Special Functions & WZ Theory

AARMS Summer School, Dalhousie University

Jul 11 – Aug 5, 2016

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Course website. http://aarms.straub.link
This syllabus as well as any other course material are posted there.
Class schedule.

Week 1: class meets MTWRF, 11-12:30pm	(MTF in Dunn 302, W in Dunn 135, R in Dunn 301B)
Week 2: class meets MTWRF, 9-10:30am	(MTWF in Dunn 135, R in Dunn 301B)
Week 3: class meets MTWRF, 11-12:30pm	(MTF in Dunn 302, W in Dunn 135, R in Dunn 301B)
Week 4: class meets TWRF, 9-10:30am	(TW in Rowe 1016, RF in Dunn 301B)

Grades. Your course grade will be based on:

- Problems (50% in total)
- Project (50%)

Problems. After most classes, problems will be posted. These can be worked on, and turned in, in groups of n students, where $n \in \{1, 2, 3\}$. Each problem is assigned some number of experience points, which you can gain by doing it (correctly). The goal is to reach a minimum number `M` of experience points by the end of the course. The precise value of `M` will be announced later, but `M` should be about 50% of the achievable points (and that's an upper bound for `M`).

Project. Let T be a suitable topic or problem of your choosing, close to your personal interests. The goal of the project is to introduce T, and to discuss and demonstrate how Sage can be helpful in working on T (the only constraint is that you should discuss both some mathematics and some computer algebra). To get a better idea of what is expected, see below for two examples.

- The outcome is two-fold:
  - a project paper, which needs to be turned in by Tuesday of the final week, and
  - a short in-class demonstration during Thursday or Friday of the final week.
- As with the assignments, you can work on the final project in groups of n students, where $n \in \{1, 2, 3\}$. The larger n, the more substantial the project is expected to be.
- As a rough guideline, your paper should be about 2-3 pages per student.
- Please let me know before the end of the second week, which project you are working on. Talk to me earlier if you would like personalized suggestions, or if you are unsure about the suitability of your topic.

Example suggestions for projects.

- Introduce Gröbner bases. Show an example by hand, and then demonstrate how we can use Sage for the computations. Give several examples that illustrate the usefulness of Gröbner bases.
- Introduce Dirichlet L-functions and the generalized Riemann hypothesis. Demonstrate how Sage allows us to work with these objects. Discuss numerical evidence for the generalized Riemann hypothesis, and maybe indicate some consequences if the hypothesis was true.

An excellent starting point is http://www.sagemath.org/doc/reference/ where you can browse the huge number of topics that are built into Sage.
You can also check out http://www.openproblemgarden.org for inspiration and, of course, lots of open problems.

Welcome to the summer school!