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SENATE COUNCIL

1. General Information

1a. Submitted by the College of: ENGINEERING

Date Submitted: 5/17/2013

1b. Department/Division: Electrical and Computer Engineering

1c. Contact Person

Name: Vijay Singh

Email: vsingh@engr.uky.edu

Phone: 257-3243

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? Yes

Inquiry - Nat/Math/Phys Sci

2. Designation and Description of Proposed Course

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

2b. Prefix and Number: EE 167

2c. Full Title: Fundamentals of Nanotechnology and Applications in Renewable Energy

2d. Transcript Title: Nanotechnology and Renewable Energy

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: In 6 lecture modules and 4 observational visits to laboratories on UK campus, this course covers: effects of small size (1 nm to 100 nm) on the electro-optical properties of materials; fundamental principles of quantum mechanics; applying quantum mechanics to understand the changes in material properties like color, luminescence and electrical conductance at nanoscale; operating principles, basic theory and design issues in solar cells; nanotechnology applications for enhancing the performance of renewable energy generation and storage systems, especially solar cells and batteries.

2k. Prerequisites, if any: Proficiency in mathematics, physics and chemistry at the high school graduate level.

2l. Supplementary Teaching Component:

3. Will this course taught off campus? No

If YES, enter the off campus address:

4. Frequency of Course Offering: Spring,

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?: 50

7. Anticipated Student Demand

Will this course serve students primarily within the degree program?: No

Will it be of interest to a significant number of students outside the degree pgm?: Yes

If Yes, explain: [var7InterestExplain]

8. Check the category most applicable to this course: Not Yet Found in Many (or Any) Other Universities ,

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?: No

If YES, list affected programs:

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|HOLLOWAY|Lawrence E Holloway|Dept approval for ZCOURSE_NEW EE 167|20121017

SIGNATURE|BJSTOK0|Barbara J Brandenburg|College approval for ZCOURSE_NEW EE 167|20121018

SIGNATURE|BJSTOK0|Barbara J Brandenburg|Subworkflow for GenEd Expert review|20121126

SIGNATURE|REBEAT1|Ruth E Beattie|UKCEC Expert review ZCOURSE_NEW EE 167|20121126

SIGNATURE|REBEAT1|Ruth E Beattie|UKCore approval for ZCOURSE_NEW EE 167|20130513

SIGNATURE|JMETT2|Joanie Ett-Mims|Undergrad Council approval for ZCOURSE_NEW EE 167|20130513

General Education Course Approval Cover Sheet

Date of Submission 10/12/2012

1. Check which area(s) this course applies to

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. Provide Course and Department Information.

Department: Electical and Computer Engineering

Course Prefix and Number: EE 167 Credit hours: 3

Course Title: Fundamentals of Nanotechnology and Applications in Renewable Energy

Expected # of Students per Calendar Yr: 100 Course Required for Majors in your Program (check one)? Yes ☐ No ☒

Prerequisite(s) for Course? Proficiency in mathematics, chemistry and physics at the level of high school graduate (algebra, trigonometry, mechanics, optics, electricity and magnetism)

This request is for (check one) A New Course ☒ An Existing Course ☐

Departmental Contact Information

Name: Vijay Singh Email: vsingh@engr.uky.edu

Office Address: 683 FPAT Phone: 257-3243

3. In addition to this form, the following must be submitted for consideration:

- A syllabus that conforms to the Senate Syllabi Guidelines, including a mapping of the stated learning outcomes to those presented on the corresponding Course Template.
- A completed Course Review Form. See the Gen Ed website http://www.uky.edu/gened/forms.html for these forms. Proposals prepared prior to September 15th, 2010 are allowed to use a narrative instead of the Course Review Form.
- If applicable, a major course change form for revision of an existing course, or a new course form for a new course.

4. Signatures

Department Chair: ______________________ Date: __________

Dean: ______________________ Date: __________

All proposals are to be submitted from the College Dean's Office
Submission is by way of the General Education website http://www.uky.edu/gened

Course Review Form
Inquiry in the Natural/Mathematical/Physical Sciences

Course: EE 167

Reviewer Recommendation

Accept ☐ Revisions Needed ☐

Using the course syllabus as a reference, identify when and how the following learning outcomes are addressed in the course. Since learning outcomes will likely be addressed multiple ways within the same syllabus, please identify a representative example (or examples) for each outcome.

