Graduate Council Agenda
Friday, April 27, 2012 at 11 am
Present: Drs. Sustich, Schmidt, Holman, Owen, Miao, Zibluk (Zeng), Christenberry, Kemp (Clifft), McKay, Risch, McLean and Mr. Kopp and Mr. Henry

1. Environmental Science
   PhD EVS bulletin changes APPROVED

2. Engineering
   Information for the bulletin for the Master of Science in Engineering degree APPROVED
   ENGR 6013 Advanced Experimental Methods APPROVED
   ENGR 6023 Advanced Engineering Math APPROVED
   ENGR 6033 Micro and Nanomanufacturing APPROVED
   ENGR 6043 Applied Probability and Estimation APPROVED
   ENGR 6113 Materials Science and Engineering APPROVED
   ENGR 6123 Engineering Optimization APPROVED
   ENGR 6133 Engineering Electrodynamics APPROVED
   ENGR 6143 Advanced Heat and Mass Transfer APPROVED
   ENGR 6153 Advanced Fluid Mechanics APPROVED
   ENGR 689V Thesis APPROVED

3. Education
   Sports Administration bulletin change APPROVED
   Exercise Science bulletin change APPROVED

Revised 9/25/2008

Code #

# Bulletin Change Transmittal Form

☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

**Bulletin Change**
Please attach a copy of all catalogue pages requiring editorial changes.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| Department Chair | Date | General Education Committee Chair (if applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Contact Person** (Name, Name of Institution, Address, Email Address, Phone Number)
Dr. Tom Risch, Director of the Environmental Sciences Program, trisch@astate.edu, 972-2007.

**2. Proposed Change**

1. To reformat the core courses Environmental Science (EVS) PhD students currently take (last updated in 2008-2009) where students had to choose from two outside areas.

2. To remove the current “tracks” which are contrary to the interdisciplinary nature of an Environmental Science Degree (i.e. EnGe, Environmental Geology; EnPE Environmental Policy; EnEn, Environmental Engineering; EnAg, Environmental Agriculture Science, EnMa Environmental Materials Sciences, EnBi, Environmental Biology).

3. To change the GRE score requirements to match the new GRE scoring.

4. To fix various typos in the Bulletin.

**3. Effective Date**

**Fall 2012**

**4. Justification**

1. Currently, the EVS Program does not have the faculty to teach the core classes listed in the bulletin. The core course model as listed in the Bulletin is currently unworkable. New faculty have been recruited to fit the current proposed changes.

2. The current “tracks” indicated in the old bulletin are contrary to the interdisciplinary nature of the Ph.D. EVS Program.

Revised 9/25/2008

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

**To copy from the bulletin:**

1. Minimize this form.
2. Go to http://registrar.astate.edu/bulletin.htm and choose either undergraduate or graduate.
3. This will take you to a list of the bulletins by year, please open the most current bulletin.
4. Find the page(s) you wish to copy, click on the "select" button and highlight the pages you want to copy.
5. Right-click on the highlighted area.
6. Click on "copy".
7. Minimize the bulletin and maximize this page.
8. Right-click immediately below this area and choose "paste".
9. For additions to the bulletin, please change font color and make the font size larger than the surrounding text. Make it noticeable.
10. For deletions, strike through the text, change the font color, and enlarge the font size. Make it noticeable.

## DOCTOR OF PHILOSOPHY DEGREE
## IN ENVIRONMENTAL SCIENCES

The mission of the program is to produce scientists with the knowledge needed to support the assessment, maintenance and recovery of environmental resources. This includes an appreciation of the economic, social, political and aesthetic context that shapes our interaction with and knowledge of the environment. Measuring and understanding the balance between environmental protection, sustainable resource management, and economic growth is a major integrating theme within the program.

**Admission Requirements**

Admission to the Graduate Program in Environmental Sciences

Applicants to the Graduate Program in Environmental Sciences Program must hold a baccalaureate or master's degree (BA, BS, MA, or MS) from an accredited institution in a relevant field of study. Students should apply to either the PhD or MS program. For both programs, applicants must submit the following to the Graduate School:

1. A completed application for admission to the Graduate Program in Environmental Sciences. Applicants are encourages to submit the application no later than January 15th for the fall semester and August 15th for the spring semester. Forms are available from the Graduate School.
2. A nonrefundable application fee. PhD application fee is 50.00, Master's application fee is $30.00. Checks must be made payable to Arkansas State University. If applications are received without payment, the Graduate school will hold all application materials and notify the applicants that no action will be taken until payment is received. International students may utilize a check or an International Postal Money Order to remit payment in the U.S. currency.

3. One copy of official transcripts of all previous undergraduate and graduate course work attempted, to be sent directly from the institution(s) previously attended. The Graduate School will compute the graduate GPA by counting all graduate courses completed, including any repeated courses. Applicants to the Graduate Program in Environmental Sciences must possess a baccalaureate degree from an accredited four year institution and meet the admission requirements of the Graduate School. Applicants should be aware that the breadth of the course work in this program demands that students have a basic background in several disciplines. Preparatory courses for this program may include:

Mathematics: Calculus I as well as an applied statistics course or second semester Calculus course. ;

Chemistry: A first and second semester chemistry course sequence.
Biology: A first and second semester biology course sequence.
Earth Science: A first and second semester earth science course sequence.
Economics: An introductory level economics course.
Political Science: American government, United States history or world history.

Students should contact the Program Director for details regarding course requirements for specific focus areas within the program. Students lacking the appropriate courses for their chosen focus area can be admitted into the program buy may be required to complete preparatory course work before enrolling in specific graduate core courses. Applicants

are also expected to have a working knowledge of computer systems and software. In some cases, the Environmental Sciences Graduate Program Committee may agree to substitute equivalent, documented work experience in the environmental field for specific courses, and in rare cases, there criteria for admission. Contact the Program Director for questions in these matters.

4. These letters of recommendation to be reviewed by the Environmental Sciences Graduate Program Committee. Note that both recommendation by the Environmental Sciences Graduate Program Committee and approval by the Dean of the Graduate School are required for admission to the program.
5. Scores from the Graduate Record Examination showing a score of 150 on both the verbal and quantitative tests, which are recommended for acceptance. ~~of the exam.~~
6. International student applications must demonstrate a satisfactory level of proficiency in the English language if English is not their native language. To do so, they must submit a score of 213 computer based on the Test of English as a Foreign Language or must satisfactorily complete advanced level II of the university's Center for English as a Second Language program.
7. Statement of Purpose. In essay form, state your reasons for undertaking graduate study in the Environmental Sciences. Please describe your qualifications for the academic program to which you are applying and your objectives in undertaking this program. Applicants to the doctoral program should clearly outline their research interests. We are interested in how the applicant's interests would complement those research interests of the faculty. Applicants to master's program should discuss their plans for their academic and professional career and how the Graduate Program in Environmental Sciences will help them attain their goals.
8. Resume C.V.~~)~~ List all colleges and universities attended, major extracurricular activities, and employment, detailing particularly those relevant to your proposed field of study, any honors or prizes awarded, and publication and research projects with which you have been associated.

Applicants are strongly encouraged to provide a personal statement describing their goals in terms of graduate education and research focus interests. Applicants should also submit a curriculum vitae describing pertinent employment and/or research experiences such as presentations and publications.

**Curriculum:**

~~Core Courses (nine hours) (choose from two outside areas)~~

**Ph.D. students are required to take one class in each of three core categories:**

~~Environmental Geology~~
~~CHEM 5053 Geochemistry (EnGe)~~
~~GEOL 5333 Hydrogeology (EnGe)~~

**a.** Environmental Chemistry**/ Soil and Water Science**

CHEM 5043 Environmental Chemistry ~~(EnGe)~~
~~CHEM 6144 Environmental Instrumentation (EnGe)~~
**PSSC 5713 Soil Quality Assessment and Interpretation**
**PSSC 5853 Soil and Water Conservation**
**PSSC 5813 Soil Fertility**
**GEOG 5633 Climatology**

**b.** Environmental Policy**, Law** & Economics

POSC 6173 Environmental Policy Processes ~~(EnPE)~~
POSC 5533 Environmental Law and Admin ~~(EnPE)~~
ECON 6353 Environmental Economics ~~(EnPE)~~

~~Environmental Biology~~

Revised 9/25/2008

## c. Interdisciplinary Environmental Studies

~~ENVR 6103 Environmental Systems Analysis (EnBi) (Note: may be used as statistics requirement)~~
~~ENVR 5203 Environmental Toxicology (EnBi)~~
~~ENVR~~ **BIO** ~~6303~~ **6623 & 6621** Case Studies in Ecosystem Management **Lecture and Lab** ~~(EnBi)~~

**BIO 5613 Conservation Biology**
**ESCI 6303 Global Water Issues**
**AGRI 6243 Environmental Sustainability**

~~Note: Additional core courses in Environmental Engineering (EnEn), Environmental Agriculture Science (EnAg) and Environmental Materials Sciences (EnMa) will be added over the coming years.~~

**Additional Requirements**

Ethics (1 hour)

ESCI**1** ~~1~~ 7151 Responsible Conduct in Research

Seminars ~~**(2 hours of each)**~~ **(4 hours, at least 2 hours of Topical Seminar)**

ESCI 7111 Environmental Science Seminar
ESCI 7121, Topical Seminar in Environmental Sciences

Statistics (6 hours ~~**total**~~)

STAT 6613 Nonparametric Statistics
**STAT 6623 Statistical Methods with SAS Programming**
STAT 6643 Multivariate Analysis
STAT 6653 Data Analysis I: Regression Analysis
STAT 6663 Data Analysis II: Analysis of Variance (ANOVA)
STAT 6673 ~~**Experiment Design**~~ **Design of Experiments**
STAT 6833 Biostatistics
AGRI 6213 Experimental Design**S**
AGRI 5233 Experimental Agricultural Statistics
**BIO 5683 Biological Data Analyses**
~~**ENVR 6103**~~ **BIO 6603 & 6601**Environmental Systems Analysis **Lecture and Lab**

Dissertation (18 hours)

ESCI ~~8891-6~~ **889V-1-12 hours** Dissertation

Substitution of equivalent courses may be made upon the recommendation of the doctoral advisory committee with the approval of the Environmental Sciences Graduate Program Committee. In addition, each student will normally take courses in their specialty area sufficient to bring the total number of credits to the minimum of 72 required for the Ph.D. in Environmental Sciences beyond the bachelor‘s degree or 42 beyond the master’s degree. Any additional course work requirements will be determined by the Doctoral Advisory Committee to meet the student's specific program needs. Each candidate for the Ph.D. in Environmental Sciences must execute an original and rigorous research project culminating in the completion and defense of a dissertation.

