Math 510 Syllabus

MEASURE THEORY AND PROBABILISTIC METHODS

Professor’s Information

Name Jorge Garcia. (Prefer to be called D.J.)
Location Office 2219 Bell Tower West
Office Hours 8:45 → 10:45 on Tuesday and 1:15 → 2:45 on Thursday. Appointments, on request.

Contact Information

E-Mail jorge.garcia@csuci.edu
Phone-Contact 437-2769 (really emergencies)

Course Information

Class meets T& R 12 - 1:15 p.m. in BT 1568
Course Page http://faculty.csuci.edu/jorge.garcia/mt/
Required Text The Elements of Integration and Lebesgue Measure, by J. Haigh., 3rd edition.

Course Description

We will study
(a) Real Numbers. (chapter 1)
(b) Topological Spaces (notes from class)
(c) Metric Spaces (chapter 2)
(d) Compact Spaces (chapter 2)
(e) Sequences and Series (chapter 3)
(f) Continuity, Differentiation and Integration (chapters 3, 4, 5)
(g) Sequences and Series of Functions (chapter 7)

From the book, we will study the first ten chapters as well as chapter 13 and probably chapter 12 to have an idea about what measure theory is. Famous convergence theorems, existence of measure theorems such as Dominated Convergence and Carathéodory Theorem will be studied. The origin of this theory starts with Newton and Lebesgue, as in analysis, the general procedure is to approximate with simple functions to conclude general results. The concept of a measure is defined and therefore the concept of an integral. Fatou’s Lemma, Minkowski, Hölders inequalities as well as Radon-Nikodym Theorem are some of the concepts that you will be able to handle. If you do not know these concepts, it is great, because you will have something to learn, otherwise do not be biased when re-studying these concepts and underestimate the knowledge we will acquire. Several kinds of integrals have been defined, and since it is useful in several areas of analysis and probability in addition of possessing important properties, the Lebesgue integral (which is more general than the Riemann) will be chosen. We will be incorporating probabilistic terminology along the semester in such a way that you will not have difficulty when approaching probability, stochastic processes and Markov processes among others.

Student Learning Objectives

Through this course, students will be able to

- Discuss the theoretical basis for different types of integrals
- Work in general $L_p$ spaces
• Analyze several types of convergences of functions
• Express concepts and techniques of Measure Theory in oral and written form.

**Required elements**

(a) **Homework**
   Homework will be done from the book mainly, about twenty problems per chapter will be given.

(b) **Reading**
   The book is so thin that you are encouraged to read it fully and slowly.

(c) **Quizzes**
   Quizzes will be given six or seven times during the semester. When grading definitions in quizzes, each question is either right or wrong, no partial credit. If you miss a quiz, you *can not make it up*; you just missed the quiz.

(d) **Make-up exams**
   Make-up exams will be given only under extreme circumstances: students who must miss class should arrange to take the exam ahead of time. Travel plans *do not* constitute a legitimate reason for rescheduling an exam. Any rescheduling of exams is at the discretion of the instructor: plan ahead, and communicate.

(e) **Presentations**
   Each of you will be given a topic from the book and you are supposed to give a 15-min general presentation on that topic at the end of the semester.

**Grade Information**

I will grade according to the following charts.

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homeworks</td>
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<tr>
<td>Midterm</td>
<td>70</td>
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<tr>
<td>Final</td>
<td>10</td>
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<table>
<thead>
<tr>
<th>grade</th>
<th>A</th>
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<td>cut-off</td>
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**Academic honesty information**

(a) **Academic dishonesty** includes such things as cheating, inventing false information or citations, plagiarism and helping someone else commit an act of academic dishonesty. It usually involves an attempt by a student to show possession of a level of knowledge or skill that he/she does not possess.

(b) **Course instructors** have the initial responsibility for detecting and dealing with academic dishonesty. Instructors who believe that an act of academic dishonesty has occurred are obligated to discuss the matter with the student(s) involved. Instructors should possess reasonable evidence of academic dishonesty. However, if circumstances prevent consultation with student(s), instructors may take whatever action (subject to student appeal) they deem appropriate.

(c) **Instructors** who are convinced by the evidence that a student is guilty of academic dishonesty shall assign an appropriate academic penalty. If the instructors believe that the academic dishonesty reflects on the student’s academic performance or the academic integrity in a course, the student’s grade should be adversely affected. Suggested guidelines for appropriate actions are: an oral reprimand in cases where there is reasonable doubt that the student knew his/her action constituted academic dishonesty; a failing grade on the particular paper, project or examination where the act of dishonesty was unpremeditated, or where there were significant mitigating circumstances; a failing grade in the course where the dishonesty was premeditated or planned. The instructors will file incident
reports with the Vice Presidents for Academic Affairs and for Student Affairs or their designees. These reports shall include a description of the alleged incident of academic dishonesty, any relevant documentation, and any recommendations for action that he/she deems appropriate.

(d) The Vice President for Student Affairs shall maintain an Academic Dishonesty File of all cases of academic dishonesty with the appropriate documentation.

(e) Student may appeal any actions taken on charges of academic dishonesty to the “Academic Appeals Board.”

(f) The Academic Appeals Board shall consist of faculty and at least one student.

(g) Individuals may not participate as members of the Academic Appeals Board if they are participants in an appeal.

(h) The decision of the Academic Appeals Board will be forwarded to the President of CSU Channel Islands, whose decision is final.

CSUCI Disability Statement

Cal State Channel Islands is committed to equal educational opportunities for qualified students with disabilities in compliance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990. The mission of Disability Accommodation Services is to assist students with disabilities to realize their academic and personal potential. Students with physical, learning, or other disabilities are encouraged to contact the Disability Accommodation Services office at (805) 437-8510 for personal assistance and accommodations.

Subject to Change disclaimer

Information contained in this syllabus, other than that mandated by the University, may be subject to change with advance notice, as deemed appropriate by the instructor.

Trips, equipment, experiential learning, or other course specific requirements. None.

Additional Elements

- **Cell Phone** Take the first minute of the class to turn off your cell phone
- **Compute your grade so far in the class** You
  (a) Scale each score you have out of 100, this is very important.
  (b) Multiply each homework-score by 0.2/n where n is the number of homework assignments so far. For example if you have returned 4 homework assignments so far, you multiply each homework-score by 0.05. These are your weighted scores. Now add all these weighted scores and call this number h
  (c) Multiply each quiz-score by 0.1/k where k is the number of exams so far. For example if you have taken 3 quizzes so far , you multiply each quiz-score by 0.033. These are your weighted scores. Now add all these weighted scores and call this total q
  (d) Multiply your midterm1-score by 0.15, call this number m1. If you have not taken your first midterm, then make a rough estimation on how much you would obtain in your first midterm out of 100.
  (e) Multiply your midterm2-score by 0.15, call this number m2. If you have not taken your second midterm, then make a rough estimation on how much you would obtain in your second midterm out of 100, a good estimation is, the same score you got for midterm 1.
  (f) Make a rough estimation on how much you would obtain in your final test out of 100. Multiply this number by 0.4, call this number mf.
Finally add the numbers \( h + m_1 + m_2 + m_f + q \), this is your total score so far. To figure out your grade in this class so far, use the table.

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