

**NOMINATION COVER SHEET**  
**2016 Virginia Outstanding Faculty Awards**

<b>1. <u>NAME</u></b> Full (Legal):        James Radford Kirkwood                      Preferred First Name: Jim	
<b>2. <u>INSTITUTIONAL INFORMATION</u></b> Institution: Sweet Briar College Rank/Position Title: Professor of Mathematics and Cameron Fellow Year Rank/Title Attained: 1998 – Professor; 2008 – Cameron Fellow Years at Institution: 32 Campus Email Address: <a href="mailto:jrkirkwood@sbc.edu">jrkirkwood@sbc.edu</a> Campus Phone: 434-381-6285 Campus Mailing Address: Dept. of Mathematical Sciences, Guion 134 Chapel Road, Sweet Briar College Sweet Briar VA 24595 Campus Communications Contact: -Name: Monica Dean -E-mail: <a href="mailto:mdean@sbc.edu">mdean@sbc.edu</a>	<b>3. <u>PROFESSIONAL INFORMATION</u></b> Academic Discipline: Mathematics Specialization/Field: Applied Mathematics Type of Terminal Degree: Ph.D. Year Awarded: 1982 Awarding Institution: University of Virginia
<b>4. <u>PERSONAL INFORMATION</u></b>	

***Please check only one box:***

- RESEARCH/DOCTORAL INSTITUTION NOMINEE:  \_\_\_\_\_  
 MASTERS/COMPREHENSIVE INSTITUTION NOMINEE:  \_\_\_\_\_  
 BACCALAUREATE INSTITUTION NOMINEE:  X \_\_\_\_\_  
 TWO-YEAR INSTITUTION NOMINEE:  \_\_\_\_\_  
 RISING STAR NOMINEE:  \_\_\_\_\_

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Signature (President or Chief Academic Officer) \_\_\_\_\_

Printed Name:  Pamela DeWeese, Interim Dean and Vice President for Academic Affairs

E-mail address:  deweese@sbc.edu                      Telephone:  434-381-6205

### **Sweet Briar College Mission Statement**

Sweet Briar College prepares women (and at the graduate level, men as well) to be productive, responsible members of a world community. It focuses on personal and professional achievement through a customized educational program that combines the liberal arts, preparation for careers, and individual development.

The faculty and staff guide students to become active learners, to reason clearly, to speak and write persuasively, and to lead with integrity. They do so by creating an educational environment that is both intense and supportive and where learning occurs in many different venues, including the classroom, the community and the world.

### **Excerpts from the Sweet Briar College Statement of Purpose in Support of the Mission**

Sweet Briar's curriculum is organized on the premise that a foundation in the liberal arts enhances the development of critical and creative abilities, develops the ability to synthesize disparate information, equips the student for graduate and professional education, and encourages her to continue to learn long after leaving Sweet Briar.

A broadly based academic program teaches the student to view her experience within wide contexts, to appreciate the achievements of the past, to understand the methods and major theories of science, to gain an appreciation of the arts, and to communicate with precision and cogency. A highly qualified faculty, committed to the highest standards of teaching, engages individuals on a human scale. In small classes, students receive the attention that encourages self-confidence and the improvement of skills for life and livelihood.

Sweet Briar continues its commitment as an independent undergraduate women's college in order to devote its resources to the education of women in the full range of the liberal arts, including those subjects that have been traditionally considered as male domains.

## Summary of Accomplishments

The National Science and Technology Council's most recent five-year strategic plan (published in May 2013) calls for making education in STEM (science, technology, engineering, and mathematics) a national priority. The plan's goals include enhancing the STEM experience of the nation's undergraduates and improving the participation of women in areas of STEM where they are significantly underrepresented.<sup>1</sup> Sweet Briar, a women's college in central Virginia, has been working toward those goals for many years, for as written in its Statement of Purpose, the College educates women in a full range of subjects, "*including those subjects that have been traditionally considered as male domains.*" Dr. James R. Kirkwood, an outstanding member of Sweet Briar's faculty, has dedicated his career to these same goals through his work as an educator, scholar, and author.

At Sweet Briar College (SBC), Dr. Kirkwood has taught mathematics, computer science, and statistics courses, mentored the research projects of mathematics majors, and directed numerous student independent studies and independent reading courses. He is a beloved professor whose inspirational teaching methods have enabled women undergraduates to realize that they can "do" math—and do it well. The results of his work are striking: since 2003, an average of over 4% of the degrees at SBC has been awarded to mathematics majors, four times higher than the national average for male and female students combined,<sup>2</sup> and SBC math graduates have gone to graduate programs at Harvard, Yale, UNC Chapel Hill, Virginia Tech, Georgetown, North Carolina State University, and the University of Virginia in recent years.

Dr. Kirkwood is the sole author of ten books, and is under contract for two more. He is the co-author of two additional books and the co-author of one chapter of another. He has also written three additional texts that are locally produced and used in SBC courses, which has resulted in over \$100,000 in savings for SBC students. He has received NSF grants for various projects, including pioneering the integration of technology into calculus courses, and for developing materials for courses in mathematical biology. He has twice received the Sweet Briar Excellence in Teaching Award. In course evaluations, in the past five years (the period for which data is available), 94% of his students have given him the highest rating for his teaching. He has used his professional expertise to benefit the community by teaching in-service courses to teachers through the University of Virginia and acted as a consultant for K-12 school systems in their selection of technology. He has served as a referee for peer reviewed articles in mathematics publications including *The American Mathematical Monthly*. His research publications include an article published in *Communications of Mathematical Physics* that introduced ideas that are now called "The Kirkwood-Thomas Theory" in mathematical physics.

