VirginiaTech
Invent the Future

LISA (Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis)

2011-2012 Annual Report
(12-12-2012)

LISA

LISA empowers Virginia Tech researchers to answer research questions, win grants, publish papers, complete dissertations, and invent the future.
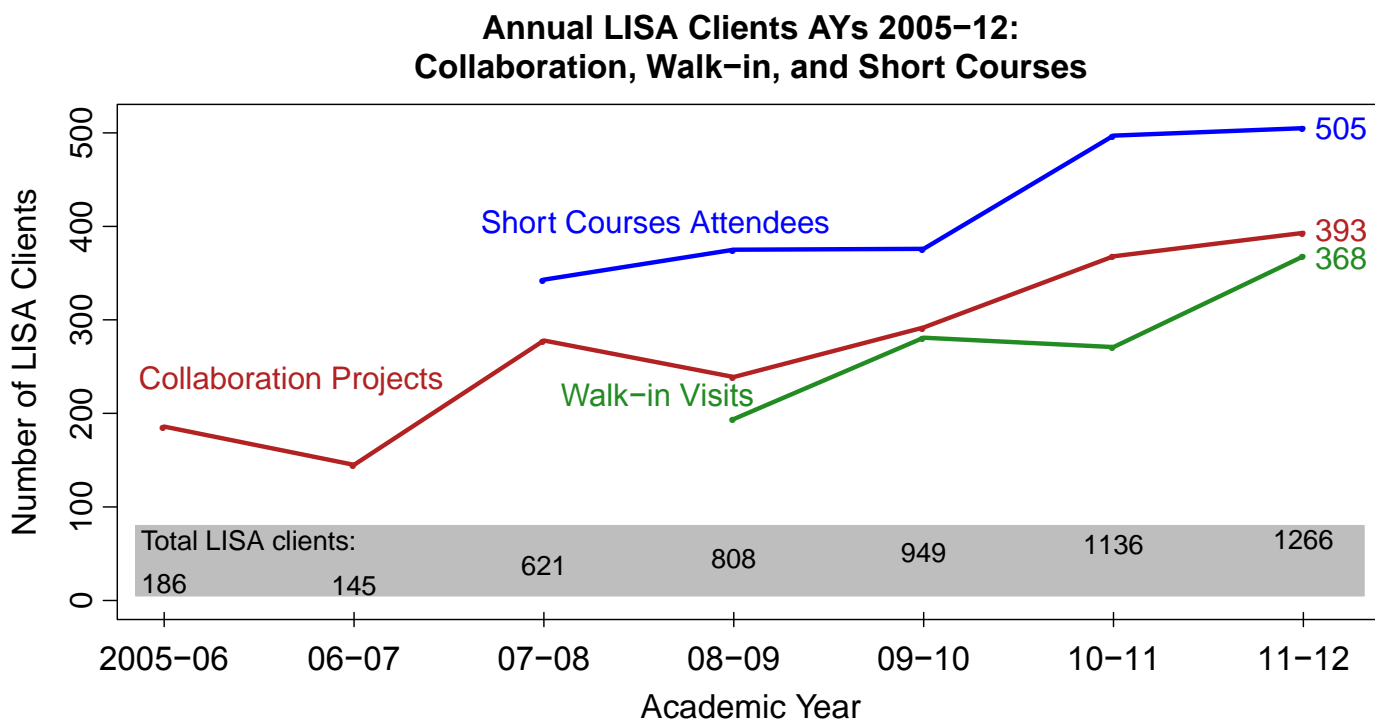
COLLABORATION | SERVICE | EDUCATION

[2] Executive Summary

The 2011-2012 academic year was very successful for LISA, Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis. LISA statistical collaborators helped more researchers around Virginia Tech than ever before, 1266 in total for the three main services of Collaboration Meetings, Walk-in Consulting, and educational Short Courses (Figure 1).

Highlights of 2011-2012:

➢ Vigorous emphasis on collaborations and co-authorships resulted in 5 peer-reviewed publications, 13 conference posters and presentations, and an additional 14 manuscript submissions.

➢ 7 grants and 15 grant proposals involved LISA for statistical collaboration.

➢ The director of LISA traveled to the new country of South Sudan to pitch "LISA 2020", a vision to create a network of 20 new statistical collaboration laboratories in developing countries by 2020.

➢ LISA was featured in an invited session of the Joint Statistical Meetings, "Fostering interdisciplinary collaboration through statistical consulting."

➢ LISA was invited to present, "Designing Surveys and Reporting the Results," at AAAS in Washington, DC, the very first workshop for the AAAS Scientific Responsibility, Human Rights and Law Program to help human rights workers use statistics and statistical thinking in their work.

➢ 61 Video Coaching and Feedback Sessions were held to review video-recorded meetings to improve statistical collaboration skills.

Figure 1. Annual number of LISA clients in academic years 2005-2012

Dr. Eric Vance, Director

Dr. Christopher Franck, Assistant Director

Dr. Anne Ryan, Faculty Collaborator

Tonya Pruitt, Administrative Specialist

Lead Collaborators

Khaled Bedair	Nels Johnson	Ciro Velasco-Cruz
Lulu Cheng	Qing Li	Sai Wang
Zaili Fang	Yiming Peng	Liaosa Xu
Andy Hoegh	Mark Seiss	Chongrui Yu
Wandi Huang	Jonathan Stallings	Huaiye Zhang

Associate Collaborators

Joel Anderson	Ting Guan	Ana Maria Ortega Villa
Gabi Betz	Xinran Hu	Keston Pierre
Marcos Carzolio	Adam James	Liang Shan
Chen Chen	Caleb King	Dr. Albert Shen
Tianlei Chen	KC Kubli	Daebum Shen
Yajuan Chen	Matthew Lanham	Carly Siegel
Ho Cho	Han Li	Amy Tillman
Gavin Corral	Ying Li	Ning Wang
Mingqian Dai	Stephen Loftus	Joshua Washburn
Yuanyuan Duan	Hao Lu	Daniel Whitehead
Youjia Fang	Hamdy Mahmoud	Chaoping Xie
Kelly Geyer	Rimy Malla	Zhiliang Xing
Lindsay Grayson	Ashley Nelson	Chaohang Zhang
Katie Griffin	Elaine Nsoise	Dengfeng Zheng

Statistics Faculty Collaborators

Dr. Jeff Birch	Dr. Yili Hong	Dr. Jie Li
Dr. Xinwei Deng	Dr. Leanna House	Dr. JP Morgan
Dr. Pang Du	Dr. Dong-Yun Kim	Dr. Eric Smith
Dr. Ina Hoeschele	Dr. Inyoung Kim	Dr. George Terrell
Dr. Golde Holtzman	Dr. Scotland Leman	Dr. Bill Woodall

LISA (Virginia Tech's Laboratory for Interdisciplinary Statistical Analysis) has been advancing research at Virginia Tech via expert statistical analysis since 1948. **LISA's mission is to train statisticians to become interdisciplinary collaborators and promote the value of statistical thinking in all phases of scientific research.** We provide statistical advice, analysis, and education to Virginia Tech researchers by offering individual collaboration meetings, walk-in consulting, educational short courses, and support for interdisciplinary research projects. In the 2011-2012 academic year, statistical collaborators from LISA collaborated with researchers on 393 projects from 63 departments, provided statistical advice for 368 visitors to LISA Walk-in Consulting, and taught 505 short course attendees how to apply statistics in their research. LISA's statistical collaborators are trained to help researchers design experiments; collect, analyze, and plot data; run statistical software; interpret results; and communicate statistical concepts to non-statisticians.