Revised 9/10/09

Code # ENGR 06

# Bulletin Change Transmittal Form

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☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

**Bulletin Change**
Please attach a copy of all catalogue pages requiring editorial changes.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| Department Chair | Date | General Education Committee Chair (if applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Contact Person** (Name, Name of Institution, Address, Email Address, Phone Number)

| | |
|---|---|
| Name | Dr. David Beasley, Dean |
| Name of Institution | Arkansas State University -Jonesboro |
| Address | College of Engineering<br>Arkansas State University<br>P.O. Box 1740, State University, AR 72467 |
| E-mail Address | dbbeasley@astate.edu |
| Phone Number | 870.972.2958 |

**2. Proposed Change**
Add specific information on the new MSE program.

**3. Effective Date**
August 15, 2012

**4. Justification**
According to the newly developed graduate program, Master of Science in Engineering (MSE), detailed information (goals, outcomes, requirements for admission and degree) will need to be added in the graduate bulletin under the College of Engineering.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

## Graduate Bulletin 2011-2012, From Pg 158.

**Courses required of all candidates**
The number of semester credit hours for the master's degree is 30. Students are required to complete 8 core courses (24 semester credit hours) and two elective courses (6 semester credit hours).

Core Courses - 24 hrs required

EGRM 6003 Engineering Statistics
EGRM 6013 Quality Control and Improvement
EGRM 6023 Engineering Management I
EGRM 6033 Engineering Management II
EGRM 6043 Operations Research
MBA 500V Survey of Accounting
MBA 501V Survey of Finance
MBA 504V Survey of Management
MBA 505V Survey of Information Systems
MBA 506V Survey of Marketing
MBA 507V Survey of Law

Electives - 6 hrs required

Option 1 – Those pursuing Professional Engineering Licensing
One CE/EE/ME 5000 co-listed, existing engineering course
Plus one EGRM course from Option 2 6 hrs

Option 2 – Those not pursuing Professional Engineering Licensing
EGRM 6053 Human Relations and Communications
EGRM 6063 Engineering Law and Regulations
EGRM 6073 Special Problems in Engineering Management
ECON 6353 Environmental Economics
MGMT 6413 Seminar in Organizational Behavior and Leadership
MIS 6413 Management Information Systems

## MASTER OF SCIENCE IN ENGINEERING DEGREE

The Master of Science in Engineering (MSE) program provides an educational experience focusing on the integration of research and technology development that allows graduates to be successful in deriving solutions to society's most challenging technical problems. To achieve this goal, the program's objectives are to discover new scientific principles, apply novel engineering solutions, and develop cutting-edge technology toward achieving efficient and sustainable use of resources; to integrate cross-disciplinary research and teaching that produces engineering professionals equipped to take on the more complex problems that face our state and country; and to establish and grow industry-university partnerships that drive toward and prepare the region for a diverse, knowledge-based economy.

Specific program outcomes are listed below. Program graduates will have:

1. Knowledge of advanced experimental methods and the ability to design experiments and collect data;
2. A good understanding of statistical concepts and an ability to apply this knowledge to achieve engineering solutions that most efficiently use information and resources;
3. A practical knowledge of fabrication and manufacturing techniques, specifically at the micro- and nano-scales;
4. An ability to apply advanced mathematical concepts to model physical systems and engineering processes to drive knowledge based design;
5. An advanced, cross-disciplinary understanding of engineering sciences, and an ability to relate physical concepts from multiple engineering disciplines;
6. An ability to identify critical issues, formulate realistic solutions, evaluate alternatives, and carry out independent research to provide novel solutions to technical problems; and
7. A demonstrated ability to make novel, significant contributions to the scientific and engineering body of knowledge.

### Admission Requirements

Each applicant must have an undergraduate GPA of at least 2.75 on a 4.00 scale and a bachelor's degree in engineering. Applicants that do not have a bachelor's degree in engineering, for example those having a bachelor's degree in physics, or those having an undergraduate GPA below 2.75, will be considered on a

case-by-case basis and must show equivalent experience and training and have completed the required pre-requisites for the courses. Applicants must present Graduate Record Examination (GRE) scores for the Verbal, Quantitative, and Analytical tests. The minimum combined Verbal and Quantitative reasoning scores must be 300 for the revised GRE test or equivalent scores for general GRE. Applicant not having completed GRE scores may be admitted conditionally, but must complete this requirement prior to finishing the first semester of course work. Applications submitted throughout the year for the following semester and in accordance to Graduate School deadlines will be considered based on qualification and space availability. All application materials must be received by the College of Engineering during the semester prior to the student's official enrollment in ASU-J courses. Official transcripts, two letters of recommendation, a resume, and a statement of purpose not exceeding three pages are also required for admission. International students require additional proof of English proficiency to meet the admission requirements of the Graduate School.

## Degree Requirements

The number of semester credit hours for the M.S.E. degree is 30. Students are required to complete four core courses (ENGR 6013, 6023, 6033, and 6043) for 12 semester credit hours, a minimum of two 6000 level graduate engineering elective courses for 6 credit hours, two additional approved graduate elective courses for 6 credit hours, and two semesters of thesis research for 6 credit hours.

The MSE curriculum is structured as a two year program (four semesters)

Year 1 (18 semester credit hours)
- ENGR 6013 Advanced Experimental Methods (3)
- ENGR 6023 Advanced Engineering Math (3)
- ENGR 6033 Micro and Nanomanufacturing (3)
- ENGR 6043 Applied Probability and Estimation (3)
- Engineering Electives (6)

Year 2 (12 semester credit hours)
- Electives (6)
- Thesis Research (6)

**COLLEGE OF ENGINEERING**
**GRADUATE COURSE DESCRIPTIONS**

**CE 5223. Transportation Engineering** Provides the engineering student with an understanding of the principles of highway design, pavement designs, highway economics, traffic theory and other areas related to traffic engineering. A highway design project is required. Prerequisites, C or better in CE 2202. Dual listed as CE 4223.

Revised 2/24/11

Code # ENGR 07

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6013

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Advanced Experimental Methods

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Lecture and lab

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Standard letter

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
Concepts of advanced measurement methods, measurements, analysis, and reporting. Topics include design of experiment, interfacing, photography and basic optics, image processing, flow visualization, high speed motion analysis, radiation detectors, monochromators, flame emission spectroscopy/scanning, flame probe and phase transition characteristics.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**
**a. Are there any prerequisites?**
No
**b. Why?**

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Dr. David Jeong, Arkansas State University, Jonesboro, P.O. Box 1740, State University, AR 72467, kjeong@astate.edu, 870-680-8593

**11. Proposed Starting Term/Year**
Fall 2013

**12. Is this course in support of a new program? If yes, what program?**
Yes, Master of Science in Engineering (MSE) program which was proposed to ADHE in 2012.

**13. Does this course replace a course being deleted?** No
**a. If yes, what course?**
**b. Has this course number been used in the past?** No
**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.**

No

**15. Justification should include:**

**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**

This course covers fundamentals of experimentation, principles of advanced indirect/direct measurement and actual measurements on various topics. The topics include design of experiments, data acquisitions and analysis, reporting, basic optics/alignment/calibration, image processing for flow visualization, high speed motion analysis, flame emission spectroscopy, flame probe measurement, differential scanning calorimetry, thermogravimetric analysis, flue gas analysis, and radiation detector. This course consists of one in-class lecture on measurement theory and one laboratory session for actual measurement every week. To support the topics, instruments to be facilitated include computers, data acquisition system, Labview, lenses, camera, camcorder, optical mounts, HeNe laser, optical table, two phase flow simulator, bunsen burner, monochromator, spectrograph, IR thermometer, DSC and TGA. Lab sessions are committed as group activities under direction of instructor or teaching assistant. Students are allowed to share only raw data from the measurements in group. Students are required to individually submit laboratory report after completion of every laboratory session based on self-analysis. Students are expected to plan and design experimentations for given topics. Students are expected to understand measurement principles applied to the instrumentations. Students are expected to be familiar with advanced measurement techniques and instrumentations. Students are expected to individually analyze the measured raw data and write lab report. Students are expected to obtain actual hands-on experiences and skills on advanced instrumentations and demonstrate how engineers are disciplined with instruments, measure/analyze data and write report.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**

This course enables students to efficiently design experiments, measure data by using advanced experimental techniques and analyze/report their findings. The objective of course aligns with mission of MSE program, CESUR (Center for Efficient and Sustainable Use of Resources) and College of Engineering at ASU. The mission of the ASU MSE program is to utilize fundamental science and technology in order to enhance the efficient and sustainable use of resources and to integrate research and teaching to promote cross-disciplinary interactions between university and industry.

**C. Student population served.**

The course primarily serves graduate students in MSE program and qualified senior students in BSE program.

**D. Rationale for the level of the course (lower, upper, or graduate).**

This course requires background of fundamental physics and chemistry to understand principles of advanced experimental methods. Basic skills to analyz data and write lab report are required. Therefore this course will need to be taken by graduate students and advanced undergraduate level.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

Week 1: Design of experiments and data analysis using Minitab
Week 2: Data acquisition and interface using Labview
Week 3: Basic optics
Week 4: Photography
Week 5: Alignment, calibrations and reporting
Week 6: Image processing for two phase flow visualization
Week 7: High speed motion analysis
Week 8: Flame emission spectroscopy
Week 9: Flame emission scanning
Week 10: Flame probe measurement
Week 11: Differential scanning calorimetry for finding eutectic point
Week 12: Thermogravimetric analysis
Week 13: Flue gas analysis
Week 14: Radiation detector

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

Taking notes, attendance, measurement, analysis and lab reports

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**

None

**19. Required reading**

Theory and Design for Mechanical Measurements, Richard S. Figliola and Donald E. Beasley, Fifth Edition, Wiley, 2011. Hand-outs for supplemental materials on instrumentations, procedures and manuals, etc.

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**

None

**21. What is the primary goal of this course?**

Students understand basic principles of advanced experimental methods, obtain hands-on experiences with instrumentation and skills to analyze/report.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

Outcome #1: Students will understand fundamental measurement principles of various advanced instrumentations and obtain hands-on experiences of the instruments.

Learning Activity #1: Students will learn concepts of indirect and direct measurement methods and how to operate.

Assessment Tool #1: The outcomes will be evaluated using lab report, homework and rubrics.

Outcome #2: Students will know how to analyze measured data and write lab reports.

Learning Activity #2: Students will learn how to analyze measured data using statistical methods and framework for lab report.

