7. Change in Curriculum

**Dwight Look College of Engineering**
Department of Aerospace Engineering
B.S. in Aerospace Engineering

**New Courses**

**AERO 220. Introduction to Aerospace Computation. (1-2). Credit 2.**
Introduction to the basic skills required for developing computer programs that solve aerospace engineering problems; engineering and math background from previous and concurrent courses will serve as the theoretical basis and motivation for programming assignments; an integrated development environment will be used for code writing, compilation, debugging, and organization. Prerequisite: AERO 211 or registration therein.

**AERO 428. Electromagnetic Sensing for Space-Borne Imaging. (3-0). Credit 3.**
Study IR and Visible range imaging systems to obtain high resolution imaging of objects from space; this area has numerous applications and areas of advanced development; following instruction in needed background on optics, telescopes, and interferometry, perform preliminary design of imaging system with a different imaging design offered each year. Prerequisite: AERO 306, 351, 421.
November 26, 2007

MEMORANDUM

TO: Robert Knight
    Chair, University Curriculum Committee

FROM: Jo W. Howze
      Senior Associate Dean for Academic Programs

SUBJECT: Proposed Changes for Bachelor of Science in Aerospace Engineering

The Dwight Look College of Engineering is proposing changes to the Bachelor of Science degree in Aerospace Engineering. The proposed changes originated in the Department of Aerospace Engineering and were approved by the College-level Undergraduate Curriculum Committee. This package includes:

- Proposed new B.S. Curriculum in Aerospace Engineering (Fall 2008, Catalog 131)
- Department Request for a New Course – AERO 220 Introduction to Aerospace Computation
- Departmental Request for a New Course – AERO 428 Electromagnetic Sensing for Space-Borne Imaging

The intention is to have the new curriculum approved and listed in Catalog 131 for Fall 2008.
TO: Donald D. Carter, Registrar

FROM: Helen L. Reed, Department Head of Aerospace Engineering

DATE: November 12, 2007

RE: Change to Catalog 131

The attached curriculum sheet outlines one change in Catalog 131 from Catalog 130 for a Bachelor of Science in Aerospace Engineering. We request that 2 credit hours from a senior year AERO Technical Elective be used in the form of a new course, AERO 220. This course will be completed by students concurrently taking AERO 201, 211, and 213, and will be taken the first semester of the student’s sophomore year. Thank you for your consideration.
# CURRICULUM IN AEROSPACE ENGINEERING
(Catalog #131, 2008-2009)

## FRESHMAN

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MATH 151 (3-2) CBK, 1</td>
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<tr>
<td>ENGR 111 (1-3) CBK, 1</td>
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<td>MATH 151R</td>
</tr>
<tr>
<td>PHYS 218 (3-3) CBK, 1</td>
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<td>MATH 151R</td>
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<td>ENGL 104 (3-0) CBK, 1</td>
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<td>UCC Elective</td>
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## SOPHOMORE

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>MATH 251 (3-0)</td>
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<td>MATH 152</td>
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<tr>
<td>AERO 201 (3-0)</td>
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<td>AERO 211 (2-2)</td>
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<td>MATH 251R</td>
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<td>AERO 213 (2-2)</td>
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<td>MATH 251R, AERO 211R</td>
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<td>AERO 220 (2-0)</td>
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<td>UCC Electives</td>
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## JUNIOR

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<tr>
<th>Course</th>
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<tbody>
<tr>
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<tr>
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<td>MATH 308</td>
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<tr>
<td>AERO 302 (1-3)</td>
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<td>AERO 301R</td>
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<tr>
<td>AERO 304 (4-0)</td>
<td>4</td>
<td>AERO 320R, MATH 308</td>
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<tr>
<td>AERO 310 (3-0)</td>
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<td>UCC Elective</td>
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<td>Tech Writing (3-0)</td>
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<td>ENGL 104</td>
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## SENIOR

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>AERO 401 (2-3)</td>
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<td>AERO 303/306/351/421</td>
</tr>
<tr>
<td>AERO 423 (3-0)</td>
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<td>Total</td>
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## TOTAL CREDIT HOURS 134

Notes:

**CBK** To be admitted to upper division, a 2.85 GPR is required in both the common body of knowledge (CBK) courses and all TAMU courses.

**R** Or registration therein (co-requisite).

**W** Designated as TAMU Writing Intensive Course required by UCC committee.

1 Requires a grade of "C" or better (includes all courses that are used as prerequisites for the AERO degree plan courses).

