Scheduling
10 Alumni Hall
515-294-2331
Fax: 515-294-9925

Experimental Course Announcement

IOWA STATE UNIVERSITY

College: Engineering Program or Department: Materials Science and Engineering

Complete the following to provide a course listing as it would appear in the catalog. Complete all fields that apply to your course. For more information about catalog format, see www.iastate.edu/~registrar/courses/course-detail.pdf

Designator and Number MSE 558X Title Eddy Current Nondestructive Evaluation

Dual-listed with: Same as: EE 558X
(co- or cross-listed with another course)

Credits: 3 Semester and year offered: Fall 2007 Prerequisite(s), if applicable:
(MatE211 or 272 or EE311 or Phy364) and Math 265 and (Math 266 or Math 267)

Grading method: A-F ☑ S-F ☐ Instructor: Nicola Bowler

Description of course content (e.g., "Study of numerical methods..."):

Description of electromagnetic fields of various eddy current probes. Description of probe field interaction with conductors, cracks and other material defects. Ferromagnetic materials. Layered conductors. Elementary inversion of probe signals to characterize defects. Special techniques including remote-field, transient, potential drop nondestructive evaluation and the use of Hall sensors. Practical assignments using a 'virtual' eddy current instrument will demonstrate key concepts.

Please check all that apply to this course:

- ☐ **Dual list:** file *dual-list proposal*, see www.iastate.edu/~registrar/forms/
- ☐ **Co-list:** departments share responsibility for the course; full description for both courses appears in catalog.
- ☑ **Cross-list:** course description appears in catalog with the department responsible for the course; other course(s) have reference to cross-listed department.
- ☐ May be taken **more than once** for credit.
- ☐ **Nonmajor graduate credit:** *300 and 400-level courses*
- ☐ **Special course fee:** *complete special course fee form available from www.iastate.edu/~registrar/forms*

Instruction Type(s) Lecture, lab, etc.	Contact Hours* per week by type
Lecture	3

*For partial term courses, include 16-week equivalent for contact hours. See www.iastate.edu/~registrar/courses/offeringinfo.shtml

U.S. Diversity and International Perspectives Requirement: Syllabus must be attached to this form.

Proposed to meet:
- ☐ U. S. Diversity Requirement
- ☐ International Perspectives Requirement

Faculty Senate Curriculum Committee Chair Date

Approvals: Please print name and date so that is legible. Deans should initial and date.

Prog. or Dept. Curr. Comm. Chair	Dept. or Prog. Chair	Coll. Curr. Chair(s)	Dean(s) initials
Dean of the Graduate College			

Co/Cross List Approvals: please print name(s); add initial and date in the spaces below. Names must be legible.

Prog. or Dept. Curr. Comm. Chair	Dept. or Prog. Chair	Coll. Curr. Chair(s)	Dean(s) initials

Submit originals for pages 1 and 2, with all signatures, to the Registrar's Student Scheduling Office, 10 Alumni Hall: by June 1 for fall courses; October 1 for spring courses; and March 1 for summer courses. Earlier deadlines apply for the *Schedule of Classes* and other publications. *An experimental course offering must be consistent with the policies and procedures approved and distributed by the Faculty Senate Curriculum Committee. (Rev. 10/05)*

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Reason for proposal (programmatic justification, need for course, intended use in new catalog, etc.):

Need for course. Proposed course stands alone but is also intended to be one of a suite of graduate courses in nondestructive evaluation which will eventually form a postgraduate certificate or masters program. The course will be offered locally at first but then through Engineering Distance Education to provide access to professionals working in the field. ISU's Center for Nondestructive Evaluation has sponsored development of the course through funding from the US Air Force.

Course outcomes/objectives (i.e., what you expect students to know or be able to do when they complete the course):

1. Explain the relationship between electric current, magnetic field, voltage, inductance and impedance.
2. Describe the electromagnetic field produced by various eddy current probe types.
3. Explain the interaction between a probe field and a conductor with or without various types of defect.
4. Interpret the probe signal due to various conductors and defects.
5. Account for changes in the probe signal due to changes in the probe configuration and lift-off.
6. Describe special techniques; remote-field, transient, potential drop nondestructive evaluation and the use of Hall sensors.
7. Understand how to optimize a particular eddy current inspection by choice of probe type and operating frequency.

Course content/major topics to be addressed (attach syllabus if required by your college/department):

See attached 'Contents'.

Relationship of this course to existing courses in other departments and programs (supporting, overlap, etc.):

EM/MSE 550 covers multiple techniques in nondestructive evaluation. The proposed course covers one of these techniques in significantly more detail.

Results of consultation with relevant departments and programs:

College of LAS use ONLY *The LAS Dean's approval is contingent upon separate,* ***attached documentation*** *from the departmental chair identifying how resources will be allocated to fund the proposed course.*

Do you propose that the course be acceptable for General Education Requirement credit? Yes ☐ No ☐

If yes, in which group?

College of Agriculture use ONLY

Is this course intended to satisfy the requirements of any of the following proficiency areas? If yes, indicate the credit that applies to each proficiency.

	Yes	No	Embedded Credits Sought
Communication			
Environment			
Problem Solving			
Ethics			

Approval for these proficiency areas must be obtained from the College of Agriculture Curriculum Committee. If you are requesting approval for any of these proficiency areas, provide separate documentation to the Chair of the College of Agriculture Curriculum Committee stating how your course meets the requirements for proficiency. Contact curriculum committee chair for details.

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