Assessment Tool #2: The outcomes will be evaluated using lab report, homework and rubrics.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

**From page 160 of the 2011-2012 Graduate Bulletin:**

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the first semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6013 Advanced Experimental Methods** Concepts of advanced measurement methods, measurements, analysis, and reporting. Topics include design of experiment, interfacing, photography and basic optics, image processing, flow visualization, high speed motion analysis, radiation detectors, monochromators, flame emission spectroscopy/scanning, flame probe and phase transition characteristics.

**ME 5503 Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

Revised 4/16/12

Code # ENGR 08

# New/Special Course Proposal-Bulletin Change Transmittal Form

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☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6023

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Advanced Engineering Math

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Lecture Only

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Letter

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
Advanced analytical techniques for the solution of engineering problems including applications in vibrations, electricity and magnetism, optics, and thermodynamics. Topics include introduction to modeling, linear algebra, tensor calculus, linear/nonlinear system solution, boundary value problems, transforms, and complex analysis.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?**
No.
**b. Why?** No prerequisites required, however, previous coursework in science and engineering is strongly recommended as required by admission to the MSE program.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Brandon A. Kemp, ASU College of Engineering, P. O. Box 1740, State University, AR, 72467
bkemp@astate.edu, 870.972.2088

**11. Proposed Starting Term/Year**
Fall 2012

**12. Is this course in support of a new program? If yes, what program?**
Yes. Master of Science in Engineering (MSE)

**13. Does this course replace a course being deleted?**
No
**a. If yes, what course?**

**b. Has this course number been used in the past?**

**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.** No.

**15. Justification should include:**
**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
Students will learn how to apply advanced analytical techniques for the solution of engineering problems including examples from vibrations, electricity, magnetism, optics, and thermodynamics. Students will learn how to simplify real problems such that an analytical solution can be obtained and identify the simplifying assumptions. The course will also cover the basics necessary for more exact numerical solution techniques.
**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
The course is consistent with the mission of the MSE program to provide an educational experience focusing on the integration of research and technology development that will allow graduates to be successful in driving solutions to society's most challenging technical problems. The course specifically addresses one of the MSE program outcomes: An ability to apply advanced mathematical concepts to model physical systems and engineering processes to drive knowledge based design.
**C. Student population served.** Graduate students in the MSE program.

**D. Rationale for the level of the course (lower, upper, or graduate).** The course is one of four core courses in the research thesis based MSE program. The course provides students with the analytical and modeling background necessary for engineering research.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

A general outline of the course activities is given below.

Week 1: Introduction to engineering modeling
Week 2: Linear algebra
Week 3: Tensor calculus
Week 4: Linear system solution
Week 5: Nonlinear system solutions
Week 6: Review of differential equations
Week 7: Series solutions to differential equations
Week 8: Laplace equation in engineering
Week 9: Poisson equation in engineering
Week 10: Special functions (Bessel functions and Legendre functions)
Week 11: Boundary value problems
Week 12: Fourier series
Week 13: Fourier transforms
Week 14: Complex analysis

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

problem sets, projects, mid-term and final exams

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**
Outcome of student projects will be the demonstration of working computer codes that solve general types of problems.

**19. Required reading**
An appropriate text to support course lectures, reading, and research as required for the implementation of algorithms in code. Students will be required to read course hand-outs and journal articles, and to implement with algorithm codes.

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**
No additional staffing or supplies will be required.

**21. What is the primary goal of this course?**
To develop students' abilities to apply advanced mathematical concepts to model physical systems and engineering processes to drive knowledge based design.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and** |

| |
|---|
| **wellness** |
| **23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**<br><br>Outcome # 1: Students will be able to identify the crux of an engineering problem, determine multiple ways to model the most important aspects and compare the advantages and disadvantages of each method.<br><br>Outcome # 2: Students will be able to list the simplifying assumptions at both the physical and mathematical modeling stages and determine the effects of these assumptions on the model outputs.<br><br>Outcome # 3: Students will gain a broad knowledge of applied mathematics techniques and student developed computer codes that can be used throughout their engineering careers to solve a variety of technical problems. |

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

Graduate Bulletin 2011-2012, Pg 160.

**EGRM 6023 Engineering Management I** Basic principles and practices of engineering management activities including planning, organization, leadership, controlling, motivating, ethics, communications, and decision making; group research of special topics with written and oral presentations is required. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, project based course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the fi rst semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6023 Advanced Engineering Math** Advanced analytical techniques for the solution of engineering problems including applications in vibrations, electricity and magnetism, optics, and thermodynamics. Topics include introduction to modeling, linear algebra, tensor calculus, linear/nonlinear system solution, boundary value problems, transforms, and complex analysis.

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

**ME 5523. Introduction to Finite Element Analysis** Theory and application of energy concepts and structural mechanics required for the development of fi nite element

Revised 2/24/11

Code # ENGR 09

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6033

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
MICRO AND NANOMANUFACTURING

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
LECTURE ONLY

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
STANDARD LETTER

**5. Is this course dual listed (undergraduate/graduate)?**
NO

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
NO

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
ADVANCED MANUFACTURING TECHNOLOGY BASED ON THE INTEGRATION OF SCIENCE, ENGINEERING, AND TECHNOLOGY. TOPICS INCLUDE MICRO AND NANOSCIENCES, MICRO ELECTRO-MECHANICAL SYSTEM (MEMS/NEMS) MACHINING AND FABRICATION, MEASUREMENT USING ADVANCED MICROSCOPES, AND DEVICE APPLICATIONS SUCH AS SENSORS AND ACTUATORS.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?**
NO
**b. Why?**
NO PREREQUISITES REQUIRED, HOWEVER, PREVIOUS COURSEWORK IN SCIENCE AND ENGINEERING IS STRONGLY RECOMMENDED AS REQUIRED BY ADMISSION TO THE MSE PROGRAM.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
DR. ILWOO SEOK, ARKANSAS STATE UNIVERSITY, JONESBORO, PO BOX 1740, iseok@astate.edu, 870-680-8589

**11. Proposed Starting Term/Year**
FALL 2012

**12. Is this course in support of a new program? If yes, what program?**
YES, MASTER OF SCIENCE IN ENGINEERING (MSE) –APPROVED AT ASU GRADUATE COUNCIL MEETING ON OCT.13.2011

**13. Does this course replace a course being deleted?**
NO
**a. If yes, what course?**

**b. Has this course number been used in the past?**
NO
**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.**
NO

**15. Justification should include:**
**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
THIS COURSE, MICRO AND NANOMANUFACTURING, IS DESIGNED TO TEACH STUDENTS THE ADVANCED MANUFACTURING STUDY, ESPECIALLY IN MICRO AND NANOTECHNOLOGY. STUDENTS IN THIS COURSE WILL GAIN THE INTRODUCTORY KNOWLEDGE IN (1) SCIENCES IN MICRO AND NANO SCALE, (2) MICRO/NANO ELECTRO-MECHANICAL SYSTEM (MEMS/NEMS) MACHINING AND FABRICATION, (3) MEASUREMENT USING ADVANCED MICROSCOPES, AND (4) DEVICE APPLICATIONS SUCH AS SENSORS AND ACTUATORS.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
THIS COURSE FITS WELL WITH THE MASTER OF SCIENCE IN ENGINEERING(MSE) PROGRAM HAVING A GOAL OF THE INTEGRATION OF RESEARCH AND TECHNOLOGY DEVELOPMENT FOR GRADUATES AND ONE EXPECTED OUTCOME OF THE ACQUISITION OF KNOWLEDGE OF FABRICATION AND MANUFACTURING TECHNIQUES, ESPECIALLY AT THE MICRO- AND NANO-SCALES. THIS COURSE WILL SERVE AS ONE OF THE CORE COURSES IN MSE PROGRAM TO SATISFY THE PROGRAM CRITERIA REQUIREMENTS. ALSO, ADDITION OF THIS COURSE WILL HELP MEET COURSE REQUIREMENTS FOR OTHER STUDENTS IN DIFFERENT GRADUATE PROGRAMS.

**C. Student population served.**
MAINLY GRADUATE STUDENTS WHO ARE STUDYING TOWARD MS IN ENGINEERING DEGREE AND ALSO OFFERED FOR GRADUATE LEVER STUDENTS IN STEM AREAS TO ALLOW MICRO AND NANO-BASED TECHNOLOGY FOR THEIR OWN RESEARCH AND DEVICE APPLICATIONS

**D. Rationale for the level of the course (lower, upper, or graduate).**
THE COURSE IS DESIGNED FOR THE GRADUATE LEVEL SO THAT STUDENTS CAN INTEGRATE BASIC BACKGROUND KNOWLEDGE FROM UNDERGRADUATE LEVEL IN VARIOUS FIELDS TOWARD ADVANCED MANUFACTURING TECHNOLOGY, ESPECIALLY IN MICRO AND NANO-SCALE DIMENSION.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

**Class Schedule (Tentatively)**

| Week No. | LECTURE TOPICS |
|---|---|
| 1 | INTRODUCTION OF MICRO AND NANOTECHNOLOGY |
| 2<br>3 | MICRO-SCIENCES (Scaling, Surface tension, Micro-actuator, Material property, and so on) |
| 4<br>5 | NANO-SCIENCES (Lithography, Quantum Mechanics, LED/Solar Cell, Tunneling effect/Transistor, Nano-biology, And So On) |
| 6<br>7<br>8 | MICROMACHING USING MEMS TECHNOLOGY (Photolithography, Etching, Deposition, Diffusion, Oxidation, Cleanroom/vacuum system, and so on) |
| 9<br>10 | NANOFABRICATIONS (E-beam/Imprint lithography, Nanoparticles, Bio-detection, Gene delivery, and so on) |
| 11 | MEASUREMENT AND MICROSCOPE (SEM, AFM) |
| 12<br>13<br>14 | SENSORS AND ACTUATORS (Transducer, Pressure/Optic/Bio-sensor, Electrostatic/Magnetic actuator, Piezo-electrics, and so on) |

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**
IN-CLASS EXAMS, TERM PROJECT, AND ORAL PRESENTATION,

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**
NO

**19. Required reading**
FUNDAMENTALS OF MICROFABRICATION AND NANOTECHNOLOGY, 3$^{RD}$ EDITION, MARC J. MADOU, CRC PRESS.