2 To be selected from the University Core Curriculum (UCC). Of the 18 hours shown as UCC electives, 3 must be from visual and performing arts (VPA), 3 from social and behavioral sciences (SBS), 6 from U.S. history, 6 from POLS 206 and 207, and 6 from international and cultural diversity (ICD). The ICD requirement may be met by courses satisfying the VPA, SBS, and history requirements if they are also on the list of ICD courses.

3 To be selected from ENGL 210 or 301.

4 To be selected from PHYS 222, 306, 309 or 314.

5 To be selected from AERO 430 or MATH 401.

6 AERO 405, 417, 426, 428, or 472, (or 489 if designated as an AERO design elective). Requires a grade of "C" or better in prerequisite courses.

7 Approved technical electives include: AERO 404, 405, 406, 417, 419, 420, 422, 424, 425, 426, 428, 430, 435, 440, 445, 472, 485H or 491H (maximum of 3 hours with prior written approval of department head, senior classification). 489; MEMA 467; ECEN 421; ENGR 385 (3 hours). Requires a grade of "C" or better in prerequisite courses. Courses cannot double count for Design Elective, Technical Elective, or Computational Methods/Mathematics. AERO 485H or 491H and ENGR 385 cannot both count for Technical Elective credit.
# Previous CURRICULUM IN AEROSPACE ENGINEERING

(Catalog #130, 2007-2008)

## FRESHMAN

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>MATH 151 (3-2)</td>
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<td>MATH 151R</td>
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<td>ENGL 104 (3-0)</td>
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<tr>
<td>UCC Electives 2</td>
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<tr>
<td>KINE 198 (0-2)</td>
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(17)

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<td>AERO 201, AERO 320R, MATH 308</td>
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<tr>
<td>AERO 304 (4-0)</td>
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<td>AERO 310 (3-0)</td>
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<td>UCC Elective 2</td>
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<tr>
<td>Tech Writing (3-0)</td>
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<td>ENGL 104</td>
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(18)

## SENIOR

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<tr>
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<td>AERO 303/306/351/421</td>
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<td>AERO 423 (3-0)</td>
<td>3</td>
<td>AERO 421</td>
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<tr>
<td>Computational Methods/Mathematics</td>
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<td>MATH 308</td>
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<td>Design Elective 6</td>
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<tr>
<td>Technical Elective 7</td>
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<td>see course descriptions</td>
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</table>

(15)

## TOTAL CREDIT HOURS 134

Notes:

- CBK To be admitted to upper division, a 2.85 GPR is required in both the common body of knowledge (CBK) courses and all TAMU courses.
- R Or registration therein (co-requisite).
- W Designated as TAMU Writing Intensive Course required by UCC committee.
- 1 Requires a grade of “C” or better (includes all courses that are used as prerequisites for the AERO degree plan courses).
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- 7 Approved technical electives include: AERO 404, 405, 406, 417, 419, 420, 422, 424, 425, 426, 430, 435, 440, 445, 472, 485H (maximum of 3 hours with prior written approval of department head, senior classification), 489; MEMA 467; ECEN 421; ENGR 385 (3 hours); NUEN 401. Requires a grade of “C” or better in prerequisite courses. Courses cannot double count for Design Elective, Technical Elective, or Computational Methods/Mathematics.
Texas A&M University
Departmental Request for a New Course
Undergraduate • Graduate • Professional
Submit original form and attach a course syllabus.

1. This request is submitted by the Department of Aerospace Engineering.

2. Course prefix, number and complete title of course: AERO 220 - Introduction to Aerospace Computation

3. Course description (not more than 50 words): Introduction to the basic skills required for developing computer programs that solve aerospace engineering problems. The engineering and math background from previous and concurrent courses will serve as the theoretical basis and motivation for programming assignments. An integrated development environment will be used for code writing, compilation, debugging, and organization.

4. Prerequisite(s) AERO 211, or registration therein Cross-listed with Cross-listed courses require the signature of both department heads.

