COURSE APPROVAL ROUTING CHECK LIST

091019

1. **Course Number:** ~~PSM~~ AEM 612 — 1st Bulletin 11-5-09; 2nd Bulletin 11-19-09

2. **Course Title:** Computational Foundations of Applied Mathematics From a Problem Solving Perspective
(*no more than 70 characters*)

Title Abbreviation: Comp Found App Math
For use in Master Schedule (*no more than 19 characters*)

3. **Action:** ☒ New Course ☐ Revision ☐ IF Designation ☐ WAC

Requested Designation(s): _____

Course Proposal/Revision Check List

This checklist will help departments avoid some of the most common mistakes made on course proposals. Your use of the checklist will allow the College Senate Curriculum Committee to focus its review on more substantive issues and expedite the approval process.

☒ Proposal format conforms to the Directory of Policy Statements, Section IV:02.00 (2002).

☒ Proposal has been proofread for spelling, punctuation, grammar, style and gender-neutral language.

☒ If the course is a new course, reasons for the additions are included; if the course is a revision of an existing course, reasons for revision and a copy of the old course are included as well as the IF Narrative when appropriate.

☒ Catalog description follows the guidelines in the Curriculum Handbook, Appendix C.

☒ Student learning outcomes are coherent with course content and assessment.

☒ Outcomes are referenced with course content.

☒ All resource entries are alphabetized and conform to a specific style manual.

☐ Cross listed courses have been checked with all chairs and deans included in development of the course.

DEPARTMENT ACTION

_____ 10/16/09
Chair, Department Curriculum Committee — Date

4. **Approved** with confirmation that all necessary laboratories, studios, resources, facilities and personnel for support of this course are available.

_____ MATH 10/16/09
Signature of Department Chairperson — Department — Date

(OVER)

Faculty (Check one)

- ☒ **SNSS** *School of Natural and Social Sciences*
- ☐ **SOE** *School of Education*
- ☐ **SAH** *School of Arts and Humanities*
- ☐ **SOP** *School of Professions*

DEAN'S ACTION

Approved with confirmation that all necessary laboratories, studios, resources, facilities and qualified faculty for support of this course are available.

10/26/09 Karen O'Connor
Date Signature of Dean (both Dean's if cross-listing)

COURSE PACKET INCLUDES:

- ☐ Electronic proposal form
- ☐ Attached electronic document with explanations of contingencies as stipulated at Dean's level
- ☐ One hard copy of proposal with attached contingencies and routing sheet with all appropriate signatures (copy of routing sheet in packet sent to Academic Affairs)
- ☐ For all revisions, one hard copy of current course should be submitted (e-copy is preferable when available)

COLLEGE SENATE ACTION

1. **Received**, logged and electronic packet and hard copies forwarded to the College Senate Office. Program title to be published in the *College Bulletin*.

10/27/09 Vanessa Masci 091019
Date Signature of College Senate Office Log Number

2. Action for Intellectual Foundations' Designation

_____ Recommend approval _____
Signature of Assistant Dean, Intellectual Foundations

_____ Recommend disapproval _____
Signature of Assistant Dean, Intellectual Foundations

3. **Action** of the College Senate Curriculum Committee

X Recommend approval and forward to College Senate

11/17/2009 Nancy A Chiarello
Date Signature of Chair, College Senate Curriculum Committee

_____ Recommend disapproval and return to Department

_____ _____
Date Signature of Chair, College Senate Curriculum Committee

ACTION OF THE OFFICE OF ACADEMIC AFFAIRS

X Approved and forwarded to President _____ 11/19/09
Signature Date

_____ Disapproved and returned to Department _____ _____
Signature Date

Prefix, Number and Name of Course: PSM 612 Computational Foundations of Applied Mathematics From a Problem Solving Perspective

Credit Hours: 1
In Class Instructional Hours: 1 **Labs:** 0 **Studio:** 0 **Field Work:** 0

Catalog Description:
Prerequisite: Admission to program or instructor permission
Introduction to algorithm design to implement mathematical models, procedural and functional programming, programming paradigms, higher level languages; statistical and visualization software, typesetting software for science and mathematics.

Reasons for Addition:
To create a one-semester-hour core module for the graduate Professional Applied and Computational Mathematics program where students will be actively engaged in problem solving in computational mathematics.

Student Learning Outcomes: Students will	**Course Content References:**	**Assessment:**
1. demonstrate the ability to program in different computing languages.	II, III, IV	Individual homework assignments, group work, examinations and computer projects.
2. design algorithms and implement algorithms using a computing language.	I–IV	Individual homework assignments, group work, examinations and computer projects.
3. analyze, compare and contrast the advantages of disadvantages of different computing languages.	II, III, IV	Individual homework assignments, group work, examinations and computer projects.
4. create reports and presentations using typesetting software.	V	Individual homework assignments, group work, and computer projects.

Course Content:

I. Algorithms and applications
- A. Algorithm design
- B. Monte Carlo method examples
- C. Random number generators
- D. Linear vs. parallel programming paradigms
- E. Data base concepts

II. Computer algebra systems
    A. Functional programming
    B. Data visualization and computer graphics
    C. Importing and exporting data from different programming languages

III. Statistical programming languages
    A. @RISK
    B. SAS
    C. EXCEL
    D. SPSS
    E. R
    F. Decision tree software
    G. Importing and exporting data

IV. C++ programming language
    A. Introduction to procedural programming
    B. High performance number crunching
    C. Parallel programming

V. LaTeX
    A. Reports and other document formats
    B. Presentations
    C. Posters

Resources:

Scholarship:

Cody, R. P., *SAS Functions by Example*, SAS Institute Inc., 2004.

Cormen, T. et al., *Introduction to Algorithms*, MIT Press, 2001.

Ghezzi, C., and Lazayeri, M., *Programming Language Concepts*, Wiley, 1998.

Knuth, D. E., *The TeXbook*, Addison-Wesley, 1984.

Lamport, L., *LaTeX: A Document Preparation System*, Addison-Wesley, 1986.

Landau, S., and Everitt, B. S., *A Handbook of Statistical Analyses Using SPSS*, Chapman & Hall/CRC Press, 2004.

Ruskeepaa, H., *Mathematica Navigator,* Elsevier, 2004.

Savitch, W., *Problem Solving with C++*, Addison-Wesley Publishing Company, 1996.

Skansholm, J., *C++ From the Beginning*, Addison-Wesley, 2002.

Periodicals:

SIAM Journal on Computing

The Mathematica Journal

Electronic and/or Audiovisual Resources:

Mathematical Association of America, "Math Gateway Online," http://mathgateway.maa.org.

SAS Institute, "SAS," http://www.sas.com/.

Soulie, J., "C++ Tutorial," http://www.cplusplus.com/doc/tutorial/.

SPSS Inc., "SPSS," http://www.spss.com/.

Wilkens, D.R., "Getting started with LaTeX," http://www.maths.tcd.ie/~dwilkins/LaTeXPrimer/.

Wolfram Research Inc., "Mathematica," http://www.Wolfram.com.