

SIAG LIFE SCIENCES CHARTER RENEWAL APPLICATION

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on the Life Sciences. The SIAM Activity Group on Life Sciences (hereafter called SIAG/LS) to which this renewal applies was originally formed under the aegis of SIAM in the fall of 1999 by the SIAM Council and by the SIAM Board of Trustees by electronic mail vote with its initial operating period beginning January 1, 2000 and ending December 31, 2002. Its charter has been renewed by the Council and Board two times thereafter. The SIAG/LS had 641 members as of December 31, 2006.

According to its Rules of Procedure, the objective of the SIAG/LS is to foster applications of mathematics to the life sciences and research in mathematics that leads to new methods and techniques useful in the life sciences. Its proposed functions were to organize minisymposia at the SIAM Annual Meetings with scheduling coordinated by the SIAM VP for Programs and the SIAM VP at Large with the SIAG/LS Chair. Furthermore, a major function of the SIAG/LS is to organize a biennial SIAM Conference on Life Sciences.

The SIAG/LS has complemented SIAM's activities and supported its proposed functions. The answers to the questions below indicate how this was accomplished and what the officers propose as the future directions for the SIAG/LS.

1. How is the field covered by the activity group doing? Is it growing, is the focus shifting? What have been the significant advances over the last three years?

The recent growth in different areas of mathematical biology has been explosive. New Ph.D. programs in mathematical biology have been springing up all over the globe. Biologists are becoming more accepting of the contributions mathematics can make to the life sciences, and more theoretical mathematicians are beginning to see the interesting and challenging mathematical problems arising in models from the life sciences. The acquisition of biological data, particularly in the general area of genetics but also in areas such as neuroscience, has continued to accelerate, posing a range of challenges in algorithm development, statistical analysis, parameter estimation, and model development and analysis. New questions are arising in the major area of functional genomics – what questions are relevant biologically and which mathematics will lead to breakthroughs in our understanding of our genetic makeup? Significant recent advances have included the implementation of simulations approaching the scale of the whole brain, a new algorithm that combines and manipulates data from “gene chips” to more easily detect certain cancer genes, and the use of advanced molecular biology techniques coupled with advanced mathematical models to isolate the components of noise from identical cells that are involved in development, evolution, and some genetic conditions.

Further evidence of the expanding interest in quantitative research in the life sciences comes from the increased number of conferences and workshops largely devoted to the life sciences. The Society for Mathematical Biology Annual Meeting will be held this year in San Jose, California in early August 2007, and SIAM itself sponsors the Conference on

Mathematics in Industry, which will have a focus on biomedical and life sciences research, in early October 2007 in Philadelphia, Pennsylvania.

The NSF/DMS-funded Mathematical Biosciences Institute in Columbus, Ohio has received renewed funding for an additional three years for its diverse programs. It is the only federally funded Institute in the US with an exclusive focus on Mathematical Biology, and their programs encourage young researchers, graduate students and postdocs, as well as established faculty, to actively participate.

In January 2006, the Howard Hughes Medical Institute, based in Chevy Chase, Maryland, began funding 10 graduate doctoral training programs across the US that are expected to produce PhDs who are able to bridge the gap between experimental and mathematical research in the biomedical and life science areas. Successful programs will continue to receive graduate student funding from the National Institute of Biomedical Imaging and Bioengineering.

2. How is the activity group doing? Is it remaining vibrant? Is the size of the SIAG/LS stable or increasing? How is the SIAG/LS keeping up with the changes in the field? How are the broader interests of SIAM reflected in the activities of the SIAG/LS?

The SIAG/LS remains dedicated to its role as a catalyst for improving the state of research and education in mathematical biology. Its membership numbers are:

Year	2002	2003	2004	2005	2006
Number	423	512	511	509	641

As shown, the membership number swelled to 641 members at the end of the last calendar year, of which 199 were students. The membership increase corresponds to a significant growth over the previous three years. We conjecture that most of this increase resulted from the joint Conference on Life Sciences with the Society for Mathematical Biology in Raleigh, NC last August 2006.

3. Please list conferences/workshops the activity group has sponsored or co-sponsored over the past three years, and give a brief (one sentence or phrase) indication of the success or problems with each.

The main activity of the SIAG/LS group is the organization of the biennial SIAM Conferences on the Life Sciences. There now have been three SIAM Conferences on the Life Sciences with the first being held in 2002 in Boston joint with the SIAM Conference on Imaging Science with 209 SIAG/LS attendees, and the second being held in 2004 in Portland joint with the SIAM Annual Meeting with 341 SIAG/LS attendees. The last meeting was held July 31 – August 4, 2006 in Raleigh, North Carolina, and was a joint meeting with the Society for Mathematical Biology (SMB). The Conference attracted 541 attendees, of which 131 were students. This represents an increase of exactly 200 attendees over the previous conference in Portland.

The Conference was very successful in terms of the broad range of topics represented in the Life Sciences and the level of attendance. The themes were Ecology, Environmental and Evolutionary Biology, Genomics, Imaging, Neuroscience, Structural Biology, Modeling Diseases, Biomathematics in Industry, Biology, Toxicology, Stochastic Effects in Biology, and Cell Motility. Two specific problems that arose were the physical size limitations of the venue and with the extreme heat and humidity at that time of year in North Carolina.