5. Is this a variable credit course? ☑ Yes ☐ No If yes, from ____ to ____.

6. Is this a repeatable course? ☑ Yes ☐ No If yes, this course may be taken ____ times. Will the course be repeated within the same semester/term? ☑ Yes ☐ No

7. Has this course been taught as a 289/489/689? ☑ Yes ☐ No If yes, how many times? 1 Indicate the number of students enrolled for each academic period it was taught. Fall 2007 - 16

8. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history) B.S. in Aerospace Engineering
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

10. Prefix Course # Title (excluding punctuation) AERO 220 INTRO AERO COMPUTATION

<table>
<thead>
<tr>
<th>Lect.</th>
<th>Lab</th>
<th>SCH</th>
<th>Subject Matter Content Code</th>
<th>Admin. Unit</th>
<th>Acad. Year</th>
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<td>0</td>
<td>2</td>
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<td>0</td>
</tr>
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</table>

Approval recommended by: Head of Department 11/15/07

Chair, College Review Committee 11-26-07

Head of Department (if cross-listed course) Date

Dean of College Date

Submitted to Coordinating Board by: Director of Academic Support Services Date

Questions regarding this form should be directed to Sandra Williams at 845-8836.
OAR/AS – 04/07

6 of 23 H
Aero 220 (1-2)  
Introduction to Aerospace Computation

This is to be a 2 credit hour course offered as 1 lecture hours and 2 recitation/lab hours per week.

Instructor: John Whitcomb, Ph.D., P.E., Professor, Aerospace Engineering Dept. 724 HRBB, (979) 845-4006, jdw@tamu.edu. Other faculty as appropriate.

Textbook: C++ Primer Plus by Stephen Prata

Prerequisites: AERO 211, or registered therein

Attendance: Attendance is considered to be very important.

Course description
This course introduces the basic skills and strategies required for developing computer programs that solve aerospace engineering problems. After a brief introduction of the types and merits of various computer languages, including FORTRAN and MATLAB, the course will focus on learning the basic concepts of the C++ programming language required to solve engineering problems. Programming assignments will be designed to illustrate not only the programming language, but also how to solve aerospace engineering problems using the computer. Engineering problems will be selected to maximize integration with Aerospace Engineering courses that would be taken concurrently, such as Aero 201, 211, and 213. The course will describe the use of an integrated development environment for code writing, compilation, debugging, and organization.

Learning objectives
As a result of this course, the student should be able to

1. Use knowledge of engineering theory to develop computer programs using a compiled language that solve sophomore level aerospace engineering problems. These programs would be implemented in a compiled language.
2. Translate manipulations required for hand solution into a form that is convenient for computer implementation
3. Write programs to perform statistical analysis, smoothing, or change of units for large data sets
4. Write a program to read the geometry of arbitrary irregular polygonal shapes from an input file and determine their properties, such as area, centroid, and moments of inertia.
5. Implement basic linear algebra operations using a programming language
6. Write a program to predict the dynamic behavior of a rigid body subjected to time varying forces due to gravity, springs, or surrounding fluid.
7. Write a program to analyze statically determinate truss structures using the method of joints
8. Write and debug modular programs consisting of a diverse collection of functions that perform data input/output, generic mathematical manipulation, and evaluation of engineering formulas.

**Grading**

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<th>Category</th>
<th>Percentage</th>
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<tr>
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<td>Short quizzes</td>
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<td>Tests</td>
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<tr>
<td>Final Exam</td>
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<th>Classes</th>
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<td>Introduction to computation</td>
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<tr>
<td>- Role of computation</td>
<td></td>
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<tr>
<td>- History</td>
<td></td>
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<tr>
<td>- Hardware</td>
<td></td>
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<tr>
<td>- Types of languages</td>
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<tr>
<td>Components of a compiled language</td>
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<tr>
<td>Working with a compiled language at the console and using an IDE</td>
<td>2</td>
</tr>
<tr>
<td>Basic data manipulation</td>
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</tr>
<tr>
<td>- Conversion between units of measure</td>
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<tr>
<td>- Statistical analysis</td>
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<td>- Sorting of a simple list</td>
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<tr>
<td>Vector and matrix operations</td>
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<tr>
<td>- Dot and cross products</td>
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<tr>
<td>- Vector transformation</td>
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<tr>
<td>- Matrix multiplication</td>
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<tr>
<td>Calculation of section properties of irregular shapes</td>
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<tr>
<td>- Centroid</td>
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<tr>
<td>- Moment of inertia</td>
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<tr>
<td>Dynamics of a point mass (1D and 2D)</td>
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<tr>
<td>Motion of a body in a fluid</td>
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<tr>
<td>Advanced data manipulation</td>
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<td>- Data smoothing via moving averages</td>
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<td>- Sorting of tabular data</td>
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<tr>
<td>Dynamics of spring-mass systems</td>
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<td>- Single mass and spring</td>
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<tr>
<td>- Multiple masses and springs (optional)</td>
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<tr>
<td>Analysis of statically determine truss (method of joints)</td>
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<td>Overview of Fortran</td>
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Academic Integrity Statement
"An Aggie does not lie, cheat, or steal or tolerate those who do."
See http://www.tamu.edu/aggiehonor for more details.

