

A SIAM President's Legacy to Students

Mention the legacy of Gene Golub, and many numerical analysts think immediately of the singular value decomposition—the fast accurate Golub–Kahan algorithm for computing the decomposition $A = U \times \Sigma \times V^T$. Others might think back to an early contribution (Golub–Welsch): computing nodes and weights in the Gauss rules for approximating integrals. But what everyone recalls is his generosity and legendary hospitality to students and young people in mathematics and computer science.

As the beneficiary of a generous bequest from the estate of Golub, who died in 2007, SIAM hoped to put the funds to use in the sort of project that Golub might well have thought up on his own. Widespread discussions over the course of about a year led to an idea that mirrors some of Golub's main priorities and contributions: a summer school for graduate students.

This plan had a precedent: In the summer of 2008, the SIAM Activity Group on Linear Algebra ran a week-long summer school in Castro Urdiales, Spain. With leading experts in four different areas recruited to teach intensive courses, the International Summer School on Numerical Linear Algebra was designed for graduate students, postdocs, and others who make use of linear algebra in their work.

SIAG/LA envisioned the program in Spain as the first in a series, to be followed by another in 2010, and then every three years in different locations around the world.

An Inspiring Model

A tireless traveler, Golub paid regular visits to colleagues all over the world, taking time to meet with students at every stop. In that tradition, the International Summer School in Castro Urdiales brought together students from 18 countries, with the largest numbers from Spain and Germany, and a sprinkling from more distant countries, including Venezuela, Turkey, and Japan. They had come to advance their knowledge of linear algebra in a short time, learning about research at the forefront of selected areas, as presented by leading researchers in those areas.

Many of the participants, like Brown University student Akil Narayan, mentioned the networking aspects of the program as a distinct benefit: “The summer school was a unique experience in that it allowed me to interact with many of my international peers coming from various backgrounds,” he wrote in response to an informal postschool questionnaire. “This allowed me to come into contact with ideas and projects that are not visible in my immediate academic circle.”

The lecturers, chosen both for their expertise in the areas presented and for their expository skills, were Michael Eiermann, Krylov subspace methods for solving systems of linear equations; Lars Eldén, matrix methods in data mining; Rich Lehoucq, mechanics and linear algebra; and David Watkins, structured eigenvalue problems. The students generally found the two-hour lectures demanding but, for the most part, accessible.

Some lectures were a very good fit with students' interests: Kirk Soodhalter, a graduate student at Temple University whose dissertation re-search (under the direction of Daniel Szyld) is concerned mainly with Krylov subspace methods, found his increasing interest in data mining nicely nurtured by Eldén's sessions. Federico Poloni, a graduate student at Scuola Normale Superiore, Pisa, was especially intrigued by the lectures on structured eigenvalue problems. “I hoped to find at least one or two interesting courses,” he said, “and all of them were.”

For the most part, the students found an experience that would not be easily replicated at their own universities, or anywhere else. “It would be difficult to emulate the breadth of topics and depth of knowledge at a single institution,” Narayan said.

Even in enthusiastically recommending the experience to others, several students had advice for future students: Be sure to arrive with a very solid background in numerical linear algebra. Future organizers might want to heed the suggestions of several students that lecturers make known their expectations of the knowledge level of their audiences. Physics was an obstacle for more than one of the 2008 students: The mechanics course “was a bit difficult to follow due to my (and most participants', I think) inexperience with the subject,” Poloni said, “but it's good to have followed it, interesting, and now I think I know more on the subject.”

Daniel Szyld, the current chair of SIAG/LA and a member of the steering committee for the linear algebra summer schools, reports that applications for the school in Spain far outnumbered the places available (75 to 50). As a result, eligibility was limited to 50 doctoral students; applicants already in possession of doctoral degrees were excluded. The same criteria will be in place for the 2010 summer school in Italy.

Linear Algebra and Much More

The next International Summer School in Numerical Linear Algebra will be held near Fasano, Italy, June 7–18, 2010; it will be known as the Gene Golub SIAM Summer School (G^2S^3 2010). Once again, the organizers have recruited four outstanding lecturers on topics of current interest: James Demmel (University of California, Berkeley), minimizing communication in numerical linear algebra; Volker Mehrmann (Technische Universität Berlin), analysis and numerical solution of nonlinear eigenvalue problems; Charles Van Loan (Cornell University), From Matrix to Tensor: The Transition to Computational Multilinear Algebra; and Margaret Wright (Courant Institute, NYU), linear algebra and optimization.

Prospective students can find details at <http://www.siam.org/students>. Applications must be submitted by February 1, 2010; applicants will learn whether they have been accepted in March.

The 2010 program is just the beginning for G^2S^3 . As envisioned by SIAG/LA, a summer school in linear algebra will be held every three years, beginning in 2013, in locations around the world. For the two intervening years, proposals will be solicited from organizers in any area of applied/computational mathematics covered by SIAM.

G^2S^3 2011 will be held in Vancouver, BC, immediately preceding ICIAM 2011. A call for proposals will be released later this year; the proposal deadline is March 31, 2010.

Details about proposal submission will be posted at www.siam.org/ as available, and Jim Crowley will be sure to keep readers informed via his SIAM News column.