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ERTH 5707/4707, Engineering Seismology; Seismological topics with engineering applications. Characterization of seismicity and seismic sources (areas and faults). Seismic hazard analysis. Empirical and theoretical modeling of strong ground motion in time and frequency domain.

- Office hours; Thursday 11:30-12:30
- All lectures are in person

Course Topics (Tentative order)

- Introduction and Plate tectonics
- Basic Seismic Parameters
- Earthquake Recurrence models
- Earthquake Data Processing and Seismic Instrumentation
- Seismic Ground Motion Relations
- Seismic Hazard Analysis
- Seismic Source Models and Simulation of Ground Motions
- Seismic Site effects
- Time Histories for Design, and Selected Topics

Course Requirements:

- The assignment component of the course must be passed to pass the course. You must pass the assignment component of the course to write the final exam. The final exam must be passed to pass the course.
- Assignments must be handed in on time. Late ones will be accepted in the instance of illness or in the instance of emergencies, by consultation with D. Motazedian. Students must contact their instructor and TAs immediately if they are ill and will miss an exam or the deadline for an assignment. Students must agree with the instructor and/or TA on how to make up the missed components. If the student is ill for a while and misses an exam, then their TA or instructor will arrange for some accommodation in the future – make a midterm exam added to the final, etc.
- Reading assignments are mandatory.
- It is your responsibility to refer regularly to the course outline for lecture topics, reading assignments, laboratory topics and pre-lab review or homework.
- Regularly log onto the course website on Brightspace to check for announcements, course information, assignments, and lecture material.
- Assignments will be posted on Brightspace.

Course Learning Objectives

- Explain the kinematics of seismotectonic plates using seismic data. [Understanding, Analyzing, Evaluating]
- Analyze seismic signals in time and frequency domain and determine earthquake location, magnitude, depth and focal mechanism. [Understanding, Analyzing, Evaluating]
- Explain the earthquake recurrence models, seismic ground motion and explain the seismic hazard analysis for a give site or region. [Understanding, Analyzing, Evaluating]

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- Explain seismic source models and simulation of ground motions. [Understanding, Analyzing, Evaluating]
- Demonstrate critical reading skills. Communicate complex information and specialized knowledge, in written and oral form, to peers and instructors. [Understanding, Analyzing, Evaluating]

Recommended Class Texts (a PDF copy of all lectures will be available to students)

- Lee, W.H.K, Kanamori, H., Jennings, P.C., Kissinger, C. (2002) International Handbook of Earthquake and Engineering Seismology. Academic Press
- Lay, T., and Wallace, T. C. (1995) Modern Global Seismology. Academic Press
- Kramer, S. L. (1996) Geotechnical Earthquake Engineering. Prentice Hall
- Scherbaum, F. (2001) Of Poles and Zeros Fundamentals of Digital Seismology. Kluwer Academic Publishers
- Havskov, J., and Alguacil, G. (2004) Instrumentation in Earthquake Seismology, Springer
- Aki, K., and Richards, P. G. (2002) Quantitative Seismology, 2nd Edition, University Science Books
- Fowler, C.M.R., 2005, The Solid Earth, 2nd edn. Cambridge Univ. Press.

Grading scheme:

- Assignments : 25%
- Term paper and presentation (Second last class) : 25%
- Quiz 1 (date ?) : 25%
- Quiz 2 (last class) : 25%

Note: EARTH5707 Students will have additional questions in each assignment.

Note: EARTH5707 Students will have additional questions in each exam.

Note: EARTH5707 Students will have additional time in each exam.

Note: EARTH5707 Students are expected to deliver more comprehensive term papers and presentations

Teaching Assistants: TBA by the department

In-class lecture and Teaching Lab COVID-19 Guidelines:

Please follow the COVID-19 Guidelines from the Carleton University and the department of Earth Sciences.

Academic Integrity

It is your responsibility to review Carleton's policy on Academic Integrity - Section 14 of the Calendar. <http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/acadregsuniv14/>

Plagiarism

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The instructor is required to report all incidents (or suspected incidents) of plagiarism to the Dean. All work handed in must be your own. Plagiarism and cheating are viewed as being particularly serious and the sanctions imposed are accordingly severe. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy. The Policy is strictly enforced and is binding on all students. Plagiarism and cheating – presenting another’s ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the graduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

Requests for Academic Accommodation

Please review the Carleton’s Student Guide to Academic Accommodations at <http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf>, and the websites therein. You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

For Students with Disabilities:

“The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your *Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation*. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam . “

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

For Religious Observance:

1. *As soon as you receive your course syllabus*, identify any potential conflicts between your religious obligations and course requirements. **2.** Make a formal written request to your instructor indicating the nature of the religious obligation and suggest possible alternative dates and/or means of satisfying the academic requirements. *NOTE: Such request should be made*

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during the first two weeks of the term, or as soon as possible after a need for accommodation is known to exist, but in no case later than the second last week of classes for that term. For detailed information on Religious Obligations please visit our website at: carleton.ca/equity/accommodation/academic.

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline