

SIAM Activity Group Life Sciences

Charter Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on the Life

Sciences (hereafter called SIAG/LS). In the fall of 1999, the SIAM Council and the SIAM Board of Trustees, under the aegis of SIAM, formed the SIAG/LS by electronic mail vote with an initial operating period between January 1, 2000 and December 31, 2002. The Council and Board have renewed the SIAG/LS charter ten times thereafter.

This SIAG has 688 members, including 239 student members, as of December 31, 2023.

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.

Its functions were:

1. Organize minisymposia at the SIAM Annual Meeting and ICIAM in years where there is no SIAG conference.
2. At least once every seven years either organize a track of at least six minisymposia at the SIAM Annual Meeting or have an activity group meeting held jointly with the annual meeting. The VP for Programs and the VP at Large will coordinate the scheduling with the SIAG chair.
3. Organize a biennial SIAM Conference on the Life Sciences. The SIAG will consider dovetailing specialized workshops and conferences with the SIAM Annual meeting or other SIAG conferences. The chair of the conference organizing committee shall be either the program director or the chairperson of the SIAG or their designee. The organizing committee must be approved by the VP for Programs at least 16 months before the conference.
4. With the approval of the SIAM Program Committee, the SIAG may organize special sessions at SIAM meetings. Other SIAG meetings may be organized only with the approval of the SIAM president and vice president for programs.

The SIAG 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.

List all current officers of the activity group (including advisory board, if relevant).

Chair: Frederick Adler

Vice Chair: Helen Moore

Program Director: Nesity Tania

Secretary: Cheng Ly

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 LS SIAG is very active with broad attendance by scientists across a broad range of biological fields and at all career levels (students to senior/retired). It is difficult to assess whether LS SIAG membership is growing given the drop in membership after 2020 (covid), but we expect growth in membership in the coming years with increasing use of machine learning / artificial intelligence in biological data; this should lead to new and exciting research in our field. The larger mathematical biology community continues to grow with the steady increase in academic journals (practitioners publish in a range of areas from pure theory, interdisciplinary studies, to predominately biological papers). There are currently 4 NSF-Simons MathBioSys Research Centers throughout the country that each receive \$10M (over 5 years) to support a range of research activity in our field.

The SIAM LS is a popular and well-attended meeting that spans many areas of the biological and mathematical sciences. It is one of the few meetings at the interface of all biological and all mathematical areas, with the other being the Society for Mathematical Biology (SMB) annual meeting. The SMB meeting is held outside of North America in the years when the LS meeting is held. Significant advances in the last 3 years: dramatic increase / more ubiquity of data-driven modeling frameworks, I don't know? The power of mathematical and computational approaches has found a new and high-profile focus through programs on "Digital Twins", promoted by the National Academies of Sciences, Engineering, and Medicine through their report "**Foundational Research Gaps and Future Directions for Digital Twins**" and a new "Mathematical Foundations of Digital Twins" initiative through DMS at NSF. SIAM LS members are at the forefront of this work by linking mechanistic modeling, advanced computation, and data assimilation methods.

There are also several centers in the US that combine mathematics and medicine: the Moffitt Cancer Center Integrated Mathematical Oncology, the UNC Computational Medicine Program, the Univ of Florida Laboratory for Systems Medicine, and the MD Anderson Cancer Center Institute for Data Science. Many of the faculty and trainees from these centers attend SIAM LS and/or SMB meetings.

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

The activity group is doing very well and remains vibrant. The energy and enthusiasm members have for learning about colleague's work and presenting their own work is high. The size of LS SIAG is stable. To keep up with changes in our field, we have had a stronger emphasis on including mathematicians working in industry (i.e., pharmaceutical, biotech) in our community.

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

We have not formally (co-)sponsored any conferences or workshops in the last 2 years, but will consider doing this especially in the odd-numbered years when there is not a SIAM LS conference.

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 track of minisymposia at an annual meeting or meet jointly with the SIAM Annual Meeting?