### Teaching

Dr. Kirkwood is recognized by the entire Sweet Briar community—students, alumnae, faculty, and staff—as one of the best teachers in an institution that places great emphasis on quality of teaching. He has a reputation for truly caring about and mentoring his students, and for doing all he can to help them learn. He has twice won the Sweet Briar Excellence in Teaching Award, which is voted on by the entire student body, given by the Student Government Association, and announced at the annual Commencement ceremony. He first won this award in 1998 and then again in 2015—and this last time, the honor was especially poignant and meaningful to Professor Kirkwood because if the College had actually closed in the summer of 2015, he would have been the last faculty member to receive the award.

<sup>1</sup> [https://www.whitehouse.gov/sites/default/files/microsites/ostp/stem\\_stratplan\\_2013.pdf](https://www.whitehouse.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf)

<sup>2</sup> National Center for Education Statistics, Institute of Education Science, cited 2012: Digest of Education Statistics 2010: [http://nces.ed.gov/programs/digest/d10/tables/dt10\\_282.asp?referrer=list](http://nces.ed.gov/programs/digest/d10/tables/dt10_282.asp?referrer=list)

Dr. Kirkwood has been highly successful in his teaching in several ways. At Sweet Briar, he has taught every mathematics course the College offers including the traditional calculus sequence (Precalculus, Calculus I, II and III), abstract algebra (Linear Algebra, Algebraic Structures, Topics in Abstract Algebra), analysis (Complex Analysis, Sequences and Series, Advanced Calculus), and applied mathematics (Probability, discrete structures, mathematical modeling, statistics), as well as computer programming classes. His course evaluations have been superb. In the last five years (the period for which the data is available), 94.2% of the students have rated his “teaching effectiveness” as “excellent” (the highest rating possible). Again and again in their written comments in end-of-semester course evaluations, Dr. Kirkwood’s students praise him for his enthusiasm, his dedication, his patience, his encouragement, and his commitment to student learning and success. Whether he taught them in an introductory or an advanced mathematics course, Dr. Kirkwood’s students state that he helped them realize that they can do well in math, that they can understand it and not be intimidated by it, and that they can even grow to love it.

- *“Math was always a difficult, frustrating subject for me. However, after taking this class, I feel so much more confident in my ability. I discovered that I really was good at this stuff. I just needed the right teacher!”*

- *“Professor Kirkwood has made me love math! He’s always enthusiastic and makes things interesting. He is always willing to help when I have questions.”*

- *“Not only have I learned a tremendous amount in this class, I’ve also had fun—a word I never associated w/math. My academic self confidence has definitely improved in this area, which has had an impact in all my other subjects—if I can “do math” I can do anything.”*

An important factor in Dr. Kirkwood’s success as a teacher is that he has been a leader in developing innovative ways to teach math. When Calculus Reform was the major topic in college mathematics instruction several years ago, he decided to create a calculus laboratory section for Calculus I classes, an idea prompted by attendance at a conference workshop where the organizers presented data from their classes that demonstrated how technology enhanced student learning. He received a National Science Foundation grant to develop a laboratory component to complement the traditional lectures for calculus and to create a series of projects that use computers for lab exercises that extend what is normally done in calculus. For example, one of these projects, “Falling Bodies,” extends the model done in calculus to the case where the velocity acts to retard acceleration, thus introducing the concept of terminal velocity; another project, “Population Models,” shows that exponential growth is unrealistic in the long term and introduces the logistic equation, which is more advanced than what is done in traditional calculus classes. Dr. Kirkwood went on to commercially publish these projects; one version is, “Calculus Projects for Mathematica,” with William C. Brown Publishers.

Besides advancing the students’ understanding of the principles of calculus, the laboratory component turned out to have another benefit: it led to much more individualized student-faculty interaction, which also seems to have promoted more enthusiasm and class discussion. Dr. Kirkwood believes these interactions have caused him to know his students better as people and they realize that he has their best interests at heart.

The project exercises require that the students observe, make conjectures, and write about their conclusions—and this is another innovative factor in Dr. Kirkwood’s pedagogy—he has his math students write. He has found that requiring students to express their findings in writing has improved not only their precision in writing but their ability to think as well—it causes them to ask, “What’s going on here?” The improved writing and communication skills Dr. Kirkwood’s students gain from their math courses help them succeed in all aspects of their liberal arts education and in their lives and careers after graduating from Sweet Briar. The “well-roundedness” of Sweet Briar’s math majors has been noted by faculty at institutions where these students have gone on to graduate school, as the following anecdote demonstrates. Earlier this summer, Dr. Kirkwood learned that a faculty member from the University of North

Carolina at Chapel Hill's graduate program in statistics (one of the most demanding programs in that field in the nation) had related to a colleague how pleased he was to have a 2014 Sweet Briar math major in their program. This was not only because her abilities in mathematics were excellent, but because she was one of the few students who could express herself well in writing and in conversation, and he expressed similar thoughts about other SBC alumnae who had gone on to graduate school in their program.

Dr. Kirkwood's teaching abilities have also benefitted students at other Virginia institutions. His love of mathematics and his delight in helping other people to learn it have led to him becoming part of several educational projects with the University of Virginia (UVA). Many of these have involved teaching classes for in-service teachers from Virginia's public schools. The Mathematics and Education departments at UVA had collaborated to produce courses that would enable in-service teachers to complete work for continued certification or obtain an advanced degree. Travel time necessitated offering these courses at satellite sites as well as in Charlottesville. UVA selected Dr. Kirkwood to be an instructor at one of these sites, where he taught the teachers on topics including geometry, probability and statistics, and calculus. Dr. Kirkwood remembers that when these courses began, he and the UVA staff met with one of the school superintendents and his staff. It was plain that this superintendent was skeptical, and Dr. Kirkwood received calls from the deputy superintendent before the course began. In fact, the deputy attended the first few class meetings and what she saw changed her mind (and her boss's mind, too). Dr. Kirkwood attended a regional meeting after the course had ended, where by chance he saw the superintendent in a parking lot. The superintendent said how pleased he had been with the course and stated in the meeting that such programs could work well "if the instructor was hand-picked." Dr. Kirkwood's teaching of these courses led to his being an informal consultant with some of the participating school systems to help them integrate technology into their curriculum, and he has subsequently given workshops to the teachers in these schools to help them integrate technology into their curriculum.