☐ Course activities that enable students to demonstrate an understanding of methods of inquiry that lead to scientific knowledge and distinguish scientific fact from pseudoscience.

Example(s) from syllabus:
An example of such activity occurs in the first and the second (of four) experimental modules called, "Nanoscale Effects in Gold and Silver", and "Seeing at Nanoscale-scanning electron microscopy and atomic force microscopy".

In these laboratory exposure modules, students will observe the synthesis of citrate stabilized gold and gold-silver alloy colloidal nanoparticles from solutions of chloroauric acid (HAuCl4) and silver nitrate (AgNO3), and the measurement of the size of these nanoparticles. The students will also observe the measurement of the optical absorption and scattering spectra of these nanoparticles to learn how the optical properties of nanoparticles can be varied by varying their size and composition.

Brief Description:
In the above laboratory modules, students will learn the experimental method of inquiry to establish a scientific fact that the properties of a materials like its color, electrical resistance etc change dramatically (in a manner that can, at first, seem counter-intuitive) when its size is reduced to a few nanometers. Further, they will learn the manner in which this scientific fact is different from the "pseudoscience" claims of ancient alchemists who falsely claimed an ability to turn lead into "gold" without reducing its size to nanometer scale or altering its composition.

☐ Course activities that enable students to demonstrate an understanding of the fundamental principles in a branch of science.

Example(s) from syllabus:
An example of this activity occurs also in the first and the second of four experimental modules called, "Nanoscale Effects in Gold and Silver", and "Seeing at Nanoscale-scanning electron microscopy and atomic force microscopy ".

Brief Description:
Results of experiments described above demonstrate the fundamental principle of quantum confinement, which is an important part of modern physics.

☐ Course activities that enable students to demonstrate the application of fundamental principles to interpret and make predictions in that branch of science.

Example(s) from syllabus:
An example of this activity occurs in the third experimental module called, "Solar cells; fabrication and

characterization". In this module, students will first design a solar cell and then will observe the fabrication of thin film solar cell that converts sun's photons into electrical energy. Along the way, they will measure the characteristics of films and devices with X-ray diffraction, spectral absorption, solar simulator, capacitance meter and quantum efficiency measurement set up. They will be able to compare theoretical predictions with experimental observation.

Brief Description:
In designing their solar cell, students will use the fundamental principle of quantum confinement to interpret and predict the advantageous characteristics of the nanostructured films which will be incorporated in the device. After observing the fabrication and testing of experimental solar cell devices, they will be able to test the validity and accuracy of their predictions.

☐ Course activities that enable students to demonstrate their ability to discuss how at least one scientific discovery changed the way scientists understand the world.

Example(s) from syllabus:
An example of this activity occurs in the second week of the second lecture module, titled, "Solar Cell Devices and Systems: Basic Principles and Device Design ". During the teaching of the third and fourth sections of this module, called, " basic elements of quantum mechanics; how does quantum mechanics elucidate the nature of reality", students will be asked to write a paper on "Blackbody Radiation and Quantum Mechanics".

Brief Description:
In this paper, students will be expected to discuss how the scientific data on blackbody radiation could not be explained by the classical physics and how the concepts of quantum mechanics had to be brought in. They will then go into the development and applications of quantum mechanics and the profound effect it has had on the way scientists understand the reality of world today

☐ Course activities that enable students to demonstrate their ability to discuss the interaction of science with society.

Example(s) from syllabus:
An example of this activity occurs not only the impact of quantum mechanics on the scientists' understanding of reality, as described above but also in the first week of the first lecture module, titled, "A Plan for Energy Independence from Foreign Oil (Week 1)". After the conclusion of this module, students will be asked to collect technical and scientific data and facts for themselves and do a "critique" paper on the "plan" presented in the class.

Brief Description:
By doing the above paper, students will gain an undersatanding of the complexity of the issues involved when scientific advances are evaluated for their impact on the society.

☐ A hands-on student project is required. This project enables students to demonstrate their ability to conduct a scientific project using scientific methods that include design, data collection, analysis, summary of the results, conclusions, alternative approaches, and future studies. Describe the required student product (paper/ laboratory report) based on the hands-on project.