ADA Notice: The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall or call 845-1637.
Shryock, Kristi

From: Whitcomb, John
Sent: Wednesday, August 22, 2007 11:44 AM
To: Shryock, Kristi; Reed, Helen
Subject: approval

-----Original Message-----
From: Valerie Elaine Taylor [mailto:taylor@cs.tamu.edu]
Sent: Tuesday, July 24, 2007 4:12 PM
To: Whitcomb, John; jdw@tamu.edu
Cc: Jennifer L. Welch; Bjarne Stroustrup; Reed, Helen; jdw@tamu.edu; Taylor, Valerie
Subject: RE: more on proposed Aero course

Hi John:

I am sending this email as a follow-up to our phone conversation today. The UGCC approved the proposed Aero course. It is good that you will continue discussions with Bjarne about his comments.

Thanks,
--Valerie

-----Original Message-----
From: Whitcomb, John [mailto:whit@aeromail.tamu.edu]
Sent: Wednesday, July 04, 2007 10:53 AM
To: Valerie Elaine Taylor; jdw@tamu.edu
Cc: Valerie Elaine Taylor; Jennifer L. Welch; Bjarne Stroustrup; Reed, Helen; jdw@tamu.edu
Subject: RE: more on proposed Aero course

Valerie,

At this point, I do not plan any further modifications to the syllabus based on Bjarne's comments. What he highlights is the challenge we face. I agree with him that there are many potential difficulties... but I am trying to stay optimistic that there are solutions. As with any "optimal design", there are compromises that must be made.

If Bjarne is agreeable, I would really like to discuss his comments and some of my strategies/examples/etc. with him as I flesh out the course.

Please pass on the syllabus to your UGCC for review. I hope that the potential conflict issues have been resolved, but if not, please let me know and we will make further modifications. I am hoping to get back to fleshing out the course details soon, but I would like to make sure we have agreement first.

The suggestions you have made thus far have not changed the course we intended, but it has made it much clearer what we are trying to do. That is important. Thanks.

Have a good 4th.

John

-----Original Message-----
From: Valerie Elaine Taylor [mailto:taylor@cs.tamu.edu]
Sent: Tuesday, July 03, 2007 5:50 PM
To: jdw@tamu.edu
Cc: Taylor, Valerie; Jennifer L. Welch
Subject: FW: more on proposed Aero course
Hello John:

Per our discussion today, I am forwarding the comments along with relevant documents from Bjarne. Please let us know if you plan to make any changes to the AERO 220 syllabus based upon Bjarne's feedback. If so, please send us the revised syllabus. Once we have the revised syllabus, we can provide feedback from the UGCC. I don't foresee problems, but want to provide an opportunity to address Bjarne's comments given he took the time to write some extensive comments and provide additional documents.

Have a good 4th.

--Valerie
Texas A&M University
Departmental Request for a New Course
Undergraduate ♦ Graduate ♦ Professional
• Submit original form and attach a course syllabus.

1. This request is submitted by the Department of Aerospace Engineering

2. Course prefix, number and complete title of course: AERO 428 - Electromagnetic Sensing for Space-Borne Imaging

3. Course description (not more than 50 words): Study IR and Visible range imaging systems to obtain high resolution imaging of objects from space. This area has numerous applications and areas of advanced development. Following instruction in needed background on optics, telescopes, and interferometry, perform preliminary design of imaging system with a different imaging design offered each year.

4. Prerequisite(s) AERO 306, 351, 421 Cross-listed with

5. Is this a variable credit course? ☑ Yes ☐ No If yes, from _______ to _______.

6. Is this a repeatable course? ☑ Yes ☐ No If yes, this course may be taken _______ times. Will the course be repeated within the same semester/term? ☑ Yes ☐ No

7. Has this course been taught as a 289/489/689? ☑ Yes ☐ No If yes, how many times? ______ Indicate the number of students enrolled for each academic period it was taught. Spring 2006 - 31; Spring 2007

8. This course will be:
   a. required for students enrolled in the following degree program(s) (e.g., B.A. in history)
   b. an elective for students enrolled in the following degree program(s) (e.g., M.S., Ph.D. in geography)
      B.S. in Aerospace Engineering

9. If other departments are teaching or are responsible for related subject matter, the course must be coordinated with these departments. Attach approval letters.