Dr. Kirkwood has also worked with UVA on a program to improve the success rate of students in their mathematics PhD program. That program had been suffering unacceptable attrition rates, so the math department introduced two summer programs, one for entering graduate students and a second for graduate students who have completed their first year. Dr. Kirkwood teaches real analysis to the entering students. This course has the goals of filling in gaps that might exist from a student's undergraduate program, introducing topics that will be seen in the graduate course in real analysis, and mentoring the students as they prepare and present an advanced topic. Dr. Kirkwood also has the responsibility of recommending to the student's graduate advisor what level of course the student should be placed in during the fall semester. The program has been running since the early 1990s and has achieved the desired results. There was one year when funds were not available, causing Dr. Kirkwood's summer course to be cancelled, and the attrition rate for students entering that year was comparable to the old rate—demonstrating the efficacy of Dr. Kirkwood's teaching and mentoring of the entering graduate students. He has been surprised and gratified by the number of students who have completed their PhDs and told him that his course was important for their success.

### **Discovery**

Dr. Kirkwood's research interests have evolved over his career. As a graduate student, he was initially drawn to do research in differential equations, primarily because a faculty member at the University of Oklahoma, W.T. Reid, was one of the pre-eminent researchers in the field dating back to his work at the University of Chicago. Professor Reid had agreed to accept him as a graduate student, something he had not done in the previous four years, but later decided to retire before Kirkwood was able to finish a thesis. After Dr. Reid retired, Kirkwood transferred to the University of Virginia, motivated by the quality of the mathematics program there. At that time UVA was recognized to have one of the top five faculty groups in the

nation in mathematical physics (according to some Harvard people in the field). Dr. Kirkwood then began doing research in that area under the direction of Larry Thomas. One of the research papers that came out of his thesis was, “Expansions and Phase Transitions for the Ground State of Quantum Ising Lattice Systems,” published in the prestigious journal *Communications in Mathematical Physics*, 88 (1983). This paper has proven to have unusual significance. The methods introduced there are now called the “Kirkwood-Thomas Theory” and the paper is still being referenced thirty years after publication.

When Dr. Kirkwood came to Sweet Briar, the expectation was that his focus would be teaching. Accordingly, his scholarly work has become pertinent to enhancing undergraduate mathematics education. Soon after he came to Sweet Briar he taught a course in beginning real analysis. Historically, the course had not been successful from the point of view of what the students were taking out of the course. A major problem was the texts available at the time tended to be written for beginning graduate students and were inaccessible. This inspired him to write a text, “An Introduction to Analysis,” that would be directed toward students beginning to study abstract mathematics. The book was successful. It is still producing royalties 25 years later. At a conference five years ago, a James Madison professor sought him out to tell him how much he liked the text. Several students in the UVA graduate program have said it was the text they used as undergraduates.

The next courses he sought to enhance were the calculus sequence. As noted earlier, he developed a sequence of projects that used technology to push students to think more deeply and express themselves in writing rather than merely solving problems on exams. This culminated in the commercial publication of laboratory projects that use computers to explore the principles of calculus. A few years later, Dr. Kirkwood’s Sweet Briar colleague, Dr. Raina Robeva, began working to introduce mathematical biology into the curriculum. She has been highly successful in this endeavor and is now a national figure in this field. Dr. Kirkwood, Dr. Robeva and others received three NSF grants to develop undergraduate course curriculum and course materials for mathematical biology. These grants also resulted in undergraduate textbooks for mathematical biology. The first two books (for which there were multiple authors, Dr. Robeva being the primary and Dr. Kirkwood the secondary author) were, “An Invitation to Mathematical Biology” (Academic Press, 2008), and an accompanying laboratory manual, “Laboratory Manual of Biomathematics” (Academic Press, 2008). The third publication is, “Mathematical Concepts and Methods in Modern Biology” (Academic Press, 2012), in which Dr. Kirkwood coauthored a chapter with his SBC Biology colleague, Dr. Janet Steven.

Dr. Kirkwood’s most recent writing has been in more advanced work—texts that bridge the gap between undergraduate and graduate mathematics. This has meant exploring topics that were new to him, or contained some aspects that were new to him. This has resulted in two texts, “Mathematical Physics with Partial Differential Equations” (Academic Press, 2012) and “Markov Processes” (Taylor and Francis 2015). The mathematical physics book was an outgrowth of helping a Sweet Briar alumna who was having difficulty in a certain part of one of her graduate courses at Yale. When Dr. Kirkwood examined the text that was being used in the course, he felt that some of the explanations it used were obscure and he therefore decided to write a book that would cover the material in a more accessible way. The “Markov Processes” book grew out of the chapter Dr. Kirkwood coauthored for “Mathematical Concepts and Methods in Modern Biology.” This chapter used ideas that were similar to those used in Markov processes, which sparked an intellectual desire to learn about that subject in depth—resulting in his book “Markov Processes.” In writing this book, Dr. Kirkwood worked with two Sweet Briar students who were doing an independent reading course with him to prepare for graduate work. The students used draft chapters of the manuscript as their text and provided valuable feedback for the final product, helping to make the book more understandable and accessible. Each of these students is now doing graduate work in prestigious graduate programs, one in statistics, and the other in economics.

These examples show how closely intertwined are Dr. Kirkwood's teaching, his intellectual interests, and his writing. In fact, he considers teaching and scholarly activity to be symbiotic functions—and it is difficult for him to make clear distinctions between the two. Teaching inspires better ways of approaching ideas by highlighting what students find difficult, what resonates and what doesn't, what excites and what is mundane. These lessons are invaluable in writing a text. Writing forces precision of expression and organization, and the construction of exciting and pertinent examples that enhance teaching.