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**
NO

**21. What is the primary goal of this course?**
THE PRIMARY GOAL OF THIS COURSE IS TO PREPARE STUDENTS WITH BACKGROUND KNOWLEDGE AND HAND-ON SKILLS TO

UNDERSTAND MICRO AND NANOTECHNOLOGY WITH THE FABRICATION METHODOLOGY OF MODERN APPLICATION.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

**OUTCOME #1:** STUDENTS WILL UNDERSTAND FUNDAMENTAL CONCEPTS ABOUT MICRO AND NANOTECHNOLOGY.
**LEARNING ACTIVITY #1:** LECTURE AND SOLVING EXAMPLE PROBLEMS IN CLASS.
**ASSESSMENT TOOL #1:** IN-CLASS EXAMS AND HOMEWORK

**OUTCOME #2:** STUDENTS WILL BRING INNOVATIVE IDEAS INTO THE MICRO AND NANO APPLICATION.
**LEARNING ACTIVITY #2:** PAPER READING ASSIGNEMNT.
**ASSESSMENT TOOL #2:** GROUP BASED TERM PROJECT AND PRESENTATION.

**OUTCOME #3:** STUDENTS WILL UNDERSTAND THE PROCESS OF MICRO AND NANOFABRICATION.
**LEARNING ACTIVITY #3:** LECTURE AND OBSERVATION OF LAB FACILITIES AND EXPERIMENTS.
**ASSESSMENT TOOL #3:** LAB REPORTS AND IN-CLASS EXAMS.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

**Graduate Bulletin 2011-2012, Pg 160.**

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the first semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6033. Micro and Nanomanufacturing** Advanced manufacturing technology based on the integration of science, engineering, and technology. Topics include micro and nanosciences, micro electro-mechanical system (MEMS/NEMS) machining and fabrication, measurement using advanced microscopes, and device applications such as sensors and actuators.

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

Revised 4/16/12

Code # ENGR 10

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6043

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Applied Probability and Estimation

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Lecture Only

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Letter

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
Application of probability to the analysis of engineering systems with inherent randomness to achieve efficient use of information in engineering analysis. Topics include random variables, statistics, probability density functions, noise, nonrandom parameter estimation, bounds, Bayesian estimation, detection, and filters.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?**
ENGR 6023 Advanced Engineering Math
**b. Why?** ENGR 6023 provides the students with the background necessary to build models of engineering systems (*i.e.* the forward problem), while ENGR 6043 uses engineering models to estimate parameter values of interest given measurements of other values with some inherent randomness (*i.e.* the inverse problem).

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Brandon A. Kemp, ASU College of Engineering, P. O. Box 1740, State University, AR, 72467
bkemp@astate.edu, 870.972.2088

**11. Proposed Starting Term/Year**
Spring 2013

**12. Is this course in support of a new program? If yes, what program?**
Yes. Master of Science in Engineering (MSE)

**13. Does this course replace a course being deleted?**
No.
**a. If yes, what course?**

**b. Has this course number been used in the past?**

**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.** No.

**15. Justification should include:**
**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
Students will learn how to apply probability to the analysis of engineering systems with inherent randomness. Students will learn about the efficient use of information in engineering analysis.
**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
The course is consistent with the mission of the MSE program to provide an educational experience focusing on the integration of research and technology development that will allow graduates to be successful in driving solutions to society's most challenging technical problems. The course specifically addresses one of the MSE program outcomes: a good understanding of statistical concepts and an ability to apply this knowledge to achieve engineering solutions that most efficiently use information and resources.
**C. Student population served.** Graduate students in the MSE program.
**D. Rationale for the level of the course (lower, upper, or graduate).** The course is one of four core courses in the research thesis based MSE program. The course provides students with the applied probability background for engineering research.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

A general outline of the course activities is given below.

Week 1: Introduction to probability
Week 2: Random variables
Week 3: Common probability density functions
Week 4: Random vectors
Week 5: Statistics
Week 6: Noise
Week 7: Nonrandom parameter estimation
Week 8: Cramer-Rao Bound
Week 9: Linear estimators
Week 10: Nonlinear estimators
Week 11: Bayesian estimation
Week 12: Detection theory
Week 13: Applications of detection
Week 14: Signal filters

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

problem sets, projects, mid-term and final exams

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**
Outcome of student projects will be the demonstration of working computer codes that solve specific estimation and detection problems.

**19. Required reading**
Students will be required to read course lecture hand-outs and algorithms in codes for implementation.

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**
No additional staffing or supplies will be required.

**21. What is the primary goal of this course?**
The primary goal of this course is to prepare students with the knowledge and quantitative skills necessary to effectively deal with the randomness that is inherent in all engineering measurements, designs, research, and analyses.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

Outcome # 1: Students will be able to identify and provide simple models for noise in engineering analysis.

Outcome # 2: Students will be able to derive parameter estimators from physical models, implement the estimators in computer code, simulate those estimators using a synthetic noise model, and compare the performance against a theoretical best case limit.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

Graduate Bulletin 2011-2012, Pg 160.

**EGRM 6003 Engineering Statistics** Basic concepts and methods of descriptive and inferential statistics including graphical techniques, measures of central tendency and dispersion, interval estimation, hypothesis and goodness of fi t tests, comparisons of two populations, and analysis of variance. Prerequisite MATH 2204 calculus I.

**EGRM 6013 Quality control and Improvement** A brief review of the evolution of quality control and improvement theory particularly as infl uenced by key pioneers such as Deming, Juran, and Taguchi. Extensive coverage of selected quality improvement techniques includes statistical process control, inspection sampling, and design of experiments. Prerequisites EGRM 6003 Engineering Statistics.

**EGRM 6023 Engineering Management I** Basic principles and practices of engineering management activities including planning, organization, leadership, controlling, motivating, ethics, communications, and decision making; group research of special topics with written and oral presentations is required. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, project based course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the fi rst semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6043 Applied Probability and Estimation** Application of probability to the analysis of engineering systems with inherent randomness to achieve efficient use of information in engineering analysis. Topics include random variables, statistics, probability density functions, noise, nonrandom parameter estimation, bounds, Bayesian estimation, detection, and filters. Prerequisite: ENGR 6023.

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

**ME 5523. Introduction to Finite Element Analysis** Theory and application of energy concepts and structural mechanics required for the development of finite element

Revised 2/24/11

Code # ENGR 11

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6113

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
MATERIALS SCIENCE AND ENGINEERING (Materials Science and Engr)

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
LECTURE ONLY

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
STANDARD LETTER

**5. Is this course dual listed (undergraduate/graduate)?**
NO

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
NO

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
PRINCIPLE CONCEPTS AND ADVANCED STUDIES IN MATERIALS SCIENCE AND ENGINEERING FOR GRADUATE LEVEL STUDENTS. FUNDAMENTAL TOPICS SUCH AS MATERIAL PROPERTIES IN MICROSTRUCTURES AND MODERN SOLID STATE PHYSICS AND QUANTUM MECHANICS ARE INTRODUCED.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?**
NO
**b. Why?**
NO PREREQUISITES REQUIRED, HOWEVER, PREVIOUS COURSEWORK IN SCIENCE AND ENGINEERING IS STRONGLY RECOMMENDED AS REQUIRED BY ADMISSION TO THE MSE PROGRAM.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
DR. ILWOO SEOK, ARKANSAS STATE UNIVERSITY, JONESBORO, PO BOX 1740, iseok@astate.edu, 870-680-8589

**11. Proposed Starting Term/Year**
SPRING 2013

**12. Is this course in support of a new program? If yes, what program?**
YES
MASTER OF SCIENCE IN ENGINEERING (MSE) –APPROVED AT ASU GRADUATE COUNCIL MEETING ON OCT.13.2011

**13. Does this course replace a course being deleted?**
NO
**a. If yes, what course?**

**b. Has this course number been used in the past?**
NO
**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.**
NO

**15. Justification should include:**

**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
THIS COURSE, MATERIALS SCIENCE AND ENGINEERING, IS DESIGNED TO TEACH STUDENTS IMPORTANT CONCEPTS SUCH AS ANISOTROPIC PROPERTIES OF MATERIALS AND THEIR TENSOR REPRESENTATION WILL BE INTRODUCED. THIS COURSE COVERS DIFFERENT MATERIAL SYSTEMS SUCH AS METAL, CERAMICS, POLYMER MATERIALS AND SEMICONDUCTOR MATERIALS AND OFFERS EXAMPLES OF MATERIALS APPLICATION IN PHOTONICS, MICROELECTRONICS, AND OTHER TECHNOLOGY FIELDS.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
THIS COURSE FITS WELL WITH THE MASTER OF SCIENCE IN ENGINEERING(MSE) PROGRAM HAVING A GOAL OF THE INTEGRATION OF RESEARCH AND TECHNOLOGY DEVELOPMENT FOR GRADUATES AND ONE EXPECTED OUTCOME OF THE ACQUISITION OF KNOWLEDGE OF MATERIAL SCIENCES FOR ENGINEERS. THIS COURSE WILL SERVE AS ONE OF THE ELECTIVE COURSES IN MSE PROGRAM TO SATISFY THE PROGRAM CRITERIA REQUIREMENTS. ALSO, ADDITION OF THIS COURSE WILL HELP MEET COURSE REQUIREMENTS FOR OTHER STUDENTS IN DIFFERENT GRADUATE PROGRAMS.

**C. Student population served.**
MAINLY GRADUATE STUDENTS WHO ARE STUDYING TOWARD MS IN ENGINEERING DEGREE AND ALSO OFFERED FOR GRADUATE LEVER STUDENTS IN STEM AREAS TO ALLOW MATERIAL SCIENCES AND PHYSICS BACKGROUND FOR THEIR OWN RESEARCH AND DEVICE APPLICATIONS

**D. Rationale for the level of the course (lower, upper, or graduate).**
THE COURSE IS DESIGNED FOR THE GRADUATE LEVEL SO THAT STUDENTS CAN INTEGRATE BASIC BACKGROUND KNOWLEDGE FROM UNDERGRADUATE LEVEL IN VARIOUS FIELDS.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

**Class Schedule (Tentatively)**

| WEEK NO. | LECTURE TOPICS |
|---|---|
| 1 | INTRODUCTION OF MATERIAL SCIENCES / BONDING IN SOLIDS |
| 2<br>3 | METALLIC/CERAMIC STRUCTURES |
| 4 | POLYMER STRUCTURES |
| 5 | DEFECT AND DISLOCATION |
| 6 | DIFFUSION |
| 7<br>8 | PHASE DIAGRAM |
| 9 | PHASE TRANSFORMATION |
| 10 | TYPES AND APPLICATION OF MATERIALS |
| 11 | MECHANICAL PROPERTIES |
| 12 | DEFORMATION/STRENGTHENING MECHANISMS |
| 13 | ELECTRICAL PROPERTIES OF MATERIALS |
| 14 | OPTICAL AND MAGNETIC PROPERTIES OF MATERIALS |

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**
HOMEWORK, IN-CLASS EXAMS, TERM PROJECT, AND ORAL PRESENTATION

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**
NO

**19. Required reading**
INTRODUCTION TO MATERIAL SCIENCES FOR ENGINEERS, 7$^{TH}$ EDITION, JAMES F. SHACKELFORD, PRENTICE HALL

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**
NO

**21. What is the primary goal of this course?**
THE PRIMARY GOAL OF THIS COURSE IS TO PROVIDE STUDENTS WITH PRINCIPLE CONCEPTS AND ADVANCED KNOWLEDGE ABOUT MATERIAL PROPERTIES IN MICROSTRUCTURES AND ENGINEERING APPLICATIONS OF MODERN PHYSICS.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

☐ **Communicating effectively** ☐ **Thinking Critically**

| | |
|---|---|
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

**OUTCOME #1:** STUDENTS WILL UNDERSTAND FUNDAMENTAL CONCEPTS ABOUT MATERIAL SCIENCES AND ENGINEERING.
**LEARNING ACTIVITY #1:** LECTURE AND SOLVING EXAMPLE PROBLEMS IN CLASS.
**ASSESSMENT TOOL #1:** IN-CLASS EXAMS AND HOMEWORK

**OUTCOME #2:** STUDENTS CAN APPLY ACQUIRED KNOWLEDGE INTO THEIR RESEARCH AND COLLABORATION.
**LEARNING ACTIVITY #2:** PAPER READING ASSIGNEMNT.
**ASSESSMENT TOOL #2:** GROUP BASED TERM PROJECT AND PRESENTATION.