There were no minisymposia directly organized by the LS SIAG at the Annual Meeting in 2023. The LS SIAG was held jointly with the Annual Meeting in 2022 (Pittsburgh, PA); at that meeting, there were 78 total minisymposia at the LS 22 meeting.

Because of the number of Activity Groups, the current guidelines are that an Activity Group should organize a track about every seven (7) Annual Meetings or meet jointly with the Annual Meeting within a seven (7) meeting period.

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?

Through the SIAM Engage platform, the LS SIAG actively communicates timely news to our members weekly and monthly. The LS SIAG twitter/X account is active with regular posts/re-posts of pertinent news in our field. Biannually, the LS SIAG awards an Early Career Prize. We have begun the process of proposing a new LS Career prize and hope to have it approved in the coming year.

The 2024 SIAM Prize committee consisted of the SIAG LS members: Rebecca Tyson (Chair, University Of British Columbia Okanagan) Kyle Wedgewood (University of Exeter) Miranda Teboh-Ewungkem (Lehigh University) Alicia Dickenstein (Universidad de Buenos Aires) Carolyn Cho (Eikon Therapeutics).

The 2024 prize will be awarded to Adrienne Jenner for “her groundbreaking work in mathematical immunology. In particular, she and her collaborators identified previously unknown molecular biomarkers that predispose individuals to severe COVID-19.” The award will be presented during the SIAG/LS conference in June 2024.

A separate effort, led by Simone Bianco and Jon Rubin, is to put together a proposal for a new SIAM Journal on the Life Sciences, SIALS. The journal will highlight the use of mathematics to address problems in the life sciences. This proposal follows up on the successful Special Section of SIAM J. Appl. Math. that they guest edited over the last 2 years, which elicited many strong submissions, and builds on an earlier proposal from almost 15 years ago developed by Anita Layton, Maia Martcheva, and Jon Rubin. Announcement of the proposed journal will be made and discussed during the SIAG LS Business Meeting at SIAM LS 2024 conference.

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

The major event the LS SIAG organizes is the biannual SIAM LS meeting. The program director plays a prominent role, thus electing a new program director to work with Nessy Tania for the 2026 meeting, as well as the other 3 LS officers for the next term, is a top priority.

We will continue to work on disseminating newsworthy events in the Life Sciences with more SIAM News articles (our SIAM news liaison: RB McGee, will help with this).

The LS SIAG will explore having a poster prize for early career researchers at the LS meeting in 2024, and longer term will look to having a sponsor to make it a monetary prize.

The LS SIAG will also consider an informal mentoring event at the LS meeting in 2024, with hopes of a more formal mentoring program longer term.

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

SIAM can continue being helpful in organizing the biannual SIAM LS meeting. A priority for the current officers is to find a location for the 2026 meeting that is near many scientists/mathematicians working in industry (e.g., the Boston area). Because of the many benefits of having biopharma involved in the LS SIAG, it would help us if we could hold meetings in the northeast US on a regular basis. SIAM staff have been very helpful in trying to facilitate that, but it seems it remains a challenge. If SIAM/staff could figure out a way to make that possible, it would be valuable to the LS SIAG and our members. This might mean paying the site venue more money, but with a plan to involve more biopharma attendees and to solicit sponsors for SIAM LS meetings.

SIAM can also help facilitate the Early Career Poster Prize, specifically the logistics of having an industry sponsor.

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

A large percentage of the LS SIAG members are academics. Although there have recently been a number of online career panels held/sponsored by SIAM, with overall a greater emphasis in including more industrial scientists in administrative/officer roles and as conference attendees, the LS SIAG community can still improve upon this. Life sciences provide a particular opportunity due to the explosive growth of the biopharma industry and its increasing use of mathematical and computational methods.

The LS SIAG could promote applied math/computation by (co-)sponsoring a workshop or other social event in the odd years when there is not an LS conference.

This SIAG/LS requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2025.



Signed,

Frederick Adler, SIAG/LS Chair

5/3/2024