Math 152 Winter 2018 Course Syllabus

Course: Math 152

Title: Applicable Mathematics and Computing: Wavelets and Fourier Series

Credit Hours: 4

Prerequisite: Math 20D and either Math 18 or Math 20F or Math 31AH. Students who have not completed listed prerequisites may enroll with consent of instructor.

Catalog Description: This course covers useful bases for representing signals and functions, with an emphasis on both theory and computation. The goal of the course is to introduce the student to some basic concepts of Fourier analysis and wavelet theory, as well as to some of their applications in engineering (specifically to signal processing). Topics include: Fourier series, Discrete Fourier analysis, the Haar system, Multiresolution Analysis and wavelets bases, and frames, with some discussion of the Fourier transform and Shannon sampling theorem. A non-complete list of applications of these techniques are audio and image analysis, multiresolution analysis, filters, and wavelet-based image compression like JPEG2000.


Subject Material: We shall cover parts of Chapters 0, 1, 4, and 5 of the text completely, along with parts of Chapters 2 and 3. We will also briefly discuss frames at the end of the class, with appropriate notes that will be provided.

Office Hours: My office is in AP&M 5747 (5th floor, door next to elevators to go to the “Annex building”). My office hours will be Wednesdays from 9am-12pm. I will list them on the course calendar, along with any last minute changes if I have a conflict. You’re always welcome to email me to set up a different time, as well.

Reading Assignments: Reading and doing the examples in the sections of the textbook corresponding to our discussions in lecture will help you learn and understand the course material better. If you work through the relevant examples in the book before you start your homework problems, you will probably solve the homework problems more easily and perform better on your exams than if you do not do the reading.
**TritonEd, Website, and Grades:** We will use [TritonEd](https://ccom.ucsd.edu/~acloninger/152_W18/teachingMath152W2018.html) for two purposes in this class to disseminate grades and post the homework information. The main course website will be located here:


**Homework:** Homework is a very important part of the course, and in order to fully master the topics, it is essential that you work carefully on every assignment and try your best to complete every problem. Homework will consist of two parts, for both types, late homework will be accepted with a 50% penalty. Homework will not be accepted after the last day of class. Homework will be collected on Thursdays unless otherwise noted in class.

1. Written homework that will more or less come from exercises in the book
   a. These assignments will be graded partly on correctness and partly on clarity of exposition
   b. You are welcome to work with your peers, but please note who you worked with and YOU MUST WRITE YOUR OWN SOLUTIONS
2. Computational homework that will be done using MATLAB
   a. Previous knowledge of MATLAB is not required, you should gain enough proficiency to perform each task throughout the semester
   b. You are welcome to work with your peers, but please note who you worked with and YOU MUST WRITE YOUR OWN SOLUTIONS
   c. If you don’t have the software, you can access it either by:
      ii. Using university-licensed MATLAB on your own computer using "UCSD Go Virtual": [http://acms.ucsd.edu/students/govirtual/](http://acms.ucsd.edu/students/govirtual/)

**Homework Help (Piazza):** Piazza is an online discussion forum that allows you to ask questions using mathematical symbols and expressions. Piazza was designed to enable you to get help quickly and efficiently from classmates, TAs, and instructors. Rather than emailing questions to the teaching staff, you are encouraged to post your questions on Piazza. Find our class page at: [https://piazza.com/ucsd/winter2018/math152](https://piazza.com/ucsd/winter2018/math152). If you have any problems or feedback for the developers, email team@piazza.com.

**Midterm Exams:** There will be two midterms (see course calendar). No calculators will be allowed for the exams. You may bring one notecard with whatever notes you care to write. There will be no makeup for the midterm exams. If you have to miss the exam for some extraordinary reason, please notify me as soon as possible.
**Final Exam:** The final exam will be held from 8:00am to 11:00am on Tuesday, March 20. Please note:

- It is your responsibility to ensure that you do not have a schedule conflict involving the final exam; you should not enroll in this class if you cannot sit for the final examination at its scheduled time.
- No calculators will be allowed during the final exam.
- If you violate the instructions of the final or communicate in any way with any other student during the final, you will receive a zero on the final, which means that you will fail the class.

**Grades:** Your cumulative average will be the better of the two weighted scores:

- 30% Homework, 20% Midterm Exam 1, 20% Midterm Exam 2, 30% Final Exam
- 30% Homework, 25% best midterm, 5% worst midterm, 40% Final Exam

After your weighted average is calculated, letter grades will be assigned based on the standard grading scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score</th>
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<tbody>
<tr>
<td>A</td>
<td>93</td>
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<tr>
<td>A-</td>
<td>90</td>
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<tr>
<td>B+</td>
<td>87</td>
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<td>B</td>
<td>83</td>
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<tr>
<td>B-</td>
<td>80</td>
</tr>
<tr>
<td>C+</td>
<td>77</td>
</tr>
<tr>
<td>C</td>
<td>73</td>
</tr>
<tr>
<td>C-</td>
<td>70</td>
</tr>
</tbody>
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We may adjust the above scale to be more lenient (depending on the overall class performance), but I guarantee that we will not adjust the scale to make it harder to get a better grade.

**Suggestions:** Below are some suggestions that I hope will help you to succeed in this course:

- Spend sufficient time on the course. According to the policy of UCSD's Academic Senate, "The value of a course in units...shall be reckoned at the rate of one unit for three hours' work per week per quarter on the part of the student." Since this course is worth 4 credits, you should be willing to spend about 12 hours per week on the course.
- Keep up with the homework and do not miss a homework assignment. Missing a homework assignment will hurt your grade because no homework scores will be dropped. This policy is designed to encourage students to complete all the assignments and reward those who do.
• Get started on the homework assignments early. This will enable you to make the most of your discussion section time by coming prepared with specific questions.
• Think about mathematics every day.

Academic Dishonesty: Academic dishonesty is considered a serious offense at UCSD. Students caught cheating will face an administrative sanction which may include suspension or expulsion from the university. It is in your best interest to maintain your integrity. (Click here for more information.)