The LISA collaborators are faculty and students in the Department of Statistics. LISA has a full-time director and assistant director who meet with faculty clients and oversee a team of graduate and undergraduate student collaborators. In addition, the entire statistics faculty may be available for collaboration on a case-by-case basis.
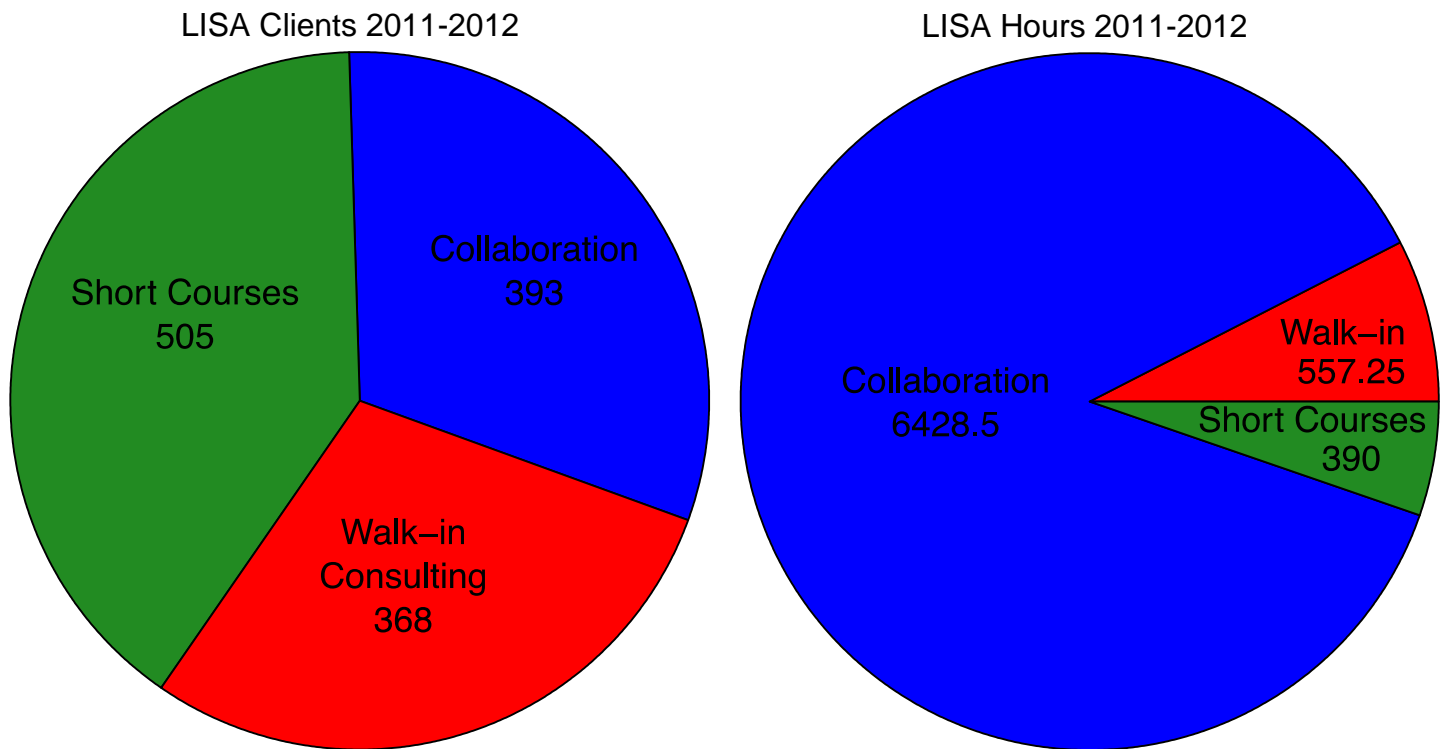
Statistical assistance is free for Virginia Tech faculty, staff, and students. LISA is funded jointly by the Office of the Vice President of Research, the College of Science, the Office of the Provost, the Graduate School, and six additional colleges (Agriculture and Life Sciences, Architecture and Urban Studies, Engineering, Liberal Arts and Human Sciences, Natural Resources and Environment, and the Pamplin College of Business). The Department of Statistics also provides funding for many of the LISA statistical collaborators and provides other support for LISA's activities. The Virginia Bioinformatics Institute (VBI) provided funding for the LISA assistant director from 2010-2012.

Users of LISA engaging in sponsored research can benefit from in-depth help and are encouraged to include statistical consulting in grant proposals. This can take the form of a direct-cost line item, a full or partial graduate research assistantship, or partial funding of a faculty member's salary. LISA provides statistical consultation and collaboration on projects outside of Virginia Tech for a fee. Through StatCom (Statistics in the Community), students in the Department of Statistics also provide pro-bono statistical consultation and collaboration for researchers studying topics of local interest and for local community nonprofits, schools, and governmental organizations.

This report summarizes LISA's main activities for the 2011-2012 academic year, highlights the activities and progress achieved over the past year, and outlines six goals for 2012-2013. In addition, this report presents the numbers of clients served and hours worked for the past seven years to help place the past year's activities into context.

LISA service continues to grow. From all over Virginia Tech, 1266 faculty, staff, and students met with LISA statistical collaborators for assistance in designing experiments and studies; collecting, cleaning, and analyzing data; interpreting results of statistical analyses; developing new theories from these results; writing grant proposals and scholarly papers; answering quick questions about statistics; and for learning new statistical methods.

During the 2011-2012 academic year, the 60 statistical collaborators of LISA met with researchers from 63 Virginia Tech departments for individual statistical collaboration meetings on 393 projects. During daily Walk-in Consulting hours, consultants met with 368 faculty, staff, and students to answer quick statistical questions on projects requiring less than 30 minutes of assistance. Twenty LISA Short Courses were offered to teach 505 graduate students and other university members how to apply statistics in their research. Overall, LISA provided at least 7375.75 hours of statistical assistance and education to members of the Virginia Tech community. Figure 2 shows a summary of the clients and hours for LISA's three main services. **This year's 1266 clients were the most LISA has ever helped in a year.**

Figure 2. Number of clients and hours for LISA's three main services

In last year's annual report we highlighted six goals we thought would advance us toward becoming the premier academic statistical consulting and collaboration laboratory in the country. We are pleased to report that **we have made excellent progress on five of them.** Our progress is described briefly below and expanded upon in subsequent sections of this report. In addition, since most of our goals have longer than a one-year horizon for achievement, we report on the progress made on the six goals for 2010-2011 from the 2009-2010 LISA annual report.

Progress and Updates on 2011-2012 Goals

1. *Promote and emphasize interdisciplinary collaborations leading to student co-authorships ~~and acknowledgments of LISA~~.*[1]

LISA's effort to emphasize interdisciplinary collaborations leading to student co-authorship is described in LISA director Dr. Eric Vance's invited talk, "Fostering the Culture of Collaboration at Virginia Tech" (www.lisa.stat.vt.edu/?q=node/4686) presented at the Joint Statistical Meetings in San Diego, CA. The results of this effort during 2011-2012 were one student co-authorship of a peer-reviewed publication stemming from a LISA project, 11 submissions, and at least six additional student co-authorships in progress. We have decided to drop our emphasis on acknowledgments of LISA in publications, theses, and dissertations since we do not have the resources to keep track of such acknowledgments. Rather than being content with acknowledgments of our work, we are encouraging collaborators to make the extra contribution to the research that will lead to a co-authorship.

2. *Secure new and increased funding to bolster LISA's efforts to be the premier academic statistical consulting and collaboration ~~center~~ laboratory.*

LISA currently has a structural budget deficit. There are two outstanding budgetary issues: 1. Cost increases mean that the funding level for LISA established in 2008 is no longer adequate to support basic services for 2013 and beyond. 2. **Demand for LISA services has exploded since 2008**, yet LISA's budget has decreased in real dollars (accounting for inflation).

Unfortunately, LISA did not make adequate progress in 2011-2012 to increase its funding. Therefore, increased funding for LISA will continue to be a priority for 2012-2013. One possible solution is for colleges that use LISA services the most to contribute more money and/or transfer GRA positions from their college to LISA to support the required number of LISA lead collaborators.

3. *Increase the number of collaborations and connections with the Virginia Tech Carilion School of Medicine and Research Institute (VTC), the Institute for Critical Technology and Applied Science (ICTAS), and other departments within Virginia Tech.*

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[1] LISA values setting goals, assessing progress toward them, and reflecting on their usefulness. As LISA adapts and changes, its goals must be evaluated and updated. The strikethroughs on the previous years' goals indicate these updates.

In 2011-2012, **LISA faculty members Dr. Chris Franck, Dr. Anne Ryan, and Dr. Jie Li were fully responsible for the development and implementation of the biostatistics curriculum at VTCSoM.** These courses introduce statistical analyses that will be useful as the medical students pursue research. During the course the LISA faculty encourage the medical students to use LISA services throughout the research process. Dr. Franck and Dr. Ryan hold assistant professor positions in the Medical School in the Department of Basic Science, and Dr. Franck serves on the Medical School Curriculum Committee. These appointments add new connections with VTC and opportunities for promotion of LISA, which will lead to an increase in future collaborations with the medical students and the VTC faculty.

In 2011-2012, LISA collaborators met with researchers from VTC on 22 collaborative projects including 4 collaborative grants and grant proposals. In spring 2012, LISA began hosting Walk-in Consulting for two hours once a week in ICTAS Café X. 30 visitors came to these extra walk-in hours for answers to their quick statistical questions. Overall, r**esearchers from 63 departments within Virginia Tech collaborated with LISA** on the highest number of collaborative projects ever (374 within Virginia Tech).

4. *Improve the integration between LISA and the graduate statistics course, "Introduction to Statistical Program Packages," and between LISA Short Courses and the graduate service courses, "Statistics in Research, parts I and II."*

LISA assistant director Dr. Chris Franck presented in-class data problems in the context of a collaboration meeting and used collaboration anecdotes to motivate in-class problems. The LISA short course series continues to be the strongest component for integration between LISA and the "Statistics in Research" course taught by Dr. Anne Ryan, who introduces LISA to the students at the beginning of each semester and encourages them collaborate with LISA on research projects. Feedback from students to Dr. Ryan indicates that many students are taking advantage of LISA services and find them helpful in their research.

