The University Of Toledo

NEW COURSE PROPOSAL

1. College: ENG
   Department: TE

2. Contact Person: Ted Evans
   Phone: 530-3349
   Email: william.evans@utoledo.edu

3. Alpha/Numeric Code (Subject area - number): GNEN 5500

4. Proposed title:
   APPLICATIONS OF ENGINEERING ANALYSIS

5. Proposed effective term: SPRING 2011
   Planned enrollment per section: __________ per term: __________

6. Is the course cross-listed with another academic unit? Yes No
   Is the course offered at more than one level? Yes No

   If yes to either question, please list additional Alpha/Numberic codes, and
   submit a separate New Course form or Course Modification form for the
   course(s) referenced below:
   a. __________ b. __________ c. __________

   Approval of other academic unit (signature):
   Name and title:

   If course is to be offered at more than one level, attach an explanation of the different requirements that students must meet for each level. If the requirements are the same for each level, justification must be provided.

7. Credit hours: Fixed: __________ or Variable: __________

8. Delivery Mode:
   a. Activity Type* Computer Assisted
      b. Minimum Credit Hours 3
      c. Maximum Credit Hours 3
      e. Weekly Contact Hours 3

9. Terms offered: Fall Spring Summer
   Years offered: Every Year Alternate Years

10. Are students permitted to register for more than one section during a term? No Yes

   Administrative Use Only
   Code:
   Approved (senate or Grad Council)
   Effective Date: __/__/____ (mm/dd/yyyy)
   CIP Code:
   Sub: __________ Prog: __________ Level: __________

   *Choices are: Lecture, Recitation, Seminar, Regular Lab, Open Lab, Studio, Clinic, Field, Independent Study, Workshop, Computer Assisted Instruction, Other
11. Grading System: Undergraduate  
   Normal Grading (A-F, PS/NC, PR, I)  
   Passing Grade/No Credit (A-C, NC)  
   Credit/No Credit  
   Grade Only (A-F, PR, I)  
   Audit only  
   No Grade  
Graduate  
   Normal Grading (A-F, PS/NC, PR, I)  
   Grade Only (A-F)  
   Satisfactory/Unsatisfactory (G only)  
   Audit only  
   No Grade  

12. Prerequisites (must be taken before):  
   a.  
   b.  
   c.  
   PIN (Permission From Instructor)  
   PDP (Permission From Department)  

13. Co-requisites (must be taken together):  
   a.  
   b.  
   c.  

14. If course is to replace an existing course(s) will be deleted, and when should that deletion occur?  

<table>
<thead>
<tr>
<th>Course to be removed from inventory</th>
<th>Final Term to be offered (YYYYT, i.e., use 20064 for Fall 06)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 5500</td>
<td>20104</td>
</tr>
<tr>
<td>c.</td>
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<tr>
<td>d.</td>
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</tbody>
</table>

15. Catalog description (30 words Maximum)  
   A course in analysis for engineers. Topics include: Linear differential equations, continuous and discrete series representation, Laplace transforms, matrix methods, eigenvalues and eigenvectors, systems of equations. Prerequisite: Graduate Standing.  

16. Attach a copy of a complete outline of the major topics covered. (Providing a syllabus that includes this information is acceptable.)  

   Syllabus  
   Attachment 1: No Attachment  
   Attachment 2: No Attachment  

17. Where does this course fit in the University/College/Department curriculum? (Be specific by course level, if applicable). Indicate prospective demand.  

   The ENEX 55600 will be offered to students enrolled in the Master of Science in Engineering program.  

18. If the proposed course is similar to another course in the College or University, please describe the difference and provide a rationale for the duplication. (If this course duplicates material covered in another course within your department or college or in another college, attach a letter of endorsement from that area’s dean and department chairperson indicating their support. Clarify the manner in which this course will differ).  

If the course is intended to meet a University Undergraduate Core requirement, complete the following and submit a course syllabus using the template.  

