FLORIDA ATLANTIC UNIVERSITY™

Graduate Programs—NEW COURSE PROPOSAL

UGPC APPROVAL _____
UFS APPROVAL _____
SCNS SUBMITTAL _____
CONFIRMED _____
BANNER POSTED _____
ONLINE _____
MISC _____

DEPARTMENT NAME:
MATHEMATICAL SCIENCES

COLLEGE OF:
CHARLES E. SCHMIDT COLLEG E OF SCIENCE

RECOMMENDED COURSE IDENTIFICATION:

PREFIX _____MAP_____ **COURSE NUMBER** ___6346_____ **LAB CODE** (L or C) _____

(*TO OBTAIN A COURSE NUMBER, CONTACT ERUDOLPH@FAU.EDU*)

COMPLETE COURSE TITLE

PARTIAL DIFFERENTIAL EQUATIONS

EFFECTIVE DATE
(first term course will be offered)

_____

CREDITS:
3

TEXTBOOK INFORMATION:
L.C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, v. 19, Amer. Math. Soc., Providence, RI, 1998

GRADING (*SELECT ONLY ONE GRADING OPTION*): **REGULAR** ___X__ **PASS/FAIL** _____ **SATISFACTORY/UNSATISFACTORY** _____

COURSE DESCRIPTION, NO MORE THAN 3 LINES:
INTRODUCTION TO THE THEORY OF PARTIAL DIFFERENTIAL EQUATIONS. LAPLACE'S EQUATION, THE HEAT EQUATION, THE WAVE EQUATION. FIRST ORDER EQUATIONS. THE FOURIER TRANSFORM. SOBOLEV SPACES, THE SOBOLEV EMBEDDING THEOREMS. SECOND ORDER ELLIPTIC EQUATIONS.

PREREQUISITES W/MINIMUM GRADE:*
MAS 5105 MULTIVARIATE ANALYSIS (MINIMUM GRADE C)

COREQUISITES:
NONE

OTHER REGISTRATION CONTROLS (MAJOR, COLLEGE, LEVEL):

PREREQUISITES, COREQUISITES & REGISTRATION CONTROLS SHOWN ABOVE WILL BE ENFORCED FOR ALL COURSE SECTIONS.

**DEFAULT MINIMUM GRADE IS D-.*

MINIMUM QUALIFICATIONS NEEDED TO TEACH THIS COURSE:
PH. D IN MATHEMATICS

Other departments, colleges that might be affected by the new course must be consulted. List entities that have been consulted and attach written comments from each.

Tomas Schonbek, schonbek@fau.edu, (561) 297-3355_____
Faculty Contact, Email, Complete Phone Number

SIGNATURES

Approved by:	*Date:*
Department Chair: _____	_____
College Curriculum Chair: _____	_____
College Dean: _____	_____
UGPC Chair: _____	_____
Dean of the Graduate College: _____	_____

SUPPORTING MATERIALS

Syllabus—must include all details as shown in the UGPC Guidelines.

Written Consent—required from all departments affected.

Go to: *http://graduate.fau.edu/gpc/* to download this form and guidelines to fill out the form.

Email this form and syllabus to *diamond@fau.edu* and *eqirjo@fau.edu* one week ***before*** the University Graduate Programs Committee meeting so that materials may be viewed on the UGPC website by committee members prior to the meeting.

Course Syllabus for Partial Differential Equations

1. **Course title/number, number of credit hours**
   Partial Differential Equations, MAP 6346, 3 credit hours

2. **Course prerequisites**
   a. MAS 5105 Multivariable Analysis (Minimum Grade C)

3. **Course logistics**
   a. Term –Spring 2011
   b. Notation if online course – N/A
   c. Class location and time (if classroom-based course) – To be determined

4. **Instructor contact information**
   a. Instructor's name – Tomas Schonbek
   b. Office address – Science & Engineering Bldg, SE43, Room 262
   c. Office hours – To be determined
   d. Contact telephone number – office (561) 297-3355, fax (561) 297-2436
   e. E-mail address – schonbek@fau.edu

5. **TA contact information (if applicable)**
   N/A

6. **Course description**
   Introduction to the theory of partial differential equations. Laplace's equation, the heat equation, the wave equation. First order equations. The Fourier transform. Sobolev spaces, the Sobolev embedding theorems. Second order elliptic equations.