Dr. Kirkwood's scholarly pursuits have been recognized and rewarded by his Sweet Briar colleagues. He has twice held the Sweet Briar Faculty Fellowship (in 1990/91 and in 1996/97), a competitive, internally-funded grant awarded to one faculty member per year to support research during an academic year sabbatical—and each of these funded sabbatical leaves resulted in the publication of a book. In 2008, he was named a Cameron Fellow (only one other currently serving Sweet Briar professor is a Cameron Fellow), which is awarded by the president at the recommendation of the dean and a faculty committee, to a full professor who has been in that rank for at least seven years and who has brought distinction to the College through "interesting work of value" such as "research or innovative teaching or service."

### **Integration of Knowledge**

The explosion of new applications of mathematics to other disciplines that has occurred in the past two decades has opened many windows to mathematicians. An abundance of opportunities exist today that in the not too distant past would have been scorned by many in the field as not doing "real mathematics." Data analysis now pervades decision making, partial differential equations has made an entry into finance, one example being the Black-Sholes theorem in investing. In mathematical physics, perhaps more than any other field, the problems in physics have resulted in new mathematics rather than simply different applications of existing mathematics for a longer period of time.

At Sweet Briar College there has been a collaboration of mathematics and biology during the past ten years that has been a model for what can be done in an undergraduate liberal arts setting, and Dr. Kirkwood feels privileged to be a part of these efforts. The story began when Dr. Robeva of the mathematics department and Dr. Davies of the biology department realized that a collaboration was possible that would enable students from each discipline to significantly expand their capabilities within their fields. Dr. Kirkwood soon joined their brainstorming sessions and became part of their group. A major problem was a lack of instructional material at the appropriate level. With the support of three NSF grants, the collaborators received funding that resulted in the development of new courses in mathematical biology, at Sweet Briar College and at other institutions, and in the three mathematical biology books previously discussed in the "Discovery" section. Besides providing crucial material for courses, these textbooks have provided for the dissemination of the group's ideas.

One course that was developed, Biomathematics, enjoyed particularly strong support from UVA. Two UVA faculty members, Dr. Mike Johnson and Dr. Marty Straume, generously agreed to give regular lectures and several other UVA faculty gave guest lectures that were open to the entire college (and extremely well intended). One topic was advances in treatment of Type I diabetes, which was presented by Dr. Boris Kovatchev, who is the leading expert in the world in developing an artificial pancreas. Other topics included using mathematical techniques to provide an early diagnosis of sepsis in newborn babies (this has resulted in the saving of lives), circadian rhythms, and fertility therapy. Each of these talks had a significant component of biology and mathematics. In addition to the biomathematics course, a course in biostatistics has been developed, and various mathematical biology modules were incorporated into already existing math and biology classes. For example, Dr. Kirkwood's collaboration with his biology colleague, Dr. Janet Steven, on their co-authored chapter for the "Mathematical Concepts and Methods in Modern Biology" textbook, extended into the classroom, where Dr.

Steven gave a series of lectures in Dr. Kirkwood's linear algebra class on the applications of linear algebra to both her joint research with him and to own her plant biology research.

This mathematical biology program is a model for interdisciplinary teaching and learning and has made students aware of additional opportunities in each field, and students that have taken these courses have gone on to participate in summer research in biomathematics and graduate school in the discipline.

### **Service**

Dr. Kirkwood has served Sweet Briar College in many ways. He has chaired the department of mathematical sciences multiple times, and has been chair of the Instruction Committee (the faculty committee that oversees the academic program of the College) three times. He co-chaired an ad hoc committee on student wellness that was charged with making recommendations to the president on the structure of the athletic program, student health, campus recreational programs and facilities, and the riding program. These recommendations resulted in several major changes in the studied areas. He has also served on the Admissions Committee several times, Lectures and Events Committee, the Advisory Committee to the Honors Program, and the Research on Human Subjects Committee, as well as on the Athletic Advisory Council. Most recently, he served on the Faculty Executive Committee (the faculty committee responsible for faculty governance) in the summer of 2015 when the committee was responsible for reconstructing the faculty in the wake of the aborted attempt to close the College. In this capacity he helped to ascertain which faculty would return to Sweet Briar, which positions needed to be filled immediately, advised the new president on which senior administrators should be changed, and coordinated with the new Board of Directors on issues of faculty governance and the relationship between the faculty and the Board.

Dr. Kirkwood has served the community of Amherst, in which Sweet Briar College is located. He worked with a student to form the first chapter for Habitat for Humanity at Sweet Briar. This involved working with Sweet Briar and Habitat for Humanity to establish the necessary paperwork for creating a chapter, and coordinating with the Amherst County Chapter in fund raising activities and work on the construction sites, in addition to actually constructing houses. He has served as chair of the committee that established new boundaries for the town of Amherst. The major work of this committee was gathering data about the surrounding regions not in the town, assessing the cost and benefit to the town if a particular region was annexed, holding town meetings for affected citizens to express their concerns, and making recommendations to the Amherst town council. He has been active as a coach and judge for Odyssey of the Mind, a creative problem solving competition for students from kindergarten through college, and has served as a high school volleyball coach. He has served in several administrative capacities for his church including Chair of Parish Council and has been active with Amherst Cares, a local charity providing food packages to needy school children.

Professor Kirkwood has also provided service to the broader higher education community and to the broader mathematics community. As discussed earlier, he has worked with graduate mathematics students at UVA for twenty years and has taught courses in math to in-service school teachers. In connection with his teaching duties for UVA, he has established relationships with school districts in the area and has worked with them to give workshops on mathematical technology and acted as a consultant on their choice of technology. He served several terms on the Faculty Senate of Virginia and was elected secretary and vice president of that organization. In his capacity as an officer, he regularly met with the leadership of SCHEV on higher education issues. He has reviewed manuscripts for potential mathematical textbooks for Elsevier Publishers (Academic Press), has been a referee for *The American Mathematics Monthly* and for *Frontiers in Systems Biology*, has given talks at Mathematical Association of America (MAA) meetings and nearby colleges and gave the keynote address at a mathematics meeting at his alma mater Southeast Missouri State University.

## Personal Statement

On March 3, 2015 Sweet Briar College unexpectedly announced it would be permanently closing on August 25 of this year. Of course, this was traumatic for everyone connected with the college. I spent many hours with students, listening through their tears, trying to give them some comfort, helping them decide on their next steps. For me, one of the outcomes of the impending closure was personal introspection. I had always felt very fortunate to be in a career where I had been happy for over thirty years in a location that was idyllic, but I never realized that I LOVED what I was doing and the place where I was doing it. With the announcement of the impending closure came e-mails and Facebook posts from people whom I had taught over the years. These were truly moving. I had never before fully realized the impact I had made on so many people and will always be grateful for their compliments.

An excerpt from the Sweet Briar mission statement reads, *“The faculty and staff guide students to become active learners, to reason clearly, to speak and write persuasively and to lead with integrity.”* Even in my most optimistic reflections, I would not have realized how successful we had been in achieving these goals, had it not been for the attempt to close the college. Within days, the alumnae had mobilized to begin fundraising, bring legal challenges to the closure, and support students. They engaged the media, politicians and communities to keep the college open. About two weeks after the announcement of closure, one of the most frequently stated sentiments of the faculty was, “We must have taught them awfully well.” This energy, love and dedication was compelling evidence for me in the value of women’s colleges and it inspired me to become active in rebuilding the academic program and encouraging students to return after the court case had been won.

Facing first the impending closure of Sweet Briar, and then the exhilaration of preparing once more for the new fall semester at a resurgent Sweet Briar, has caused me to reflect a great deal on my career. The emphasis of my field, mathematics, has in some ways undergone transitions in the last two decades more profound than any in history. It has blossomed from a field that was almost exclusively theoretical and has become increasingly interdisciplinary and fundamental to research in a myriad of fields including biology, economics, medicine, and finance. In one manifestation of the cross-disciplinary nature of mathematics, I have worked with Dr. Raina Robeva of the math department and Dr. Robin Davies of the biology department in the creation of a math-biology program at Sweet Briar. Two new courses have been created, biomathematics and biostatistics, and biomathematical modules added to existing courses.

One of the things I find intriguing about mathematics is the diversity of skills that are emphasized in its study. These include dealing with highly abstract concepts, constructing and clearly presenting logical arguments, finding patterns and analyzing data, breaking down complex problems into simpler pieces, reading carefully and writing unambiguously. A person armed with expertise in all of these skills will be a valuable employee in almost any field requiring advanced thinking. This is a strong selling point in making students and their parents aware of the vast professional opportunities available to people educated in the mathematical sciences. It also highlights my responsibility to ensure that our graduates meet the necessary qualifications.

Even more important to me than the intellectual stimulation that I get from mathematics is the satisfaction I get when I help students succeed, especially students who initially struggle. Here are two representative success stories: The first is illustrated by a note that I received from a student:

*Dear Professor Kirkwood,*

*I just felt the need to write a short note to thank you. I have never in my life done well in a math class – every year since elementary school has been a struggle. Hours and hours of studying always led to D’s and F’s on exams and I’ve spent many tears simply out of frustration. I wanted to thank you because this is the first class (yes, it took until college!) that I have not*

*only learned the material, but learned not to panic about math. I never dreaded going to class, and as much as I have to laugh when I say this- I actually enjoyed it. I felt you should know how much it meant for me to not panic about math. It's honestly never happened before, and it's the best feeling to know that maybe I'm not all that stupid when it comes to numbers. Never stop teaching! You have a gift, and thank you for sharing it.*

*Kristen Trayer*

The second example took place about four years ago, when I taught a student in Calculus I who made a D. Due to a scheduling conflict, she ended up taking Calculus II at a nearby school rather than Sweet Briar. Not surprisingly, she failed the first test there— scoring around 35%. This was a wakeup call, where she knew if something didn't change, she was gone. Even though this class was taken at another institution, she started coming to get help for it from me several hours a week. It was tough going at first. We probably initially talked as much about attitude as about math. She started to achieve some small successes. We emphasized the successes and her confidence grew. By the end of the course, her test scores were in the 80's. Her mother was thrilled. (So was I.) Her physics professor and other Sweet Briar professors noticed a similar improvement in her attitude and performance. She went on to complete a degree in engineering and landed a great job.

One of the challenges to mathematics teachers is the number of students who approach the subject with a defeatist attitude. Sadly, this seems to have often come from their prior teachers or from their parents. It is my belief that if you think you will fail at something, then you almost certainly will. Changing an attitude can be difficult. You need to have some success – even a small amount - to establish a basis for optimism. In my experience, the strategy that seems to work best to overcome this defeatist attitude is working one-on-one with a student.

Some general principles that I believe are important in helping an individual are:

1. Be accessible and open. Many students find the first trip to their instructor's office to get extra help intimidating. If they don't feel the first meeting is worthwhile, there won't be a second.
2. Point out what a student is doing right before getting into criticism.
3. Everyone is different. An explanation that is compelling for a majority of a class will not necessarily work for everyone. The best way to determine what works for an individual is to listen. Formulate your explanation to the student based on what (s)he says. Repeating the same explanation is frustrating for both instructor and student.

A principle that is more subject-specific to mathematics is:

Emphasize trying to understand the structure of a problem and a plan of attack. Things as simple as writing down what you know and what you have to find or prove can pay huge dividends. Writing what seem to be important formulas and results serves to put the information in front of you. If baffled, see if the problem can be restated to make it more understandable.

It can be easy to lose one's enthusiasm after doing essentially the same thing for a long period of time. One of the gratifying things I have found on my course evaluations is how many students say, "It is obvious he is having fun when he is teaching." They are right. I am. I think that attitude is infectious and the students become more enthusiastic, which makes my job even more fun. It's a wonderful cycle. Besides that, I really like mathematics. Writing textbooks keeps the subject fresh for me. I have taken a subject that I never formally studied, spent a few years studying it and writing about it. An example of this is my latest book on Markov Processes. The idea of producing something tangible that has a deadline is a great incentive. The fact that I am learning the subject makes me more aware of points that students may find difficult, and makes me a better teacher. Writing for an audience forces me to be careful with an explanation.

