FORMAT 1

Submit original with signatures + 1 copy + electronic copy to UAF Governance.

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	**ECE**	**College/School**	**CEM**
Prepared by	**Bill Bristow**	**Phone**	**7357**
Email Contact	**Bill.Bristow@gi.alaska.edu**	**Faculty Contact**	**Bill Bristow**

1. ACTION DESIRED (CHECK ONE): Trial Course [ ] New Course [X]

2. COURSE IDENTIFICATION: Dept **EE** Course # **668** No. of Credits **3**

Justify upper/lower division status & number of credits:

Course will present radar systems at a level appropriate to graduate students. This is an advanced topic for which a graduate background is required. The course will meet 3 hours per week and will require a substantial amount of outside work for the students.

3. PROPOSED COURSE TITLE: **Radar Systems**

4. To be CROSS LISTED? *YES/NO* **no** If yes, Dept: [ ] Course # [ ]

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

5. To be STACKED? *YES/NO* **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.

COURSE FORMAT: (check all that apply) [ ] *1* [ ] *2* [ ] *3* [ ] *4* [ ] *5* [X] *6 weeks to full semester*

OTHER FORMAT (specify) [ ]

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

9. CONTACT HOURS PER WEEK: **3** LECTURE hours/weeks [ ] LAB hours /week [ ] PRACTICUM hours /week

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/cd/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):

An introduction to modern radar engineering. Theoretical radar performance calculations will be developed and applied to radars designed for various applications. Consideration will be given to system parameters such as receiver noise, operating frequency, antenna characteristics, target characteristics, radio propagation, transmitted signal modulation, pulse

coding, and methods of detection. Various special purpose radars will be presented including: meteorological radars, scientific radars, and synthetic aperture radars.

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** [x]

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: [x] **PASS/FAIL:** [ ]

RESTRICTIONS ON ENROLLMENT (if any)

14. 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

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

15. SPECIAL RESTRICTIONS, CONDITIONS

16. PROPOSED COURSE FEES $

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

17. PREVIOUS HISTORY

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

If yes, give semester, year, course #, etc.: Spring 1999, Spring 2005

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

None. Will be offered in place of another graduate course.

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 [x] 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:

Charles E Mayer — Date 9/29/10
Signature, Chair, Program/Department of: ECE

Debasmita Misra — Date 10/7/10
Signature, Chair, College/School Curriculum Council for: CEM

Date 10/11/10
Signature, Dean, College/School of: CEM

Date
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

Date
Signature, Chair, UAF Faculty Senate Curriculum Review Committee

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

Date
Signature, Chair, Program/Department of:

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

Date
Signature, Dean, College/School of:

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 668 – RADAR SYSTEMS

Course Outline

Radars are an important and fascinating topic of modern electrical engineering and physics. They are used for a variety of purposes including tracking of aircraft, missiles, satellites, and ships at sea. In addition, they are used for meteorological and space physics remote sensing, and for remote sensing the earth's surface from space. Whatever their purpose, all radars operate under the same basic principles. In this course, we will develop an understanding of these principles and will examine some of the specializations of different types of radars.

Course Content: An introduction to modern radar engineering. Theoretical radar performance calculations will be developed and applied to radars designed for various applications. Consideration will be given to system parameters such as receiver noise, operating frequency, antenna characteristics, target characteristics, radio propagation, transmitted signal modulation, pulse coding, and methods of detection. Various special purpose radars will be presented including: meteorological radars, scientific radars, and synthetic aperture radars.

Course Goals: The goal of this course it to provide students with an understanding of the performance and design of radar systems.

Learning Outcomes: Students will learn

1) How to determine the power received given radar parameters and target characteristics.
2) How target shape determines its scattering cross section
3) How received power and noise determine detectability
4) Signal design for detection and resolution
5) Target parameter estimation
6) Radar system design

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

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

Text: Radar Principles by Peyton Peebles, Wiley Interscience

Homework: Problems will be assigned weekly. A research project will be required.

Examinations: One midterm exam and one final exam.

Grading: 30% Homework, 30% Project, 20% Midterm, 20% Final

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.

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

Support Services: No support services

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.

TENTATIVE COURSE ORGANIZATION

DATE	TOPIC	CHAPTER
JAN 21	INTRODUCTION TO RADAR SYSTEMS	
JAN 24	RADAR EQUATION	4
JAN 26 – FEB 4	RADAR CROSS SECTIONS	5
FEB 7 – FEB 16	DETECTION	9
FEB 18 – FEB 21	RADAR SIGNALS	6
FEB 23 – FEB 25	RESOLUTION (AMBIGUITY FUNCTION)	8
FEB 28 – MAR 9	PULSE COMPRESSION	7
MAR 11	MID TERM	
MAR 21 – APR 8	PARAMETER ESTIMATION	10, 11, 12, 2
APR 11 – APR 13	DSP IN RADAR	15
APR 15 – MAY 6	SYSTEM COMPONENTS CONSIDERATIONS	
	OVERALL SYSTEMS	
	TRANSMITTERS	
	RECEIVERS	
	ANTENNAS	3
	DATA PROCESSING ELECTRONICS	
	CONTROL ELECTRONICS	
	SPECIAL TOPICS	

MILITARY RADARS
METEOROLOGICAL RADARS
SPACE SCIENCE RADARS
SYNTHETIC APERTURE RADARS