Please explain how this course fulfills the general education guidelines. (Guidelines are available in Faculty Senate Website)  

Course Approval:
Display New Course Information

<table>
<thead>
<tr>
<th>Department Curriculum Authority:</th>
<th>Date / / (mm/dd/yyyy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department Chairperson:</td>
<td>Date / / (mm/dd/yyyy)</td>
</tr>
<tr>
<td>College Curriculum Authority:</td>
<td>Date / / (mm/dd/yyyy)</td>
</tr>
<tr>
<td>College Dean:</td>
<td>Date / / (mm/dd/yyyy)</td>
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</tbody>
</table>

After college approval, submit the original signed form to the Faculty Senate (UH 3320) for undergraduate-level courses; for graduate-level courses submit the original signed form to the Graduate School (UH3240). For undergraduate/graduate dual-level courses, submit the proposals to each office.

<table>
<thead>
<tr>
<th>Faculty Senate Undergrad. Curriculum Comm.:</th>
<th>Date / / (mm/dd/yyyy)</th>
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<tbody>
<tr>
<td>Faculty Senate Core Curriculum Comm:</td>
<td>Date / / (mm/dd/yyyy)</td>
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<tr>
<td>Graduate Council:</td>
<td>Date / / (mm/dd/yyyy)</td>
</tr>
<tr>
<td>Office of the Provost:</td>
<td>Date / / (mm/dd/yyyy)</td>
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<tr>
<td>Registrar's Office:</td>
<td>Date / / (mm/dd/yyyy)</td>
</tr>
</tbody>
</table>
The University Of Toledo
NEW COURSE PROPOSAL

1. College: Engineering
   Department: Engineering Technology

2. Contact Person: Elia Fridman
   Phone: 3273
   Email: elia.fridman@utoledo.edu

3. Alpha/Numeric Code (subject area - number): ENGT - 5500

4. Proposed title: Applications of Engineering Analysis
   Proposed effective term: Fall 2006

5. Planned enrollment per section: ______ per term: 10

6. Is the course cross-listed with another academic unit? No
   Is the course offered at more than one level? No
   If yes to either question, please list additional Alpha/Numeric codes:
   a. ____________________________ b. ____________________________ c. ____________________________
   Approval of other academic unit (signature):
   Name and title:
   If course is to be offered at more than one level, attach an explanation of the different requirements that students must meet for each level. If the requirements are the same for each level, justification must be provided.

7. Credit hours: Fixed: 3 or Variable: ______ to ______

8. Delivery Mode:
   a. Activity Type:
      Primary: Lecture, Secondary: ____________ Tertiary: ______
   b. Credit Hours: 3
   c. Weekly Contact Hours: 3

9. Terms offered: X Fall X Spring X Summer
   Years offered: X Every Year X Alternate Years

10. Are students permitted to register for more than one section during a term? No
    May the course be repeated for credit? X No X Yes
    Maximum Hours: ______

11. Grading system:
    Undergraduate
    ___ Normal Grading (A-F, PS/NC, PR, I)
    ___ Passing Grade/No Credit (A-C, NC)
    ___ Credit/No Credit
    ___ Grade Only (A-F, PR, I)
    ___ Audit only
    ___ No Grade
    Graduate
    ___ Normal Grading (A-F, PS/NC, PR, I)
    ___ Grade Only (A-F)
    ___ Satisfactory/Unsatisfactory (G only)
    ___ Audit only
    ___ No Grade

12. Prerequisites (must be taken before): Graduate Standing a. ____________________________
    Co-requisites (must be taken together): a. ____________________________
                                          b. ____________________________
                                          c. ____________________________

13. If course is to be replaced, course(s) will be deleted, and when should that deletion occur?
    Course to be removed from inventory
    Final Term to be offered
    a. ____________________________
    b. ____________________________

14. Catalog description (30 words maximum):
    A course in analysis for engineers. Topics include: Linear differential equations, continuous and discrete series representations. Laplace transforms, matrix methods, eigenvalues and eigenvectors, systems of equations.

