MET 482 Section 001
METALLURGICAL DESIGN (CAPTSTONE DESIGN)

Spring Semester 2015

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                       Hours: By appointment via email

Course Grading:
  3-Project status reports  30%
  1-Oral presentation(group)  20%
  1-Final report (group)  50%

Textbook (recommended, but not required):

References:

Course Objectives:

This course, which runs concurrently with Met 410/610 (“Pyrometallurgy”) and subsequent to MET 451 (“Process Optimization, Design and Control”), prepares students for the transition to industry by teaching necessary skills in process development and project analysis, design, evaluation, and management. Students will gain the understanding of developing a metallurgical processing plant to recover the value from a mineral deposit. This “greenfield” open-ended project assignment requires the students to define the appropriate scope, synthesize a variety of alternatives, design and cost the entire project, perform an economic evaluation, assess the risk, and make a presentation suitable for management or other decision makers.

The entire class will act as the “engineering design” contractors for the project. The students will be required to determine the optimum rate of return, the production rate (tons per day), and size the unit operations for the plant. Overall cost of the equipment, scale of operation, the plant design and economic analysis will be reported in a final report that will be provided to mining industry personnel who will critique the report, and give feedback to the work completed. Throughout the term, homework and quizzes will be used to ensure that each individual student understands the design process concepts. These individual homework assignments and quizzes are included in the “Project status reports”. For example each
individual student must demonstrate competency in the finance topics of cash flow (an indicator of economic viability), equipment design and costing, and capital budgeting.

**Syllabus for MET 482**  
**(Spring Semester 2015)**

**METALLURGICAL DESIGN (CAPTSTONE DESIGN)**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Reading</th>
<th>Lecture</th>
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<tr>
<td>1</td>
<td>Presentation of the Problem</td>
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<td></td>
<td>• Ore Body Definition</td>
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<td>• Topographical Maps Near the Deposit</td>
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<td>• Determine the Optimum Plant Location</td>
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<td>1-2</td>
<td>Concepts of Engineering Design</td>
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<td></td>
<td>• Capital Equipment Estimate</td>
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<td>• Process Cost Estimate Based on Capital Equipment</td>
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<td>• “Narrowing the Estimate”</td>
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<td>2-4</td>
<td>Value of Money</td>
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<td>• Cash Flow and Cash Flow Tables</td>
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<td>• Present Value</td>
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<td>• Evaluating the Rates of Return</td>
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<td>• Determining the Best Choice</td>
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<td><strong>Status Report Due end of Week 4</strong></td>
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<td>5-9</td>
<td>Process Design Considerations</td>
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<td>• Optimal Plant Footprint of Equipment</td>
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<td>• Designing the Plant Flowsheet</td>
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<td>• Developing the Building Infrastructure</td>
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<td><strong>Status Report 2 Due End of Week 9</strong></td>
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<td>10-12</td>
<td>Finalizing the Design</td>
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<td><strong>Status Report 3 Due End of Week 12</strong></td>
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<td>13-15</td>
<td>Classes on Economics and Time for Students to Work on Project</td>
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<td><strong>Final Written Report Due Last Day of the Semester</strong></td>
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<td><strong>Oral Report Scheduled for the Presentation during the Scheduled Final Time-slot</strong></td>
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**Prerequisites:**
Because the course is a core course to the mineral industry, Mineral Processing, Hydrometallurgy and Pyrometallurgy are pre- or co-requisites for this course. Those enrolled in pass/fail must have knowledge or working experience in these courses.

**Method of Instruction:**
This course will be a lecture course. A working knowledge of the internet and a computer that can allow the student to download material via pdf, plus e-mail for group interaction is required. Each student will be required to turn in the weekly homework; collaboration via chat groups and email is encouraged, but not mandatory.

**WebCampus:**
The enrolled student will be provided with a log-on name and password that will allow access to this WebCampus course (visit www.unr.edu for quick link in the upper right corner). Once in the class, the lecture videos, supplemental reading and group contacts will be available on Wednesday afternoon for those registered in the class.

