Introduction to Complex Variables and Applications, aka MATH 508

Francisco–Javier Sayas

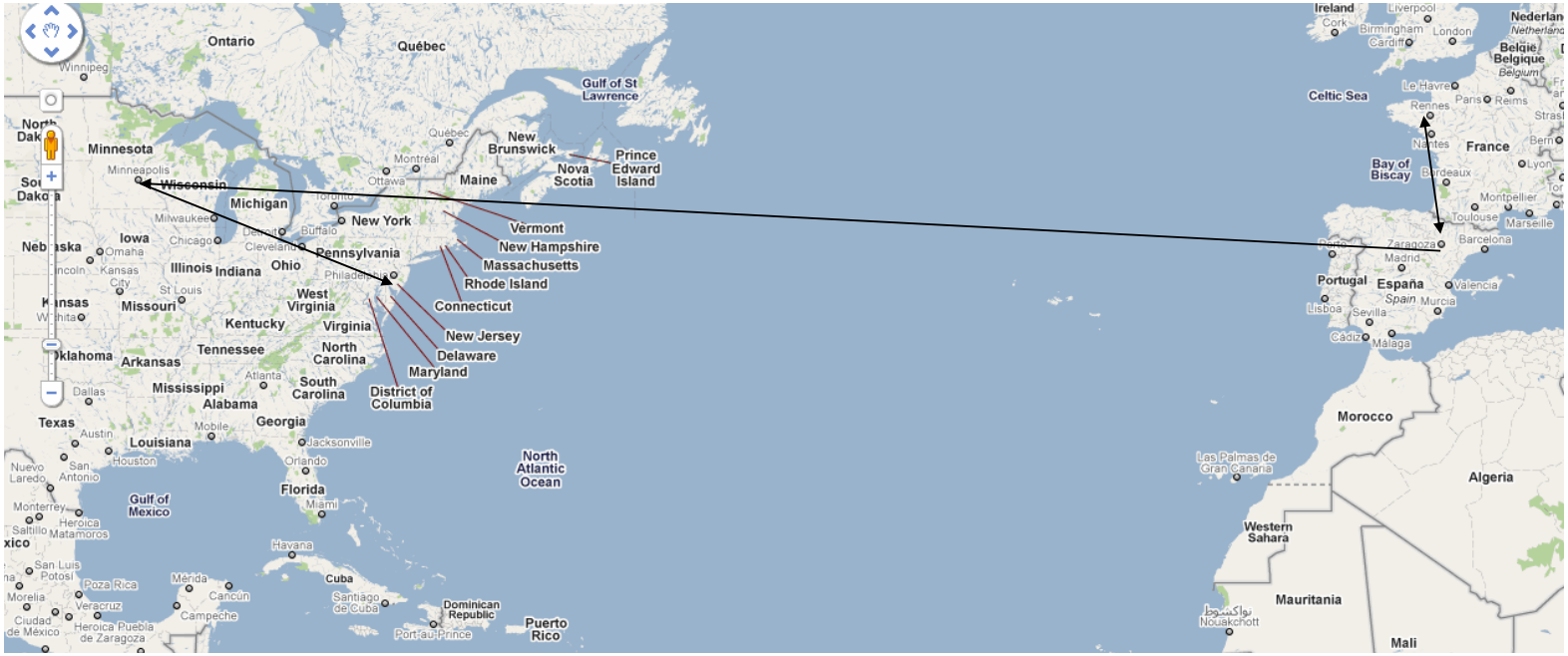
Spring 2011

Your instructor

1. My name: Francisco Javier Sayas
2. Ways to call me: First name (Francisco), middle name (Javier), nickname (Pancho), formal names (Professor, ...) not that recommended
3. Ways not to call me: Dude, Hey, ...
4. My whereabouts: 532 Ewing Hall
5. Office hours: Monday and Wednesday 9:00am to 10:30am. Also BY APPOINTMENT
6. The best way to contact me: by e–mail

`fjsayas (at) math.udel.edu`

A map


Ontario
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Nova Scotia
Prince Edward Island
Vermont
New Hampshire
Massachusetts
Rhode Island
Connecticut
New Jersey
Delaware
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District of Columbia
Pennsylvania
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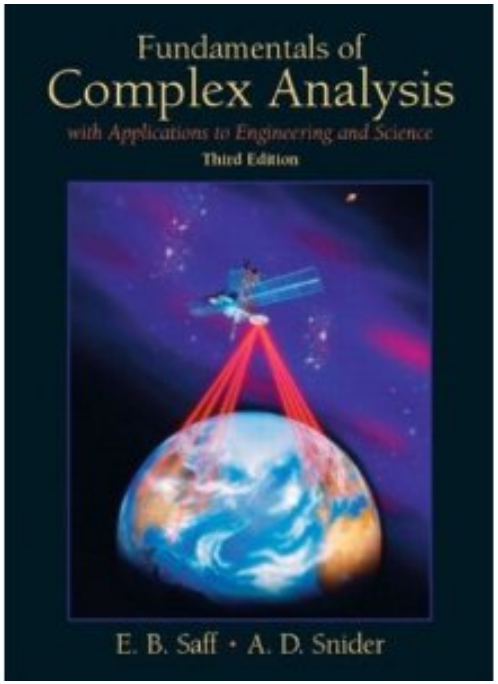
Indiana
Illinois
Iowa
Missouri
West Virginia
Virginia
Kentucky
North Carolina
South Carolina
Tennessee
Arkansas
Mississippi
Alabama
Georgia
Florida
Louisiana
Texas
Oklahoma
Kansas
Nebraska
Gulf of Mexico
North Atlantic Ocean
Cuba
Havana
Dominican Republic
Puerto Rico
Ireland
Celtic Sea
France
Bay of Biscay
Portugal
España
Spain
Morocco
Algeria
Western Sahara
Mauritania
Mali

The website

`http://math.udel.edu/~fjsayas/math508/`

1. Exact schedules of lectures. What was taught in each of them
2. Recommended and assigned problems
3. Dates of quizzes and exams. What they will be about as well.
4. Due dates for HW
5. The kind of information you tend to forget: what's this guy's name again? when are the office hours? what's maximum grade for this HW assignment?

The book



E. Saff & A. Snider. *Fundamentals of Complex Analysis with Applications to Engineering and Science*

- We'll do chapters 1 to 7
- Exercises will be taken from the book
- *Reading* the book is reaaaally recommended
- Look for the pretty figures (they'll be way better than mine on the board)

Seven chapters

1. Complex numbers
2. Analytic functions
3. Elementary functions
4. Complex integration
5. Series representations for analytic functions
6. Residue theory
7. Conformal mapping

Simple rules for the office hours

1. Official office hours are M & W from 9am to 10:30am. My office is, again, 532 Ewing Hall
2. DO NOT HESITATE to ask for an appointment for office hours if you cannot make it at these times, or you really need an answer to your urgent doubts.
3. How do I get an appointment? Ask me at the beginning or end of class. Or send me an e–mail.
4. Asking questions by mail is not recommended. It's difficult to explain content with formulas by mail.
5. Showing up at my office unscheduled is not recommended.
6. BTW, my mailbox is absolutely off-limits. Do not leave stuff there!

Evaluation

Part of the grade will reflect the quality of the argumentation and the clarity of its exposition. Solutions limited to formulas spread over the page will get less credit than solutions that are explained. Use the book as an example of how to write.

The final grade is composed of the grades obtained in quizzes, homework assignments and two exams. (See next slide) There will not be make-up quizzes and all assignments have to be delivered on the due date. No late assignments will be accepted.

Evaluation (cont'd)

1. Five in-class quizzes. 50 points each. The best four grades count (200 points maximum)
2. Five HW assignments. 25 points each. The best four grades count (100 points maximum)
3. One midterm exam on March 22. 350 points
4. The final exam. 350 points

Your goal

Get as many of the 1000 points as you can

Exams will be open book / open notes. Most quizzes will be open book, but not all of them.

Attendance policy

As worded in the syllabus

Attendance to the lectures is highly encouraged and will be taken into account in cases where round-off is needed in the final grade.

Academic honesty

As worded by the University of Delaware All students must be honest and forthright in their academic studies. To falsify the results of one's research, to steal the words or ideas of another, to cheat on an assignment, or to allow or assist another to commit these acts corrupts the educational process. Students are expected to do their own work and neither give nor receive unauthorized assistance. Any violation of this standard must be reported to the Office of Student Conduct. For more details, check

`http://www.udel.edu/stuguide/11-12/code.html#honesty`

Unless you are asked to do so in a concrete assignment, you cannot colaborate with your colleagues in assignments and projects. Cheating of any kind (even if the student does not take any advantage from it) will be grounds for an F grade.

Q & A

Let's begin with the introductions

The thing to remember about the *imaginary unit* $\imath$ is the property

$$\imath^2 = -1$$

In this class the imaginary unit will always be called $\imath$ (or *i*; just a different font). Some people (electrical engineers, for instance) prefer $\jmath$ (or *j*).

Some examples on how to deal with i

$$\frac{1}{i} = \frac{1}{i} \cdot \frac{i}{i} = \frac{i}{-1} = -i$$

$$i^3 = i^2 \cdot i = (-1) \cdot i = -i$$

What's i^4? What's i^5?

Something very useful you should always remember

$$(a + b\,\imath)(a - b\,\imath) = a^2 + b^2$$

Why is this helpful? Because it makes division as simple as multiplication:

$$\begin{aligned}\frac{2+3\imath}{2-\imath} &= \frac{2+3\imath}{2-\imath}\cdot\frac{2+\imath}{2+\imath} = \frac{(2+3\imath)(2+\imath)}{(2-\imath)(2+\imath)} = \frac{(2+3\imath)(2+\imath)}{5} \\ &= \frac{1+8\imath}{5} = \frac{1}{5} + \frac{8}{5}\imath\end{aligned}$$