5. *Improve the training of LISA statistical collaborators by regularly providing feedback on their performance.*

After each semester, the director of LISA meets individually with LISA collaborators to review feedback received by clients. This has become a regular part of LISA's education and training program and is beneficial, though the frequency of providing feedback should be increased. In addition to once-a-semester feedback, **LISA had 61 video coaching and feedback sessions, reviewing all 53 LISA collaborators who regularly met with clients.** See page 18 for more details on this innovative program for improving statistical collaboration skills.

6. *Encourage other universities to emulate LISA by writing papers and giving talks at national conferences about LISA.*

So far no one in LISA has written a paper about LISA, but Dr. Eric Vance and Dr. Anne Ryan presented five invited talks about LISA and three posters about LISA. LISA achieved international

acclaim in the paper "Fostering the Practice and Teaching of Statistical Consulting among Young Statisticians in Africa" (www.iiste.org/Journals/index.php/JEP/article/view/1161) by Nigerian statistician Olawale Olushina Awe, when he **cited LISA as the model statistical collaboration laboratory for African universities to adopt.**

Progress and Updates on 2010-2011 Goals

1. *Increase collaborations with ~~the Virginia Bioinformatics Institute (VBI)~~, the Virginia Tech Carilion School of Medicine and Research Institute (VTC), and the Institute for Critical Technology and Applied Science (ICTAS).*

In 2011-2012, **Dr. Chris Franck co-authored one publication and submitted five grant proposals with collaborators from VBI.** However, as of August 2012, VBI is no longer supporting part of his salary. See Goal 3 from 2011-2012 above for an update on the increased collaboration between LISA and VTC and ICTAS.

2. *Use LISA to recruit to Virginia Tech statistics graduate students who are eager to apply their statistical knowledge to solve real-world problems and help researchers make discoveries in diverse fields.*

Of the 35 students in the 2011-2012 cohort of first-year graduate students, only one said that LISA was the deciding factor in his decision to attend Virginia Tech over other schools that offered him an assistantship. To increase this number and ratio, LISA prepared a recruiting flyer (www.lisa.stat.vt.edu/sites/default/files/VT.Statistics.recruiting.pdf) and a list of undergraduate advisors in math, statistics, and computer science programs across the United States. Our plan for 2012-2013 is to send the flyer to these advisors to highlight the unique aspects of LISA that allow students to earn a PhD in statistics while solving real word problems, helping people, and traveling around the world.

3. *Create opportunities for LISA statistical collaborators to become involved "on the ground" in research projects around the world.*

In spring 2012, two LISA collaborators, Mark Seiss and Marcos Carzolio, refined techniques for statisticians to improve data collection and data quality in large interdisciplinary survey research projects. A manuscript on these techniques has been submitted for publication. In summer 2012, LISA Director Dr. Eric Vance traveled to South Sudan to evaluate the possibility of supporting a statistical collaboration laboratory at the University of Juba. These experiences are highlighted in this report on page 26.

4. *Present talks at national conferences so that LISA becomes recognized across the country as a model for academic statistical consulting and collaboration.*

See Goal 6 from 2011-2012 above.

5. *Improve the integration between LISA and the two graduate statistics courses "Introduction to Statistical Program Packages" and "Communication in Statistical Collaborations." The latter course is designed to teach second-semester statistics graduate students and undergraduate statistics majors what they need to know to be effective statistical collaborators that they don't learn in their other, more technically focused statistics courses.*

Page 28 in this report details the changes made to the course "Communication in Statistical Collaborations" to **emphasize more teamwork and collaboration skills.**

6. *Use weekly meetings and video coaching and feedback sessions to improve LISA collaborators' overall statistical collaboration skills, including communication skills and technical statistical skills.*

Weekly meetings and video coaching and feedback sessions have become a regular part of LISA's education and training program. See page 18 for more details.

[10] Collaboration

As a *laboratory* for interdisciplinary statistical analysis, LISA creates new knowledge in at least three ways:

1. We help researchers answer questions they could not have answered without expert statistical advice.

2. When we encounter new types of data for which standard statistical methods do not apply, we create new knowledge by developing new statistical methods that enable researchers to extract useful information from their data.

3. We are researching the process of statistical collaboration itself, advancing knowledge in best practices for statistical collaboration and how to improve one's statistical collaboration skills.

Our primary focus is on point 1 above, contributing statistical expertise to research projects in many disciplines. Collaboration meetings typically last for one hour, with multiple follow-up meetings as necessary. LISA statistical collaborators meet with researchers to discuss their research goals, the nature of the data collected or to be collected, how the data can be analyzed to answer the researcher's specific questions, what the statistical results mean in terms of the research goals, and how the researcher can explain the results to his or her intended audiences. After and between meetings, LISA collaborators typically analyze the clients' data or conduct background research to determine the most appropriate statistical analysis for the client.

LISA met with researchers during the fall 2011 semester on 130 projects for a total of 2640.5 hours. In spring 2012, LISA met with researchers on 162 projects for 2303.75 hours. In the summer semester LISA met with researchers on 101 projects for 1484.25 hours. Table 1 below summarizes these numbers.

Table 1. Collaboration clients and hours for the 2011-2012 academic year

Collaboration	Fall 2011	Spring 2012	Summer 2012	Total
Clients	130	162	101	393
Hours	2640.5	2303.75	1484.25	6428.5

To offer services to Virginia Tech researchers who might not require the intense, personalized efforts of the collaboration meetings, **LISA provides walk-in consulting for answering quick questions and giving statistical advice** on smaller, simpler projects. Assistance is limited to less than 30 minutes when others are waiting.

LISA began offering additional times and locations for walk-in consulting during the spring semester. **Walk-in consultants were available for 557.25 hours this academic year**, which is an increase of over 150 hours from last year.

LISA Walk-in Consultants met with 120 visitors during fall 2011, 161 during spring 2012, and 87 during the summer sessions. During the 2011-2012 academic year, **LISA walk-in consultants met with a total of 368 clients.**

Wandi Huang assists Amar Mukhtar from the McNair Scholars Program during LISA Walk-In Consulting.

Table 2. Walk-In Consulting times and locations during 2011-2012

Semester	Day and Time	Location
Fall	Monday – Friday 1-3 pm (standard)	401 Hutcheson Hall
Spring	Monday – Friday 1-3 pm (standard)	GLC Video Conference Room
Spring	Tuesday 1-3 pm (additional)	ICTAS Café X
Spring	Thursday 1-3 pm (additional)	Sandy Hall
Summer	Monday – Friday 1-3 pm (standard)	GLC Video Conference Room

Table 3. Walk-In Consulting clients and hours for 2011-2012

Walk-In	Fall 2011	Spring 2012	Summer 2012	Total
Clients	120	161	87	368
Hours	198	243	116.25	557.25

[12] Short Courses

LISA teaches a series of evening short courses each semester to help graduate students apply statistics in their research. The focus of these two-hour courses is on learning practical statistical techniques for analyzing or collecting data. Taught by graduate students and faculty from LISA and the Department of Statistics, these short courses proved to be very popular, with **505 students, faculty, and staff** attending. The tables below describe the course titles, instructors, dates, and attendance for the 20 short courses. Five of these courses were taught twice due to limited classroom size, and two were taught as two-part courses. In 2011-2012, **LISA taught a total of 25 short course sessions.**

Table 4. LISA Short Course titles, instructors, and attendance for 2011-2012

Fall 2011		
Date	Title	Attendance
September 6, 2011	"What LISA Can Do for You and a Tutorial in T-Tests and ANOVA" by Dr. Anne Ryan	19
September 20, 2011	"Introduction to Design and Analysis of Experiments" by Jonathan Stallings	21
September 27 & 29, 2011	"Introduction to R" by Sai Wang[2]	35
October 4, 2011	"Applying Statistics in Research: Case Studies" by Nels Johnson	10
October 11 & 13, 2011	"Introduction to JMP" by Wandi Huang[2]	29
November 9, 2011	"Survey Sampling" by Dr. Anne Ryan and Marcos Carzolio[3]	12
		126

Spring 2012		
Date	Title	Attendance
January 31, 2012	"Designing Experiments and Collecting Useful Data" by Jonathan Stallings	33
February 7, 2012	"How to Create a Successful Survey" by Marcos Carzolio	32
February 14, 2012	"Statistical Analysis in R, Part I" by Andy Hoegh	32
February 16, 2012	"Statistical Analysis in R, Part II" by Andy Hoegh	17
February 21 & 23, 2012	"Combining the Power of R and Excel: RExcel" by Matthew Lanham*	24
February 28, 2012	"Regression Analysis Using JMP" by Mark Seiss	32
March 13, 2012	"Bayesian Methods for Regression in R" by Nels Johnson	17
		187

