APPLICATION FOR NEW COURSE

Submitted by College of Engineering Date May 14, 2002

Department/Division offering course Chemical and Materials Engineering

2. Proposed designation and Bulletin description of this course

a. Prefix and Number MSE 202 b. Title* Materials Science Laboratory

*NOTE: If the title is longer than 24 characters (including spaces), write A sensible title (not exceeding 24 characters) for use on transcripts

c. Lecture/Discussion hours per week 0 hour d. Laboratory hours per week 3 hours

e. Studio hours per week f. Credits 1

g. Course description

To teach students the basic materials characterization laboratory techniques and demonstrate the difference in properties between different types of materials

h. Prerequisites (if any)

None, but MSE students have to enroll in MSE 201 simutaneously

May be repeated to a maximum of _____ (if applicable)

4. To be cross-listed as

_____ _____

Prefix and Number Signature, Chairman, cross-listing department

5. Effective Date Spring, 2003 (semester and year)

6. Course to be offered ☐ Fall ☑ Spring ☐ Summer

7. Will the course be offered each year? ☑ Yes ☐ No
(Explain if not annually)

8. Why is this course needed?

To provide hand-on experience in materials laboratory techniques for students.

9. a. By whom will the course be taught? Tongquang Zhai

b. Are facilities for teaching the course now available? ☑ Yes ☐ No
If not, what plans have been made for providing them?

10. What enrollment may be reasonably anticipated? 10- 15

11 Will this course serve students in the Department primarily? ☑ Yes ☐ No

Will it be of service to a significant number of students outside the Department? ☐ Yes ☑ No
If so, explain.

Will the course serve as a University Studies Program course? ☐ Yes ☑ No

If yes, under what Area?

12. Check the category most applicable to this course

☒ traditional; offered in corresponding departments elsewhere;

☐ relatively new, now being widely established

☐ not yet to be found in many (or any) other universities

Is this course part of a proposed new program: ☐ Yes ☑ No
If yes, which?

14. Will adding this course change the degree requirements in one or more programs?* ☐ Yes ☑ No
If yes, explain the change(s) below

15 Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used.

16. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.

17. Within the Department, who should be contacted for further information about the proposed course?

Name Tony Zhai Phone Extension 7-4958

*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.

Signatures of Approval:

Department Chair	6/19/02 Date
Dean of the College	10/21/02 Date
UNDERGRADUATE COUNCIL	10/29/02 Date of Notice to the Faculty
*Undergraduate Council	FEB 5 2003 Date
*University Studies	Date
*Graduate Council	Date
*Academic Council for the Medical Center	Date
*Senate Council (Chair)	Date of Notice to University Senate

*If applicable, as provided by the Rules of the University Senate

ACTION OTHER THAN APPROVAL

Outline of MSE 202 Materials Science Laboratory (1 Credits)

Goals:

1. To introduce students to basic materials characterization laboratory techniques, such as metallographic technique, hardness testing, tensile testing, and scanning electron microscopy, etc.

2. To demonstrate the difference in properties of different materials including metal, polymers, ceramics and semiconductors.

Text Book: None

References:

1. The Science and Engineering of Materials, Third Edition [by] Donald. R. Askeland.

2. Metals Handbooks, ASTM, 1992.

3. Tensile testing, edited by Patricia Han, (TA418.16 .T46, Engineering library) 1992.

4. Optical microscopy for the materials sciences [by] J.H. Richardson (TN690.R53)

   Optical microscopy of metals [by] R.C. Gifkins. (TN690.G48)

5. Rockwell hardness measurement of metallic materials, Samuel R. Low. (C 13.10:960-5) Young Library (Periodicals--Service Desk). (http://www.msel.nist.gov/practiceguides/SP960_5.pdf, accessible from a PC on campus)

6. Modern Physical Metallurgy & Materials Engineering, Sixth Edition, R.E. Smallman & R.J. Bishop, Butterworth Heinemann, 1999.3.

Topics: Students will participate in the following laboratory practicals

1. Preparation of metallographic samples
   - Sample grinding, mechanical polishing,
   - Electro-polishing, etching and anodizing
2. Optical microscopy
   - Bright field and dark field techniques
   - Observation of grain structure and particles
   - Grain size measurement
3. Hardness testing
   - Brinel hardness and Vicker hardness
4. Tensile testing
   - Sample preparation and testing
   - Measurement of ultimate tensile strength, yield strength and elongation
5. Scanning electron microscopy (SEM) and energy dispersion spectroscopy (EDS)

Observation of fracture surface
Composition analysis of particles

6. Electrical Conductivity
   Aluminum under different conditions of temperature and deformation
   Silicon under different conditions
   Polymers

Note:

Visit to SECAT	
Experimental reports	(due two weeks after each practical starts)
Final Exam	(contains written and oral parts)

Laboratory reports: Each student will prepare a report for each practical describing the practical procedure, working principle and application, and discussing the results from the pratical. The report must be typed or word processed. The margins should be 1" in all sides and the type should be no smaller than 10 point and no larger than 12 point. No handwritten reports will be accepted. Your paper will be evaluated based on content (70%), clarity (20%) and organization (10%). Ask someone in the class to proofread your report for spelling, grammar and punctuation errors. Do not plagiarize or paraphrase directly from published literature or from your classmates. The minimum penalty for plagiarism is an "E" grade in the course. Write your report in your own words. If you have any questions about plagiarism or paraphrasing, consult the instructor before handing in the assignment.

Note: Attendance in the laboratory practicals is ***mandatory***. Those who miss the experiment sessions will receive appropriate reduction in their final grading.

Grading: The course grade is based on average numerical scores from laboratory reports (60%) and the final exam (40%). Letter grades will be assigned as follows:
≥90=A; 80-89= B; 70-79= C; 60-69= D; ≤59= E

Outcome:

1. Understand fundamental knowledge about basic materials characterization techniques (such as metallographic sample preparation, optical microscopy, hardness testing, tensile testing, SEM and EDS).
2. Learn relevant terminology in metallurgy, such as grinding, polishing, anodizing, grain structure, particles, hardness, yield strength, ultimate tensile strength, elongation, stress, strain, fracture surface.
3. Understand the difference in properties (mechanical and electrical) between different types of materials.