**OUTCOME #3:** STUDENTS WILL UNDERSTAND VARIOUS DIFFERENT MATERIAL DEVICES
**LEARNING ACTIVITY #3:** LECTURE AND LAB EXERCISES.
**ASSESSMENT TOOL #3:** LAB REPORTS AND IN-CLASS EXAMS.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

Graduate Bulletin 2011-2012, Pg 160.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the first semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6113. Materials Science and Engineering** Principle concepts and advanced studies in materials science and engineering for graduate level students. Fundamental topics such as material properties in microstructures and modern solid state physics and quantum mechanics are introduced.

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

**ME 5523. Introduction to Finite Element Analysis** Theory and application of energy concepts and structural mechanics required for the development of finite element methods are presented. Applications to beams, trusses, torsion, etc. are presented. Prerequisites, C or better in ENGR 2413. Dual listed as ME 4523.

**ME 5543. Machine Design** Analysis and design of mechanical system components using theoretical and empirical concepts coupled with computational modeling and numerical analysis. Prerequisites, C or better in ENGR 2413. Dual listed as ME 4543.

**ME 5553. Heat Transfer** Application of theories of heat transfer by conduction, convection, and radiation to manufacturing processes and industrial applications. Prerequisites, C or better in MATH 4403, ENGR 2423, ENGR 3443, and ENGR 3473. Dual listed as ME 4553.

Revised 2/24/11

Code # ENGR 12

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6123

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
ENGINEERING OPTIMIZATION

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
LECTURE ONLY

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
STANDARD LETTER

**5. Is this course dual listed (undergraduate/graduate)?**
NO

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
NO

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
FORMULATION AND MODELING ASPECTS OF ENGINEERING PROBLEMS USING VARIOUS OPTIMIZATION TECHNIQUES TO SEEK OPTIMUM VALUE AND DESIGN UNDER SPECIFIC REQUIREMENTS. SET-UP NUMERICAL FORMULATIONS AND ALGORITHMS, INTRODUCTION OF DESIGN OF EXPERIMENTAL METHODS, AND APPLICATION TO PRACTICAL ENGINEERING PROBLEMS INCLUDED.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?**
NO
**b. Why?**
NO PREREQUISITES REQUIRED, HOWEVER, PREVIOUS COURSEWORK IN SCIENCE, MATHEMATICS, AND ENGINEERING IS STRONGLY RECOMMENDED AS REQUIRED BY ADMISSION TO THE MSE PROGRAM.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
DR. ILWOO SEOK, ARKANSAS STATE UNIVERSITY, JONESBORO, PO BOX 1740, iseok@astate.edu, 870-680-8589

**11. Proposed Starting Term/Year**
FALL 2013

**12. Is this course in support of a new program? If yes, what program?**
YES
MASTER OF SCIENCE IN ENGINEERING (MSE) –APPROVED AT ASU GRADUATE COUNCIL MEETING ON OCT.13.2011

**13. Does this course replace a course being deleted?**
NO
**a. If yes, what course?**

**b. Has this course number been used in the past?**
NO
**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.**
NO

**15. Justification should include:**

**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
THIS COURSE, ENGINEERING OPTIMIZATION, IS DESIGNED TO TEACH STUDENTS IMPORTANT CONCEPTS OF THE FORMULATION AND MODELING ASPECTS IN ENGINEERING OPTIMIZATION PROBLEMS. STUDENTS WILL UNDERSTAND AND APPLY THESE NUMERICAL METHODS TO OPTIMIZE MAJOR PROPERTIES ON THEIR RESEARCH PROBLEMS.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
THIS COURSE FITS WELL WITH THE MASTER OF SCIENCE IN ENGINEERING (MSE) PROGRAM HAVING A GOAL OF THE INTEGRATION OF RESEARCH AND TECHNOLOGY DEVELOPMENT FOR GRADUATES AND ONE EXPECTED OUTCOME OF THE ACQUISITION OF KNOWLEDGE OF NUMERICAL METHODS. THIS COURSE WILL SERVE AS ONE OF THE ELECTIVE COURSES IN MSE PROGRAM TO SATISFY THE PROGRAM CRITERIA REQUIREMENTS. ALSO, ADDITION OF THIS COURSE WILL HELP MEET COURSE REQUIREMENTS FOR OTHER STUDENTS IN DIFFERENT GRADUATE PROGRAMS.

**C. Student population served.**
MAINLY GRADUATE STUDENTS WHO ARE STUDYING TOWARD MS IN ENGINEERING DEGREE AND ALSO OFFERED FOR GRADUATE LEVER STUDENTS IN STEM AREAS TO ALLOW VARIOUS NUMERICAL OPTIMIZATION TECHNIQUES FOR THEIR OWN RESEARCH AND DEVICE APPLICATIONS

**D. Rationale for the level of the course (lower, upper, or graduate).**
THE COURSE IS DESIGNED FOR THE GRADUATE LEVEL SO THAT STUDENTS CAN INTEGRATE BASIC BACKGROUND KNOWLEDGE FROM UNDERGRADUATE LEVEL IN VARIOUS FIELDS.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

**Class Schedule (Tentatively)**

| WEEK NO. | LECTURE TOPICS |
|---|---|
| 1 | PRELIMINARY CONCEPTS, MATHEMATICAL FUNDAMENTALS |
| 2 | ONE DIMENSIONAL UNCONSTRAINED MINIMIZATION |
| 3 | UNCONSTRAINED OPTMIZATION, STEEPEST DESCENT METHOD |
| 4 | UNCONSTRAINED OPTIMIZATION, NEWTON BASED METHODS |
| 5 | LINEAR PROGRAMMING |
| 6 | |
| 7 | CONSTRAINED MINIMIZATION |
| 8 | CONSTRAINED MINIMIZATION WITH PENALTY FUNCTION METHODS |
| 9 | DIRECT SEARCH METHODS |
| 10 | DIRECT SEARCH METHODS MULTIOBJECTIVE OPTIMIZATION |
| 11 | INTEGER AND DISCRETE PROGRAMMING |
| 12 | DYNAMIC PROGRAMMING<br>APPLICATIONS TO TRANSPORTATION, ASSIGNMENT, NETWORKS |
| 13 | FINITE ELEMENT BASED OPTIMIZATION |
| 14 | DESIGN OF EXPERIEMENTAL/TAGUCHI |

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**
HOMEWORKS, IN-CLASS EXAMS, TERM PROJECT

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**
NO

**19. Required reading**
ENGINEERING OPTIMIZATION:THEORY AND PRACTICE, SINGIRESU S. RAO, WILEY

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**
NO

**21. What is the primary goal of this course?**
THE PRIMARY GOAL OF THIS COURSE IS TO PREPARE STUDENTS WITH THE KNOWLEDGE AND MATHEMATICAL FORMULATOINS NEEDED TO SOLVE ENGINEERING PROBLEMS USING VARIOUS OPTIMIZATION TECHNIQUES.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

**OUTCOME #1:** STUDENTS WILL UNDERSTAND NUMERICAL OPTIMIZATION TECHNIQUES TO SOLVE ENGINEERING PROBLEMS.
**LEARNING ACTIVITY #1:** LECTURE AND SOLVING EXAMPLE PROBLEMS IN CLASS.
**ASSESSMENT TOOL #1:** IN-CLASS EXAMS AND HOMEWORK

**OUTCOME #2:** STUDENTS WILL EMPLOY ACQUIRED KNOWLEDGE INTO THEIR RESEARCH PROBLEMS.
**LEARNING ACTIVITY #2:** PAPER READING ASSIGNMENT.
**ASSESSMENT TOOL #2:** TERM PROJECT.

**OUTCOME #3:** STUDENTS WILL BE CAPABLE OF USING COMPUTER LANGUAGE SKILLS TO SOLVE SETUP FORMULATION.
**LEARNING ACTIVITY #3:** LECTURE
**ASSESSMENT TOOL #3:** HOMEWORK AND IN-CLASS EXAMS.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

## Graduate Bulletin 2011-2012, Pg 160.

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the first semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6123. Engineering Optimization** Formulation and modeling aspects of engineering problems using various optimization techniques to seek optimum value and design under specific requirements. Set-up numerical formulations and algorithms, introduction of design of experimental methods, and application to practical engineering problems included.

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

**ME 5523. Introduction to Finite Element Analysis** Theory and application of energy concepts and structural mechanics required for the development of finite element methods are presented. Applications to beams, trusses, torsion, etc. are presented. Prerequisites, C or better in ENGR 2413. Dual listed as ME 4523.

Revised 4/16/12

Code # ENGR 13

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6133

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Engineering Electrodynamics

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Lecture Only

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Letter

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
Dynamic theory of material interactions with electricity, magnetism, and light based on conservation of energy and momentum. Examples include modern applications of optical manipulation such as optical tweezers and optical binding of matter.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?**
ENGR 6023 Advanced Engineering Math and an undergraduate course in electromagnetics.