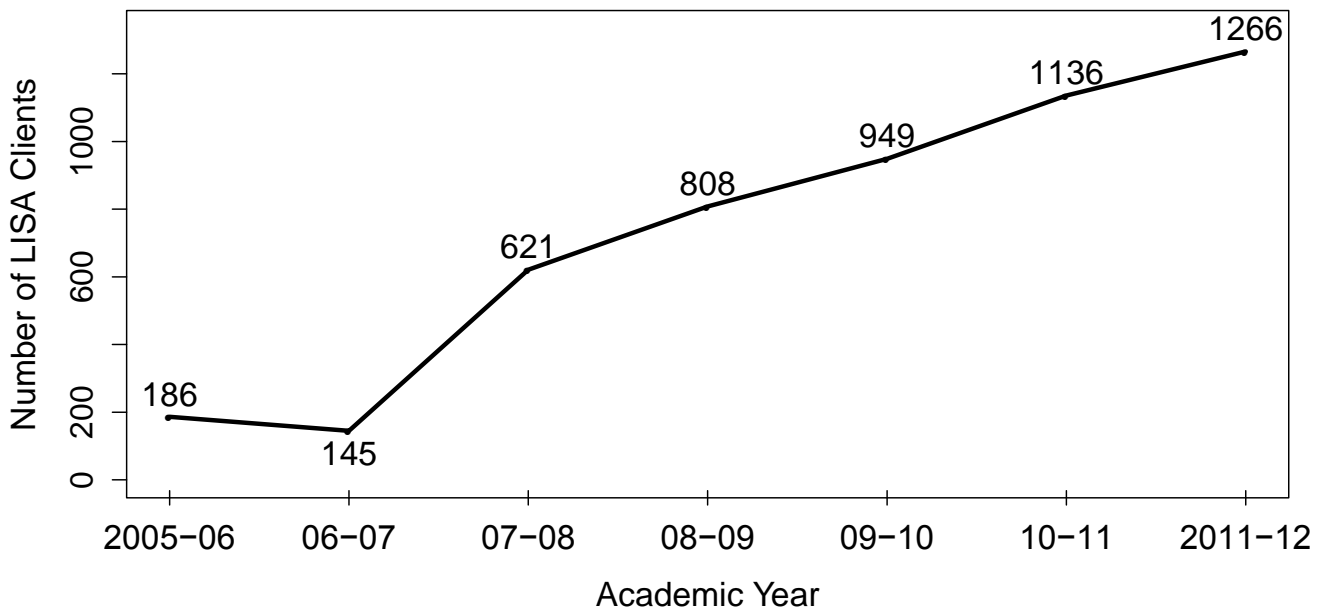| Summer 2012		
Date	Title	Attendance
June 11 & 18, 2012	"Introduction to Using JMP" by Yiming Peng*	43
June 21, 2012	"Explore JMP Capabilities in Design of Experiments" by Liaosa Xu	11
June 25, 2012	"Structural Equation Modeling (SEM)" by Khaled Bedair	27
July 15, 2012	"Designing Surveys and Interpreting the Results" by Dr. Eric Vance	32
July 17, 2012	"Introduction to R, Part I" by Andy Hoegh	33
July 19, 2012	"Introduction to R, Part II" by Andy Hoegh	22
July 23 & 26, 2012	"Fixed Effects, Random Effects, and Correlated Data" by Nels Johnson*	24
		192

[2] Two sessions of these courses were taught because of limited classroom size.

[3] This course was taught for the English Rhetoric and Writing Department.
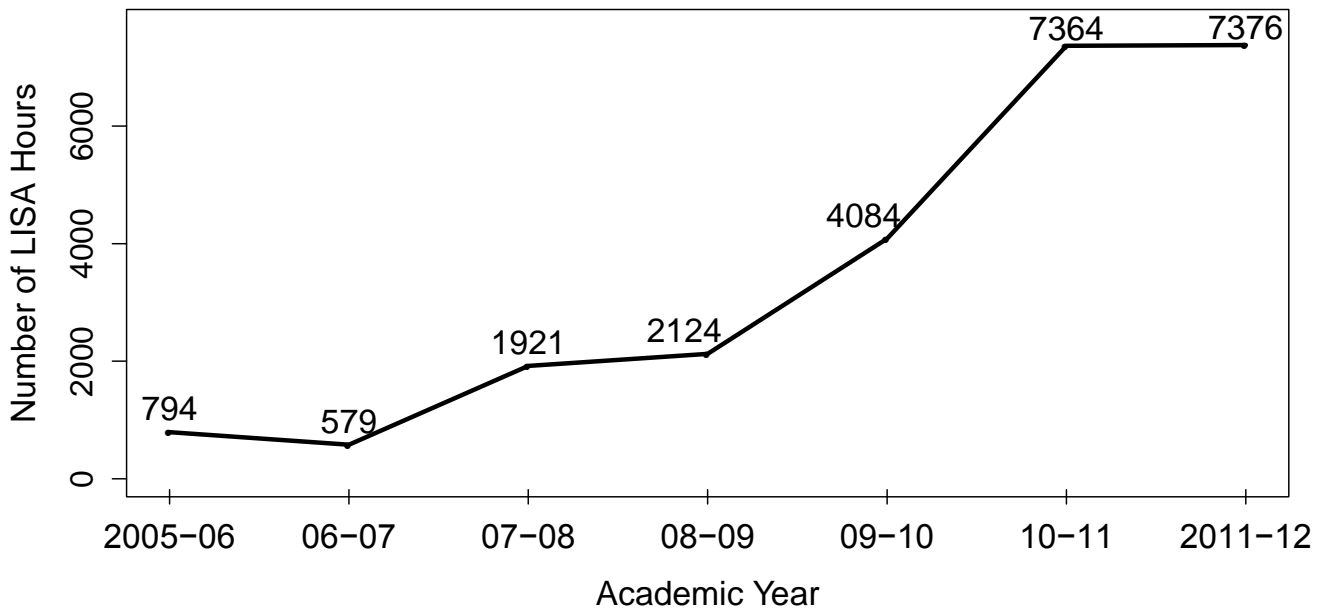
The two plots below (Figure 3) show the total number of LISA clients and hours for our three main services of Collaboration, Walk-in Consulting, and Short Courses for the past seven academic years. LISA was created in spring 2008 to succeed the Statistical Consulting Center, which was originally created in 1948. In summer 2008, LISA began offering short courses. In fall 2008, LISA began offering Walk-in Consulting.

Total LISA Clients:
Academic Years 2005−06 to 2011−12

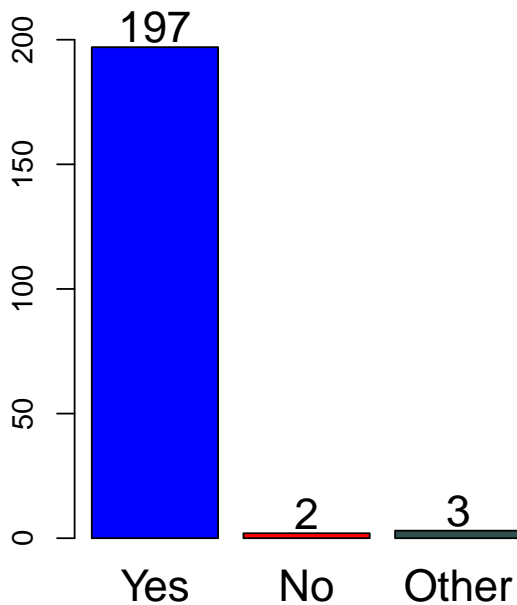**Total LISA Hours:**
Academic Years 2005−06 to 2011−12

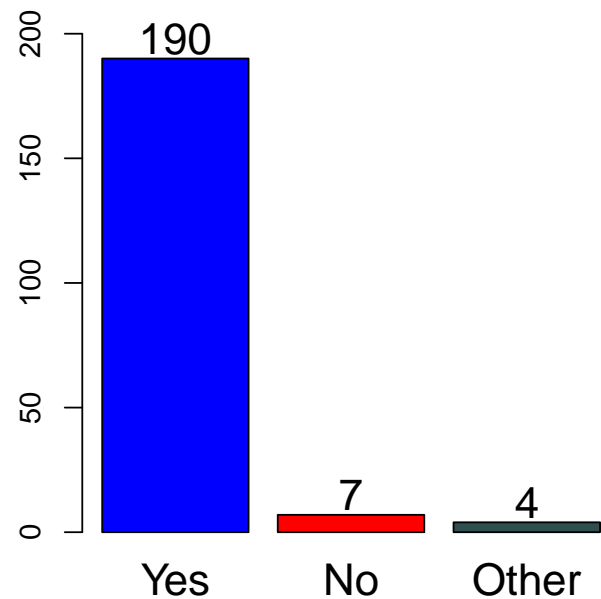**Figure 3.** Total number of LISA clients and hours for Collaboration, Walk-In Consulting, and Short Courses

[14] Feedback from Clients

At the conclusion of each academic term, clients who requested statistical collaboration meetings are asked to fill out a feedback survey evaluating their experience with LISA. Below are the summaries of two of the survey questions (Figure 4) and a selection of comments (next section) from clients in each of the eight colleges at Virginia Tech. By counting "Other" responses as half "Yes" and half "No", **98.3% of LISA clients considered LISA's services "helpful", and 95.5% were satisfied with their overall LISA experience.**

Q1: Was the service you received from LISA helpful?

