1:30 pm to 2:50 pm

Class Room: Quinn Hall 206

Prerequisite: None

Instructor: Dr. Calvin M. Stewart, Ph.D.
Department of Mechanical Engineering
E-mail: cmstewart@utep.edu
Phone: 915-747-6179
Office: ENG A117
Office Hours: TR, 12:30 pm to 1:20 pm

Course Objective
An advanced course in computational mechanics. There is No prerequisite. This course focuses on the application of advanced computational mechanics tools to structural mechanics and material behavior problems. By the end of the course, students will have the skills to, given a mechanics problem, identify the appropriate computational mechanics tool, calibrate models, perform parametric simulations to evaluate models and structure, identify function relationships, and analyze probabilistic results. In addition, symbolic regression, genetic programming, and machine learning will be applied to elementary mechanics and modeling problems.

Topics Covered
1. Introduction
2. Mechanical Behavior and Properties
3. Constitutive Models
4. Model Calibration
5. Parametric Simulations
6. Symbolic Regression & Genetic Programming
7. Monte Carlo Methods
8. Finite Element Analysis
9. Machine Learning
10. Computational Thermodynamics (CALculate PHAase Diagrams → CALPHAD)
Grades

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>60%</td>
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<tr>
<td>Exams (2)</td>
<td>40%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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Grade Scale

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>100-90%</td>
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<td>89-80%</td>
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<tr>
<td>69-60%</td>
<td>D</td>
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<tr>
<td>&lt;60%</td>
<td>F</td>
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The instructor reserves the right to revise this grading plan.

Special Topics

Time permitting, some of the following special topics will be covered at the end of the course:

- High Performance Computing: TACC (UTEP, Dr. Chessa and/or Dr. Kumar)
- CALPHAD: Thermo Calc, PyCalphad (Thermo-Calc Rep)
- Mesoscale Modeling / Unit Cells (UTEP, Dr. Arrieta)
- Microstructural Modeling & Evolution (AFRL, Dr. Schwalbach)
- 3D Microstructural Reconstruction and Synthesis (AFRL, Mr. Green)
- High-Strain Rate Codes (AFRL, Dr. Gonzalez)
- Test Matrix Design (LANL, Dr. Semelsberger)
- Topology Optimization (KCNSC Employee)

Class Attendance Policy

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid and other programs.

As per UTEP rules, you may be asked to show a UTEP ID at any time during class.

If a student is absent or misses an assignment due to university related duty, serious illness, or family emergency an excused absence/makeup may be arranged. For university related duty, the faculty advisor of the student organization must send notification to the professor before the planned absence. For serious illness or family emergency, the staff in the Office of Student Life can send notification to the professor of the absence. The student must visit the Office of Student Life and provide supporting documentation (e.g., a doctor’s note, letter from primary care provider) to verify illness or injury.
Course Drop

It is the student’s responsibility to officially drop a course that s/he no longer wishes to take before the course drop deadline. Failure to do so WILL result in a grade of “F” on the student’s academic record. If you fall behind, do not give up and quit attending without dropping the course first. Athletes must receive permission from the Miner Athletic Advising Center before dropping a course. International students with F or J visas must receive permission from the Office of International Programs before dropping a course.

Disability and Accommodations

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass.