University of Alberta
Department of Mathematical & Statistical Sciences

Course Title & Number, Section Number
Academic Term & Year

Instructor: Vakhtang Putkaradze
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Personal Web Page: TBA

Office Hours: MWF 11-12 or by appointment.

Lecture Room & Time: Math 657, TR 9:30 - 10:50 am

Course Web Page: TBA

Course Description:
Notions; Elliptic PDE's; Parabolic PDE's; Hyperbolic PDE's; Nonlinear Integrable PDE's.

Course Prerequisites:
Prerequisite: MATH 436 or equivalent; pre- or corequisite: MATH 518.

It is important to prepare yourself for this course through a review of the prerequisite material. Students who do not have the required prerequisites at the time of taking this course should not expect supplementary professorial tutoring from the instructor. The latter statement is intended to try to keep office hours reasonable and available to all students in the class.

Course Objectives and Expected Learning Outcomes:
By the end of the course, the students will have a good understanding of different types of equations (parabolic, hyperbolic, elliptic), analyze regularity of their solutions and find explicit solutions whenever possible. Students will also learn how to solve first order nonlinear equations with methods of characteristics, and learn how to treat spontaneously emerging singularities in these equations. Students will also learn how to treat some nonlinear PDEs by reduction to linear PDEs.

Lecture Schedule & Assigned Readings:
Schedule of lectures is approximate and subject to change. All chapter/section notation refers to L. C. Evans' book: *Partial Differential Equations*, 2nd. Ed., American Mathematical Society Vol. 19.

Week	Dates	Topic	Readings
1	Sept. 3-7	Transport & Laplace Equations	Ch 1 & Sec. 2.1, 2.2
3	Sept 10-14	Heat & wave equations	Sec. 2.3, 2.4
3	Sept 17-21	Nonlinear first order PDEs	Sec. 3.1, 3.2
4	Sept 24-28	Nonlinear first order PDEs cont'd	Sec. 3.3, 3.4
5	Oct 1-5	Separations of variables, similarity etc.	Sec. 4.1, 4.2, 4.3
6	Oct 8-12	Other methods of solution	Sec. 4.4, 4.5, 4.6
7	Oct 15-19	Theory of linear PDEs; Sobolev spaces	Sec. 5.1– 5.4
8	Oct. 22-26	Sobolev inequalities; Midterm – Oct 25	Sec. 5.4, 5.5, 5.6
9	Oct 29-Nov 2	Inequalities continued	Sec. 5.6–5.9
10	Nov. 5-9	Second order elliptic equations	Sec. 6.1, 6.2, 6.3
11	Nov. 12-16	Maximum principles; eigenvalues/functions	Sec. 6.4, 6.5
12	Nov. 19-23	Linear evolution equations	Sec. 7.1, 7.2, 7.3
13	Nov. 26-30	Linear evolution equations	Sec. 7.4, 7.5, 7.6

Required Textbook:
L. C. Evans: *Partial Differential Equations*, 2nd. Ed., American Mathematical Society Vol. 19; ISBN 978-0-8218-4974-3.

Grade Evaluation:
The course mark will be calculated based on the following breakdown:

Course Component	Weight of Total Mark	Date
Homeworks (minus lowest)	25 % (5% each x5)	Consult the table below
Midterm	25%	Thursday, Oct 25 in class
Final Exam	50%	Consult Final Exam Planner

Note: The date of the final examination is set by the Registrar and takes precedence over the final examination date reported in this document. Students must verify this date on BearTracks when the Final Exam Schedule is posted.

The final letter grade will be determined from the course mark as follows:
An overall course mark of 50% or more guarantees a passing grade of at least D. An overall course mark of 90% or more guarantees a grade of at least A.

Grades are unofficial until approved by the Department and/or Faculty offering the course.

Assignments:
Published on this web page - please check regularly.

Schedule of homework assignments:

HW number	Due date
1	Sept 18
2	Oct 2
3	Oct 16
4	Nov 6
5	Nov 20
6	Dec 4

Missed or late assignments All homework's are due on the date posted, at the beginning of the class. Absolutely no late homeworks will be accepted no matter what the reason for the lateness may be. However, in order to compensate for possible emergencies, one lowest homework score will be dropped. Homeworks may be delivered either in person in class, or using any method with a *verifiable time stamp*, *e.g.* email, fax etc.

Past (or Representative) Evaluative Material:
Evaluative material for the course (exams from previous years) will be available online through this web site.

Exam Aids:
No calculators, computers, or cell phones are allowed during midterm and final exams. For Midterm exam, students are allowed one student-prepared sheet of notes, filled, if necessary, on both sides (2 pages total). For the Final exam, students are allowed two double-sided sheets of notes (4 pages total). No other exam aids are allowed.

