The University of North Texas

Spring 2017

Course number and name

Materials Science and Engineering Senior Design I (MTSE4090)

Credits and contact hours

2 Credits. W 1:00pm - 1:50pm; Additional hour with advisor

Class Hour

Meets every Thursday at 2:45-3:45 PM in DP D212

Instructor’s or course coordinator’s name

Instructor: Dr. Narendra Dahotre
Office: DP C136E, Phone: 940-369-7678, Narendra.Dahotre@unt.edu

Text book, title, author, and year

a. Other supplemental materials
   Lecture slides and notes – this will be a major source

Specific Course Information

a. Brief description of the content of the course (catalog description)

   The primary objective of this course is to provide every student with experience in “real
   world” engineering design that draws on many of the skills that have been mastered
during their studies in the Department of Materials Science and Engineering at the
University of University of North Texas. Students will exhibit an ability to design a
system, component, or process to meet a desired need. This is a two course sequence
with the first course (this course, MTSE4090) providing the preliminary work required
to complete a design project (determining project scope, technical background and literature
review, planning a project, considering safety, environmental and ethics in design,
preliminary design and presenting design work both orally and in writing).

b. Prerequisites or co-requisites

   MTSE 3010, MTSE 3020, MTSE 3030, MTSE 3040, MTSE 3050, MTSE 3070, MTSE
   3080.

c. Indicate whether a required, elective, or selected elective course in the program

   Required
Specific goals for the course

a. Specific outcomes of instruction

- Students are expected to function in an environment that is more similar to that which they will encounter in their careers outside the university setting. As such, instructors have two main functions: to serve as advisors to the senior design student/teams and as evaluators of student/team progress.
- Students are expected to operate effectively either as an individual or in a team environment; team evaluations will be compiled at the end of the semester using the attached rubric.
- Students will succeed by exhibiting an ability to apply and integrate knowledge of material structure, properties, processing and performance for a materials selection and process design problem.
- Students should consider additional aspects such as the economic, environmental, ethical, safety as well as social and political impacts of the effort.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

This course addresses ABET Student Outcome(s):
- c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- d) An ability to function on multi-disciplinary teams.
- f) An understanding of professional and ethical responsibility.
- g) An ability to communicate effectively.
- h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- i) A recognition of the need for, and an ability to engage in life-long learning.

Course Schedule: Meets every Wednesday at 2:40 PM in DP D208B

Session 1: Project assignments, introduction, course expectations (Narendra (Dahotre)
Session 2: Design Project Introduction and Presentations (Narendra Dahotre)
Session 3: Introduction to project management; Gathering technical information, including patents and standards (Marcus Young)
Session 4: Design Engineering and business ethics (Wang)
Session 5: Engineering Design Constraints and Standards (Narendra Dahotre)
Session 6: Legal and Ethical Issues in Engineering Design and Laboratory Safety in Execution of Design Project (Narendra Dahotre)
Session 7: Individuals/Groups present progress report to advisors
Session 8: Project definition DUE – Report & 5 min presentation to advisory groups, questions and answers
Session 9: Use of Engineering Software for Materials (Srini Srinivasan)
Groups present progress report to advisors
Session 10: Background Report & Team Evaluations DUE – Report & 5 min presentation to advisory groups, questions and answers
Session 11: Review
Session 12: Groups present progress report to advisors
Session 13: Draft Final Report DUE – progress meeting with advisors
Session 14: Groups present draft Poster & Defense to advisors
Session 15: Final Report & Team Evaluations DUE, Poster Presentation and Defense (Wed TBD)

Grading:

Students will be evaluated based on homework assignments related to classroom lectures, attendance and progress reports submitted to advisors, team evaluations, prepared presentations and written reports. Grades will be assigned for each task and group members will evaluate the group’s performance during the semester. Points will be based on the following.