**b. Why?** An undergraduate course in electromagnetics provides the student with the necessary introduction to electromagnetic theory based on Maxwell's equations and ENGR 6023 gives the applied mathematics background necessary to study more complex theories and applications in electrodynamics.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Brandon A. Kemp, ASU College of Engineering, P. O. Box 1740, State University, AR, 72467
bkemp@astate.edu, 870.972.2088

**11. Proposed Starting Term/Year**
Spring 2013

**12. Is this course in support of a new program? If yes, what program?**
Yes. Master of Science in Engineering (MSE)

**13. Does this course replace a course being deleted?**
No.
**a. If yes, what course?**

**b. Has this course number been used in the past?**

**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.** No.

**15. Justification should include:**
**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
Students will learn how to apply classical electromagnetic theory based on Maxwell's equations to model modern applications in electrodynamics, particularly at the micro- and nano-scales.
**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
The course is consistent with the mission of the MSE program to provide an educational experience focusing on the integration of research and technology development that will allow graduates to be successful in driving solutions to society's most challenging technical problems. By integrating an energy and momentum conservation approach to the study of electrodynamics, the course specifically addresses one of the MSE program outcomes: an advanced, cross-disciplinary understanding of engineering sciences, and an ability to relate physical concepts from multiple engineering disciplines**.**

**C. Student population served.** Graduate students in the MSE program.

**D. Rationale for the level of the course (lower, upper, or graduate).** The course is one of the advanced engineering science courses in the research thesis based MSE program. The course provides students with the background necessary for engineering research in optical manipulation (*i.e.* the use of light as a physical tool in nanotechnology).

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

A general outline of the course activities is given below.

Week 1: Review of vector/tensor calculus
Week 2: Energy and momentum conservation in engineering
Week 3: Conservation laws in mechanics and fluids
Week 4: Introduction to Maxwell's equations
Week 5: Energy and momentum in electromagnetics
Week 6: Conservation laws in electrostatics
Week 7: Examples in electrostatics
Week 8: Electromagnetic waves
Week 9: Dispersion relation: energy and momentum in media
Week 10: Radiation pressure
Week 11: Energy and momentum in absorbing media
Week 12: Optical stretchers
Week 13: Optical trapping
Week 14: Optical binding

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

problem sets, computer projects, scholarly paper reviews, mid-term and final exams

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**
Outcome of student projects will be the demonstration of working computer codes that model real applications.

**19. Required reading**
Students will be required to read journal articles and give oral reviews of current topics contained within.

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**
No additional staffing or supplies will be required.

**21. What is the primary goal of this course?**
To prepare students in the M.S. ENGR program for research in light-matter interactions particularly at the micrometer and nanometer scales.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

☐ **Communicating effectively**
☐ **Thinking Critically**
☐ **Using mathematics**
☐ **Using Technology**
☐ **Understanding global issues**
☐ **Understanding interdependence**
☐ **Developing a life-long appreciation of the arts and humanities**
☐ **Developing a strong foundation in the social sciences**

☐ **Using science to accomplish common goals**

☐ **Providing foundations necessary to achieve health and wellness**

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

Outcome # 1: Students will be able to apply classical electromagnetic theory to model the manipulation of matter with electric fields, magnetic fields, and light.

Outcome # 2: Students will be able to use the energy and momentum continuity laws from electromagnetics in harmony with those from fluids a mechanics to deduce the dynamics of material systems subject to electromagnetic forces.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

Graduate Bulletin 2011-2012, Pg 160.

**EGRM 6003 Engineering Statistics** Basic concepts and methods of descriptive and inferential statistics including graphical techniques, measures of central tendency and dispersion, interval estimation, hypothesis and goodness of fi t tests, comparisons of two populations, and analysis of variance. Prerequisite MATH 2204 calculus I.

**EGRM 6013 Quality control and Improvement** A brief review of the evolution of quality control and improvement theory particularly as infl uenced by key pioneers such as Deming, Juran, and Taguchi. Extensive coverage of selected quality improvement techniques includes statistical process control, inspection sampling, and design of experiments. Prerequisites EGRM 6003 Engineering Statistics.

**EGRM 6023 Engineering Management I** Basic principles and practices of engineering management activities including planning, organization, leadership, controlling, motivating, ethics, communications, and decision making; group research of special topics with written and oral presentations is required. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, project based course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the fi rst semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6133 Engineering Electrodynamics** Dynamic theory of material interactions with electricity, magnetism, and light based on conservation of energy and momentum. Examples include modern applications of optical manipulation such as optical tweezers and optical binding of matter. Prerequisite: ENGR 6023 Advanced Engineering Math and an undergraduate course in electromagnetics.

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

Revised 2/24/11

Code # ENGR 14

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6143

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Advanced Heat and Mass Transfer

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Lecture only

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Standard letter

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
Conservation laws, steady/unsteady conduction, mass diffusion, exact/numerical solutions of PDE, FDM, Fourier/Laplace transform in heat transfer, convection, heat transfer in Couette/Poiseuille/Falkner-Skan flows, heat transfer in laminar/turbulent boundary layer, natural convection and radiation.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**
**a. Are there any prerequisites?**
Undergraduate coursework in fluid mechanics and heat transfer.
**b. Why?**
Students need to have background of fundamental fluid mechanics and heat transfer to advance their knowledge in this course.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Dr. David Jeong, Arkansas State University, Jonesboro, P. O. Box 1740, State University, AR 72467, kjeong@astate.edu, 870-680-8593.

**11. Proposed Starting Term/Year**
Spring 2013

**12. Is this course in support of a new program? If yes, what program?**
Yes. Master of Science in Engineering (MSE) program which was proposed to ADHE in 2012.

**13. Does this course replace a course being deleted?** No
**a. If yes, what course?**
**b. Has this course number been used in the past?** No
**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.**

No

**15. Justification should include:**

**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**

Students are expected to demonstrate ability to solve typical engineering problems regarding heat and mass transfer. Students are expected to derive significant integral or differential mass/momentum/energy equations. Students are exposed to various heat and mass transfer problems. Students are expected to be familiar with analytical or numerical solution techniques in solving conjugate fluid flow and heat/mass transfer problems. Students obtain skills to make computer program using MATLAB and/or MAPLE. Students understand phase change mechanism through mass diffusion.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**

This course enables students to efficiently approach to solutions of actual heat and mass transfer problems by applying learned principles and solution skills. The objective of course aligns with mission of MSE program, CESUR (Center for Efficient and Sustainable Use of Resources) and College of Engineering at ASU. The mission of the ASU MSE program is to utilize fundamental science and technology in order to enhance the efficient and sustainable use of resources and to integrate research and teaching to promote cross-disciplinary interactions between university and industry.

**C. Student population served.**

The course primarily serves graduate students in the MSE program and qualified senior students in BSE program.

**D. Rationale for the level of the course (lower, upper, or graduate).**

This course requires understanding of fundamental heat transfer because the partial differential equations (PDE) governing heat and mass transfer are derived with exact/numerical solutions. Therefore this course will need to be taken by graduate students and advanced undergraduate level.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

Week 1: Three principal modes of heat transfer
Week 2: Conservation laws
Week 3: Steady and unsteady heat conduction
Week 4: Mass diffusion
Week 5: Exact and Numerical solutions of partial differential equations
Week 6: Finite Difference Methods
Week 7: Fourier and Laplace transform in unidirectional unsteady heat transfer, Self-similar solutions
Week 8: Convective heat transfer
Week 9: Convective mass transfer
Week 10: Navier-Stokes equation with heat transfer, Couette and Poiseuille flows
Week 11: Heat transfer in laminar and turbulent boundary layer
Week 12: Heat transfer in Falkner-Skan flows
Week 13: 2D natural convection
Week 14: Radiative heat transfer

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

Taking notes, attendance, homework, quizzes, midterm and final exams

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**

None

**19. Required reading**

Fundamentals of Heat and Mass Transfer, T. Bergman, A. Lavine, F. Incropera, D. DeWitt, 7th Edition, Wiley, 2011

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**

None

**21. What is the primary goal of this course?**

Students will understand how to establish and solve governing equations of heat and mass transfer problems by using analytical/numerical solution techniques.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

Outcome #1: Students can identify physical meaning of each term in the governing equations of heat and mass transfer.

Learning Activity #1: Students will learn how to set up control volume, initial/boundary conditions, and governing equations.

Assessment Tool #1: The outcomes will be evaluated using homework, exams and rubrics.

Outcome #2: Students will know how to approach solutions of the governing equations using analytical and numerical methods.

Learning Activity #2: Students will learn analytical and numerical solution techniques to solve the governing equations in heat and mass transfer area.

Assessment Tool #2: The outcomes will be evaluated using homework related to problem solving and computer programming.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

**From page 160 of the 2011-2012 Graduate Bulletin:**

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the first semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6143 Advanced Heat and Mass Transfer** Conservation laws, steady/unsteady conduction, mass diffusion, exact/numerical solutions of PDE, FDM, Fourier/Laplace transform in heat transfer, convection, heat transfer in Couette/Poiseuille/Falkner-Skan flows, heat transfer in laminar/turbulent boundary layer, natural convection and radiation. Prerequisite: Undergraduate coursework in fluid mechanics and heat transfer.

**ME 5503 Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

Revised 2/24/11

Code # ENGR 15

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 6153

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Advanced Fluid Mechanics

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Lecture only

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Standard letter

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**
Principal concepts and advanced topics in fluid mechanics including vector analysis, kinematics, control volume theorem, continuity, momentum, Navier-Stokes, Euler and Bernoulli equations, potential flow, circulation, vorticity, similarity, boundary layers approximation and turbulence.

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**
**a. Are there any prerequisites?**
Undergraduate course in fluid mechanics.
**b. Why?**
Students need to have background of fundamental fluid mechanics to advance their knowledge in this course.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Dr. David Jeong, Arkansas State University, Jonesboro, P.O. Box 1740, State University, AR 72467, kjeong@astate.edu, 870-680-8593.

**11. Proposed Starting Term/Year**
Fall 2012

**12. Is this course in support of a new program? If yes, what program?**
Yes, Master of Science in Engineering (MSE) program.

**13. Does this course replace a course being deleted?** No
**a. If yes, what course?**
**b. Has this course number been used in the past?** No
**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.**

No

**15. Justification should include:**

**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**

Students are expected to demonstrate ability to solve typical engineering problems regarding fluid mechanics. Students are expected to derive significant integral or differential mass/momentum/energy equations. Students are expected to be familiar with exact or numerical techniques in solving fluid mechanics-related problems.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**

This course enables students to efficiently approach solutions of problems in fluid mechanics by applying learned principles and solution skills. So the objective of course aligns with mission of MSE program, CESUR (Center for Efficient and Sustainable Use of Resources) and College of Engineering at ASU. The mission of the ASU MSE program is to utilize fundamental science and technology in order to enhance the efficient and sustainable use of resources and to integrate research and teaching to promote cross-disciplinary interactions between university and industry.