A hands-on student project is described in the fifth lecture module called, "The Project". First, students will do the design and numerical evaluation of a solar system for a grid-connected 3-bedroom house in Lexington, KY. Next, they will compare their design with the experimental solar home now operating at University of Kentucky. As a part of this project, students will be asked to write a detailed report that includes a description of design, data, analysis, results and conclusions and suggestions for future improvements.

☐ Course activities that demonstrate the integration of information literacy into the course.

Example(s) from syllabus:
An example of this activity occurs in the first week of the first lecture module, titled, "A Plan for Energy Independence from Foreign Oil (Week 1)". After the conclusion of this module, students will be asked to collect technical and scientific data and facts for themselves and do a "critique" paper on the "plan" presented in the class.

Brief Description:
By doing the above paper, students will have an opportunity to enhance and demonstate their information literacy skills.

Reviewer's Comments

e

Courses	Request Tracking

New Course Form

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

Open in full window to print or save

Generate R

Attachments:

Browse... Upload File

	ID	Attachment
Delete	827	EE 167 Cover Sheet-filled-Oct12 doc.doc
Delete	828	EE 167 Course Review Form-Oct 11-2012 doc.doc
Delete	1839	SyllabusEE-167-Revised May 10-2013-E.docx

First 1 2 Last

Select saved project to retrieve... Get New

(*denotes required fields)

1. **General Information**

a. * Submitted by the College of: ENGINEERING Today's Date: 5/17/2013

b. * Department/Division: Electrical and Computer Engineering

c.
* Contact Person Name: Vijay Singh Email: vsingh@engr.uky.edu Phone: 257-3243
* 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
- [x] 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: EE 167

c. * Full Title: Fundamentals of Nanotechnology and Applications in Renewable Energy

d. Transcript Title (if full title is more than 40 characters): Nanotechnology and Renewable Energy

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 ( ) 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

Course Syllabus of a Proposed General Education Course (EE-167)

Title: Fundamentals of Nanotechnology and Applications in Renewable Energy
Course Number and Credits: EE-167 (3 credits)
Department: Department of Electrical and Computer Engineering
Scheduled Meeting Times:_TBA (Three 50-minute lectures per week)

Pre-requisites for this Course: Proficiency in mathematics, physics and chemistry at the high school graduate level.

Instructor: *Dr. Vijay Singh*, Professor, Department of Electrical and Computer Engineering,
Office Phone: 257-3243; e-mail: vsingh@engr.uky.edu
Office Address: 683 FPAT
Office Hours TBA

Course Description: In 6 lecture modules and 4 observational visits to laboratories on UK campus, this course covers: effects of small size (1 nm to 100 nm) on the electro-optical properties of materials; fundamental principles of quantum mechanics; applying quantum mechanics to understand the changes in material properties like color, luminescence and electrical conductance at nanoscale; operating principles, basic theory and design issues in solar cells; nanotechnology applications for enhancing the performance of renewable energy generation and storage systems, especially solar cells and batteries.

General: Class will meet three times a week for 50-minute lecture periods over a semester consisting of 39 lectures and 3 midterm tests over a period of 14 weeks.

Course Overview:
Topics covered in this course include: inquiry into the effects of small size (1 nm to 100 nm) on the electrical, mechanical and optical properties of materials; fundamental principles of quantum mechanics, electrons, particles and waves; discrete energy levels; energy bands in solids; Heisenberg's uncertainty principle; how quantum mechanics changed the way we understand the world; applying quantum mechanics to understand the changes in material properties with size, color, luminescence, electrical conductance; nanotechnology and society; applications in the fields of renewable energy, information technology, environment, medicine, and pharmacy; using nanotechnology to enhance the performance of solar cells.

Student Learning Outcomes:

Upon successful completion of this course, a student will be able to,

1. Describe the operating principles of a solar cell device

2. Analyze the electrical characteristics of a solar cell
3. Calculate the power output of a solar cell
4. Describe the basic elements of quantum mechanics
5. Calculate the values of selected electrical and optical characteristics of Nanoscale materials as functions of their size
6. Describe the role of nanotechnology in enhancing the performance of renewable energy devices like solar cells and batteries.

