**TRIAL COURSE OR NEW COURSE PROPOSAL**

**SUBMITTED BY:**

<table>
<thead>
<tr>
<th>Department</th>
<th>ECE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepared by</td>
<td>Bill Bristow</td>
</tr>
<tr>
<td>Email Contact</td>
<td><a href="mailto:Bill.Bristow@gi.alaska.edu">Bill.Bristow@gi.alaska.edu</a></td>
</tr>
<tr>
<td>College/School</td>
<td>CEM</td>
</tr>
<tr>
<td>Phone</td>
<td>7357</td>
</tr>
<tr>
<td>Faculty Contact</td>
<td>Bill Bristow</td>
</tr>
</tbody>
</table>

1. **ACTION DESIRED**
   
   (CHECK ONE):
   
<table>
<thead>
<tr>
<th>Trial Course</th>
<th>New Course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

2. **COURSE IDENTIFICATION**

   Dept: EE  
   Course #: 614  
   No. of Credits: 3  

   Justify upper/lower division status & number of credits: This will be a graduate level lecture course with three contact hours per week. Content will require the background level expected of graduate students.

3. **PROPOSED COURSE TITLE:**

   Numerical Methods for Electrical Engineers

4. **To be CROSS LISTED?**

   YES/NO

   (Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. **To be STACKED?**

   YES/NO

   If yes, Dept:  
   Course #:

6. **FREQUENCY OF OFFERING:**

   Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. **SEMESTER & YEAR OF FIRST OFFERING** (if approved)

8. **COURSE FORMAT:**

   NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

<table>
<thead>
<tr>
<th>COURSE FORMAT:</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>(check all that apply)</td>
<td>6 weeks to full semester</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   OTHER FORMAT (specify)

   Mode of delivery (specify lecture, field trips, labs, etc)

9. **CONTACT HOURS PER WEEK:**

<table>
<thead>
<tr>
<th>LECTURE hours/week</th>
<th>LAB hours/week</th>
<th>PRACTICUM hours/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See [http://www.uaf.edu/uafgov/faculty/cc/credits.html](http://www.uaf.edu/uafgov/faculty/cc/credits.html) for more information on number of credits.

   OTHER HOURS (specify type)

10. **COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):**

   This course will present the basic techniques for numerical solution of the problems of electrical and computer engineering. Many areas of electrical engineering require analysis of systems that cannot be adequately addressed via analytical means and require numerical modeling. Examples of such electrical engineering problems will be used as a vehicle for study of the necessary numerical techniques. In each class of problem, the basic techniques will be presented, the students will be required to write software for their solutions, and available software packages will be examined.
11. **COURSE CLASSIFICATIONS:** (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

   - H = Humanities
   - S = Social Sciences

   Will this course be used to fulfill a requirement for the baccalaureate core?
   - YES
   - NO

   If YES, check which core requirements it could be used to fulfill:
   - O = Oral Intensive, Format 6
   - W = Writing Intensive, Format 7
   - Natural Science, Format 8

12. **COURSE REPEATABILITY:**

   Is this course repeatable for credit?
   - YES
   - NO

   Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

   How many times may the course be repeated for credit?
   - TIMES

   If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?
   - CREDITS

13. **GRADING SYSTEM:** Specify only one.

   - LETTER: 
   - PASS/FAIL: 

14. **RESTRICTIONS ON ENROLLMENT (if any)**

15. **PREREQUISITES**  
    Graduate standing in Electrical or Computer Engineering, or permission of instructor

   These will be required before the student is allowed to enroll in the course.

   **RECOMMENDED**  
    Electromagnetic Waves, Digital Signal Processing, Programming in C and Matlab

   Classes, etc. that student is strongly encouraged to complete prior to this course.

16. **SPECIAL RESTRICTIONS, CONDITIONS**

17. **PROPOSED COURSE FEES**

   Has a memo been submitted through your dean to the Provost & VCAS for fee approval?
   - Yes
   - No

18. **PREVIOUS HISTORY**

   Has the course been offered as special topics or trial course previously?
   - Yes
   - No

   If yes, give semester, year, course #, etc.: Spring 2006

19. **LIBRARY COLLECTIONS**

   Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

   - No
   - Yes

   No special library requirements

20. **IMPACTS ON PROGRAMS/DEPTS**

   What programs/departments will be affected by this proposed action?
   Include information on the Programs/Departments contacted (e.g., email, memo)

   none

21. **POSITIVE AND NEGATIVE IMPACTS**

   Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.
JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

This course has been offered previously on a trial basis and was quite successful. It is anticipated that the course will become a regular offering of the department. It fits with the core of a graduate EE curriculum.

