CSE Curriculum Committee

Agenda Summary
Sept. 21, 2010

Full agenda is on the web site: http://www.aem.umn.edu/~shield/csecc/

1. Approval of April 4, 2010 meeting Minutes – see web site.
2. Meeting Schedule for 2010-11 (watch web site for updates)
    - 2:30 on Tuesday 2010-12-7
    - 2:30 on Tuesday 2011-2-1
    - 2:30 on Tuesday 2011-4-19
3. Special Notes: College Renaming
    - College in ECAS is TIOT - College of Science and Engineering
    - All IOFT courses are now CSE
    - College specific Math courses renamed: CSE Calculus, etc.
    - All IT's in prerequisites were changed to CSE (220 instances) by central.
4. Items for Information only (already approved in ECAS):
    a. See web site (key ones are in special notes above)
5. Items for Approval without Objection (already approved in ECAS):
    a. BBE 4302, 4407, 4412W, 5302, 5407, 5412: minor name changes
    b. BBE 4404: change of prerequisites to BBE 4303, BBE 5303 or AEM 3031 from 3001, CHEM 3501
    c. BBE 4523: Prerequisite changes: removal of [BIOL 3407 or BIOL 3807 or EEB 4068 or LA 3204]
    d. BBE 5404: prerequisite change to BBE 4303, BBE 5303, AEM3031, Grad student
    e. BBE 5523: Prerequisite change to CHEM 1022, CE 3502, Graduate student
    f. CE 4253: reduction to 3 credits
    g. MATH 5345H: Added H (changed to Honors course)
    h. MATS 3851W: Prerequisite change to 3801, 4013 from 3011
    i. MATS 4002: Prerequisite change to include [MATH 2373 or equivalent]
    j. MATS 4013: Prerequisite change to include [CHEM 3502 or PHYS 2303]
    k. MATS 4212: Prerequisite change to include [4001 or CHEN 3101]
    l. MATS 4400: Prerequisite change to drop ChEn major allowed.
    m. MATS 5353: new course – cross list of GEO 5353

6. Action Items (new course syllabi are below or separate handouts):
    a. AEM 1907: Freshman Seminar: Build and Fly a Model Aircraft: New course (see below)
    b. AEM 4391: Independent Design Project: New Course (see below)
    c. EE 4303: Introduction to Programmable Devices Laboratory: New Course (see below)
    d. MATH 4603/4 – Advanced Calculus I and II: New Courses (see below)
7. New Business
8. Adjourn

New Courses Syllabi

AEM 1907: Freshman Seminar: Build and Fly a Model Aircraft, 2 credits

Prerequisite: Freshman

Catalog Description: Hands on construction and flight of an electric powered radio controlled model plane. Flight testing is required, primarily during normal class periods. Analysis of data from flight tests. Additional activities associated with manned and unmanned aircraft, including the engineering challenges of past, current, and future aircraft.

Brief description: One of the first questions asked by newcomers to aviation is "How do airplanes fly?" In this hands-on course we will explore this question by designing, building, and flying small radio controlled model airplanes. The aircraft will be electric powered with a 3 foot wingspan and weigh under 2 pounds. Students will learn the fundamentals of flight and have the opportunity to pilot their aircraft. Flight testing will be a required class activity primarily during normal class periods. Additional elements of the course will be data analysis from the flight tests to validate the design decisions, lectures, discussions, and activities associated with manned and unmanned aircraft, including the engineering challenges of past, current, and future aircraft.

Three sentence biography of faculty member teaching the seminar: Austin Murch is a Research Fellow in the Aerospace Engineering and Mechanics Department and is the Director of the department's UAV Research Group, which operates several small unmanned aircraft in support of a range of research activities. He holds a BS and MS in Aerospace Engineering and previously worked at the NASA Langley Research Center conducting research in aerodynamic modeling, subscale flight testing, and simulation development. Austin also has experience in radio controlled model aircraft and holds a Commercial Pilot's License.

This course has been approved as a freshman seminar by the college. NASA Space Grant is paying the instructor, college is covering the course expenses.

AEM 4391: Independent Design Project, 3 credits

Catalog Description: Independent design project construction and testing under the guidance of a faculty member. Projects may include designs from 4331 and group projects are allowed.

Students are responsible for finding a faculty adviser for their project. Final project report (written or oral) is required.

Prerequisites**:** Aerospace Vehicle Design (AEM 4331)

Format of Course: Group or individual projects (independent study)

Computer Usage: CAD/CAM, FEA, MatLab/Simulink, etc. (varies by team)

Course Objectives:

The purpose of this course is to allow students to take their conceptual designs through the building and testing stages. The projects in this course may be continuations of the projects started in the previous semester of AEM 4331. Students work alone or in small multidisciplinary groups to finalize and build their designs.

Course Outcomes:

Students who successfully complete the course will demonstrate the following outcomes by designing, building and testing a model and documenting same with a proposal, status reports, meetings, oral presentations and written reports.

1. An ability to apply knowledge of mathematics, science and engineering.
2. An ability to design a system, component or process to meet desired needs. .
3. An ability to function on multi-disciplinary teams.
4. An ability to identify, formulate and solve engineering problems.
5. An ability to communicate effectively.
6. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Relationship of course to program objectives:

This course is an integrated design experience in which students learn teamwork, problem solving skills, system design and oral and written communication skills. The course involves fluid mechanics and aerodynamics, aerospace structures and dynamics and controls. The course is designed to foster life-long learning.