As I reflect on how I would describe my career, I think I could steal the title from the classic movie and say, "It's been a wonderful life."

## James R. Kirkwood: Abbreviated Curriculum Vitae

### Education:

Postdoctoral Fellow, The Institute for Mathematics and Its Applications (NSF),  
Minneapolis MN 1983  
Ph.D., University of Virginia, Charlottesville, VA, 1982  
M.A., University of Oklahoma, Norman, OK, 1976  
B.S., Southeast Missouri State College, Cape Girardeau, MO, 1968

### Professional Experience:

Sweet Briar College:  
2008-present Cameron Fellow  
1998-present Professor of Mathematical Sciences  
1990-1998 Associate Professor of Mathematical Sciences  
1983-1990 Assistant Professor of Mathematical Sciences

University of Virginia:  
1991-present (summers) Adjunct Professor of Mathematics  
(Taught real analysis to entering mathematics graduate students)

### Major Grants from External Sources:

2008-2012 National Science Foundation, Modern Biology, Modern Mathematics, and Modern Solutions: Moving Biomathematics Education Beyond Calculus, \$149,982, (Consultant)  
2004-2007 National Science Foundation, Biomathematics: Developing a Textbook and Case Study Manual for Teaching Introductory Courses in Mathematical Biology, \$74,994, (Co PI)  
2002-2005 National Science Foundation, Teaching Quantification Skills in the Biology and Mathematics Curricula, \$65,225, (Co PI)  
1992-1994 National Science Foundation, Establishment of a Calculus Laboratory, \$27,920, (PI)

### Professional Services:

Referee for *American Mathematical Monthly*  
Referee for *Frontiers in Systems Biology*

### Publications:

#### **Books**

*Advanced Linear Algebra* (Taylor and Francis, in progress)

*Mathematical Physics with Partial Differential Equations, 2<sup>nd</sup> Edition* (Academic Press, in progress)

*Markov Processes* (Taylor and Francis 2015)

*Mathematical Concepts and Methods in Modern Biology* (Academic Press, 2012)  
(Chapter author)

*Mathematical Physics with Partial Differential Equations* (Academic Press, 2012)

*Laboratory Manual of Biomathematics* (Academic Press, 2008) (coauthor)

*An Invitation to Mathematical Biology* (Academic Press, 2008) (coauthor)

*An Introduction to Analysis 2<sup>nd</sup> Edition* (PWS Publishing Company, 1994)

*Calculus Projects with Maple®* (Wm. C. Brown Publishers, 1994)

*Calculus Projects with Mathematica®* (Wm. C. Brown Publishers, 1994)

*Calculus Projects with DERIVE®* (Wm. C. Brown Publishers, 1994)

*An Introduction to Analysis* (PWS Publishing Company, 1989)

### **Journal Articles**

“Phase Transitions in the Ising Model with Transverse Field,” *Journal of Statistical Physics*, 37 (1984) 404-417.

“Percolation in Continuous Systems” with C.E.Wayne, *IMA Preprint Series*, 34 (1983).

“Expansions and Phase Transitions for the Ground State of Quantum Ising Lattice Systems” with L.E. Thomas, *Communications in Mathematical Physics*, 88 (1983) 569-580.

### **Locally published Books**

Calculus

Calculus 2

Abstract Algebra

### **Significant Awards:**

Sweet Briar Excellence in Teaching Award, 2015 (an award voted on by the student body)

Sweet Briar Excellence in Teaching Award, 1998

Sweet Briar Faculty Fellowship, 1996/1997 (a competitively awarded sabbatical fellowship)

Sweet Briar Faculty Fellowship, 1990/1991

### **Letters of Support (Excerpted)**

Although my time working with Dr. Kirkwood has not been lengthy, I have had ample opportunity to observe firsthand his professionalism and his commitment to students and teaching. When I arrived at Sweet Briar to help keep the college open after an announcement of closure, he was one of the first people to offer to assist me. Because there was no academic dean in place, he and a couple other colleagues prepared a list of vacant positions and made suggestions about how they might be filled quickly to prepare for the opening of school. In those conversations, he made it clear that he not only loved the institution and wanted it to be successful, but he was committed to having the students have a full and rich experience at the college in spite of a diminished enrollment. As I talked to students who were considering returning to the campus, a recurring question was whether Dr. Kirkwood would be there. It was clear that the students like and respect him, as do his colleagues. His commitment to students is further demonstrated by his availability for personal assistance and counsel as well as his support for their co-curricular activities, including attending athletic contests. He has established a reputation as an outstanding teacher and mentor. —**Phillip C. Stone, President, Sweet Briar College (SBC)**

Professor Jim Kirkwood is a consummate teacher and faculty scholar. He has twice won the Excellence in Teaching award given by the students. His patience and quiet sense of humor have won over generations of Sweet Briar students who entered believing that they were not “math people,” but who graduated with majors or minors in mathematics. He is capable of framing a question from multiple perspectives and finding points of relevance to other disciplines that make students eager to find solutions to complex mathematical or interdisciplinary problems. His graduates have gone on to careers in the intricacies of Homeland Security, technology firms, teaching at all levels, business, and a variety of other fields. Many students owe their quantitative reasoning skills, however they might use them, to him. His colleagues see him as a solid touchstone on curricular issues. His questions are always posed in such a way as to guide discussions toward the core of a strong liberal arts program of study and those elements within it that affect every discipline on campus. He quietly leads others in effective and strategic ways to see the interrelationships between the disciplines. Professor Kirkwood exemplifies all an undergraduate professor should be: an outstanding teacher, an intellectually curious scholar, and an engaged and engaging colleague who makes everyone who works with him better as teachers as well. —**Pamela DeWeese, Interim Dean and VP for Academic Affairs and Professor of Modern Languages, SBC**