Q2: Were you satisfied with your overall LISA experience?

Figure 4. Summary of quantitative feedback on LISA collaboration meetings

LISA also receives qualitative feedback on collaboration meetings. A selection of quotes from collaboration clients are presented in the next section.

Mark Rogers, COE

Yiming is a dedicated individual. When he sets out to help you on a project, he means it. This was obvious since the beginning of our collaboration. I could tell he had been thinking and working hard on my project between meetings. Simply put Yiming is an extremely valuable asset to any graduate student. I could not be more pleased or impressed with the quality of work and professionalism from Yiming Peng.

Ali Sukru Cetinkaya, Pamplin

Dr. Eric Vance was very helpful and friendly. He and Rimy Malla listened to my research problem, asked me some questions to understand the problem clearly and when they got the problem I faced at the research clearly, they advised me how to solve the problem. I learned a technique that I was not aware until that time. Thank you very much for the services LISA provides for the researchers. Since VT is a research oriented university, services of LISA should continue in the future. I am very satisfied with the service given by LISA. Thank you.

Laura Zseleczky, CAUS

Our collaborators were very open-minded when we came in with a complex, messy, and probably unusual research project. They did a very good job of talking about things and breaking them down into smaller pieces so that they knew where we were coming from and we had a better idea of where we could go with our research.

Melissa Lubin, CLAHS

Since I live in Richmond, we met by SKYPE. Both Zaili and Albert were fantastic. They were friendly, showed great listening skills, worked together to problem solve and helped me learn how to perform the calculations that I needed to do for my study.

I really wanted to do the calculations myself--from inputting the data correctly, to transforming the data, to recoding it, to performing the necessary calculations and interpreting the results. They helped me on all levels. Also, I wanted to truly understand my results so that I could feel totally confident when presenting my findings. Because of their assistance, I feel that my calculations are accurate and precise.

Thank you Zaili and Albert for making what seemed like a daunting and intimidating process to a dare I say, an understandable and intriguing one!

Lynn Rallos, CALS

They really think and try to digest the information I provide. They are able to "laymanize" the statistical terms and explanations to a level that I could understand. They know what questions to ask me to help them understand my experimental design and the analysis that I would most likely need. They are also patient and I can really sense that they are listening.

Ronald Tyler, CVM

Jonathan Stallings and Chen did a great job explaining and helping me look at the statistical differences between groups for our research project. They were the utmost professionals and great to work with. Jonathan was excellent in explaining statistical questions and helping me address what tests and procedures would yield the most usable data.

Vicki Garcia, COS

If I did have an upcoming project, I would be interested in collaborating with a LISA co-investigator. I think LISA is a great resource - way better than the statistical help available at my last university. I always recommend you to colleagues who are having stats trouble. For us grad students at least, it's crucial that this resource is free.

Emily Smith-McKenna, CNRE

LISA is a great resource for researchers and graduate students, especially for those new to the world of scientific study/data analysis and academic publishing.

Huaiye put a tremendous amount of effort in the statistical analysis of my project. We ran into a lot of problems with attempts at different statistical models and procedures, rewriting code to run analyses in alternative programs, he stuck with it and overall he put a lot of effort into the statistical model.

LISA provides statistical support for sponsored projects and collaborates with researchers across disciplines on grant proposals. In 2011-2012, LISA was funded on 7 grants. LISA collaborators were co-PIs or key personnel on 14 grant proposals.

Funded Projects:

1. (PI Mary Marchant, Department of Agricultural and Applied Economics) 9/10-9/11
   USDA/NIFA
   "Improvement and Marketing of the Food and Agricultural Education Information System (FAIES)"
   This grant included funding for LISA statistical collaborators **Eric Vance**, **Albert Shen**, and **Katie Griffin**.

2. (PI Mary Marchant, Department of Agricultural Economics) 9/11-9/12
   (Co-PIs **Eric Vance**, LISA and Eric Smith, Department of Statistics)
   USDA/NIFA
   "Improvement and Marketing of the Food and Agricultural Education Information System (FAIES)"
   This grant included funding for LISA statistical collaborators **Eric Vance**, **Katie Griffin**, and **Hao Lu**.

3. (PI Ralph Hall, Department of Urban Affairs and Planning) 4/11-12/11
   Millennium Challenge Corporation
   "Impact Evaluation for the Millennium Challenge Corporation-Supported Rural Water Investment in Mozambique"
   This grant included funding for LISA statistical collaborators **Eric Vance**, **Mark Seiss**, **Andy Hoegh**, and **Marcos Carzolio**.

4. (PI Tom Campbell, ICTAS) 11/10-10/11
   ADA Technologies
   "A Carbon Nanotube Metrology System for Counterfeit Detection"
   This grant provided funding for LISA for statistical collaborators **Anne Ryan**, **Dipayan Maiti**, and **Eric Vance**.

5. (PI Warren Bickel, VTCRI) 9/08-6/13
   NIH/NIDA
   "Executive Function Therapy for Stimulant Addiction"
   This grant provided funding for LISA statistical collaborator **Chris Franck**.

6. (PI Warren Bickel and Read Montague, VTCRI) 7/10-6/15
   NIH/NIDA
   "Inter-Temporal Trade-offs in the Risky Decisions of Cocaine Addicts"
   This grant provided funding for LISA statistical collaborator **Chris Franck**.

7. (PI McCoy, Building Construction) 1/12-1/14
   HUD
   "Impact of Market Behavior on the Adoption and Diffusion of Innovative Green Building Technologies"
   This grant provided funding for LISA statistical collaborator **Chris Franck**.

Proposals Submitted:

1. (PI Mary Marchant, Department of Agricultural Economics)
   (Co-PIs **Eric Vance**, LISA and Eric Smith, Department of Statistics)
   USDA/NIFA
   "The Food and Agricultural Education Information System (FAIES)"

2. PI: Ted Fuller
   Co-PI: **Eric Vance**
   National Institutes of Health: National Institute on Aging
   "Declining Life Expectancy: Anomaly or Harbinger?"
   $974,410 (23% credit)

3. PI Kathleen Alexander
   Co-PI **Eric Vance**
   Morris Animal Foundation
   "What is the epidemiology of *Mycobacterium mungi -* how can we control this emerging wildlife disease?"

4. PI Onwubiko Agozino
   Co-PI: **Eric Vance**
   Institute of Education Sciences (IES)
   "Effective Study Habits and Hard Work Ethics as Social and Behavioral Contexts for Academic Learning."
   $1,600,000 over four years (50% credit to the Department of Statistics)

5. PI Christian Wernz
   Co-PI **Eric Vance**
   Commonwealth Health Research Board
   "Determining Factors that Contribute to Variation in Imaging Technology Use in Virginia"
   $155,234 (10% credit)

6. PI Wornie Reed
   Statistician: **Eric Vance**
   NIH
   "Improving Cancer Knowledge among Low-Income African American Females"

7. PI Wornie Reed
   Statistician: **Eric Vance**
   NIH
   "Using barbershops and telephone messages to recruit African American males to use preventive medical services"

8. PI Chenming (Mike) Zhang
   Associate Professor, Biological Systems Engineering
   National Pork Board
   "Development of a universal vaccine against North American genotype of porcine reproductive and respiratory syndrome virus."

