UNIVERSITY OF KENTUCKY

New Course Report

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OFFICE OF THE SENATE COUNCIL

1. General Information

1a. Submitted by the College of: ENGINEERING

Date Submitted: 1/30/2014

1b. Department/Division: Chemical &Materials Engineering

1c. Contact Person

Name: Fuqian Yang

Email: fyang0@engr.uky.edu

Phone: 257-2994

Responsible Faculty ID (if different from Contact)

Name:

Email:

Phone:

1d. Requested Effective Date: Semester following approval

1e. Should this course be a UK Core Course? No

2. Designation and Description of Proposed Course

2a. Will this course also be offered through Distance Learning?: No

2b. Prefix and Number: MSE 601

2c. Full Title: Introduction to Materials Science and Engineering

2d. Transcript Title:

2e. Cross-listing:

2f. Meeting Patterns

LECTURE: 3

2g. Grading System: Letter (A, B, C, etc.)

2h. Number of credit hours: 3

2i. Is this course repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester?

2j. Course Description for Bulletin: The purpose of this course is to provide a general background in the field of materials science and engineering for graduate level students. Fundamental topics include chemical bonding in materials, crystal structure and defects, diffusion and phase diagrams. The mechanical, electrical and optical properties of materials will be discussed in the context of processing history and application. Important concepts such as anisotropic properties of materials and their tensor representation will be introduced. The course covers major materials systems (metals, ceramics, polymers, composites, and electronic materials) and offers examples of materials applications in a range of technical areas.

2k. Prerequisites, if any: Graduate standing in chemical engineering or materials science and engineering, or consent of instructor.

2l. Supplementary Teaching Component:

3. Will this course taught off campus? No

If YES, enter the off campus address:

4. Frequency of Course Offering: Fall,

Will the course be offered every year?: Yes

If No, explain:

5. Are facilities and personnel necessary for the proposed new course available?: Yes

If No, explain:

6. What enrollment (per section per semester) may reasonably be expected?: 5-10

7. Anticipated Student Demand

Will this course serve students primarily within the degree program?: Yes

Will it be of interest to a significant number of students outside the degree pgm?: No

If Yes, explain:

8. Check the category most applicable to this course: Traditional – Offered in Corresponding Departments at Universities Elsewhere,

If No, explain:

9. Course Relationship to Program(s).

a. Is this course part of a proposed new program?: No

If YES, name the proposed new program:

b. Will this course be a new requirement for ANY program?: Yes

If YES, list affected programs: Course will be required for students admitted to the master's or PhD program in Materials Science and Engineering, who do not demonstrate a sufficient undergraduate background in Materials.

10. Information to be Placed on Syllabus.

a. Is the course 400G or 500?: No

b. The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from **10.a** above) are attached: Yes

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

1.How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?

2.How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.

3.How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.

4.Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?

If yes, which percentage, and which program(s)?

5.How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?

6.How do course requirements ensure that students make appropriate use of learning resources?

7.Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.

8.How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?

9.Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? NO

If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

10.Does the syllabus contain all the required components? NO

11.I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

SIGNATURE|KALIKA|Douglass S Kalika|MSE 601 NEW Dept Review|20140204

SIGNATURE|BJSTOK0|Barbara J Brandenburg|MSE 601 NEW College Review|20140827

SIGNATURE|ZNNIKO0|Roshan N Nikou|MSE 601 NEW Graduate Council Review|20141015

Courses | Request Tracking

New Course Form

https://myuk.uky.edu/sap/bc/soap/rfc?services=

Generate R

Open in full window to print or save

Attachments:

Browse... Upload File

	ID	Attachment
Delete	2980	MSE601ProposedSyllabus.docx

First 1 Last

Select saved project to retrieve... Get New

(*denotes required fields)

1. General Information

a. * Submitted by the College of: ENGINEERING Submission Date: 1/30/2014

b. * Department/Division: Chemical & Materials Engineering

c.

* Contact Person Name: Fuqian Yang Email: fyang0@engr.uky.edu Phone: 257-2994

* Responsible Faculty ID (if different from Contact) Email: Phone:

d. * Requested Effective Date: ◉ Semester following approval OR ○ Specific Term/Year [1]

e.