**C. Student population served.**

The course primarily serves graduate students in the MSE program and senior students in BSE program.

**D. Rationale for the level of the course (lower, upper, or graduate).**

This course requires understanding of fundamental fluid mechanics because the partial differential equations (PDE) governing mass/momentum/energy ar incompressible/viscid flow are derived with exact/numerical solutions of the PDE. Therefore this course will need to be taken by graduate students and advanced undergraduate level.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)**

Week 1: Vector analysis
Week 2: Kinematics and decomposition
Week 3: Continuum equations and momentum equations
Week 4: Navier-Stokes equation and solutions
Week 5: Inviscid flow, Euler and Bernoulli equation
Week 6: Euler and Bernoulli solutions
Week 7: Streamfunction and vorticity
Week 8: Potential flow
Week 9: Circulation theorems
Week 10: Vorticity equations and inviscid flow with vorticity
Week 11: Similarity
Week 12: Boundary Layer Theorem
Week 13: Boundary Layer Approximation
Week 14: Turbulence

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

Taking notes, attendance, homework, quizzes, midterm and final exams

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**

None

**19. Required reading**

Fluid Mechanics, Frank M. White, Seventh Edition, McGraw-Hill, 2011

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**

None

**21. What is the primary goal of this course?**

Students are able to identify physical interpretation of each term in the governing equations and approach analytical/numerical solutions of the integral and differential forms.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

| | |
|---|---|
| ☐ **Communicating effectively** | ☐ **Thinking Critically** |
| ☐ **Using mathematics** | ☐ **Using Technology** |
| ☐ **Understanding global issues** | ☐ **Understanding interdependence** |
| ☐ **Developing a life-long appreciation of the arts and humanities** | ☐ **Developing a strong foundation in the social sciences** |
| ☐ **Using science to accomplish common goals** | ☐ **Providing foundations necessary to achieve health and wellness** |

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

Outcome #1: Students can identify physical meaning of each term in the governing equations of fluid mechanics.

Learning Activity #1: Students will learn how to set up control volume, initial/boundary conditions, and governing equations.

Assessment Tool #1: The outcomes will be evaluated using homework, exams and rubrics.

Outcome #2: Students will know how to approach solutions of the governing equations using analytical and numerical methods.

Learning Activity #2: Students will learn analytical and numerical methods to solve the governing equations in fluid mechanics area.

Assessment Tool #2: The outcomes will be evaluated using homework related to problem solving and computer programming.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

**From page 160 of the 2011-2012 Graduate Bulletin:**

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the first semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 6153 Advanced Fluid Mechanics** Principal concepts and advanced topics in fluid mechanics including vector analysis, kinematics, control volume theorem, continuity, momentum, Navier-Stokes, Euler and Bernoulli equations, potential flow, circulation, vorticity, similarity, boundary layers approximation and turbulence. Prerequisite: Undergraduate course in fluid mechanics.

**ME 5503 Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

Revised 4/16/12

Code # ENGR 16

# New/Special Course Proposal-Bulletin Change Transmittal Form

☐ **Undergraduate Curriculum Council** - Print 1 copy for signatures and save 1 electronic copy.
☒ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

☒ **New Course or** ☐ **Special Course (Check one box)**
Please complete the following and attach a copy of the catalogue page(s) showing what changes are necessary.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| | | Professional Education Head of Unit (If applicable) | Date |
| Department Chair | Date | | |
| | | General Education Committee Chair (If applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

**1. Proposed Course Prefix and Number (For variable credit courses, indicate variable range.)**
ENGR 689V (1-6)

**2. Course Title – if title is more than 30 character (including spaces), provide short title to be used on transcripts. Title cannot have any symbols (e.g. slash, colon, semi-colon, apostrophe, dash, and parenthesis). Please indicate if this course will have variable titles (e.g. independent study, thesis, special topics).**
Thesis

**3. Will this course be lecture only, lab only, lecture and lab, activity, dissertation, experiential learning, independent study, internship, performance, practicum, recitation, seminar, special problems, special topics, studio problems, student exchange, occupational learning credit, or course for fee purpose only (e.g. an exam)? Please choose one.**
Thesis research

**4. What is the grade type (i.e. standard letter, credit/no credit, pass/fail, no grade, developmental)?**
Credit/no credit

**5. Is this course dual listed (undergraduate/graduate)?**
No

**6. Is this course cross listed? (If it is, all course entries must be identical including course descriptions. It is important to check the course description of an existing course when adding a new cross listed course.)**
No

**7. Brief course description (40 words or less) as it should appear in the bulletin.**

**8. Indicate all prerequisites and if this course is restricted to a specific major, which major. (If a student does not have the prerequisites or does not have the appropriate major, they will not be allowed to register).**

**a. Are there any prerequisites?** No
**b. Why?** Registration for thesis credit is subject only to approval of the student's research thesis advisor.

**9. Course frequency (e.g. Fall, Spring, Summer). Not applicable to Graduate courses.**

**10. Contact Person (Name, Name of Institution, Address, Email Address, Phone Number)**
Brandon A. Kemp, ASU College of Engineering, P. O. Box 1740, State University, AR, 72467
bkemp@astate.edu, 870.972.2088

**11. Proposed Starting Term/Year**
Fall 2012

**12. Is this course in support of a new program? If yes, what program?**
Yes. Master of Science in Engineering (MSE)

**13. Does this course replace a course being deleted?**
No
**a. If yes, what course?**

**b. Has this course number been used in the past?**

**Attach Course Deletion Proposal-Bulletin Change Transmittal Form.**

**14. Does this course affect another program? If yes, provide contact information from the Dean, Department Head, and/or Program Director whose area this affects.** No

**15. Justification should include:**

**A. Academic rationale and goals for the course (skills or level of knowledge students can be expected to attain).**
Students will learn to do independent engineering research.

**B. How does the course fit with the mission established by the department for the curriculum? If course is mandated by an accrediting or certifying agency, include the directive.**
The course is consistent with the mission of the MSE program to provide an educational experience focusing on the integration of research and technology development that will allow graduates to be successful in driving solutions to society's most challenging technical problems. The course specifically addresses one of the MSE program outcomes: an ability to identify critical issues, formulate realistic solutions, evaluate alternatives, and carry out independent research to provide novel solutions to technical problems.

**C. Student population served.** Graduate students in the MSE program.

**D. Rationale for the level of the course (lower, upper, or graduate).** This course is for thesis credit in the research-based Master of Science in Engineering program.

**16. Outline (The course outline should be topical by weeks and should be sufficient in detail to allow for judgment of the content of the course.)** Independent research under the direction of thesis advisor.

**17. Course requirements (e.g. research papers, projects, interviews, tests, etc.)**

Written and/oral reports as required by the thesis advisor.

**18. Special features (e.g. labs, exhibits, site visitations, etc.)**

**19. Required reading**

**20. Department staffing and classroom/lab resources (Will this require additional faculty, supplies, etc.?)**

**21. What is the primary goal of this course?**
To engage students in original, independent research.

**22. If this proposal is for a general education course, please check the primary goal this course addresses:**

- ☐ **Communicating effectively**
- ☐ **Using mathematics**
- ☐ **Understanding global issues**
- ☐ **Developing a life-long appreciation of the arts and humanities**
- ☐ **Using science to accomplish common goals**
- ☐ **Thinking Critically**
- ☐ **Using Technology**
- ☐ **Understanding interdependence**
- ☐ **Developing a strong foundation in the social sciences**
- ☐ **Providing foundations necessary to achieve health and wellness**

**23. Considering the indicated primary goal, provide *up to three outcomes* that you expect of students after completion of this course. For example, what will students who meet this goal *know* or *be able to do* as a result of this course?**

Outcome # 1: Students will be able to carry out independent research within their engineering discipline.

**From the most current electronic version of the bulletin, copy all bulletin pages that this proposal affects and paste it to the end of this proposal.**

Graduate Bulletin 2011-2012, Pg 160.

**EGRM 6003 Engineering Statistics** Basic concepts and methods of descriptive and inferential statistics including graphical techniques, measures of central tendency and dispersion, interval estimation, hypothesis and goodness of fi t tests, comparisons of two populations, and analysis of variance. Prerequisite MATH 2204 calculus I.

**EGRM 6013 Quality control and Improvement** A brief review of the evolution of quality control and improvement theory particularly as infl uenced by key pioneers such as Deming, Juran, and Taguchi. Extensive coverage of selected quality improvement techniques includes statistical process control, inspection sampling, and design of experiments. Prerequisites EGRM 6003 Engineering Statistics.

**EGRM 6023 Engineering Management I** Basic principles and practices of engineering management activities including planning, organization, leadership, controlling, motivating, ethics, communications, and decision making; group research of special topics with written and oral presentations is required. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6033 Engineering Management II** Principles and practices of engineering management including marketing management, globalization, time management, forecasting, fi nance, cost, accounting, managing technology, engineering management in the new millennium; invited lectures and seminars covering projects of interest to civil, electrical, mechanical, and manufacturing engineers in management positions. Co-requisite, MBA 506V; Prerequisite, MBA 500V, MBA 501V, and EGRM 6023. This course is restricted to graduate students majoring in Engineering Management.

**EGRM 6043 Operations Research** Quantitative techniques for decision making; break-even analysis, economic models, Gaussian distributions, inventory control, production models, and mathematical programming. Prerequisite: EGRM 6003, Engineering Statistics.

**EGRM 6073 Special Problems in Engineering Management** A capstone, projectbased course consisting of an investigation of an engineering management topic approved by the faculty; weekly project meetings, a formal engineer's log book of activities, progress reports, oral presentation, and a comprehensive written report are required. Prerequisite, EGRM 6033. This course is restricted to graduate students in Engineering Management and can only be taken during the fi rst semester prior to graduation.

**ENGR 5703 Environmental, Safety, and Health Engineering** Survey and analysis of contemporary environmental, safety, and health-related topics pertinent to engineering and technology applications and practice, including technical, regulatory, economic, and other nontechnical aspects. Prerequisite: admission into the Engineering Management graduate program.

**ENGR 689V Thesis**

**ME 5503. Fluid and Thermal Energy Systems** Analysis and design of components, systems, and processes using the fundamentals presented in Thermodynamics, Fluid Mechanics, and Heat Transfer. Corequisite, ME 4553. Prerequisites, C or better in ENGR 3473 and ENGR 3443. Dual listed as ME 4503.