9. PI Ralph Hall
   Co-PI **Eric Vance**
   3ie International Initiative for Impact Evaluation
   "Statistically Based Impact Evaluations for Rural Water Supply Projects in Honduras"

10. PI Bernice Hausman
    Statistician: **Anne Ryan**
    NIH
    "Being at Genetic Risk: Rhetoric and the Use of Discourse about Genes"

11. PI Warren Bickel
    Co-PI **Chris Franck**
    NIH/NIDA
    "Neurobehavioral Decision Systems During Sustained Recovery"

12. PI Warren Bickel and Stephen LaConte
    Co-PI **Chris Franck**
    NIH/NIAAA
    "The Repair of Self-Control in Alcohol Dependence: Working Memory and Real Time fMRI"

13. PI Skip Garner
    Statistician: **Chris Franck**
    NIH
    "Microsatellite Instability-based cancer target identification and validation"

14. PI David Mittelman
    Statistician: **Chris Franck**
    NIH
    "Dissection of genomic and transcriptomic instability in Fanconi Anemia"

15. PI David Mittelman
    Statistician: **Chris Franck**
    NIH
    "Human microsatellite genotypes from HTS data using informed error profiles"

One of LISA's missions is to **contribute statistical thinking to interdisciplinary research projects**. The natural result of such projects is a co-authored publication. In 2011-2012, LISA collaborators were co-authors on 5 peer-reviewed publications and submitted 14 others.

Co-authored publications:

1. Gupta, P.K.; **Franck, C.T.**, Miller, W.J.; Gupta, H.; Forse, R.A. "Development and validation of a bariatric surgery morbidity risk calculator using the prospective, multicenter NSQIP dataset". *Journal of the American College of Surgeons*, 2011 Mar; 212(3): 301-9.

2. Zhou, L.; **Franck, C.T.**; Yang, K.; Pilot, G.; Heath, L.S.; Grene, R. "Mining for meaning: visualization approaches to deciphering *arabidopsis* stress responses in roots and shoots". *OMICS*, 2012 Apr;16(4): 208-28.

3. Serenari, C.; Leung, Y.; Attarian, A.; **Franck, C.T.** "Understanding Environmentally Significant Behavior Among Whitewater Rafting and Trekking Guides in the Garhwal Himalaya, India". *Journal of Sustainable Tourism*, 2012 June; 20(5): 757-772.

4. Nichols, T.C.; Franck, H.W.G.; **Franck, C.T.**; DeFriess, N.; Raymer, R.A.; Merricks, E.P. "Sensitivity of Whole Blood Clotting Time and Activated Partial Thromboplastin Time for Canine Factor IX: Relevance to Gene Therapy and Determination of Post-transfusion Elimination Time of Canine Factor IX in Canine Hemophilia B". *Journal of Thrombosis and Haemostasis*, 2012 Mar; 10: 474-476.

5. Beeman, S.M.; Kemper, A.R.; Madigan, M.L.; **Franck, C.T.**; **Loftus, S.C.** "Occupant Kinematics in Low-Speed Frontal Sled Tests". *Accident Analysis & Prevention*, 2012 July; 47: 128-139.

Publications Submitted:

1. **Vance, E.A.**; Xie, X.; Henry, A.; Wernz, C.; Slonim, A.D. "Variation in Computed Tomography Scan Use: The Effects of Patient, Hospital, and Geographic Factors". (Submitted in 2012 to *The American Journal of Managed Care.*)

2. Dal Cengio Leonardi, A.; Keane, N.J.; Bir, C.A.; **Ryan, A.N.**; **Xu, L.**; VandeVord, P. "Head Orientation affects the intracranial pressure response resulting from shock wave loading in the rat". (Submitted in 2012 to *Journal of Biomechanics.*)

3. Parkunan, V.; Johnson, C.S.; **Xu, L.**; **Peng, Y.**; Tolin, S.A.; Eisenback, J.D. "Induction and maintenance of systemic acquired resistance by acibenzolar-S-methyl in cultivated tobacco". (Submitted in 2012 to *Plant Disease.*)

4. Alexander, K.; **Carzolio, M**.; Goodin, D., **Vance, E.** "Climate change is likely to worsen the public health threat of diarrheal disease in Botswana". (Submitted in 2012 to *Environmental Health Perspectives.*)

5. Prussin II, A.J.; **Li, Q.**; **Malla, R**.; Ross, S.D.; Schmale III, D.G. "Application of Microsatellites to Track the Long Distance Movement of a Plant Pathogen from a Field-Scale Source of Inoculum". (Submitted in 2012 to *Applied and Environmental Microbiology.*)

6. Smith-McKenna, E.K.; Resler, L.M.; Tomback, D.F.; **Zhang, H.**; Malanson, G. P. "Topographic Influences on the Distribution of White Pine Blister Rust in *Pinus albicaulis* Treeline Communities". (Submitted in 2012 to *Ecoscience Journal*.)

7. Stephens, T.D.; Carrington J.L.; Brooks, R.M.; **Cheng, L.**; Carrington, A.C.; Porr, C.A.; Splan, R.K. "Effects of pentoxifylline, caffeine, and taurine on post-thaw motility and longevity of equine frozen semen". (Submitted in 2012 to *Journal of Equine Veterinary Science* and *Equine Veterinary Journal*.)

8. Wang, H.; Masters, S.; Hong, Y.; **Stallings, J.**; Falkinham III, J.O.; Edwards, M.A.; Pruden, A. "Effect of Disinfectant, Water Age, and Pipe Material on Occurrence and Persistence of Legionella, Mycobacteria, Pseudomonas aeruginosa, and Two Amoebas". (Submitted in 2012 to *Environmental Science and Technology*.)

9. Henley, W.F.; **Johnson, N.G.**; Ciparis, S.; Hanlon, S.D.; Heffinger, D.G. "Effects of Coal in Substrate on Organ Tissues of Rainbow Mussels, Villosa iris (Unionoida: Unionidae)". (Submitted in 2012.)

10. McAvoy, T.J.; Salom, S.M.; Yu, B.; Ji, H.L.; Du, Y.Z.; Reardon, R.; Kok, L.T.; **Johnson, N.** "Impact of Eucryptorrhynchus brandti and E. chinensis (Coleoptera: Curculionidae) on Ailanthus altissima in China". (Submitted in 2012.)

11. McAvoy, T.J.; Snyder, A.L.; Salom, S.M.; Kok, L.T.; **Johnson, N.G.** "Road Survey of the Invasive Tree-of-heaven (Ailanthus altissima) in Virginia". (Submitted in 2012 *Invasive Plant Science and Management*.)

12. Aruguete, D.M.; Kim, B.; Hochella, Jr., M.F.; Ma, Y.; Cheng, Y.; **Hoegh, A.**; Liu, J.; Pruden, A. "Antimicrobial nanotechnology: Implications for the management of multiple drug-resistant pathogens". (Submitted in 2012 to *Journal of Environmental Monitoring*.)

13. Hall, R.P.; **Vance, E.A.**; Van Houweling, E.; Davis, J. "A Study of Multiple-Use Water Services in Rural Senegal: Can Water Pay for Water?" (Submitted in 2012 to *World Development*.)

14. Van Houweling, E.; Hall, R.P.; Diop, A.S.; Davis, J.; **Seiss, M.** "The role of productive water use in women's livelihoods; evidence from rural Senegal". (Submitted in 2012 to *Water Alternatives*.)

Selected Posters and Presentations:

LISA collaborators are often invited to talk about statistics and/or LISA and to present work stemming from statistical collaborations. The following are a selection of 13 posters and presentations by LISA collaborators in 2011-2012:

1. **Eric Vance**, "Introduction to LISA." Presented in August 2011 at the Virginia Tech FDI New Faculty Orientation, Blacksburg, VA.

2. Onwubiko Agozino, **Eric Vance**, **Zaili Fang**, "Race, Ethnicity, Age and Gender Articulation in Existing Databases on Alcohol-Related Arrests." Paper presented at 2011 American Society of Criminology.

3. **Anne Ryan**, "LISA Services." Poster presented at the SouthWest Virginia Life Science Forum, Virginia Tech Carilion Research Institute, October 6, 2011, Roanoke, VA.

4. **Eric Vance**, "LISA On-the-ground Statisticians in Mozambique: a new paradigm for interdisciplinary collaboration." Presented in November 2011 at the IDR Symposium, Virginia Tech.

5. Ralph Hall, Jennifer Davis, Kory Russel, **Eric Vance**, **Mark Seiss**, "Results from the Baseline Study of the MCC-Funded Rural Water Supply Activity in Nampula." Paper presented in December 2011 at the Millennium Challenge Corporation headquarters in Washington, DC.

6. **Eric Vance** and **Anne Ryan**, "LISA Walk-in Consulting Kick-off Seminar." Presentation invited by Dr. Roop Mahajan, ICTAS, January 17, 2012, Blacksburg, VA.

7. Mary A. Marchant, Lisa Hightower, **Katherine Griffin**, Bill Richardson, Eric Smith, **Eric Vance** and Anupa Sharma, "The Scholarship of Study Abroad Programs: Engaging Students through International Experiences." Poster presented at the 2012 Conference on Higher Education Pedagogy, Blacksburg, VA.

8. **Eric Vance**, "Communication in Statistical Collaborations: Teaching Statisticians How to Be Effective Interdisciplinary Collaborators." Poster presented at the 2012 Conference on Higher Education Pedagogy, Blacksburg, VA.