Jim Kirkwood is an established scholar, a beloved teacher, an amazing person, and a remarkable colleague and mentor. Jim’s dedication to teaching has shaped the professional lives of hundreds of Sweet Briar students, whose career success may often be tracked back directly to his role as the first mathematics professor they had in college, as their mentor for a challenging senior project, or as the advisor who encouraged them to apply to a prestigious graduate program. The quality and breath of the textbooks Jim has authored over the years is remarkable. His book *An Introduction to Real Analysis* is now a classic for undergraduate and graduate students nationwide who study mathematical analysis. His more recent books, such as *Mathematical Physics with Partial Differential Equations*, are rapidly gaining momentum. Adding to this list our joint book, *An Invitation to Biomathematics*, co-authored by a team of Sweet Briar and University of Virginia faculty, makes the breadth of Jim’s work truly exceptional - very few authors have the expertise for covering such a wide range of mathematical disciplines with understanding and clarity. Moreover, Jim is an incredible colleague and team player. He is a reliable and devoted collaborator and a trusted partner who I have come to rely on for advice in my research and educational work. His focus, expertise, enthusiasm, and professionalism are truly encouraging and inspiring. Jim is one of the pillars of creativity, collegiality, productivity, and academic prestige at Sweet Briar College. I am proud and fortunate to have him as a

colleague, a collaborator, and friend. —**Raina Robeva, SCHEV OFA Recipient in 2014; Professor of Mathematical Sciences, SBC; Visiting Professor of Mathematics, Randolph Macon College; Editor-in-chief, Frontiers in Systems Biology; Chair of the Board of Advisors, National Institute for Mathematical and Biological Synthesis (NIMBUS)**

I have known Jim Kirkwood from the time he was my Ph.D. student. Our contact has continued over the years because of our common research interests in mathematical physics—particularly statistical mechanics—and because of his involvement with a mathematical analysis summer course he has taught many times for the Math Department here at the University of Virginia, which is part of a grant-funded full-year program to ensure students' preparation for our 7000-level graduate courses and ultimately for their Ph.D. general exams. Our students come from small and large, US and foreign, colleges and universities. The immediate goal is that these students be prepared for the fall courses in analysis and algebra, the former a year-long course in measure theory and integration and complex analysis, the courses directly preparatory for the general exams. Jim has always taught the initial “transition” summer course in analysis, leading entering students with their varied backgrounds to full preparation for the 7000-level math analysis courses. The design of this course has required considerable thoughtfulness as to its content, agility in meeting the needs of students with varying backgrounds, and simply showing a friendly sympathetic presence. And this is what Jim, with a steady hand and on his own initiative, has done for our program. Finally, I cannot help noting Jim's teaching and administrative contributions to the Math Department at Sweet Briar. He has been instrumental in assembling a department which is truly excellent and interesting in its choices of emphasis, one of the very best college departments in the state.

—**Lawrence E. Thomas, Professor of Mathematics Emeritus, University of Virginia**

I've long admired Jim's ability to take a difficult subject and get students to see its beauty and its relevance to them. While there are countless examples of students who speak very highly of his courses, one example of Jim's teaching sticks out in my mind. A student had received a bad grade in a calculus course, required of her major, because she was struggling with her transition to college. The next term, she took a calculus course at a neighboring college. Jim found out about her situation and volunteered his time to work with her. Obviously, Jim didn't need to do this, but he knew his support could make a big difference for the student. Indeed, it did. She is now an engineer with a great career and a bright future. In addition to being an outstanding role model and teacher, Jim also has a great deal of experience and wisdom to provide faculty, and I've been lucky enough to receive some of it. Jim is a prolific textbook author and he has been very supportive to me and my colleagues as we've worked to earn a textbook contract and to deliver a thoughtful product. While he may not know it, he gave us the kind of calm, encouraging advice that helped me get back to work on a long project with renewed vigor and insight. —**Henry M. Yochum, Professor of Physics and Engineering, and Director, Engineering Program, SBC**

Since joining the faculty of Sweet Briar College, Jim Kirkwood has been my mentor, my colleague, my friend and – as of late – my comrade in arms! When the announcement that our beloved college was closing came on March 3, the Sweet Briar College community was given a remarkable opportunity. We were allowed to see inside ourselves and to discover just what we would do when our backs were forced against the wall. During the four months of uncertainty, Jim was a source of strength and compassion our college community desperately needed. Because of his long standing tenure, he has always been known as a sort of “elder statesmen” among our faculty, but went beyond the call of duty when his colleagues and friends needed his innate wisdom and strength. —**Marcia Thom-Kaley, Assistant Professor of Music and Director of Alumnae Admissions Recruiters, SBC; member, SBC Board of Directors**

Dr. Kirkwood is probably the kindest, most approachable educator I have known. He is humble and modest. He never created a hierarchy in his classroom. I consider him a role model as an educator. I clearly benefitted from his educational talents and feel strongly that I would not have made it to medical school without him. I currently am an Assistant Professor in the Department of Community and Family Medicine at Duke. I split my time between clinical practice and teaching medical students. I have modeled my own teaching on that of Dr. Kirkwood. I try to make myself approachable to students so they feel they can ask questions, no matter how basic. I pride myself on meeting students where they are, and being able to assess what they need to know at the various stages of their training and what they need to progress to a different level. These are all lessons I learned from Dr. Kirkwood. Because of these strengths, I have been entrusted to direct the largest course in the medical school, the Practice Course, taken by every medical student at Duke for three of their four years. —**Nancy J. Weigle, M.D., Assistant Professor, Duke University School of Medicine; SBC Class of 1995**