10. Prefix Course # Title (excluding punctuation)
    AERO 428 ELECTROMAG SENSING IMG
    Lect. Lab SCH Subject Matter Content Code Admin. Unit Acad. Year FICE Code 03 00 03 1 A 02 01 00 06 01 00 08 - 09 00 3 6 3 2

Approval recommended by:

Head of Department 11/15/07

Head of Department (if cross-listed course) Date

Submitted to Coordinating Board by:

Director of Academic Support Services

Chair, College Review Committee 11/26-07

Dean of College Date

Dean of College 11/26-07

Date Effective Date

Questions regarding this form should be directed to Sandra Williams at 845-8836.
OAR/AS – 04/07

13 of 23 H
Electromagnetic Sensing for Space-Borne Imaging

1. Introduction: Course Description and Learning Goals

2. Course Outline: Class Schedule, and Lecture Topics

Final Presentation at NASA/JPL: April 24, 2008.
Final Report due April 28, 2008

4. Project Discussion: Extra-Solar Planet Detection and Intensity Correlation Array

Instructor:

Prof. D. C. Hyland

Course Textbooks:


Secondary:


Prerequisites: Aero 306, 351, 421
INTRODUCTION

1. Course Description

In this course, we study IR and Visible range imaging systems that can be used to obtain high resolution imaging of space objects. This area has numerous applications and areas of advanced development, including space situational awareness and astronomy. To provide an instructive example, the class is challenged to perform a preliminary design of a system (working either in the visible range or in IR) for detection of extra-solar planets out to 15 parsecs. In the first 20 lectures (meeting every Monday, Wednesday and Friday), students will be instructed in the needed background on optics, telescopes, interferometry and imaging. There will also be lectures on NASA’s Exploration Program, including the Space Interferometry Mission (SIM) and Terrestrial Planet Finder (TPF) Missions. The Instructor serves on the Science Working group of TPF-I. After a mid-term examination, students will be organized into technical specialty teams to address the space system design challenge. In addition to performing the paper design study, students will acquire first-hand knowledge by helping with the integration of the first two observatories of the Intensity Correlation Array (ICA). The ICA is a projected distributed observatory array, using the Hanbury Brown-Twiss effect to achieve ultra-fine resolution astronomical imaging and planet detection from ground-based facilities. With NASA funding, the Instructor is establishing two specially designed observatories on or near the A&M Main Campus. More details are given in Section 4.

Learning Objectives

1) Introduce students to working in teams, including useful rules-of-thumb for understanding people dynamics.
2) Teach students to use/create trade-off diagrams to make engineering decisions.
3) Teach communication skills, both in writing and in presentations.
4) Introduce non-technical design drivers (cost, safety, public policy...).
5) Familiarize students with technical issues concerning space-borne imaging systems.
6) Introduce students to realistic review and design procedures as practiced by NASA and the Air Force.

ADA statement

The Americans with Disabilities Act (ADA) is a federal antidiscrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall or call 845-1637.
2. COURSE OUTLINE

The course consists of two phases.

Phase I is composed primarily of lectures, homework, and group exercises in class. Due to the need for instruction in much new material, this phase covers the first seven weeks of the semester. Lecture topics will include [tentative lecture date]:

1. Introduction to Course and the Design Challenge [1/18];
2. Planet finding techniques, intro. to SIM and TPF [1/20];
3. Review of Maxwell’s equations, EM wave propagation [1/23];
4. Geometric optics approximation: Analysis of lenses and mirrors [1/25];
5. Survey of monolithic telescope designs [1/27];
6. Telescope design: light gathering, types of aberrations, Strehl ratio [1/30];
7. Fourier optics: Kirchoff integral, Huygens-Fresnel principle [2/1];
8. Telescopes revisited: Diffraction limits, PSF, MTF [2/3];
9. Intro. to sparse aperture systems: Sparse primary, interferometers [2/6];
10. Interference phenomena, optical coherence[2/8]
12. Survey of types of interferometry and existing facilities. [2/13]
17. Entry pupil processing (EPP): Classical and quantum equivalences [2/24]
18. EPP approaches: E-field reconstruction, Intensity correlation [2/27]
20. Reprise of imaging techniques: advantages/disadvantages [3/3]