9. Ralph Hall, **Eric Vance**, Emily Van Houweling, **Mark Seiss**, **Andy Hoegh**, and **Marcos Carzolio**, "An Interdisciplinary Approach to Evaluating the Impact of a Rural Water Improvement Project in Mozambique." Presented for the Africa Regional Strategy Coalition, OIRED, February 10, 2012, Blacksburg, VA.

10. **Eric Vance**, "Communication in Statistical Collaborations: Teaching Statisticians How to Be Effective Interdisciplinary Collaborators." Poster presented at the 2012 Inaugural ASA Conference on Statistical Practice, Orlando, FL.

11. **Eric Vance**, "Designing Surveys and Reporting the Results." Invited workshop for the AAAS Scientific Responsibility, Human Rights and Law Program, June 8, 2012, Washington, DC.

12. **Eric Vance**, "Fostering interdisciplinary collaboration through statistical consulting." Invited session sponsored by the Section on Statistical Consulting for the 2012 Joint Statistical Meetings, San Diego, CA.

13. **Eric Vance**, "Fostering the Culture of Collaboration at Virginia Tech." Invited paper presented at 2012 Joint Statistical Meetings, San Diego, CA.

[22] Video Coaching and Feedback Sessions

LISA's main activity is interacting with clients during collaboration meetings to help them advance their research through the collection, modeling, analysis, and interpretation of data. In fall 2010, **LISA began collecting and analyzing data on itself to improve collaboration meetings by video recording meetings, watching the videos, and then analyzing them** in a small group setting of typically 5-7 participants, including 1 faculty member, 1 note taker, 1-2 "stars" of the video, and 1 or more additional students.

Collaborators review a recorded meeting during a Video Coaching and Feedback Session.

Of the 53 LISA statistical collaborators who regularly met with clients in 2011-2012, all 53 had at least one collaboration meeting videoed and reviewed each semester they were active in LISA. Coaching and feedback in **these review sessions focused on how to improve collaboration skills.** Participants focused on three aspects of the meeting:

1. Interpersonal relationships between the client and collaborators

2. Intrapersonal attitudes and emotions

3. Technical aspects of the meeting, including whether the client understood the statistical advice.

After reviewing 61 collaboration meetings in 2011-2012, we were pleased to discover that these **video coaching and feedback sessions yield immediate benefits for the participants**, who learn what to stop doing (e.g., speaking before thinking, excess fidgeting, being disengaged) and what to start doing (e.g., ask the client what she wants from the meeting, paraphrase the overall research goals). Repeated video sessions offer **opportunities for LISA statistical collaborators to practice new techniques** and to verify if they actually work in practice **to improve collaboration meetings.**

Table 5. Video Coaching and Feedback Session totals for 2011-2012

	Fall 2011	Spring 2012	Summer 2012	Total
Videos Watched	31	18	13	62
Collaborators Reviewed	32	24	17	73 (53 unique)
Video Coaching and Feedback Sessions	30	18	13	61

LISA is pleased to announce that the **2011 Outstanding LISA Collaborator of the Year is Mark Seiss**, a fifth year statistics PhD student from Alpha, New Jersey.

LISA provides Virginia Tech faculty, staff, and student researchers with quality statistical support for free. LISA's statistical collaborators are trained to help researchers design experiments; collect, analyze, and plot data; run statistical software; interpret results; and communicate statistical concepts to non-statisticians.

At the end of a collaboration project, clients are asked to complete a feedback survey about the quality of service they received and if they were satisfied. This survey provides clients the opportunity to nominate a statistical collaborator for the award as well as to provide feedback for the improvement of the collaboration service as a whole and for individual collaborators. During 2011, **LISA received 42 nominations for the Outstanding LISA Collaborator of the Year award.**

Mark Seiss

Mark Seiss first began working with LISA when he joined the Department of Statistics in August 2008. He has since worked on 115 collaboration projects. **Clients frequently describe Mark as professional and knowledgeable.** Perhaps most important to clients is that **Mark is willing to go the extra step to understand their project and then explain the statistics in ways they understand.** Mark has also presented eight short courses for the LISA Short Course series and has hosted Walk-in Consulting for three semesters.

Mark Seiss working as an on-the-ground statistician in Mozambique.

"As many LISA clients have concluded, Mark is an expert in the statistical program SAS. These clients appreciate his proficiency in SAS, but it's really his general prowess in statistics and his willingness to help that makes him such an outstanding LISA collaborator. **Mark was chosen** for these skills **to become LISA's first *on-the-ground statistician*** for a large, interdisciplinary project in Mozambique during the summer of 2011, a role in which he excelled," said Eric Vance, director of LISA.

Ralph Hall, a faculty member from the College of Architecture and Urban Studies said, "Mark should receive an award for his outstanding work in Mozambique during the summer of 2011. **His commitment** to ensuring that our surveyors collected high-quality data not only **resulted in the best data set we have every created**, but also helped the surveyors enhance their skills/capacity to collect information. The individual surveyor feedback sessions Mark held throughout the fieldwork helped promote VT's mission of international engagement by creating a team of surveyors in Mozambique who now have a real appreciation of the importance of collecting good quality information."

[24] Outstanding LISA Collaborator of the Year

There were three other **finalists for the Outstanding LISA Collaborator of the Year award: Nels Johnson, Jonathan Stallings, and Chongrui Yu.** Below are a few quotes received from clients for each of these honorees.

Nels Johnson was the 2010 LISA Collaborator of the Year and continued to impress clients in 2011. Adyan Rios a graduate student in the Department of Fisheries and Wildlife Sciences was one of the individuals to nominate Nels. Adyan shared that, "Nels always responds quickly to my emails for scheduling meetings. He always does a great job responding to my questions both in person and also by email when necessary. **He is very good at explaining concepts or analysis** I am unfamiliar with, as well as patient with me when it takes a few minutes for me to grasp."

Nels Johnson

Fall 2011 was **Jonathan Stallings**' first semester with LISA, and the clients he worked with appreciated his dedication and work ethic. He was "very helpful and communicative. Although my set-up was not properly designed, he did not 'give-up' on my poor data...he worked hard to pull together all possible conclusions. He certainly **worked above and beyond**," commented Evan Bowles from environmental engineering who later encouraged his colleague to meet with Jonathan for advice on designing her research study before starting collecting data.

Jonathan Stallings

Chongrui "Ronnie" Yu, currently a statistician with Farmers Insurance in Tampa, FL, started working with LISA in the summer of 2008. Chongrui's clients feel that he **is a very professional and hardworking collaborator**. "Ronnie was a great help! He not only helped me with which statistics to use with my project but also helped me to understand why, as well as how to use JMP. He was also available to meet when I needed, responded to emails in a timely fashion, **and was more than willing to help with anything I needed during our meetings**. He met with me as many as 10 times (possibly more) until I felt comfortable with discussing and interpreting my stat results," commented Jennifer Coleman a graduate student in Crop and Soil Environmental Sciences.

Chongrui Yu

Honorable mentions (in alphabetical order) **are Joel Anderson, Andy Hoegh, Wandi Huang, Jennifer Kensler, Caleb King, Austin Rhodes, Ciro Velasco-Cruz, Sai Wang, Pei Xiao, and Huaiye Zhang.**

Statistics in the Community—**StatCom** for short—was first **established by graduate students** from the Department of Statistics at Purdue University in 2001 **to provide professional statistical consulting services to non-profit and governmental organizations in the community free of charge.** With the support of the American Statistical Association, StatCom now exists over an international network of colleges and universities, each with its own interpretation of how StatCom can serve their community.

The graduate students in the Department of Statistics at Virginia Tech began a StatCom program in 2008 and promptly joined the growing StatCom Network. The first director of VT StatCom was Matthew Williams. His tenure ended in May 2011 when he graduated with his PhD in statistics. The current director is statistics PhD student Andy Hoegh, and the faculty advisor is Dr. Eric Vance, the director of LISA.

StatCom donated 11 boxes of statistical textbooks for use in South Sudan.

In the past year, nine StatCom students have worked on three different projects at Virginia Tech.

- ➢ The first project is an assessment of environmental samples collected annually at Smith Mountain Lake since 1987. **StatCom members have provided statistical support** on several different aspects of this project including: graphical displays of the data used in annual reports, models testing relationships between blue and green algae, and evaluating spatial effects of phosphorus on Secchi depth.
- ➢ The second project, which is just getting underway, was brought to the group by the Virginia Rural Water Association. Fishing guides have noticed a decrease in water quality, which has hurt business. **StatCom is compiling historical water samples to attempt to create models of water clarity over time and space.** If there is not sufficient data publicly available to satisfy the client's concerns, StatCom will also assist in a sampling plan for collecting water samples on the New River.
- ➢ The final project included a survey on community involvement and citing of the Roanoke Rescue Mission. **StatCom members evaluated the survey questions**, provided insight on pilot testing the survey, **and made recommendations on distributing the survey**.

