MTSE 4060: MATERIALS SELECTION AND PERFORMANCE

Instructor Contact

Name: Dr. Aidin Imandoust
Pronouns: He/Him
Office Location: Discovery Park E-120
Phone Number: (940) 369-5346
Class Website: Lectures, assignments, exams, quizzes will be posted on CANVAS
Office Hours: Monday 2:00PM-3:00PM, Wednesday 2:00PM-3:00PM or by appointment.
Email: aidin.imandoust@unt.edu
Communication: CANVAS and Email will be the primary tools used to communicate with each other. Exam grades will be posted within 2 weeks after an exam is administered. Assignments, exams, and projects will be submitted via CANVAS.

Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT’s full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Course Objectives

<table>
<thead>
<tr>
<th>Specific Course Learning Outcome</th>
<th>ABET Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understand how structure, properties, and processing affects performance</td>
<td>X</td>
</tr>
<tr>
<td>2. Use digital materials’ databases and design tools such as CES EduPack Software from Granta Design</td>
<td>X</td>
</tr>
<tr>
<td>3. Design and conduct computational exercises to explore materials performance via case studies.</td>
<td>X X X</td>
</tr>
<tr>
<td>4. Recognize new design opportunities in materials by working on a team project and communicate their ideas with peers.</td>
<td>X X X</td>
</tr>
</tbody>
</table>

Course Prerequisites or Other Restrictions

MTSE 3000 and MTSE 3010. The student must be familiar with fundamentals of materials science – crystal structure, bonding, mechanical properties, and processing. The students must be able to log in remotely to MTSE computers in E138 to conduct computational exercises.
Course Description

I. Introduction to Materials Selection and Design (3 weeks)
   - Review of engineering materials and their properties
   - Organizing materials and processes
   - Strategic thinking: matching material to design
   - The design processes

II. Materials Property Charts, and Material and Process Selection Basics (3.5 weeks)
   - Material and structural indices
   - Selection strategy including computer-aided selection
   - Selection with multiple constraints and conflicting objectives
   - Processing for properties and systematic process selection

III. Case Studies Using Ashby Method (8 weeks)
   - Materials selection for strength-limited, fracture-limited, toughness-limited design
   - Materials selection for fatigue and creep sensitive applications
   - Materials selection for wear and friction applications

Textbook


Teaching Philosophy

I encourage student questions and participation during lecture. Students must be proactive in getting confusions clarified.
Grading

An (A-F) grading scale will be used. The point percentages used to calculate the final grade are:

- A >= 90; B = 80-89; C = 70-79; D = 60-69; F = < 60

Your grading will be based on the following areas of assessment:

- Assignments & Quizzes 20%
- Midterm 1 25%
- Midterm 2 25%
- Project presentation 30%
Course Policies

Attendance Policy
Participation in class lectures is mandatory. If you are unable to attend a class, please email me. Excused absences include illness, conference travel, family emergency, religious holiday, and any other unplanned difficulty as determined by the instructor. Student(s) with 3 or more unexcused absences will be dropped from the class. Don’t disrupt classes by coming late.

Late Work
Late work will lead to one letter grade drop. Late work will NOT be accepted if submitted after the answers are posted. There will be no extra credit opportunities.

Examination Policy
The exams are open or closed-book exams and will be administered via CANVAS. You will download the exam from CANVAS and have a fixed amount of time to complete it and upload your answer file back on CANVAS for grading. Work on your exam during a time you expect stable Internet connection. A student who misses exam(s) due to unavoidable reasons such as conference travel, family emergencies, and sickness must show proof such as doctor’s and/or advisor’s note to the instructor to get permission and/or arrange for a makeup exam.

Assignment Policy
The instructions for assignments and their due dates will be posted on CANVAS. You must upload your answers in PDF files on CANVAS. Turnitin or similar software will be used to check your project report and your assignments.

Note that the University is committed to providing a reliable online course system to all users. However, in the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324 and obtain a ticket number. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Instructor Responsibilities and Feedback
- The instructor will help students grow and learn, provide clear instructions for projects and assessments, answer questions about assignments, identify additional resources as necessary, provide grading rubrics, review and update course content.
- Please help the instructor by being proactive in asking questions and seeking help.

Syllabus Change Policy
Any changes to the syllabus (in an extraordinary situation) will be clearly communicated to the students.

Course Evaluation
Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course. SPOT evaluation window: November 16–December 3.
MTSE 4060 Project Guidelines:

1- Your presentation is your final exam! And it is going to be graded through voting by myself and students participating in the course.
2- It is going to be done as a team project. Each team is going to have 3-4 members. Team members should equally contribute to making a presentation for the assigned project.
3- Each presentation will be 45 mins and the allocated time will be evenly shared with the team members to do their part of the presentation. Team members agree on assigning tasks for the members.
4- The project topics will be assigned after I receive the list of teams and their members. The availability of the project topics will be first come first serve basis.
5- The only required document for this project is a powder point presentation.
6- Your presentation must cover all the concepts we cover during the semester.
7- Below are suggestions for project subjects:

1. Materials selection for therapeutic implants (hip replacement, knee replacement, spinal surgery, etc.)
2. Materials selection for jet engines (turbine blades, engine housing, etc.)
3. Materials selection for aircraft body and structure (interior structure and fuselage, etc.)
4. Materials selection for nuclear applications (plasma facing and high temperature components)
5. Materials selection for automotive power train (engine, transmission, motor mounts, etc.)
6. Materials selection for additive manufacturing (types of alloys/polymers appropriate for the technology)
7. Materials selection for weight reduction and fuel efficiency (lightweight alloys for automotive and aerospace applications)