Form Revised January 2001
Office of the Provost
Curriculum & Schedule Management
15. Attach a copy of a complete outline of the major topics covered. (Providing a syllabus that includes this information is acceptable.)

16. Where does this course fit in the University/College/Department curriculum? (Be specific by course level, if applicable). Indicate prospective demand.

The ENGT-5500 will be offered to students enrolled in the Master of Science in Engineering program.

17. If the proposed course is similar to another course in the College or University, please describe the difference and provide a rationale for the duplication. (If this course duplicates material covered in another course within your department or college or in another college, attach a letter of endorsement from that area’s dean and department chairperson indicating their support. Clarify the manner in which this course will differ).

18. If the course is intended to meet a University Undergraduate Core requirement, complete the following:
   a. Explain how this course fulfills the guidelines established for the competency area identified. Guidelines are available from Faculty Senate Office, UH 3320, x2112 or x2182.

   b. Identify the intellectual competencies which this course is intended to fulfill: Inquiry; Communication; Understanding mathematical and quantitative concepts; historical consciousness and social awareness; scientific inquiry; values; aesthetic mode of thinking; information acquisition and use.

   c. How does this course develop the intellectual competencies identified?

**Course Approval:**

Department Curriculum Authority: _______________________________ 10/21/05
Department Chairperson: _______________________________ 10-21-05
College Curriculum Authority: _______________________________ 10/25/05
College Dean: _______________________________ 11/01/05

After college approval, submit the original signed form plus 14 copies to the Faculty Senate (UH 3220) for undergraduate-level courses; for graduate-level courses submit the original signed form plus 6 copies to the Graduate School (UH 3240). For undergraduate/graduate dual-level courses, submit the proposals to each office.

University Undergraduate Curriculum Committee or Graduate Council: _______________________________ 2-7-2006

Office of the Provost: _______________________________ 2/22/06

*Form Revised January 2001*

*Curriculum & Schedule Management*
COLLEGE OF ENGINEERING
DEPARTMENT OF ENGINEERING TECHNOLOGY

SYLLABUS

COURSE APPLICATIONS OF ENGINEERING ANALYSIS
(ENGT-5500)

PREREQUISITE Graduate Standing

CREDIT 3 semester hours


DESCRIPTION A course in analysis for engineers. Topics include, linear differential equations, continuous and discrete series representations, Laplace Transforms, matrix methods, eigenvalues and eigenvectors, systems of equations. Emphasis will be placed on applications and on software assisted mathematics

INSTRUCTOR Dr. Ella Fridman

OFFICE Scott Park Campus, Engineering Technology Center
Office # 1124
Office Hours MW 3:30-5:30pm
Phone: 419-530-3273
Fax : 419-530-3068
E-mail: Ella.Fridman@utoledo.edu

COURSE OBJECTIVES

On completion of the course students should:

a) understand and be able to develop mathematical models of physical systems using methods studied in the course

b) greatly enhance their capability to confront and solve ordinary differential equations and eigenvalue problems and become adept at using numerical methods for solution of these problems

c) learn to solve problems involving linear algebraic equations and appreciate the application of these equations in many fields of engineering

d) recognize how the Fourier series is used to fit data with periodic functions as well as applications of Fourier transforms in the field of engineering

e) acquire sufficient computer skills to develop their own programs using MATLAB software package
f) learn to use analytical as well as numerical methods to attack and solve practical problems arising in industry.

GRADING POLICY.

Every student is required to complete all quizzes and take final exam. The grade will be calculated using weight

<table>
<thead>
<tr>
<th>Quizzes</th>
<th>30%</th>
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<tbody>
<tr>
<td>Home Work</td>
<td>30%</td>
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<tr>
<td>Final Exam: Comprehensive</td>
<td>40%</td>
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</table>

Each student will be expected to contribute to the on-going threaded discussion appearing on the Class Discussion Page (Bulletin Board) and to participate in the Chat Room discussions.