StatCom at Virginia Tech's existing projects have been referred from the LISA or by direct contact with StatCom staff. StatCom at Virginia Tech has a strong relationship with LISA and the Virginia Tech Statistics Department. All graduate students take a course on communication in statistical collaboration, which serves as an introduction to work as a statistical collaborator. As part of the Master's curriculum students serve as collaborators in LISA for at least one semester, as part of this experience students can choose to work StatCom projects.

For more information please visit: www.lisa.stat.vt.edu/?q=statcom.

One of **LISA's** goals for expanding the **global impact** of statistics is to help **create a network of 20 new statistical collaboration laboratories in developing countries by 2020**. Our proposed method for doing this is simple: Statisticians from developing countries come to Virginia Tech to work in LISA and learn how to communicate and collaborate with non-statisticians. They return to their countries to work as collaborative statisticians, create a new laboratory, and train other statisticians to join them in working with researchers to solve research problems. Faculty and students from LISA later visit the newly created statistical collaboration labs for between 2 weeks and 6 months to help create the new centers or to sustain them by providing additional training and support.

One technically sound **statistician** educated and trained to communicate and collaborate will enable and accelerate 50 or more research projects per year, which **can positively impact thousands of people.**

LISA is currently seeking funding to implement these ideas to train statisticians from developing countries to communicate and collaborate with non-statisticians and thus enable and accelerate research in these countries.

In June, Dr. Eric Vance, director of LISA, traveled to South Sudan with the Rebuild Higher Education in Agriculture (RHEA) program to promote the use of statistics in agricultural research at the University of Juba.

Dr. Vance met with the Vice Chancellor, three members of the statistics department, the crop science department head, the registrar for the College of Natural Resources, and others to pitch his idea of developing a statistical collaboration center at the University of Juba. The members of the **statistics department** were **enthusiastic about the idea of learning to communicate and collaborate with researchers.** The Vice Chancellor felt that it would be more useful to first train agricultural researchers in statistics and then develop a statistical collaboration program sometime in the future.
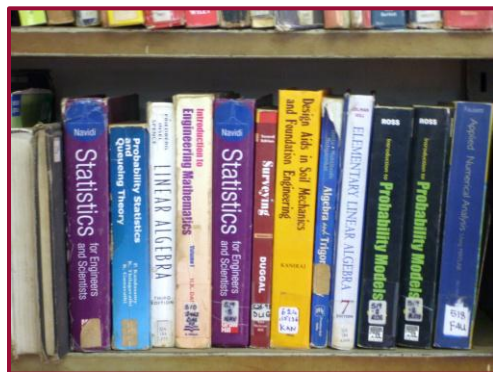
Dr. Vance left it in the hands of the faculty to convince the Vice Chancellor that **a statistical collaboration laboratory would benefit the University of Juba and their emerging agricultural research programs.**

The entrance gate of the University of Juba

Loro Goré, department head, and Dr. Jaafar Juma, assistant professor, hang a poster about LISA at the University of Juba.

The statistics section of the University of Juba library

Eric Vance meeting with Martin Baro and Loro Goré.

At this year's Joint Statistical Meetings in San Diego, the American Statistical Association's **Section on Statistical Consulting sponsored the session**, "Fostering Interdisciplinary Collaboration Through Statistical Consulting" to **highlight the important contributions statistical consulting and collaboration centers make toward training students to become interdisciplinary collaborators.**

Today's scientific problems are extremely complex and will only be solved through collaborative efforts between disciplines. As our society becomes more dependent on data to make decisions, statisticians play ever more important roles in research. Industry, government, and academia increasingly demand that the statisticians they hire have collaboration experience. For these reasons and others, it is desirable for statistics students to consult and collaborate on projects with researchers in other disciplines. However, if statisticians lack sufficiently deep knowledge or interest in the specific domain of the problem and if would-be collaborators think of statistics as merely a bag of tools used to test hypotheses, attempts at collaboration will be unsuccessful.

Michael Lavine, Eric Vance, and Paul Roback at JSM in San Diego

In this session organized by Dr. Eric Vance, three directors of academic statistical consulting centers briefly described how their centers provide consulting and collaboration experience to emerging statisticians, from undergraduates to postdocs. The primary focus of this session, however, was not on the experience the undergraduates, graduate students, and postdocs get through these three centers. The primary focus was on the training they receive in how to be effective interdisciplinary collaborators.

Dr. Paul Roback from St. Olaf Collage described successful strategies and structures he has implemented in the Center for Interdisciplinary Research to train undergraduate statisticians to collaborate with faculty researchers. **Dr. Eric Vance**, the director of LISA at Virginia Tech, **described the culture shift experienced by the graduate students in LISA from their previous focus on** *consulting* (in which they help answer the clients' *statistical* questions) **to** *collaboration* (in which they help to answer the clients' *scientific* questions). This talk is available at www.lisa.stat.vt.edu/?q=node/4686. Dr. Michael Lavine from the University of Massachusetts, Amherst, extended this discussion to how his experience running a statistical consulting center has led to improvements in his department's curriculum.

[28] Communication in Statistical Collaborations

In spring 2012, 45 undergraduate statistics majors and first-year statistics M.S. students **learned communication and collaboration skills** that will help them **become effective interdisciplinary collaborators.** In the 3-credit course *Communication in Statistical Collaborations,* the students focused on giving and receiving effective feedback; listening for understanding; structuring and leading efficient and mutually satisfactory statistical collaboration meetings; asking good questions; explaining statistics to non-statisticians; and presenting statistical results and interpretations orally, through plots and graphs, and in writing to non-statistical audiences. Through assigned readings, individual homeworks and tests, team tests, and in-class team application exercises, the students learned and practiced the skills—not taught in their other statistics courses—that will transform them from technically sound statisticians into **problem-solving, people-helping statistical collaborators**.

Besides the novel content, the spring 2012 *Communication in Statistical Collaborations* course was radically different from every other course taught at Virginia Tech because the professor, Dr. Eric Vance, redesigned it to use **Team-Based Learning**, a highly effective educational strategy that incorporates four key features to teach course content through daily teamwork, communication, and collaboration in and out of the classroom.

Feature 1: Students **collaborate** in balanced, diverse, permanent teams of 5-7 students chosen fairly and transparently by the professor.

Feature 2: The overall course grade consists of three components: individual assessments, team assessments, and a team maintenance and peer evaluation score.

Feature 3: Course content is split into approximately 6 modules. Each module begins with a readiness assurance process consisting of an individual test on the main concepts of the reading assignment, the same test taken immediately afterward by the team, instant feedback and inter-team discussion about the test, and a short clarifying lecture by the professor—not on material the students were able to learn themselves through the assigned readings—but on material the students need help understanding.

Feature 4: Assured that the students are ready to engage with the course material to achieve proficiency or mastery, the remainder of the class periods **focus on team application exercises that compel team members to apply course content and communicate, collaborate, debate, select, and justify the best answer choice for the exercise.**

Team CALM-J discussing course content during a team application exercise.

Team Xioaning celebrating after their proposal was voted the best in the class.

LISA's primary goal is to be the premier academic statistical collaboration laboratory. To that end, LISA will continue efforts to provide high quality training for its students and faculty and high quality service, research, and education for clients. LISA will also seek to improve in these efforts. Ideas and opportunities for improvement and specific focus in 2012-2013 are listed below, along with **measurable goals for each point of focus**.

2012-2013 Goals

1. *Continuing faculty support and encouragement for deep collaborations/student co-authorships*

   ➤ Achieve at least 5 student co-authored publications resulting from a LISA collaboration.

2. *Improving the quality of our services*

   ➤ Maintain 95% or higher positive feedback from our collaboration clients. Video review every collaborator who regularly meets with clients at least once per semester.

3. *Recruiting students to the department*

   ➤ Have at least 3 incoming students admit that LISA was a major deciding factor in choosing to attend Virginia Tech over somewhere else.

4. *Securing additional—and permanent—funding for LISA*

   ➤ By the end of 2013, LISA must have permanent and sufficient funding for at least 6 lead collaborators; the director, assistant director, and administrative specialist; and for software, supplies, and travel.

5. *Forming new connections and strengthening the old with VTC, VCOM, and other VT departments*

   ➤ Increase the number of collaborations with VTC and VCOM from 2011-2012 and collaborate with researchers from at least 50 departments at Virginia Tech.

6. *Celebrating the International Year of Statistics by making progress on "LISA 2020"*

   ➤ Continue to build awareness of LISA 2020 by promoting the vision in at least 3 conference talks or posters. Submit at least 2 grant proposals to fund LISA 2020.

[30] Contacts

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