Should this course be a UK Core Course? ○ Yes ◉ No

If YES, check the areas that apply:

☐ Inquiry - Arts & Creativity	☐ Composition & Communications - II
☐ Inquiry - Humanities	☐ Quantitative Foundations
☐ Inquiry - Nat/Math/Phys Sci	☐ Statistical Inferential Reasoning
☐ Inquiry - Social Sciences	☐ U.S. Citizenship, Community, Diversity
☐ Composition & Communications - I	☐ Global Dynamics

2. Designation and Description of Proposed Course.

a. * Will this course also be offered through Distance Learning? ○ Yes [4] ◉ No

b. * Prefix and Number: MSE 601

c. * Full Title: Introduction to Materials Science and Engineering

d. Transcript Title (if full title is more than 40 characters):

e. To be Cross-Listed [2] with (Prefix and Number):

f. * Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours[3] for each meeting pattern type.

3	Lecture		Laboratory[1]		Recitation		Discussion
	Indep. Study		Clinical		Colloquium		Practicum
	Research		Residency		Seminar		Studio
	Other	If Other, Please explain:					

g. * Identify a grading system:

◉ Letter (A, B, C, etc.)
○ Pass/Fail
○ Medicine Numeric Grade (Non-medical students will receive a letter grade)
○ Graduate School Grade Scale

h. * Number of credits: 3

i. * Is this course repeatable for additional credit? ○ Yes ◉ No

If YES: Maximum number of credit hours:

If YES: Will this course allow multiple registrations during the same semester? ○ Yes ○ No

j. * Course Description for Bulletin:

The purpose of this course is to provide a general background in the field of materials science and engineering for graduate level students. Fundamental topics include chemical bonding in materials, crystal structure and defects, diffusion and phase diagrams. The mechanical, electrical and optical properties of materials will be discussed in the context of processing history and application. Important concepts such as anisotropic properties of materials and their tensor representation will be introduced. The course covers major materials systems (metals, ceramics, polymers, composites, and electronic materials) and offers examples of materials applications in a range of technical areas.

k. Prerequisites, if any:

Graduate standing in chemical engineering or materials science and engineering, or consent of instructor.

l. Supplementary teaching component, if any: ○ Community-Based Experience ○ Service Learning ○ Both

3. * Will this course be taught off campus? ○ Yes ◉ No

If YES, enter the off campus address:

4. Frequency of Course Offering.

a. * Course will be offered (check all that apply): ☑ Fall ☐ Spring ☐ Summer ☐ Winter

b. * Will the course be offered every year? ◉ Yes ○ No

If No, explain:

5. * Are facilities and personnel necessary for the proposed new course available? ◉ Yes ○ No

If No, explain:

6. * What enrollment (per section per semester) may reasonably be expected? 5-10

7. Anticipated Student Demand.

a. * Will this course serve students primarily within the degree program? ◉ Yes ○ No

b. * Will it be of interest to a significant number of students outside the degree pgm? ○ Yes ◉ No

If YES, explain:

8. * Check the category most applicable to this course:

☑ Traditional – Offered in Corresponding Departments at Universities Elsewhere
☐ Relatively New – Now Being Widely Established
☐ Not Yet Found in Many (or Any) Other Universities

9. Course Relationship to Program(s).

a. * Is this course part of a proposed new program? ○ Yes ◉ No

If YES, name the proposed new program:

b. * Will this course be a new requirement [5] for ANY program? ◉ Yes ○ No

If YES [5], list affected programs::

Course will be required for students admitted to the master's or PhD program in Materials Science and Engineering, who do not demonstrate a sufficient undergraduate background in Materials.

10. Information to be Placed on Syllabus.

a. * Is the course 400G or 500? ○ Yes ◉ No
If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in **10.b**. You must include: (i) identi additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See SR

b. ☑ * The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if appl **10.a** above) are attached.

[1] Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.
[2] The chair of the cross-listing department must sign off on the Signature Routing Log.

[1] In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, re two hours per week for a semester for one credit hour. (from SR 5.2.1)
[2] You must also submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.
[3] In order to change a program, a program change form must also be submitted.

