Chair: Tracy Christofero | **GC#6: Course Addition**

Request for Graduate Course Addition

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one identical PDF copy to the Graduate Council Chair. If attachments included, please merge into a single file.
3. ***The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.***

College: CITE | Dept/Division: Engineering | Alpha Designator/Number: ME- 602 | ◯ Graded ◯ CR/NC

Contact Person: Asad Salem | Phone: 696-3207

NEW COURSE DATA:

New Course Title: Advanced Engineering Analysis II

Alpha Designator/Number: M E 6 0 2

Title Abbreviation: A d v a n c e d E n g r A n a y l s i s I I

(Limit of 25 characters and spaces)

Course Catalog Description: (Limit of 30 words)

This is the second course in a two-course sequence to learn advanced analytical and computational methods to solve multi-dimensional diffusion, heat, biharmonic, and elasticity equations.

Co-requisite(s): None | First Term to be Offered: Spring-2016

Prerequisite(s): ME 601 | Credit Hours: 3

Course(s) being deleted in place of this addition (*must submit course deletion form*):

Signatures: if disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head _____	Date _____
Registrar _____	Date _____
College Curriculum Chair _____	Date _____
Graduate Council Chair _____	Date _____

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College: CITE | Department/Division: ENGINEERING | Alpha Designator/Number: ME-602

Provide complete information regarding the new course addition for each topic listed below. Before routing this form, a complete syllabus also must be attached addressing the items listed on the first page of this form.

1. FACULTY: Identify by name the faculty in your department/division who may teach this course.

Asad Salem

2. DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the proposal. Enter "***Not Applicable***" if not applicable.

Not Applicable

3. REQUIRED COURSE: If this course will be required by another deparment(s), identify it/them by name. Enter "***Not Applicable***" if not applicable.

None

4. AGREEMENTS: If there are any agreements required to provide clinical experiences, attach the details and the signed agreement. Enter "***Not Applicable***" if not applicable.

Not Applicable

5. ADDITIONAL RESOURCE REQUIREMENTS: If your department requires additional faculty, equipment, or specialized materials to teach this course, attach an estimate of the time and money required to secure these items. (Note: Approval of this form does not imply approval for additional resources.) Enter "***Not Applicable***" if not applicable.

None

6. COURSE OBJECTIVES: (May be submitted as a separate document)

Please refer to the attached syllabus

7. COURSE OUTLINE (May be submitted as a separate document)

Please refer to the attached Syllabus

8. SAMPLE TEXT(S) WITH AUTHOR(S) AND PUBLICATION DATES (May be submitted as a separate document)

Advanced Engineering Mathematics: 4th Ed., by D. Zill and W. Right. 2011

9. EXAMPLE OF INSTRUCTIONAL METHODS (Lecture, lab, internship)

Lecture

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10. EXAMPLE EVALUATION METHODS (CHAPTER, MIDTERM, FINAL, PROJECTS, ETC.)

Mid-term exams 50%
Assignments including Projects: 25%
Final Exam: 25%

11. ADDITIONAL GRADUATE REQUIREMENTS IF LISTED AS AN UNDERGRADUATE/GRADUATE COURSE

None

12. PROVIDE COMPLETE BIBLIOGRAPHY (May be submitted as a separate document)

- Advanced Engineering Mathematics, 10th Ed., Erwin Kreyszig, 2011.
- Advanced Mathematics for Engineers and Scientists, Paul Duchateau, 2013
- Advanced Engineering Mathematics, Alan Jeffrey, 2001
- Advanced Engineering Mathematics. 2nd Ed, Michael D. Greenberg, 1998

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Please insert in the text box below your course summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:
Course Number and Title:
Catalog Description:
Prerequisites:
First Term Offered:
Credit Hours:

Department: Weisberg Division of Engineering
Course Number and Title: ME 602: Advanced Engineering Analysis II

Catalog Description:
This is the second course in a two-course sequence to learn advanced analytical and computational methods to solve multi-dimensional diffusion, heat, biharmonic, and elasticity equations.

Prerequisite: ME 601

First year Offered: Spring 2016

Credit Hours: 3

Course Title/Number	ME 602: Advanced Engineering Analysis II
Semester/Year	
Days/Time	
Location	EL 101
Instructor	Dr. Asad Salem
Office	EL 108
Phone	304-696-3207
E-Mail	salema@marshall.edu
Office/Hours	
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to www.marshall.edu/academic-affairs and clicking on "Marshall University Policies." Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

Course Description:

This is the second course in a two-course sequence to learn advanced analytical and computational methods to solve multi-dimensional diffusion, heat, biharmonic, and elasticity equations.

Prerequisite: ME 601

Required Text: *Advanced Engineering Mathematics: 4th Ed.*, by D. Zill and W. Right. 2011.

