

SIAM Activity Group Uncertainty Quantification Charter Renewal Application

This CHARTER RENEWAL APPLICATION applies to the SIAM Activity Group on Uncertainty Quantification. The SIAM Activity Group (or SIAG UQ) to which this renewal applies was originally formed under the aegis of SIAM in December 2010 by the SIAM Council and by the SIAM Board of Trustees with its initial operating period beginning December 11, 2010 and ending December 31, 2012. Its charter has been renewed by the Council and Board three times thereafter.

Statistics:

- This SIAG has 737 members, including 357 student members and 180 non-student members as of December 31, 2017
- Of the non-student members there are 52 female and 314 male members
- There are 257 domestic and 123 international non-student members

According to its Rules of Procedure, the objective(s) of the SIAG are:

- It is the purpose of the SIAM Activity Group on Uncertainty Quantification to foster activity and collaboration on all aspects of the effects of uncertainty and error on mathematical descriptions of real phenomena. It seeks to promote the development of theory and methods to describe quantitatively the origin, propagation, and interplay of different sources of error and uncertainty in analysis and predictions of the behavior of complex systems including biological, chemical, engineering, financial, geophysical, physical, and social/political systems. The SIAG serves to support interactions between mathematicians, statisticians, engineers, and scientists working in the interface of computation, analysis, statistics, and probability.
- Together with its partner UQ Interest Group in ASA, the SIAG organizes a biennial conference, sponsors minisymposia at conferences, publishes a newsletter biannually, and maintains an electronic discussion group.

Within the framework of SIAM, the SIAG will conduct activities that implement its purposes. The SIAG on Uncertainty Quantification will organize activities in uncertainty quantification.

The SIAG is expected to:

1. Organize minisymposia at the SIAM Annual Meeting in years where there is no SIAG conference.
2. *At least once every five 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 Uncertainty Quantification. 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, and conduct special one- or two-day meetings immediately before or after a regular SIAM 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.*

SIAG meetings, workshops, and conferences may be organized only with the approval of the SIAM President and the SIAM 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.

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

Chair: Roger Ghanem

Vice-Chair: Elaine Spiller

Program Director: Youssef Marzouk

Secretary: Noemi Petra

2. 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 two years?

The field continues to grow very rapidly with new linkages at the interface of various mathematical disciplines such as optimization, data science and networks, and several application areas. The SIAG is at the center of that growth as indicated by the tripling of its membership since it was created in 2010, and the persistent growth in its conference. This growth has also been supported and perhaps validated by an increase of funding opportunities from various funding agencies, and an ongoing cultural shift in computational science from prediction towards statistical inference. This shift brings with it new mathematical, algorithmic, and scientific challenges that will continue to invigorate this community. The health of the field is also witnessed to by the growth of related activities within other professional societies.

3. 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?

Membership in this SIAG has tripled since its inception in 2010. Activities in Machine Learning, Networks, Data Science, Optimization, Numerical Analysis, Dynamical Systems and Orthogonal Polynomials are all reflected within this SIAG as reflected by its Journal and its Conference.

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

The SIAG UQ organizes the biennial conference on Uncertainty Quantification.

This list of conferences may be found at:

<http://www.siam.org/meetings/archives.php#UQ>.

In addition to the biennial conference, the SIAG has sponsored two workshops. The first one on Parameter Space Dimension Reduction (<http://www.siam.org/meetings/dri17/>) was organized by Paul Constantine and David Gleich and featured 41 talks over two days (July 9-10 2017). The

second workshop was organized by Roger Ghanem, Habib Najm, David Higdon, and Michael Mahoney on the subject of UQ and Machine Learning (<http://hyperion.usc.edu/UQ-SciML-2018/>) And featured 60 participants and 24 talks (June 4-6 2018).

5. 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 at an annual meeting or meet jointly with the SIAM Annual Meeting?

The SIAG organized 5 minisymposia with 10 sessions at the 2017 SIAM Annual Meeting. These were organized by Hoang Tran and Clayton Webster (High Dimensional Systems), Akil Narayan and Paris Pedikaris (Multifidelity Approaches), Khachik Sargsyan, Xun Huan and Habib Najm (Model Error), Tan Bui-Thanh (PDE-Constrained Inverse problems), and Matti Morzfeld and Kodi Law (Data Assimilation).

The SIAG organized 4 minisymposi at the 2018 SIAM Annual Meeting. These were organized by Drew Kuri (Stochastic Optimization), Paul Constantine (Active Subspace), Troy Butler (UQ in Geosciences), Kody Law (UQ and Data). The SIAG has never met jointly with the SIAM Annual Meeting.

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

The SIAG also sponsors an Early Career Prize which was awarded at this year's Conference to Aretha Teckentrup. We are at the early stages of discussion within the SIAG leadership about instituting additional awards to recognize and promote excellence within our membership.

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

Our next biennial conference will be held in Munich in 2020. We anticipate sponsoring a couple of workshops in the intervening time. We do not have firm commits for these yet, but we are working on growing these workshops with colleagues in Shanghai and Vienna.

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

It would be very conducive to our purpose if the lag time in approving the sponsorship of thematic workshops could be reduced to one or two months. Science and research is evolving at a very rapid pace. Our ability to respond promptly to requests from our members is critical for matching their enthusiasm.

9. How can the activity group help SIAM in its general role of promoting uncertainty quantification?

The activity group should do a better effort at leveraging SIAM's network of publications and conference to disseminate its stories, its challenges and its successes. We will be proposing ideas to SIAM leadership along these lines, and we are open to suggestions from them.

This SIAG requests that the SIAM Council and Board of Trustees renew its charter for a two-year operating period beginning January 1, 2019.

Signed and dated by the current SIAG Chair

June 4 2018