Course Goals/ Objectives:

The main objective is to expose a large number of incoming freshmen students to the excitement of Nanotechnology and its promise toward improving the human condition through applications in renewable energy and other fields. For students majoring in Electrical Engineering, Materials Engineering, Chemical Engineering or Mechanical Engineering, this course will also serve as a feeder for the "Nanoscale Engineering Tracks", which are planned as parts of the above four existing B.S. degree programs in the College of Engineering.

Required Materials:

Textbook: "Nano-Age: How Nanotechnology Changes our Future", by Mario Pagliaro, 2010, Wiley-VCH Verlag GmbH and Co, KG&A, Weinheim, ISBN 978-3-527-3267-1

Other Materials:

Reference Book: "Nanostructured Materials for Solar Energy conversion", edited by Tetsuo Soga, 2006, Elsevier. (Also, other reference books and literature articles will be prescribed; handouts will be distributed)

Outline of the Content:

1. <u>A Plan for Energy Independence from Foreign Oil (Week 1)</u>

   How installing 40,000 square miles of solar panels in the desert southwest of United States can supply 70% of U.S. electricity needs thus eliminating the need to import oil and save the environment from the pollutants from excessive burning of oil and coal. This would require actions in the fields of,

   (i) <u>Engineering and Science</u>. At present, power conversion efficiency (from solar/optical power to electrical power) of commercial thin film solar modules is about 10%. In the next few years, it needs to be increased to 14%. ***One of the most promising routes is Nanoscale Engineering and quantum mechanics based science.***

   (ii) <u>Economics and Public Policy.</u> America needs to invest in the solar infra-structure by building a d.c. grid that will transport electrical power from the southwestern desert to the rest of country. An initial investment of about $

400 billion (in 2008 dollars) in infra-structure is needed. After 2020, solar industry will be self-sustaining.

2. Solar Cell Devices and Systems: Basic Principles, Device Design, (Weeks: 2-7).
Semiconductors; properties of single crystals; basic elements of quantum mechanics; how does quantum mechanics elucidate the nature of reality; particles and waves; nature of electrons; discrete energy levels; energy bands in solids; electron transport in crystalline semiconductors; p-n junctions; solar cells: device physics, design issues; survey of current approaches for improving the performance of solar cells; role of nanotechnology
3. Introduction to the Science of Nanoscale (Week 8-11)
Inquiry into the effects of small size (1 nm to 100 nm) on the electrical, mechanical and optical properties of materials; fabrication techniques; basic elements of quantum mechanics; understanding the variations in material properties with size variations: color; luminescence; electrical conductance; mechanical properties.
4. Using Nanoscale Devices and Materials to Enhance the Performance of Solar Cells, Batteries and Super capacitors (Weeks 12-14)
Nanoporous membranes; nanowires; quantum dots; carbon nanotubes; sensors; solar cells; batteries; super-capacitors, fuel cells.
5. Project (Weeks 6-12)
Students will be asked to do the design and numerical evaluation of a solar system for a grid-connected 3-bedroom house in Lexington, KY. Next, they will compare their design with the experimental solar home now operating at University of Kentucky.
6. Lectures on Fabrication and Charcterization Techniques and Laboratory Practices, and 4 Observational Visits to Laboratories on UK Campus (Weeks 2-13)
Over the 14 week semester, 7 class periods will be used to introduce the basics of fabrication and characterization techniques and provide an opportunity for students to observe in a close interactive manner a series of experimental modules in the laboratories of the Department of Electrical and Computer Engineering (ECE), Power and Energy Institute of Kentucky (PEIK) and the Center for Nanoscale Science and engineering (CeNSE). These modules are,
(i) Nanoscale effects in gold and silver
Students will learn both fundamental aspects of nanoscience and their application to renewable energy and medicine by observing the synthesis of colloidal nanoparticles that support localized surface plasmon resonances. This experiment is an excellent example of how material properties, in this case optical property, change at the nanoscale. In addition, plasmonic effects in metal nanoparticles have been widely explored for enhancing the efficiency of solar cells, for medical and environmental sensing, and for photothermal cancer therapy. This module involves the synthesis of citrate stabilized gold and gold-silver alloy colloidal nanoparticles from solutions of chloroauric acid ($HAuCl_4$) and silver nitrate ($AgNO_3$). The production of Au-Ag alloy nanoparticles is based on the procedure, which is currently in

use in Dr. Todd Hastings' laboratory in CeNSE. The students will also learn about the techniques used for measuring the optical absorption and scattering spectra of these nanoparticles, localized surface-plasmon resonances and how the optical properties of the nanoparticles can be tuned based on size and composition.