<table>
<thead>
<tr>
<th>Task</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework assignments</td>
<td>50</td>
</tr>
<tr>
<td>Project Definition Report/Presentation</td>
<td>25</td>
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<tr>
<td>Background Report</td>
<td>100</td>
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<tr>
<td>Draft Final Report</td>
<td>25</td>
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<tr>
<td>Poster Presentation and Defense</td>
<td>100</td>
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<tr>
<td>Final Report</td>
<td>100</td>
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</table>

Grades will be assigned using the following scale: A>90%>B>80%>C>70%>D>60%>F

Individuals/Groups are responsible for planning their own meetings outside of class to complete the project and for scheduling time with the faculty advisor and industrial sponsor (if appropriate). Review the educational objectives carefully to determine additional details that should be considered in all senior design presentations and written reports.

Student Design Teams are responsible for a series of written reports that build on each in completing the final reports that will be submitted at the end of each semester.

First, the Project Definition Report/Presentation (25 points) should focus on the Goals and Objectives of the project including the problem definition, scope of work, major challenges and general plan to complete the project. This should be detailed in the written report and outlined in a Powerpoint Presentation to the faculty (DUE March 10th).

Second, the Background Report (100 points) should start with a revised Goals and Objectives and includes a thorough “state of the art” literature and background search of all pertinent sources (journals, proceedings, handbooks, patents, internet, industrial literature, industrial visits, existing data, internal documents, etc.). The background literature and information should be evaluated in light of your project to provide the overall direction and ideas for the project. This report will also include the plan for the preliminary work to be completed before the end of the semester. This will include a detailed written report and an outline in a Powerpoint Presentation to the faculty (DUE March 31st).

Third, a Final Report (25 point Draft and 100 point Final) should be built on the first reports and revisions suggested by your advisor group. The first written draft of this report is due November 20th and the final written report is due with your poster on May 5th. The final written report describes in detail the following aspects of the project:

- Goals and Objectives- based on the ‘Problem Definition and Scope” determined with your faculty advisor in October;
- Background Information- including that information developed, revised and updated for the October ‘State-of-the-Art” literature review;
- The engineering approach planned to meet the goals and objectives;
- A discussion of the preliminary work done this semester;
- A detailed plan for work to be accomplished next semester, including
  - Specific tasks and anticipated timelines, including milestones (use GANTT chart)
  - Anticipated budgets.
Students are encouraged to consider the potential environmental and societal impacts of their design project, in addition to the technical objectives and approach. Each of the written reports will be graded by the design team advisor group.

The style of each report is open, but every written report should include a cover page with the title of the project, the names of the design team members, the faculty advisor, industrial sponsor/contact person and the date.

The Student Design Teams also will be responsible for a 3’ x 4’ poster that summarizes the written report and that includes the same project aspects that are described above. Students will use the PowerPoint template provided. The posters will be displayed on the design evaluation day (TBD). The design teams will be interviewed by MSE faculty members who will judge each project based on the aspects described above. The design teams will have their written report available for the faculty judges to provide additional information as needed. These interviews and the poster presentation will be worth 100 points, as tallied from the faculty score sheets. An example of a faculty score sheet is attached. Please contact Erik Forney (MSE Office) for information about printing posters prior to the departmental review using the template provided.
<table>
<thead>
<tr>
<th>Students/project</th>
<th>Is the ‘goal’ clearly stated? (3)</th>
<th>Are the objectives well defined? (3)</th>
<th>Does it cover problem definition, scope of work, major challenges and general plan to complete the project (14)</th>
<th>Is a GANTT chart included? (5)</th>
<th>Total (25)</th>
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<tbody>
<tr>
<td>Prakash Gupta, Jason Meyer, Joseph Carrillo</td>
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<tr>
<td>Laser Surface Designing/Engineering</td>
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<td>Graham Cartwright, Zharif Mohd Zahir, Kevin Williams</td>
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<td>Composition Design for Touch Screen Glasses</td>
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<tr>
<td>Students/project</td>
<td>Is the ‘goal’ clearly stated (revised and updated)? (10)</td>
<td>A thorough “state of the art” literature and background search (60)</td>
<td>Is the GANTT chart included and updated? (10)</td>
<td>Plan for the preliminary work for this semester (20)</td>
<td>Total (100)</td>
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</table>
| Brian Owens and Jennifer Scozzari  
Project Title: Design of laser Cladded High Entropy Alloys for Coin Press Die Heads | | | | | |
Project List and Grading – III, May 5, 2017 – 100 points for combined oral and poster presentation
Evaluator- __________________