Missed Midterm:
A student who cannot write a midterm due to incapacitating illness, severe domestic affliction or other compelling reasons can apply for an excused absence. To apply for an excused absence, the student must present supporting documentation pertaining to the absence to the instructor within two working days following the scheduled date of the missed term work, or as soon as the student is able. In the case of an incapacitating illness, either a medical note or a statutory declaration (which can be obtained at the students Faculty Office) will be accepted.

An excused absence is a privilege and not a right; there is no guarantee that an absence will be excused. Misrepresentation of Facts to gain an excused absence is a serious breach of the Code of Student Behaviour.

Missed Final Examination:
A student who cannot write the final examination due to incapacitating illness, severe domestic affliction or other compelling reasons can apply for a deferred final examination. Such

an application must be made to the students Faculty office within 48 hours of the missed examination and must be supported by a Statutory Declaration (in lieu of a medical statement form) or other appropriate documentation (Calendar section 23.5.6). Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. Misrepresentation of Facts to gain a deferred examination is a serious breach of the Code of Student Behaviour.

Any deferred final examinations are scheduled as follows: Saturday January 12, 0900. Please have your students meet outside CAB 357 at 8:30 to register

Date: Saturday, January 12, 2013
Time: 9:00 sharp
Location: Please meet outside CAB 357 at 8:30 am to register

Re-examination:
A student who writes the final examination and fails the course may apply for a re-examination. Re-examinations are rarely granted in the Faculty of Science. These exams are governed by University (Calendar section 23.5.5) and Faculty of Science Regulations (Calendar section 192.5.9). Misrepresentation of Facts to gain a re-examination is a serious breach of the Code of Student Behaviour.

STUDENT RESPONSIBILITIES

Academic Integrity:
The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.governance.ualberta.ca) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All forms of dishonesty are unacceptable at the University. Any offense will be reported to the Senior Associate Dean of Science who will determine the disciplinary action to be taken. Cheating, plagiarism and misrepresentation of facts are serious offenses. Anyone who engages in these practices will receive at minimum a grade of zero for the exam or paper in question and no opportunity will be given to replace the grade or redistribute the weights. As well, in the Faculty of Science the sanction for cheating on any examination will include a disciplinary failing grade (no exceptions) and senior students should expect a period of suspension or expulsion from the University of Alberta.

Collaboration on Assignments:
Every term there are several students who receive academic sanctions for copying assignments. Here are some tips to avoid copying on assignments:

1. Do not write down something that you cannot explain to your instructor.
2. When you are helping other students, avoid showing them your work directly. Instead, explain your solution verbally. Students whose work is copied also receive academic sanctions.
3. If you find yourself reading another student's solution, do not write anything down. Once you understand how to solve the problem, remove the other person's work from your sight and then write up the solution to the question yourself. Looking back and forth between someone else's paper and your own paper is almost certainly copying and will result in academic sanctions for both you and your fellow student.
4. If the instructor writes down part of a solution in order to help explain it to you or the class, you cannot copy it and hand it in for credit. Treat it the same way you would treat another student's work with respect to copying, that is, remove the explanation from your sight and then write up the solution yourself.
5. There is often more than one way to solve a problem. Choose the method that makes the most sense to you rather than the method that other students happen to use. If none of the ideas in your solution are your own, there is a good chance it will be flagged as copying.

Students should refer to Collaborating on Assignments link on the Truth in Education website `http://www.uofaweb.ualberta.ca/TIE/`.

Exams:
Your student photo I.D. is required at exams to verify your identity. Students will not be allowed to begin an examination after it has been in progress for 30 minutes. Students must remain in the exam room until at least 30 minutes has elapsed. Electronic equipment cannot be brought into examination rooms.

Cell Phones:
Cell phones are to be turned off during lectures, labs and seminars. Cell phones are not to be brought to exams.

Audio or Video Recording:
Audio or video recording of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Recorded material is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the instructor.

Students with Disabilities:
Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students Union Building).

Academic Support Centre:
Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Academic Support Centre (2-300 Students Union Building).

Decima Robinson Support Centre for Mathematical & Statistical Sciences:
Students who require additional help with assignments or have questions about the course material in general are encouraged to visit the Decima Robinson Support Centre (528 Central Academic Building). Graduate students will be available to provide one-on-one help. In order to get maximum help during each visit, students are asked to be specific about the problem with which they are seeking help. The Centre is open Monday to Friday, 9:00–15:00.

Policy about course outlines can be found in section 23.4(2) of the University Calendar.

Disclaimer:
Any typographical errors in this Course Outline are subject to change and will be announced in class.