Reading assignments would be given out during class. Homework assignments will be given out each week concerning the previous week’s material. The assignments are given out each Friday in class and are due the following Friday in accordance with the following schedule:

HW #1 Out[1/25], Due [2/1]
HW #2 Out[2/1], Due [2/8]
HW #3 Out[2/8], Due [2/15]
HW #4 Out[2/15], Due [2/22]
HW #5 Out[2/22], Due [2/29]

At the outset, the class will be organized into Research Teams whose main purpose is to help ones peers learn the lecture material and collaborate on solution of the homework problems. Each Friday when an assignment is given out, one of the research teams will be asked to give a short presentation of the team’s solution to one of the previous week’s homework problem. We will meet three times a week during this phase - Mon., Wed., and Fri. An examination would be given at the end of Phase I, on March 7. Before Spring
Break, the class will be organized into Technical Specialty Teams and A Study Manager and Assistant Study Manager will be elected.

Phase II – Beginning immediately after Spring Break and six weeks long - is the conceptual design phase for the design challenge using the technical research done in Phase I. The groups organized at the end of Phase I will have five weeks to create a conceptual mission design as described in the principal text (Larson and Wertz). Special lectures can be given and/or groups can use class time to work together. Weekly meetings will be held for the class management team to brief the instructor on the project status. It is hoped that all students can attend or perform the Final Presentation at NASA/JPL in Pasadena, California on April 24, 2008. The instructor will hold office hours and will serve an active role in working with students. The Final Report describing the conceptual design will be due on April 28, 2008.

<table>
<thead>
<tr>
<th>Grading Scheme</th>
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<tbody>
<tr>
<td>Phase I (50%)</td>
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<tr>
<td>Homework</td>
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<tr>
<td>Homework Presentations</td>
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<tr>
<td>Midterm Exam</td>
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<td>Phase II (50%)</td>
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<tr>
<td>Final Review</td>
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<td>Final Report</td>
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<td>TOTAL</td>
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SPECIAL ASSIGNMENTS

Faculty Advisors - JPL Program Monitors: Our role is to interpret/defend/enforce the provisions of the Design Challenge Performance Specifications. We serve as the “customers” and evaluate designs.

Project Manager: The PM has oversight and ultimate responsibility for the entire project. The PM’s responsibilities include:
- Assuming the leadership role and managing the program
- Being knowledgeable of all aspects of the project and possessing ultimate authority to solve disputes (technical and otherwise)
- Setting agenda for and conducting class sections in Phase II of course
- Being responsible for the report, model, and final presentation
- Acting as the Master of Ceremonies for the final presentation

Assistant Project Manager: The APM assists the PM in carrying out his/her task, but specifically:
- Chairs Systems Engineering Team
- Serves as the liaison between the technical groups and the PM
- Is responsible for all “public relations” aspects of the project
- Takes care of details needed to run the project such as disk space, email aliases, logistics for the final presentation (e.g., refreshments, invitations, etc.).

Technical Group Leader: The TGL is in charge of a small group which specializes in a particular subsystem of the overall design. The TGL’s roles are to:
- Assign appropriate tasks to team members
- Report team progress to the program management team
- Represent group on Systems Engineering Team
- Take responsibility for the team’s portion of the final presentation, and report
- Present the results of trade studies of technical issues to the class and management team
- Work with management and other team leaders to resolve technical issues.

Technical Group Member: A TGM’s goals are to:
- Work to increase the group’s preparedness in the field of specialization
- Support the group by doing research and/or making inquiries
- Making trade studies of technical issues
- Report results to the TGL periodically
- Carry out liaison activities with other groups
- Define and carry out individual contributions to the Final Report and Presentation

Report-Writing Committee: The RWC’s role is to prepare the final report that describes the vehicle design according to the guidelines provided in the specimen contract. The final report is due on April 28. The RWC consists of one member from each technical group, the PM, and the APM. The PM will Chair this committee. The report must be of the highest quality, and must strictly adhere to the guidelines provided by the Mars Program Office.

Final Presentation Team: The FPT consists of all TGL’s, the PM, and the APM. The purpose of the Final Presentation is to present material that is in the final report. The presentation will be given April 24.

