COURSE APPROVAL ROUTING CHECK LIST

091017

1st Bulletin 11-5-09
2nd Bulletin 11-19-09

1. **Course Number:** ~~PSM~~ ACM 610

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

Title Abbreviation: Cont 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 — Date

Karen O'Connor — 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 — Date

Vincent Maxi — Signature of College Senate Office

091017 — 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 — Date

Nancy A. Nicola — 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

Signature

11/19/09 — Date

_____ Disapproved and returned to Department

_____ Signature

_____ Date

Prefix, Number and Name of Course: PSM 610 Continuous 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.
Problem solving and applications of continuous mathematics, including real analysis, single and multi-variable calculus, differential equations, optimization and Fourier analysis. Emphasis on team building and group management through problem solving activities.

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 continuous mathematics.

Student Learning Outcomes: Students will	**Course Content References:**	**Assessment:**
1. integrate and synthesize principles and methods of applied calculus and real analysis to solve real life problems.	I	Group work in class, individual homework assignments, examinations, and projects.
2. integrate and synthesize principles and methods of differential equations to solve real life problems.	I, II	Group work in class, individual homework assignments, examinations, and projects.
3. integrate and synthesize fundamentals of the Fourier transform and apply the properties of the Fourier transform to solve real life problems.	I, II, III	Group work in class, individual homework assignments, examinations, and projects.
4. analyze problems involving optimization.	IV	Group work in class, individual homework assignments, examinations, and projects.
5. communicate, both orally and in writing solutions to complex problems drawn from continuous mathematics.	I, II, III, IV	Group work in class, individual homework assignments, and projects.

6. demonstrate ability to manage and communicate with team members when solving problems.	I, II, III, IV	Group work in class and projects.

Course Content:

I. Applied calculus and real analysis
- A. Problems in single and multi-variable calculus
- B. Problems in vector calculus: planes, surfaces.
- C. Problems in curvature, Green's and Stokes' Theorem.
- D. Problems in different coordinate systems (Cartesian, cylindrical, polar, spherical)

II. Differential equations
- A. Problems in dynamical systems
- B. Problems in partial differential equations (heat, wave, transport equations).

III. Fourier analysis
- A. Problems in Fourier and inverse Fourier transformations
- B. Problems in fast Fourier transformations
- C. Problems in Fourier series

IV. Optimization models
- A. Problems in one variable optimization
- B. Problems in multivariable optimization
- C. Computational methods for optimization

Resources

Scholarship:

Blanchard, P., Devaney, R., and Hall, R. H., *Differential Equations,* Brooks/Cole, 2002.

Brigham, E. O., *The Fast Fourier Transform and its Applications*, Prentice-Hall, Inc., 1988.

Edwards, C. H., and Penney, D. E., *Differential Equations and Boundary Value Problems: Computing and Modeling*, 2nd ed., Prentice-Hall Inc., 2000.

Fogiel, M., *The Advanced Calculus Problem Solver*, Research and Education Association, 1981.

Lebedev, N. N., Skalskaya, I. P., and Uflyand, Y. S., *Worked Problems in Applied Mathematics*, Dover Publications, 1979.

Meerschaert, M. M., *Mathematical Modeling,* Elsevier Academic Press, 2007.

Morton, K. W., and Mayers, D. F., *Numerical Solution of Partial Differential Equations: An Introduction,* Cambridge University Press, 2005.

Strikwerda, J. F., *Difference Schemes and Partial Differential Equations*, Society for Industrial and Applied Mathematics (SIAM), 2004.

Periodicals:

College Mathematics Journal

Differential Equations and Applications

Differential Equations and Dynamical Systems

Mathematics Magazine

Notices of the American Mathematical Society

SIAM Journal of Optimization

The American Mathematical Monthly

Electronic and/or Audiovisual Resources:

Consortium for Mathematics and Its Applications, Inc. (COMAP), "COMAP, Learn with Us," www.comap.com.

COMAP, "MATHmodels, A New Resource to Make Math Modeling a Year Round Activity," http://www.mathmodels.org/.

COMAP, "Project Intermath," http://www.comap.com/undergraduate/projects/intermath/.

COMAP, "UMAP Tools for Teaching", collection of CD-ROMS available at http://www.comap.com/product/cdrom/.

Numerical Recipes Software, "Numerical Recipes: The Art of Scientific Computing, (Third Edition)," www.nr.com.

Sulivan, S.J., "Scientific Computing and Numerical Analysis FAQ," http://mathcom.com/corpdir/techinfo.mdir/index.html.

Smith, S.W., "The Scientist and Engineer's Guide to Digital Signal Processing," http://www.dspguide.com/pdfbook.html.