Relationship of course to program outcomes:

This course provides the following program outcomes:

1. Design and conduct experiments
2. System design
3. Multidisciplinary teamwork
4. Identify engineering problems
5. Communication skills
6. Lifelong learning

7. Engineering tools
8. Aerodynamics
9. Materials
10. Structures
11. Propulsion
12. Flight mechanics
13. Stability and control

Course Outline:

Independent work followed by written report or oral presentation.

Outcome Measurement:

Outcomes are measured by the final report, which may be written or oral, CAD drawings, design logs (notebooks), written reports, and peer evaluations.

EE4303 --- Introduction to Programmable Logic Devices Laboratory, 1 credit

Catalog Description: Introduction to Verilog. Combinatorial and sequential logic synthesis with Verilog. Implementation in FPGAs.

This course will use Moodle

Text: Michael Ciletti, Starter's guide to Verilog 2001, Pearson/Prentice-Hall, 2004
In addition to the text we will make extensive use of online resources

Prerequisites: EE2301 and EE2361

Grading Components:

lab quizzes (online): 10%
first lab report: 30%
final lab report: 60%
All labs need to be completed and all lab reports turned in to pass this course

Schedule:

Lab 1 Compiling Verilog Code with the Xilinx IDE (1.0 week)
Lab 2 HDL entry (1.0 week)
Lab 3 Schematic capture (1.0 week)
Lab 4 FPGA implementation (1.5 week)
(first lab report due)
Lab 5 Counters (2.5 week)
Lab 6 State Machines (part 1: datapaths) (2.0 week)
Lab 7 State Machines (part 2: controllers) (2.0 week)
Lab 8 Optimizing the implementation (1.5 week)
(final lab report due)

Note there is a week and half slack at the end of the labs as some labs might take longer.

MATH 4603/4 – Advanced Calculus I and II

Math 4603: Advanced Calculus I, 4 credits

Catalog Description: Axioms for the real numbers. Techniques of proof for limits, continuity, uniform convergence. Rigorous treatment of differential/integral calculus for single-variable functions.

Prerequisites: ((2243 or 2373) and (2263 or 2374)) or 2574 or #
Equiv: 01072 - Math 4606/Math 5615/Math 5616

Syllabus:

This is the first semester of a treatment of mathematical analysis based on definitions, theorems and complete proofs---but also with illustrative important examples. It is expected that students in Math 4603 will have already successfully completed courses in single-and multi-variable calculus, as well as a course involving a significant about of linear algebra (such as a semester course treating both linear algebra and differential equations)

In Math 4603, the major topics will be: mathematical induction; limits of both sequences and functions: continuity, differentiation, and integration in a single-variable setting; infinite series of numbers and functions.

Textbook: *Introduction to Analysis* (Revised Fifth Edition), by Edward D. Gaughan., Brooks/Cole, Pacific Grove, CA, 2009.

Summary outline of the topics by week:

Week 1: Relations, functions, and mathematical induction
Week 2: The real numbers, convergence of sequences, and subsequences
Week 3: Limits of monotone sequence, limits of functions
Week 4: Algebra of limits, Enrichment and review based on first 3 chapters
Week 5: Continued review and enrichment, First mid-term
Week 6: Continuous functions
Week 7: Differentiation of functions
Week 8: Single-variable inverse function theorem, Riemann integral
Week 9: Riemann integral, Riemann-Stieltjes integral (from class notes)
Week 10: Enrichment and review based on weeks 6-10
Week 11: Second mid-term, infinite series
Week 12: Infinite series, Taylor's formula, sequences of functions
Week 13: Sequences and series of functions
Week 14: Enrichment and review based on weeks 11-13 and review of entire course

Note: The teacher for Fall 2010 has found it useful to move quite quickly through chapters---and then in the week before a test to go back both for review and further teaching of some things that had been given too little time earlier. The above schedule reflects this, but other teachers could use different strategies that work for them.

MATH 4604: Advanced Calculus II, 4 credits

Catalog Description: Sequel to Math 4603. Topology of n-dimensional Euclidean space. Rigorous treatment of multi-variable differentiation and integration, including chain rule, Taylor's Theorem, implicit function theorem, Fubini's Theorem, change of variables, Stokes' Theorem.

Course Prerequisites: 4603 or 5615 or #
Equiv: Math 5616

Syllabus:
This is the second semester of a rigorous treatment of mathematical analysis, building on the first semester, Math 4603. It is expected that students in Math 4604 will have already completed Math 4603 or Math 5615 or a similar course.

In Math 4604, differentiation and integration theorems for functions of several variables will be the central topic. As time permits, additional topics may include convergence properties for sequences and series of functions of several variables.

Student grades will be determined by examinations (two midterm exams and a final examination), as well as regular homework assignments.

Textbook: *Advanced Calculus of Several Variables*, by C.H. Edwards, Jr., Dover Publications, New York, 1994.

Summary outline of the topics by week:
Week 1: Review of n-dimensional vectors. Vector algebra, inner products, linearity.
Week 2: Basic topics in matrices and determinants.
Week 3: Topology and convergence in n-space.
Week 4: Curves, velocities and potentials. General derivatives of functions on n-space.
Week 5: The chain rule and its consequences. Optimization and Lagrange multipliers.
Week 6: Taylor's Formula, Newton's Method.
Week 7: The Implicit Mapping Theorem.
Week 8: Area and Integration. Fubini's Theorem.
Week 9: Fubini's Theorem, Change of Variable.
Week 10: Arc-length, line integrals, notion of a linear differential form.
Week 11: Multilinear Functions. Surface area.
Week 12: The classical versions of the Divergence Theorem and the Theorem of Stokes.
Week 13: Multilinear differential forms.
Week 14: The General Theorem of Stokes.