Please use the poster presentation time to question students and adjust your evaluation

<table>
<thead>
<tr>
<th>Students/project</th>
<th>Is the ‘goal’ clearly stated (final)? (10)</th>
<th>Is literature search final (20) – ABET outcome ‘i’</th>
<th>Are reasonable constraints and standards included? (10) – ABET outcome ‘c’</th>
<th>Is the GANTT chart included for both semesters? (10)</th>
<th>Is team work acknowledged? (5) – ABET outcome ‘d’</th>
<th>Are the oral and poster presentation effective? (25) – ABET outcome ‘g’</th>
<th>Plan for the work for next semester (20)</th>
<th>Total (100)</th>
</tr>
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<tr>
<td>Brian Owens and Jennifer Scozzari</td>
<td>Project Title: Design of Laser Cladded High Entropy Alloys for Coin Press Die Heads</td>
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Teammate Evaluation Rubric: Submit to coordinator **no later than 03/31/17** after submission of the project definition/report and in-class group presentation on March 11, 2015 and background report and in-class group presentation on April 1, 2015.

Your Name: __________________________ Teammate’s Name: _____________________

<table>
<thead>
<tr>
<th>Research &amp; Gather Information</th>
<th>Unsatisfactory 1</th>
<th>Developing 2</th>
<th>Satisfactory 3</th>
<th>Outstanding 4</th>
<th>Score</th>
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</thead>
<tbody>
<tr>
<td>Does not collect any information that relates to the topic</td>
<td>Collects very little information- some relates to the topic</td>
<td>Collects some basic information- most relates to the topic</td>
<td>Collects a great deal of information- all relates to the topic</td>
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<table>
<thead>
<tr>
<th>Fulfill Team Roles &amp; Duties</th>
<th>Does not perform any duties of assigned team roles</th>
<th>Performs very little duties</th>
<th>Performs nearly all duties</th>
<th>Performs all duties of the assigned team roles</th>
<th></th>
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<tr>
<th>Shares equally</th>
<th>Always relies on others to do work</th>
<th>Rarely does the assigned work- often needs reminding</th>
<th>Usually does the assigned work- rarely needs reminding</th>
<th>Always does the assigned work without having to be reminded</th>
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<tr>
<th>Listens to other teammates</th>
<th>Is always talking- never allows anyone else to speak</th>
<th>Usually doing most of the talking- rarely allows others to speak</th>
<th>Listens, but sometimes talks too much</th>
<th>Listens and speaks a fair amount</th>
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**Average Score**
Teammate Evaluation Rubric: Submit to coordinator **no later than 05/05/15** after presentation/discussion of the project progress report to/with the advisor on April 15, 2015 and submission of final report on April 22, 2015.

Your Name: __________________________  Teammate’s Name: _____________________

<table>
<thead>
<tr>
<th></th>
<th>Unsatisfactory 1</th>
<th>Developing 2</th>
<th>Satisfactory 3</th>
<th>Outstanding 4</th>
<th>Score</th>
</tr>
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<tr>
<td><strong>Research &amp; Gather Information</strong></td>
<td>Does not collect any information that relates to the topic</td>
<td>Collects very little information - some relates to the topic</td>
<td>Collects some basic information - most relates to the topic</td>
<td>Collects a great deal of information - all relates to the topic</td>
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