**ME 5523. Introduction to Finite Element Analysis** Theory and application of energy concepts and structural mechanics required for the development of fi nite element

Revised 9/25/2008

Code #

# Bulletin Change Transmittal Form

☐ **Graduate Council** - Print 1 copy for signatures and send 1 electronic copy to mmcginnis@astate.edu

**Bulletin Change**
Please attach a copy of all catalogue pages requiring editorial changes.

| | | | |
|---|---|---|---|
| Department Curriculum Committee Chair | Date | COPE Chair (if applicable) | Date |
| Department Chair | Date | General Education Committee Chair (if applicable) | Date |
| College Curriculum Committee Chair | Date | Undergraduate Curriculum Council Chair | Date |
| College Dean | Date | Graduate Curriculum Committee Chair | Date |
| | | Vice Chancellor for Academic Affairs | Date |

1. **Contact Person** (Name, Name of Institution, Address, Email Address, Phone Number)

   **HPESS Jim Stillwell, Chair HPESS or Tom Adams, Graduate Coordinator HPESS, Arkansas State University, P.O. Box 240, State University Arkansas, Email: jstillwel@astate.edu or tadams@astate.edu, Phone: 870-972-3066**

2. **Proposed Change**

The revision below incorporates and illustrates proposed changes in the admission criteria for the MS Degree in Sports Administration. Specifically, the changes move away from a GPA and a minimum GRE score to a multi-point admission criteria. Criteria will now include: GPA, GRE, Resume, Writing sample, Letters of Recommendation, and potentially an on-site interview.

2. **Effective Date**

**Fall 2012**

4. **Justification**

a. The proposed changes correct the catalog to reflect recent changes in the GRE scoring. In addition, and perhaps more importantly, the proposed changes reflect a move by our department to use multiple sources of information when determining student admission. This is a move away from the practice of being limited by past academic performance (GPA) and minimum entrance exam scores (GRE or MAT).

**Delete from Page 116**

~~**Admission Requirements**~~
~~Applicants must meet the admission requirements of the ASU Graduate School and the specific program requirements. The minimum requirement for admission is the baccalaureate degree or its equivalent from an accredited institution.~~
~~1. Applicants are required to submit all official transcripts as verification of coursework and degree(s).~~
~~2. Submit a formal Statement of Goals which should explain in at least 500 words why he/she wants to be admitted into the program and what he/she plans to do with the M.S. Sport Administration degree.~~

~~3. A current resume.~~
~~4. Submit at least two letters of recommendation from individuals who can speak to the applicant's academic potential and professional capabilities. Applicants must have at least one recommendation from a university faculty member who is familiar with the applicant's work as a student. The professional recommendation should come from a supervisor in which he/she has evaluated the applicant's current or prior work.~~
~~5. Submit official scores from the Graduate Record Examination (GRE).~~

~~For unconditional admission, students are required to have a minimum combined score of 820. Students are also required to have a 2.75 cumulative GPA or 2.75 GPA during the last 60 credits of university work.~~
~~For conditional admission, students are required to have a 2.50 cumulative GPA AND when the undergraduate GPA is multiplied by the GRE score, the total is at least 1850.~~
~~Faculty may require interviews in addition to written credentials as part of the admission process. In addition to these requirements, admission to the degree program may require completion of specific prerequisite undergraduate courses.~~
~~Applicants will be considered for admission during a given review cycle only if all of the above materials have been received by the Graduate School's application deadlines. After the initial review of admission materials the committee members can either choose to reject the candidate without an interview or decide to proceed with an interview. Following the interview phase, the Admissions Committee makes its final recommendation to accept the candidate for admission or to deny admission. Incomplete applications will not be considered~~.

Replace With:

**Admission Requirements**

Applicants must meet the admission requirements of the ASU Graduate School and the specific program requirements. The minimum requirement for admission is the baccalaureate degree or its equivalent from an accredited institution.

Applicants must present evidence of potential ability to perform academic work at the advanced graduate level. Standardized test proficiency and past grade performance will be used to provide the primary data for judging academic ability. Other indicators, such as quality of writing in the Applicant's prepared statement and faculty references, will also be considered. Based on past academic performance, an applicant must qualify for either unconditional or conditional admission status.

- For unconditional admission, students are required to have a minimum 3.0 cumulative GPA or 3.25 GPA during the last 60 credit hours of university work.

- For conditional admission, students are required to have a 2.75 cumulative GPA or 3.0 GPA during the last 60 credit hours of university work.

Applicants are required to submit the following:

1. Official transcripts as verification of all coursework and degree(s).
2. A formal Statement of Goals which should explain in at least 500 words why he/she wants to be admitted into the program and what he/she plans to do with the M.S. in Sport Administration degree.
3. A current resume.
4. At least two letters of recommendation from individuals who can speak to the applicant's academic potential and professional capabilities. Applicants must have at least one recommendation from a university faculty member who is familiar with the applicant's work as a student. The professional recommendation should come from a supervisor in which he/she has evaluated the applicant's current or prior work.
5. Official scores from the Graduate Record Examination (GRE).

Lastly, faculty may require interviews in addition to written credentials as part of the admission process. In addition to the above requirements, admission to the degree program may require completion of specific prerequisite undergraduate

courses. Applicants will be considered for admission during a given review cycle only if all of the above materials have been received by the Graduate School's application deadlines. After the initial review of admission materials the committee members can either choose to reject the candidate without an interview or decide to proceed with an interview. Following the interview phase, the Admissions Committee makes its final recommendation to accept the candidate for admission or to deny admission. Incomplete applications will not be considered.

Revised 9/25/2008

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1. **Contact Person** (Name, Name of Institution, Address, Email Address, Phone Number)

   **HPESS Jim Stillwell, Chair HPESS or Tom Adams, Graduate Coordinator HPESS, Arkansas State University, P.O. Box 240, State University Arkansas, Email: jstillwel@astate.edu or tadams@astate.edu, Phone: 870-972-3066**

2. **Proposed Change**

The revision below incorporates and illustrates proposed changes in the admission criteria for the MS Degree in Exercise Science. Specifically, the changes move away from a GPA and a minimum GRE score to a multi-point admission criteria. Criteria will now include: GPA, GRE, Resume, Writing sample, Letters of Recommendation, and potentially an on-site interview.

2. **Effective Date**

**Fall 2012**

4. **Justification**

   a. The proposed changes correct the catalog to reflect recent changes in the GRE scoring. In addition, and perhaps more importantly, the proposed changes reflect a move by our department to use multiple sources of information when determining student admission. This is a move away from the practice of being limited by past academic performance (GPA) and minimum entrance exam scores (GRE or MAT).

**Delete from Page 116**

~~**Admission Requirements**~~

~~Students seeking admission into the Master of Science degree program in Exercise Science must meet the admission requirements of the Graduate School for unconditional or conditional status. In addition, applicants must meet specifi c program requirements. Candidates who do not meet the Exercise Science program admission requirement will be required to complete undergraduate coursework to meet identifi ed defi ciencies. Previously completed coursework will be evaluated on an individual basis to determine if any defi ciencies exist in foundation courses for the discipline. Identifi ed courses may be completed concurrently with graduate~~

~~work, but must be completed before the student is admitted to candidacy for the degree.~~
~~For unconditional admission, academic profi ciency must be established through satisfaction of either of the following admission selection criteria:~~
~~1. A minimum cumulative undergraduate grade point average of 3.00 (or 3.25 on the last 60 hours) and a scaled score of at least 384 on the Miller Analogies Test (MAT) or a minimum score of 790 on the combined verbal and quantitative sections of the Graduate Record Examination (GRE).~~
~~2. A minimum cumulative undergraduate grade point average of 2.75 (or 3.00 on the last 60 hours) and a scaled score of at least 388 on the Miller Analogies Test (MAT) or a minimum score of 820 on the combined verbal and quantitative sections of the Graduate Record Examination (GRE).~~
~~For conditional admission, academic profi ciency must be established through satisfaction of either of the following admission selection criteria:~~
~~1. The total undergraduate GPA is 2.50 and when the undergraduate GPA is multiplied by 10 and then multiplied by the MAT score the total is at least 9700.~~
~~2. The total undergraduate GPA is 2.50 and when the undergraduate GPA is multiplied by the GRE score the total is at least 1850.~~

Replace With:

**Admission Requirements**

Students seeking admission into the Master of Science degree program in Exercise Science must meet the admission requirements of the Graduate School for unconditional or conditional status. In addition, applicants must meet specific program requirements. Candidates who do not meet the Exercise Science program admission requirement will be required to complete undergraduate coursework to meet identified deficiencies. Previously completed coursework will be evaluated on an individual basis to determine if any deficiencies exist in foundation courses for the discipline. Identified courses may be completed concurrently with graduate work, but must be completed before the student is admitted to candidacy for the degree. In addition, undergraduate deficiency course removal must be sequenced in order to provide the student with the appropriate background knowledge before enrollment into the respective graduate level course will be allowed.

Applicants must present evidence of potential ability to perform academic work at the advanced graduate level. Standardized test proficiency and past grade performance will be used to provide the primary data for judging academic ability. Other indicators, such as quality of writing in the Applicant's prepared statement and faculty references, will also be considered. Based on past academic performance, an applicant must qualify for either unconditional or conditional admission status.

- For unconditional admission, students are required to have a minimum 3.0 cumulative GPA or 3.25 GPA during the last 60 credit hours of university work.

- For conditional admission, students are required to have a 2.75 cumulative GPA or 3.0 GPA during the last 60 credit hours of university work.

Applicants are required to submit the following:

1. Official transcripts as verification of all coursework and degree(s).
2. A formal Statement of Goals which should explain in at least 500 words why he/she is seeking admission into the program and what plans he/she has following the attainment of the degree.
3. A current resume.
4. At least two letters of recommendation from individuals who can speak to the applicant's academic potential and professional capabilities. Applicants must have at least one recommendation from a university faculty member who is familiar with the applicant's work as a student. The professional recommendation should come from a supervisor in which he/she has evaluated the applicant's current or prior work.
5. Official scores from the Graduate Record Examination (GRE).

Lastly, faculty may require interviews in addition to written credentials as part of the admission process. In addition to the above requirements, admission to the degree program may require completion of specific prerequisite undergraduate courses. Applicants will be considered for admission during a given review cycle only if all of the above materials have

been received by the Graduate School's application deadlines. After the initial review of admission materials the committee members can either choose to reject the candidate without an interview or decide to proceed with an interview. Following the interview phase, the Admissions Committee makes its final recommendation to accept the candidate for admission or to deny admission. Incomplete applications will not be considered.