7. **Course objectives/student learning outcomes**
   The course introduces the student to the basic concepts of the theory of partial differential equations. Students completing the course will have seen a wide variety of initial and boundary value problems for partial differential equations and learned a number of techniques to solve such problems. They will have a good overview of this important area of mathematics and be ready for a more advanced, research oriented, course. Being an introductory course, most of the emphasis is on linear equations, but a few nonlinear problems will also be approached.

8. **Course evaluation method**
   There will be graded homework assignments accounting for 20% of the student's cumulative performance, two midterm exams each, accounting for 25% of the student's cumulative performance, and a final exam that accounts for 30% of the cumulative performance. The overall grade in the course is derived from the cumulative performance according to the following table.

9. **Course grading scale (optional)**

Cumulative Performance	Grade
>94%	A
>90% - 94%	A-
>87% - 90%	B+
>83% - 87%	B
>80% - 83%	B-
>75% - 80%	C+
>65% - 75%	C

>60% - 65%	C-
>57% - 60%	D+
>53% - 57%	D
>50% - 53%	D-
<50%	F

10. Policy on makeup tests, late work, and incompletes

If a student cannot attend an exam or hand in a homework project on time due to circumstances beyond their control then the instructor may assign appropriate make-up work. Students will not be penalized for absences due to participation in University-approved activities, including athletic or scholastics teams, musical and theatrical performances, and debate activities. These students will be allowed to make up missed work without any reduction in the student's final course grade. Reasonable accommodation will also be made for students participating in a religious observance. Also, note that grades of Incomplete ("I") are reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances. A grade of "I" will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student must show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate.

11. Special course requirements (if applicable)

N/A

12. Classroom etiquette policy (if applicable)

University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions."

13. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodation due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) -- in Boca Raton, SU 133 (561-297-3880); in Davie, MOD 1 (954-236-1222); in Jupiter, SR 117 (561-799-8585); or at the Treasure Coast, CO 128 (772-873-3305) – and follow all OSD procedures.

14. Honor Code policy statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 at http://www.fau.edu/regulations/chapter4/4.001 Honor_Code.pdf

15. Required texts/readings

L.C. Evans, *Partial Differential Equations*, Graduate Studies in Mathematics, v. 19, Amer. Math. Soc., Providence, RI, 1998

16. Supplementary/recommended readings

a. F. John, *Partial Differential Equations*, 4th. Edition, Springer Verlag, New York, NY, 1995.
b. F. Treves, *Basic Linear Partial Differential Equations*, Academic Press, New York, NY 1975.

c. *An introduction to partial differential equations*. Second edition. Texts in Applied Mathematics, 13. Springer-Verlage, New York, 2004. xiv+434 pp. ISBN: 0-387-00444-0
d. Renardy, Michael; Rogers, Robert C., *Partial differential equations. An introduction*. Second edition. John Wiley & Sons, Ltd., Chichester, 2008. x+454 pp. ISBN: 978-0-470-05456-7

17. Course topical outline

Topical Course Outline

Week	Topic
1-2	Generalities. Examples of partial differential equations. Linear, semi linear and quasi linear equations. Well posed problems. Weak and strong solutions, Regularity.
3-4	Laplace's equation and harmonic functions. Green's functions. Green's function for the sphere and for the half-space. Poisson's formula.
5	Exam 1
6	The heat equation. Solution formula.
7-8	The wave equation. The one dimensional case and D'Alembert's formula. The wave equation in n space dimensions. Domain of influence and domain of dependence. Huygens' principle.
10-11	First order partial differential equations. The method of characteristics. Hamilton-Jacobi equations.
12	Exam 2
13-14	The Fourier transform. Theorem of Plancherel. Fundamental solutions of linear partial differential equations with constant coefficients.
15-16	Sobolev spaces and the Sobolev embedding theorems.