MEASUREMENT OF PERFORMANCE

Course grades will be based primarily on the team performance as evidenced by activities throughout the term and the final team report. In addition, near the end of the term team members will be asked to evaluate other team members. These evaluations will be used for fine-tuning of the individual grades. Also, team leaders will evaluate the management team and the management team will evaluate team leaders. No persons will receive a major lowering of their grade as a result of these evaluations without an opportunity to defend their performance. Quantitative evaluations (1 - 10) will be required in six categories:
ATTITUDE
Outstanding in enthusiasm
Very interested and industrious
Average in diligence and interest
Somewhat indifferent
Totally uninterested

WORKING WITH OTHERS
Exceptionally well accepted
Works well in the group setting
Gets along satisfactorily
Works mostly alone, does not communicate

DEPENDABILITY
Can be relied upon to follow through
Above average in dependability
Usually dependable
Sometimes neglectful or careless
Unreliable, can’t be counted on to follow through

QUANTITY OF WORK
Worked above and beyond the call of duty
Put out a full day’s effort each week
Did reasonable amount of work
Did less work than expected
Did hardly anything at all

QUALITY OF WORK
Excellent, usable work
Very good
Average
Below average, much not pertinent to project
Poor

ATTENDANCE AND PUNCTUALITY
Always present and on time
Just an occasional and excused absence
Average in attendance
Often not there when needed, frequently absent or late
Unreachable
Note: All activities should be consistent with the Aggie Honor Code:

"An Aggie does not lie, cheat, or steal or tolerate those who do"

4. Project Discussion: Extra-Solar Planet Detection and the Intensity Correlation Array

In January 2004, President Bush identified the search for Earth-like planets as a goal in his new vision for space exploration. In response, NASA has identified "Earth-like Planets and Life" as one of four key research areas in its Vision for Space Exploration. One of the most important programs supporting this research is the Terrestrial Planet Finder (TPF). The TPF observatories will study all aspects of planets outside our solar system: from their formation and development in disks of dust and gas around newly forming stars to the presence and features of those planets orbiting the nearest stars; from the numbers at various sizes and places to their suitability as abodes for life. As illustrated in the artist’s concept below, TPF consists of two complementary facilities covering separate wave length domains: A visible light coronograph having an approximately 10 meter primary mirror and an IR interferometer using free-flying telescopes and beam combiners. Both are needed to adequately perform the spectroscopic analysis that could reveal signs of living organisms in the target planet atmospheres.

The design challenge posed in this course will not seek TPF capabilities. In particular, we require the ability to detect Earth-size planets out to 15 pc, but not the ability to do high SNR spectroscopy to identify bio-markers. This limitation relieves many performance constraints and prompts us to require that the space-borne planet detection capability be achievable at low cost and with methods that can be implemented in the near future. Although the system we address will have less capability than TPF, it can significantly help the TPF mission by identifying promising targets for TPF in advance of TPF launch – thereby streamlining the survey for Earth-like planets. Also, during the long period of preparation of TPF, our design can boost public awareness and whet the public’s appetite for the comprehensive sort of data and search efficiency that only TPF can provide.
A step toward such a low-cost space-based system might be the Intensity Correlation Array (ICA) which is currently under development. As illustrated in the figure below, this is a widely distributed network of ground-based observatories with two modes of operation: Independent operation for educational purposes, and Collective operation for high resolution astronomy, including planet detection. The array is based on the Hanbury Brown-Twiss (HB-T) effect that provides an inexpensive way to combine separate telescopes, and has been shown recently to offer numerous advantages for sparse aperture systems having a large number of telescopes. The ultimate concept, as indicated in the Figure, is to equip all of the regional Divisions of the Texas A&M University system with appropriately designed and dedicated facilities (existing observatories cannot be used for this concept). Each member institution would “own” its local observatory, but would also take turns controlling the entire array. By this mechanism, a broad segment of the public can become active participants in the exploration mission. Moreover, long before it is fully equipped, the ICA can serve as a ground-based, proof-of-concept test to support a space-based system.

At present, vendors are under contract to provide the equipment for the first two observatories of the ICA within this spring semester. These are specially designed for the ICA and will be located in or near the Main Campus (see the sketches below). Involvement by interested students in the construction, integration and test of these observatories will provide a highly relevant, “hands-on” component of this course, complementing the theoretical and design studies.