GRADE: 
\[ A \geq 90.0; 90.0 > A^- \geq 87.0; 87.0 > B^+ \geq 84.0; 84.0 > B^- \geq 80.0; 80.0 > B \geq 77.0; 77.0 > C^+ \geq 74.0; 74.0 > C^- \geq 70.0; 70.0 > C^- \geq 67.0; 67.0 > D^+ \geq 64.0; 64.0 > D^- \geq 60.0; 60.0 > D^- \geq 57.0; F \leq 57.0 \]

COURSE OUTLINE

<table>
<thead>
<tr>
<th>1.1</th>
<th>Supplement Ch. 1-5</th>
<th>MATLAB</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Mathematical Modeling</td>
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<td>Starting with MATLAB</td>
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<table>
<thead>
<tr>
<th>1.2</th>
<th>Supplement Ch. 6-10</th>
<th>Programming in MATLAB</th>
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<tbody>
<tr>
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<td>Applications in Numerical Analysis</td>
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<tr>
<th>2</th>
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<th>Ordinary Differential Equations (ODE)</th>
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<thead>
<tr>
<th>2.1</th>
<th>Ch.1.1-1.7</th>
<th>Separation of Variables</th>
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<tr>
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<td>Exact Differential Equations</td>
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<tr>
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<td>Integrating Factors</td>
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<td>Linear Differential Equations</td>
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<table>
<thead>
<tr>
<th>2.2</th>
<th>Ch.1.7-1.9</th>
<th>Modeling with First order ODE</th>
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<tbody>
<tr>
<td></td>
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<td>Radiocarbon Dating</td>
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<td>Mixing Problem</td>
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<td>Heat Transfer Problem (Newton's Law of Cooling)</td>
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<td>Boyle-Marriott's Law for Ideal Gases</td>
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<td>Outflow from the Tank, Torrichelli's Law</td>
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<td>Electric Circuits</td>
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</table>

| 2.3 | Ch.2.1-2.9 | Second Order Linear ODE |
| 2.4 | Ch.2.11-2.12 | Homogeneous and Nonhomogeneous Equations with Constant Coefficients
|     |             | Modeling with Second Order ODE
|     |             | Free Oscillations (Mass-Spring Systems)
|     |             | Pendulum
|     |             | Torsional Vibrations
|     |             | Forced Oscillations. Resonance
|     |             | Electric Circuits
| 2.5 | Ch.19.1-19.3 | Numerical Solutions of ODE
|     |             | Euler's Method
|     |             | Runge-Kutta Methods
|     |             | Project (Bungee Jump)
| 3   |             | Linear Algebra
| 3.1 | Ch.6.1-6.7  | Basic Operations with Matrices
|     |             | Linear Systems of Equations
|     |             | Gauss Elimination
|     | Ch.7.1-7.2  | Determinants
|     |             | Eigenvalue Problems.
|     |             | Applications:
|     |             | a) Stretching of an Elastic Membrane
|     |             | b) Mass-Spring Systems with Several
|     |             | Masses and Springs
| 3.2 | Ch.18.1-18.8| Numerical Methods in Linear Algebra
|     |             | Gauss Jordan Method
|     |             | LU Decomposition
|     |             | Iterative Methods
| 3.3 | Ch.3.1-3.6  | Systems of Differential Equations
|     |             | Homogeneous Linear Systems
|     |             | with Constant Coefficients
|     |             | Applications:
|     |             | Mixing Problem Involving Two Tanks
|     |             | Electrical Network
| 4   |             | Laplace Transforms
| 4.1 | Ch. 5.1-5.7 | Laplace Transform, Inverse Laplace Transform
|     |             | Solving Differential Equations with Laplace Transform
|     |             | Models of Electric Circuits
| 5   |             | Fourier Analysis
| 5.1 | Ch. 10.1-10.6| Continuous Fourier Series
|     |             | Forced Oscillations
| 5.2 | Ch.10.9-10.11| Discrete Fourier Transform
|     |             | Fast Fourier Transform
|     |             | The Power Spectrum
| 5.3 |             | Signal Processing Applications
|     |             | (Project)