(ii) Seeing at nanoscale: scanning electron microscopy and atomic force microscopy
Students will learn the operating principles of these Nanoscale imaging machines and will be able to see the images of Nanoscale materials made in Module (i) above.

(iii) Solar cells; fabrication and characterization
Students will observe the processes involved in the fabrication of thin film solar cell that converts sun's photons into electrical energy. Along the way, they will learn about the measurement techniques for characterizing films and devices with X-ray diffraction, spectral absorption, solar simulator, and capacitance meter and quantum efficiency measurement set up.

(iv) Solar Car and Solar Home Visits
Students will visit the solar car and solar home on the campus, speak with more advanced engineering students who have built and are continually improving the car and the home.

Course Assignments:

12 Graded Homework Assignments at 10 points each: 10 % of the composite score for course
10 short quizzes (scheduled or unscheduled (pop)) at 10 points each: 10 % of the composite score for course
2 Mid-term Exams at 100 points each: 40 % of the composite score for course
1 Nine-week Project Assignment at 100 points: 20 % of the composite score for course
1 Final Exam at 100 points each: 20 % of the composite score for course

Course grading:

90-100%=A
80-90%=B
65-80%=C,
50-65%=D
Less than 50%=E

Final Exam Information:

Date, Time, Location: To be announced (TBA)

If you have three or more final exams scheduled on the same day and are requesting a rescheduling due to the limitation rule on final exam scheduling, a rescheduling request must be made in writing at least two weeks before the exam as per the rules.

Mid-term Grade:

Mid-term grades will be posted in myUK by the deadline established in the Aademic Calendar (http://www.uky.edu/Registrar/AcademicCalendar.htm)

Course Policies:

Submission of Assignments
Assignments will be due at the beginning of class on the due date. Almost all assignments are expected to be turned in on paper (hard copy) although for some, online submission might be allowed, if so specified at the beginning of assignment.

Attendance Policy
Students are expected to attend all class sessions unless excused specifically.

Excused Absences, Including for Religious Holidays
Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absence due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Policy for making up assignments and exams after an excused absence

Homework Assignments:
If the student is not able to turn in a homework assignment on time because of an excused absence and a solution has been already posted, then he or she will receive a score for that assignment, which is equal to the average of his or her scores for the rest of HW assignments over the whole semester

Midterm Tests:
If the student is not able to take a midterm test because of an excused absence then he or she will receive a score for that midterm test, which is equal to the average of his or her scores for the rest of the midterm tests AND the final examination, which is comprehensive, thus including the entire course material for the semester.

Final Examination:
If the student is not able to take the final exam because of an excused absence then he or she will,

(i) Receive a score for the final exam, which is equal to the average of his or her scores for all midterm tests IF he or she had not missed any midterm test because of an excused absence.

(ii) Take a make-up final exam IF he or she had missed one or more midterm tests because of excused absences.

Academic Integrity, Cheating and Plagiarism:
There is an expectation of academic honesty and of the absolute unacceptability of plagiarism and other forms of cheating. UK rules apply (http://www.uky.edu/Ombud). The use of any electronic devices other than calculators is prohibited during examinations and quizzes. Any questions on acceptability of devices shall be made no later than the class meeting prior to quiz or examination.

Classroom and Learning Accommodations:
Any student with a disability who is taking this course and needs classroom or exam accommodations should contact the Disability Resource Center, 257-2754, room 2 Alumni Gym, jkarnes@uky.edu

Cell Phone Use
Cell phones must be turned off and stowed during class and exams. They may not be used for any reason, including texting, or as a calculator during class. If an emergency occurs and a cell phone needs to be used, please gather your things and leave the room for the rest of the session.

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