Planning for the 2008 SIAM Conference on the Life Sciences (LS08), the first stand-alone conference that SIAG/LS has organized, is well under way with the selection of an Organizing Committee, the conference themes, the venue in Montreal, Canada, and the conference dates of August 4-7, 2008. A slate of eight Plenary Speakers has been proposed, and these potential speakers are presently being contacted. The themes for this conference are Imaging, Biomechanics, Protein Networks, Biomathematics in Industry, Gene Networks, Computational Biology, Neuroscience, and Epidemiology. Steve Cox and Jon Rubin are the main conference organizers, and they have been doing an excellent job in organizing the conference and keeping it on track with SIAM's schedule.

One challenge for this meeting is the establishment of a clear identity for the meeting, distinct from the annual SMB meetings and other related workshops. The LS08 will be held immediately following the conclusion of the SMB Annual Meeting to be held in the vicinity of Toronto, Canada. We feel that overall, the content of the SIAM Life Sciences meetings have a more mathematically sophisticated emphasis than that of other related meetings. Moreover, the meeting is of a sufficiently large size to offer participants access to multiple minisymposia in their areas of specialization as well as the opportunity to sample offerings on a broad variety of mathematical biology topics, unlike most workshops. Nonetheless, the SIAM LS08 meeting will compete with the 2008 SMB meeting, the 2008 Gordon Conference on Theoretical Biology, and will overlap with the Annual Meeting of the Ecological Society of America being organized by Lou Gross, a mathematical ecologist and former President of SMB.

One difficulty with the planning of this conference was that there seemed to be little flexibility in terms of moving the conference dates back to late May/early June, as a result of the temporal proximity of several other SIAM conferences and the number of SIAM staff available to handle these conferences.

4. Please indicate the number of minisymposia directly organized by the activity group at the last two SIAM annual meetings. When did the SIAG last organize a tract of minisymposia at an annual meeting?

In 2004, there were two and a half days of overlap between the SIAM Conference on the Life Sciences and the SIAM Annual Meeting in Portland. Two of the Plenary Lectures were shared between the two conferences and there were an additional five minisymposia on life sciences at the SIAM AN04. Otherwise, there have been no minisymposia directly organized by the SIAG/LS at the 2005 and 2006 SIAM ANs held in New Orleans and in Boston, respectively. However, it should be noted that at the 2005 and 2006 SIAM ANs, there were numerous minisymposia on life sciences organized by individuals. There is no SIAM AN this year because of the ICIAM conference in Switzerland in July.

5. Please indicate other activities sponsored by the activity group, to include newsletters, prizes and Web sites. Have each of these been active and successful?

Detailed discussions have taken place among the officers, led by Ramit Mehr, on the development of a more comprehensive website. There have been some updates on the SIAG/LS website maintained by SIAM. The SIAG/LS mailing list, which now is functional, presently has approximately 600 members and includes several SIAM staff members interested in SIAG/LS communications. There are only a few SIAG/LS members who do not have email addresses on file with SIAM.

SIAM uses the mailman program to manage our lists, so individuals and list owners can manage subscriptions and messages through a web-based interface. Jim Parker of SIAM and Ramit Mehr have been assigned as administrators of the list, and Ramit Mehr has been assigned as list moderator. The list is currently set for all members to be moderated and it has been tested.

6. What activities are planned and proposed for the next period of the charter? Please describe scheduled and suggested future activities in detail.

We will continue the Lee Segel Forum at LS08, and career-life balance, interdisciplinary funding opportunities, and interdisciplinary training have been discussed as possible topics.

Further updates to the SIAG/LS website are being planned and will include contributions from members, which will be solicited through the SIAG/LS mailing list.

Sharing the SMBnet-digest is another option for communicating with members that may increase the visibility of messages originating from both SMB and SIAG/LS memberships and prevent double mailings. However, in spite of initial enthusiasm from the SMB board, they recently requested a formal letter regarding this issue. This letter will be written as soon as our mailing list and website have been completely set up to our satisfaction.

7. How can SIAM help the activity group achieve its goals?

We appreciate the dedication of SIAM staff to the support of SIAM/LS conferences. Assistance in advertising the SIAM LS08 to SIAM members also will be highly valuable.

One way to encourage more people to publish papers in SIAM journals is to get some of those journals indexed in PubMed. This is the site where most biologists look for previously published results and thus researchers who want to have an impact in the field want to publish in journals which appear in PubMed. A likely candidate for this would be SIADS as there are many biological papers in this journal. SIAM can help the SIAG/LS achieve its goals by directly telling us what services SIAM can offer the SIAG/LS. What administrative, logistical, and financial support is available to the SIAG/LS and where are these resources/guidelines listed? Also, what pre-conference schedules and procedures must be followed in order to participate as a SIAG, say in the SIAM AN? This will allow us time to solicit minisymposia for the SIAM AN. SIAM also can provide lobbying support and contact information for the discipline in terms of research grants from NIH, NSF, NASA, DOE, DOD, Howard Hughes, etc.

8. How can the activity group help SIAM in its general role of promoting applied mathematics and computational science?

The 21st Century is being called the Century of Biology, and certainly biology and medicine are the most active and exciting fields of science at the present time and this situation is expected to continue over the next several decades. New experimental methods such as imaging and genetic manipulation allow (and force) biologists to become much more quantitative. SIAM will greatly benefit from these directions as more and more applied mathematicians and computational scientists focus their research in the life sciences. In the most recent dynamical systems conference, three (and arguably four) of the plenary speakers described work in biology and medicine. Over twenty minisymposia were organized in biological areas at DS07 as well. As more mathematicians enter biology, SIAM through the SIAG/LS will be in a good position to represent them.

The SIAG/LS requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2008.

Signed

Robert M. Miura
Chair, SIAM Activity Group on Life Sciences
July 3, 2007