1. Title Page

Annual Report (July 1, 2021 - June 30th 2022)
Center for Applied Mathematics and Statistics (CAMS)
Director: Jiguang Sun
09/27/2002

2. Mission Statement
The mission of CAMS is to promote interdisciplinary research among mathematicians, statisticians, scientists, and engineers, and provide statistical consulting service for Michigan Tech and the community.

3. Activities and Highlights
3.a Primary activities and highlights - (i) CAMS director works with the management committee (3 members) to operate the center. (ii) The individual needs to be an active MTU researcher in an area related to the mission of CAMS. (iii) We had one new member last year. (iv) Invite the member to attend the seminars and the summer workshop. Encourage the statisticians to offer consulting services and set up the collaborations. (v) The center meeting and summer workshop brought the members together for collaborations and discussions on potential external grant applications.

(1) Statistical Consulting Service
The statisticians of CAMS (Kui Zhang, Fan Dai, Byungjun Kim, Ray Molzon, Xiao Zhang) provide free statistical consulting services for Tech faculty and students, (Spring 2022, Summer 2021, Fall 2022).

(2) CAMS annual meeting, Friday, Oct. 29, 1:00pm-5:00pm by Zoom.

(3) Joint CAMS and Math Seminars
   - Chi-wang Shu, Brown University, 9/24/2021
   - Xiao Zhang, Michigan Tech, 2/18/2022
   - Sarah Kitchen, MTRI, 3/25/2022
   - Jie Shen, Purdue, 09/23/2022

(4) Copper Country Workshop on Applied Mathematics, Statistics, and Data Sciences, July 5-7, 2022 at MTU.
The goal of the workshop is to bring leading researchers to discuss the recent developments in applied mathematics, statistics, data sciences, and build collaborations among the participants from different areas.

The workshop attracted 47 participants including faculty and students. There were 30 speakers from 19 universities including Columbia University, Brown University, Purdue University, University of Notre Dame, York University, University of Georgia, Stevens Institute of Technology, Auburn University, University of South Carolina, Michigan State University, University of Michigan, University of Texas at San Antonio, Missouri University of Science and Technology, University of Florida, Iowa State University, Kansas State University, University of Minnesota, The George Washington University, and Michigan Tech.

Details about the workshop can be found at: https://sites.google.com/mtu.edu/copper-country-workshop/home

3.b Current CAMS member list
See Appendix.

4. Budget Overview
4.a The center received a transfer of $5,000 from VPR. The fund is mainly used to support the statistical consulting services. The department of mathematical sciences also provides funds for CAMS to support statistical consulting services and workshops.
4.b There was no IRAD revenue, FY 21-22.
4.c List of proposals - see Appendix.
4.d n/a (FY 21-22 is the first year of CAMS).

5. Future Plans and Goals
5.a CAMS will continue to provide free Statistical Consulting Service to Tech faculty and students. CAMS plans to continue to foster interdisciplinary collaborations and proposals. CAMS plans to organize Copper Country Workshop on Inverse Problems and Imaging, Summer 2023 and will continue to organize one summer workshop each year.
5.b CAMS will continue to work hard towards its short term goal (3 years): $2,000,000.00 for submitted proposals and $500,000.00 for funded research proposals.
5.c n/a
5.d n/a
5.e n/a

6. Challenges and Barriers
FY 21-23 is the first year of CAMS. There are two main challenges: collaborations and proposal success rate. CAMS plans to encourage the members to collaborate by inviting members to give talks at math department seminars. The center will also work with the members to analyze the reasons for low success rates. Lack of IRAD revenue can potentially affect the operation of the center.

Appendix
A.1 Current CAMS member list
Wei, Hairong - CFRES
Chatterjee, Snehamoy - Geological and Mining Engineering and Sciences, COE
Jiang, Jingfeng - Biomedical Engineering, COE
Masoud, Hassan - Mechanical Engineering, COE
Oommen, Thomas - Geological and Mining Engineering and Sciences, COE
Xi, Xin - Geological and Mining Engineering and Sciences, COE
Xue, Pengfei - Civil, Environmental, and Geospatial Engineering, COE
Dai, Fan - Mathematical Sciences, CSA
Iyer, Kartik - Physics, CSA
Kim, Byung-Jun - Mathematical Sciences, CSA
Labovsky, Alexander - Mathematical Sciences, CSA
Molzon, Ray - Mathematical Sciences, CSA
Ong, Benjamin - Mathematical Sciences, CSA
Piret, Cecile - Mathematical Sciences, CSA
Rho, Yeonwoo - Mathematical Sciences, CSA
Sha, Qiuying - Mathematical Sciences, CSA
Sun, Jiguang - Mathematical Sciences, CSA
Xu, Zhengfu - Mathematical Sciences, CSA
Yang, Yang - Mathematical Sciences, CSA
Zhang, Kui - Mathematical Sciences, CSA
Zhang, Qian - Mathematical Sciences, CSA
Zhang, Xiao - Mathematical Sciences, CSA

A2. Proposals (all through CAMS. submitted total: $2,276,448)
1. Robust numerical methods for flow and transport in fractured porous media, Yang Yang, American Mathematical Society, $50,000. (declined)
2. Simplified Essentially non-oscillatory type high order finite volume methods solving hyperbolic conservation laws on unstructured mesh, Zhengfu Xu, NSF, $403,997. (declined)
3. Data-Driven Methods for Severely Ill-posed Inverse Problems, Jiguang Sun, NSF, $392,273. (declined)
4. Robust numerical methods for flow and transport in porous media, Yang Yang, Simons Foundation, $42,000. (awarded)
5. Large Eddy Simulation with Correction - a new class of turbulence models with high physical fidelity, Alexander Labovsky, NSF, $243,165. (declined)
6. Clustering and Visualizing High-dimensional Data with Mixed Features, Fan Dai, NSF, $157,687. (declined)
7. Statistical methods for association studies based on biobanks linked to electronic health records, Qiuying Sha, NIH, $156,500. (pending)
9. Collaborative Research: Robust numerical methods for flow and transport in fractured porous media, Yang Yang, NSF, $211,036. (declined)
10. The spurious solutions of high order curl problems and a spurious-solution-free numerical scheme, Qian Zhang, NSF, $114,295. (pending)