Rev 8/09

Submit as New Proposal Save Current Changes

MSE 601: Introduction to Materials Science and Engineering

Instructor:

Dr. Fuqian Yang
779 FPAT
8592572994
fyang0@engr.uky.edu

Textbook:

Fundamentals of Materials Science and Engineering: An Integrated Approach, William D. Callister, David G. Rethwisch, 4th Edition, 2012, Wiley

Optional Textbooks:

1. Materials Science and Engineering: An Introduction, William D. Callister, David G. Rethwisch, 9th Edition, 2013, Wiley
2. Condensed Matter Physics, Michael P. Marder, 2nd Edition, 2010, Wiley

Course description:

The purpose of this course is to provide a general background in the field of materials science and engineering for graduate level students. Fundamental topics include chemical bonding in materials, crystal structure and defects, diffusion and phase diagrams. The mechanical, electrical and optical properties of materials will be discussed in the context of processing history and application. Important concepts such as anisotropic properties of materials and their tensor representation will be introduced. The course covers major materials systems (metals, ceramics, polymers, composites, and electronic materials) and offers examples of materials applications in a range of technical areas.

Pre-requisites: Graduate standing in chemical engineering or materials science and engineering, or consent of instructor.

Course objectives:

- Provide a general background in the field of materials science and engineering at the graduate level.
- Introduce students to the fundamental structural nature of materials, including microstructure and defects, and their effect on physical properties.

Course outcomes:

The student will gain a basic knowledge of metals, ceramics, polymers and electronic materials. At the end of this course, the student will have the foundational background required to undertake more advanced coursework in the MSE graduate curriculum.

Specific course outcomes are:

1. Use concepts of inter-atomic bonding to predict fundamental physical properties of different classes of materials.
2. Determine the crystallographic directions and planes, and the linear and planar atomic densities for a particular crystal structure.
3. Relate plastic deformation and cold work to the strength of metals.
4. Determine the phases expected to be present and calculate their compositions and the volume fraction of each phase for a given binary phase diagram and a particular alloy composition at a given temperature.
5. Determine the microstructures expected for various alloy compositions cooled from the melt at different rates for a binary eutectic phase diagram.
6. Demonstrate knowledge of the relation between semiconductor conductivity and band gap energy states.
7. Demonstrate the ability to relate the structure of polymers to properties and processing methods.
8. Establish the relationship of composite properties to the properties of the individual constituents.

Lectures: (subject to change)

1.0	Introduction	Chapter 1
1.0	Bonding in Solids	Chapter 2
4.0	Metallic/Ceramic Structures	Chapter 3
2.0	Polymer Structures	Chapter 4
2.0	Defects and Dislocations	Chapter 5
2.0	Diffusion	Chapter 6
4.0	Phase Diagrams	Chapter 10
Midterm Examination		
3.0	Phase Transformations	Chapter 11
3.0	Types and Applications of Materials	Chapter 13
4.0	Mechanical Properties	Chapter 7
2.0	Deformation/Strengthening Mechanisms	Chapter 8
2.0	Electrical Properties of Materials	Chapter 12
2.0	Optical and Magnetic Properties of Materials	Chapter 18/19
Final Examination		

Grading:

Class attendance and participation	10%
Homework assignments	20%
Midterm Exam	35%
Final exam	35%
Course Total	100%

General Policies:

Attendance and Responsibility

Class attendance is required. If you have to miss a class for a legitimate reason, please inform me in writing as early as possible so that we can plan appropriately and provide you with make-up materials.

Homework and Exam Policy

Homework is due at the beginning of class on days when collected. No late homework is accepted. You are expected to do your own homework. You can ask questions about homework problems in class or during office hours. You are encouraged to discuss course concepts and appropriate approaches to problems with classmates, but please do not turn in someone else's solutions as if they were your own.

You must be present for exams. Missing an exam without prior approval will result in a ZERO. Make-up exams will be given ONLY in those exceptional cases in which the student provides a "University acceptable" written excuse. Note that the make-up must be taken before the scheduled time.

Cell phones

Cell phones MUST BE TURNED OFF before the start of class or lab.

Disability statement

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

Please carefully read the information in the syllabus. Your enrollment in this course implies that you agree with the principles stated herein.