References:

- Advanced Engineering Mathematics, 10th Ed., Erwin Kreyszig, 2011.
- Advanced Mathematics for Engineers and Scientists, Paul Duchateau, 2013
- Advanced Engineering Mathematics, Alan Jeffrey, 2001
- Advanced Engineering Mathematics. 2nd Ed, Michael D. Greenberg, 1998

Course Motivation: This course provides analytical and computational techniques in the more advanced areas of mathematics that are of most relevance to engineering disciplines. Applications of these techniques for the solution of boundary value and initial value problems will be given. The problems treated and solved in this course are typical of those seen in applications and include problems of heat conduction, mechanical vibrations and wave propagation.

Course Outcomes: With the successful completion of the course, the student should be able to:

a) Strengthen their fundamental analytical skills, in preparation for advanced studies and research.
b) Gain an Understanding of how to use mathematics to address practical operational issues facing dynamical, mechanical and thermal systems engineers.

Course Objectives: The objective of this course is to provide graduate mechanical engineering students of with various mathematical techniques that are necessary in order to solve practical problems.

1. Students will demonstrate ability to solve linear systems, apply various methods of mathematical, and communicate solutions in writing.
2. Students will demonstrate ability to solve non-linear systems, apply various methods of mathematical, and communicate solutions in writing
3. Students will demonstrate ability to solve PD's, apply various methods of mathematical, and communicate solutions in writing.
4. Students will demonstrate the ability to comprehend advanced mathematics, and present the material orally and in writing

Course Outlines:

- **Emphasis I: Diffusion/ Heat Equation (4 weeks)**
  1. Approximate and numerical solutions of multi-dimensional heat equation with transient and moving heat source

  Emphasis II: Biharmonic and wave equations (4 weeks)
  1. Approximate solutions
  2. Numerical solutions

- **Emphasis III: Nonlinear Elasticity Equation (4weeks)**
  1. Approximate Solution
  2. Numerical of non-linear elasticity equation
- **Emphasis IV: Special and orthogonal Functions and their applications in dynamics systems**
  1. Spherical Bessel Function, Hermite, Laguerre, and Legendre polynomials, and Weber-Hermite Functions

Grading:

Grading Basis:	Mid-term exams:	50%	A:	90-100%
	Assignments:	25%	B:	80-90%
	Final Exam:	25%	F:	0-60%

Homework and Academic Dishonesty Policy:

Homework assignments will be announced in class, and periodic in-class quizzes will be given. Late work is not accepted, except in cases of officially university-excused absences.

Students are expected to adhere to the Marshall University academic dishonesty policy, found in the undergraduate catalog. Academic dishonesty will not be tolerated, and infractions of the university academic dishonesty requirements will lead to sanctions and reporting to the Office of Academic Affairs. Students are particularly encouraged to be careful to avoid cheating, plagiarism, and complicity as related to homework assignments.

Copying homework is not allowed:

Acceptable Behavior	Unacceptable Behavior
☺ Discuss homework problems with others.	☹ Show someone every step of a problem.
☺ Check answers with other students.	☹ Hand your assignment to someone else.
☺ Help other students learn & find mistakes.	☹ Group working problems simultaneously*

* Since everyone works at a different speed, "group work" can degenerate into a slower student copying a faster one, without really understanding what is going on. Quizzes and exams are taken individually, so it is important for students to learn how to solve problems on their own. **Incoming homework assignments will be screened for inappropriate collaboration.**

Additional Academic Policies:

Marshall University policies pertaining to Academic Dishonesty, Excused Absences, University Computing Services Acceptable Use, Inclement Weather, Dead Week, Students with Disabilities, Academic Dismissal, Academic Forgiveness, Academic Probation and Suspension, Academic Rights and Responsibilities of Students, Affirmative Action, and Sexual Harassment can be found at:
http://www.marshall.edu/academic-affairs/?page_id=802

Relationships between Course, Program, and Degree Profile Outcomes

Course Outcome – student will:	**Implementation Method**	**Evaluation Method**	**Program Outcomes**	**Degree Profile Outcomes**
Strengthen their fundamental mathematical skills, in preparation for advanced studies and research.	• Lectures • In-class examples • Homework assignments	• Homework Assignments • Exam problems	a3, b3, e3, k3	• Specialized knowledge • IS: Quantitative Fluency • IS: Communication Fluency
Gain an Understanding of how to use mathematics to address practical operational issues facing dynamical, mechanical and thermal systems engineers.	• Lectures • In-class examples • Homework assignments	• Homework • Exam problems	a3, b3, e3, k3	• Specialized knowledge • IS: Quantitative Fluency • IS: Analytic Inquiry • IS: Communication Fluency