APPROVALS:

Signature, Chair, Program/Department of: [Redacted] Date 5/29/10

Signature, Chair, College/School Curriculum Council for: [Redacted] Date 10/9/10

Signature, Dean, College/School of: [Redacted] Date 10/14/10

Signature of Provost (if applicable)

Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair, UAF Faculty Senate Curriculum Review Committee Date

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

Signature, Chair, Program/Department of: Date

Signature, Chair, College/School Curriculum Council for: Date

Signature, Dean, College/School of: Date
ATTACH COMPLETE SYLLABUS (as part of this application).
Note: The guidelines are online: http://www.uaf.edu/uafgov/faculty/cd/syllabus.html
The department and campus wide curriculum committees will review the syllabus to ensure that each of the items listed
below are included. If items are missing or unclear, the proposed course change will be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES
During the first week of class, instructors will distribute a course syllabus. Although modifications may be
made throughout the semester, this document will contain the following information (as applicable to the
discipline):

1. Course information:
   - Title, □ number, □ credits, □ prerequisites, □ location, □ meeting time
   (make sure that contact hours are in line with credits).
2. Instructor (and if applicable, Teaching Assistant) information:
   - Name, □ office location, □ office hours, □ telephone, □ email address.
3. Course readings/materials:
   - Course textbook title, □ author, □ edition/publisher.
   - Supplementary readings (indicate whether □ required or □ recommended) and
   - any supplies required.
4. Course description:
   - □ Content of the course and how it fits into the broader curriculum;
   - □ Expected proficiencies required to undertake the course, if applicable.
   - □ Inclusion of catalog description is strongly recommended, and
   - □ Description in syllabus must be consistent with catalog course description.
5. □ Course Goals (general), and (see #6)
6. □ Student Learning Outcomes (more specific)
7. Instructional methods:
   - □ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction,
   - studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video
   - conferencing, etc.).
8. Course calendar:
   - □ A schedule of class topics and assignments must be included. Be specific so that it is clear that the
   - instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say
   - "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work
   - in Progress to allow for modifications during the semester.
9. Course policies:
   - □ Specify course rules, including your policies on attendance, tardiness, class participation, make-up
   - exams, and plagiarism/academic integrity.
10. Evaluation:
    - □ Specify how students will be evaluated, □ what factors will be included, □ their relative value, and
    - □ how they will be tabulated into grades (on a curve, absolute scores, etc.)
11. Support Services:
    - □ Describe the student support services such as tutoring (local and/or regional) appropriate for the
    - course.
12. Disabilities Services:
    - The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that
    - UAF students have equal access to the campus and course materials.
    - □ State that you will work with the Office of Disabilities Services (208 WHIT, 474-5655) to provide
    - reasonable accommodation to students with disabilities.”
EE-614 Numerical Techniques for Electrical Engineering - 3 credits

**Prerequisites:** Graduate standing in Electrical Engineering or approval of instructor. Recommended: background in electromagnetic waves, digital signal processing, and programming in C and MATLAB

**Course Description:**
This course will present the basic techniques for numerical solution of the problems of electrical and computer engineering. Many areas of electrical engineering require analysis of systems that cannot be adequately addressed via analytical means and require numerical modeling. Examples of such electrical engineering problems will be used as a vehicle for study of the necessary numerical techniques. For each class of problem, the basic techniques will be presented, the students will be required to write software for their solutions, and available software packages will be examined.

**Course Goals:** The goal of this course is to provide students with an understanding of the numerical techniques typically used in the solution of electrical engineering applications.

**Learning Outcomes:** Students will learn
1. Numerical formulation of problems
2. Solutions of nonlinear equations
3. Systems of nonlinear equations
4. Eigenvalues and eigenvectors
5. Numerical solution of differential equations

Instructor: William Bristow Elvey 701D, Ph: 474-7357
E-Mail: Bill.Bristow@gj.alaska.edu
Office Hours: MWF 9:30-10:30 PM in Duckering 207

Lectures: MWF, 10:30-11:30 AM, Duckering 232

**Potential Texts:**
Applied Numerical Methods for Engineers and Scientists, Rao, Prentice Hall

**Grading:** Course grade will be determined from: 30% homework, 40% in class examinations, 30% project.

**Evaluation:** Numerical scores will be given for all assignments. Final grades will be based upon a curve.

**Course readings:** Weekly readings from the text will be assigned, with supplementary materials provided.
**Instructional methods:** The course is primarily delivered through lectures, though there will be some in class discussion. In addition there will be weekly programming assignments.

**Course policies:** Attendance is not mandatory, though highly recommended. Late homework is not accepted.

**Course Outline:**

1. **Foundations.**
   - A. Introduction.
   - B. Nonlinear Equations
   - C. Simultaneous Linear Equations.
   - D. Eigenvalues and Eigenvectors.
   - E. Curve Fitting and Interpolation.

2. **Numerical Differentiation and Integration.**
   - A. Differentiation.
   - B. Basic Numerical Integration.
   - C. Better Numerical Integration.

3. **Ordinary Differential Equations: Initial-Value Problems.**
   - A. Taylor Methods.
   - B. Runge-Kutta Methods.
   - C. Multistep Methods.
   - D. Stability.
   - E. Methods of Modern Computing.

4. **Ordinary Differential Equations: Boundary-Value Problems.**
   - A. Shooting Method for Linear BVP.
   - B. Shooting Method Nonlinear BVP.
   - C. Finite-Difference Method for Linear BVP.
   - D. Finite-Difference Method for Nonlinear BVP.
   - E. Methods of Modern Computing.

5. **Partial Differential Equations.**
   - A. Classification of PDE.
     - i. Heat equation: Parabolic PDE.
     - ii. Wave equation: Hyperbolic PDE.
     - iii. Poisson Equation - Elliptic PDE.
   - B. Finite Element Method for an Elliptic PDE.
   - C. Methods of Modern Computing.
Disabilities Services: The Office of Disability Services implements the American with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.