**Project Status Reports:**
The course will be conducted as if the class is a contracted engineering company responsible for making a final presentation to a client regarding one of their ore bodies (whenever possible, we will try to use an actual ore body being considered by a mining company). There will be three 100 point status reports during the semester. The reports will be presented in memo format for the instructor (i.e. project manager) to evaluate the progress being made by the group in designing the operation.

**Final Reports:**
A written final report will be due on the project at the end of the term. The report will have the final process plan, economic analysis, and determination of operating strategies for the problem/ore presented. The final report will be graded for content, grammar, spelling and technical completeness. All members of the class will work on the final report, and each will sign the line of the “Table of Contents” that they had primary responsibility in preparing. It is likely that a copy of this report will be provided to the individuals who provided information (i.e., ore deposit information, process parameters, etc.) for review and feedback.

A final group oral presentation will be provided during finals week. All of the class is expected to participate in this oral presentation, which will be presented to the faculty and industrial representatives (whenever possible).

**Grading:**
Grading will be based primarily on exam scores, group participation and homework assignments. Items covered in the lectures will be on the exams even though not in the text assigned. Tests are worth 100 points each.

- 3-Project status reports \[30\%\]
- 1-Oral presentation (group) \[20\%\]
- 1-Final report (group) \[50\%\]

Final grades will be computed by taking the weighted average percentage of points that the student has received out of the total possible for all tests, homework and the semester project. Below is the grading scale. The following categories will be observed for grades:

- **A**: 90-100%
- **B+**: 88-90%
- **B**: 80-88%
- **C+**: 78-80%
- **C**: 65-79%
- **D+**: 62-65
- **D**: 50-62%
- **F**: <50%

For Pass/Fail grading, the student must do at least “C” grade work to pass this course. Letter grades will be given to those enrolled for a letter grade. The lower end of each grade category is guaranteed to go no higher. If it seems appropriate, the instructor may lower the standards slightly. There will be neither "+"s nor "-"s attached to any grades.

A student may receive a "W" (withdraw) grade only if withdrawal occurs before the end of the allotted drop date for the semester. To withdraw, the student must inform the instructor verbally or in writing why the withdrawal is taking place, and must formally withdraw through student services. If a student does not complete the course, but does not formally withdraw, an "F" grade will be issued. "I" grades for "incomplete" will be given only under the most extenuating circumstances, and only with prior approval of the instructor.

If a student receives less than a 70% grade on either of the first two tests the student will be given the option of taking it or another test on the same subject matter (at instructors discretion) until a grade of 70% or better is achieved. The grade for that test will then be recorded as 70%.

Assignment completeness and attendance will be considered in grading if a student is a "border-line" case. Extra credit is not given in this course.

**Attendance:**

Attendance for all students will be monitored for log-on and group participation. Regular log-on to WebCampus, viewing the videos plus supplementary material and group participation are required.
On campus students must attend class unless a UNR time conflict form is signed by the instructor. Weekly assignments will be given in class so assignment completion will require attendance, so role will be taken. The consequence of class non attendance will be subject to instructor discretion.

**Statement on Academic Dishonesty:**

Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student’s enrollment without a grade, giving an F for the course or for the assignment. For more details, see the [UNR General Catalog](#).

**Statement on Disability Services:**

Any student with a disability needing academic adjustments or accommodations is requested to speak with me or the Disability Resource Center (Thompson Building Suite 101) as soon as possible to arrange for appropriate accommodations.

**Lecture Class Notices:**

Students will turn off their cell phones during the lecture class. Use of cell phones during in-class exams will be considered cheating and appropriate disciplinary action will ensue.

**Not a Contract:**

This document does not in any way represent a contract. It is only a summary of how the instructor expects the course to proceed. It may be changed at any time by the instructor.  
15 weeks = 30 lecture classes ≈ 40 hrs, Supplemental Webcampus material ≈ 10 hours