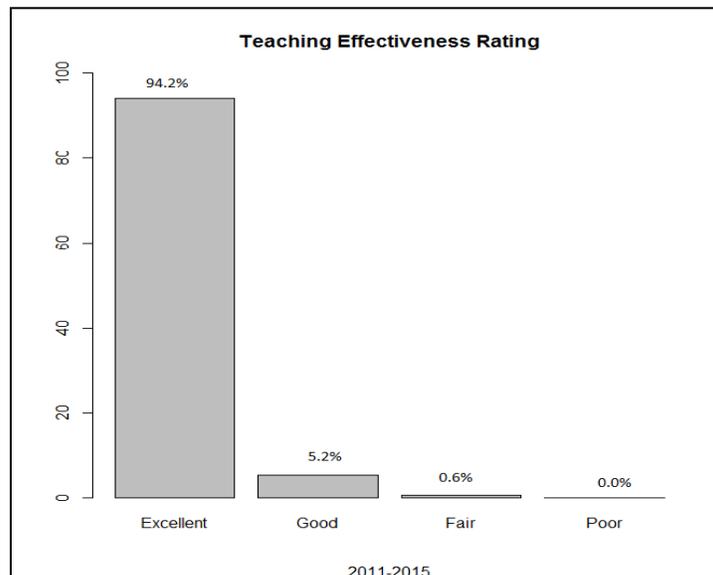
We used to joke that Dr. Kirkwood could teach math to a monkey, but I actually believe, given that opportunity, it is probably true. Math can be an incredibly challenging and intimidating subject, but Dr. Kirkwood removed any sense of this from the room. He never left a student behind in class and was still able to challenge the most enthusiastic of us. Beyond his teaching achievements, he is absolutely adored by each and every student who encounters him; he is a fixture on campus and an amazing part of the Sweet Briar culture. It takes a rare and extraordinary person to be able to span the demands of delivering a high quality education, engage students across educational levels and interests, and also be a culture carrier in the campus community. I am proud to have been taught by Dr. Kirkwood, who has given me a strong foundation both educationally and by his example of character, which influences my life to this day. —**Leah Busque, Founder and CEO of TaskRabbit; SBC Class of 2001; member of the SBC Board of Directors**

Dr. Kirkwood was my academic advisor, professor, and senior thesis mentor. I have known him for more than five years and interacted closely with him during my entire undergraduate study. I took ten of his classes, two of which were one-on-one independent studies, and I completed my senior thesis on Markov Processes with him in the spring of 2014. He is one of the best professors I have ever had. His teaching is, needless to say, remarkable, and he is always willing to help students. To me, he is more than a professor—he is a mentor for life. He cared about my academic performance, my research, and even my hiking classes and banjo practice. He introduced to me the Women in Mathematics program at the Institute for Advanced Study and Princeton University in 2013 and helped me get in. He gave me advice on my career path and graduate school applications, from GRE math subject preparation to what questions to ask at open houses. When I was applying for PhD programs, I was often lost in choosing areas of study and intimidated by the elite departments. It was Dr. Kirkwood who told me to follow my heart while thinking everything through and never lose faith in myself. He sat down with me multiple times going through my huge list of schools, and shared with me his insights and personal experiences. He made me realize how much I have accomplished and how much more I can achieve. After coming to Sweet Briar as a young, immature high-school graduate, Dr. Kirkwood introduced to me this world of interesting math problems, research opportunities, and life lessons. Even after graduation, I still keep in touch with him. He was the biggest reason I am still passionate about math and research. I do not know how many roles he played in my education, but I would not be where I am without his teaching and mentoring. —**Xiaotong Phoebe Jiang, Graduate Research Assistant and Second Year PhD Student, Department of Biostatistics, UNC Chapel Hill; SBC Class of 2014**

## Additional Documentation

### SBC Course Evaluation Data

The table provides results compiled from student evaluations for the past five years (the period from which SBC began doing course evaluations online). It shows that 94.2% of Dr. Kirkwood's students have rated his "teaching effectiveness" as "excellent" (the highest rating possible).



### Selected Comments from Dr. Kirkwood's course evaluations, 1998/1999 - 2014/2015

#### Spring 1999: Math 023—Calculus I (note: course later renumbered as MATH 123)

- Dr. Kirkwood is wonderful—he is the best math teacher I've ever had. Math has always been something that I've had to work at but he makes it so easy that I rarely am confused. But when I am he has always been there to help. He goes out of his way to teach us. I love this class.
- Dr. Kirkwood is a wonderful professor. He takes time to answer everyone's questions w/a positive attitude. He spends as much time as necessary making sure everyone has grasped the concepts. Students feel free to meet w/him outside of class for extra help. When he comes into class he always has a cheery, bright attitude, which really makes learning easier & fun.

#### Spring 1999: Math 208—Advanced Calculus (note: course later renumbered as MATH 434)

- Professor Kirkwood is always helpful and ready for questions. In fact, unlike some professors, I think he would rather teach based on questions we ask—that's a good thing b/c it boosts the confidence level of the students.

#### Spring 2000: Math 024—Calculus II (note: course later renumbered as MATH 124)

- J. Kirkwood is a wonderful professor. He shows in detail how to reason through problems, makes sure everyone understands, and is always willing to answer questions. This is the first time I have understood everything I was doing in a math class.
- Before I took this course I was plagued with math anxiety. I never thought I would be capable of passing any calc class! But Prof. Kirkwood is such a great teacher. Anytime I started to get confused or frustrated I would go to his office & he would take time to explain things to me. He could teach a monkey calculus!

#### Fall 2002: Math 024—Calculus II

- I have never been good in math but this class was taught in such a way that I understand the material & can apply it in life and in other courses (i.e., physics). Prof. Kirkwood...approached problems in numerous ways to accommodate all of the different learning styles of his students.

I am no longer intimidated by math classes.

Spring 2003: Math 116—Linear Algebra (note: course later renumbered as Math 232)

- Before this class I was convinced I could not “do” math. This class has made me understand everything that I didn’t understand about math in high school. I feel my quantitative reasoning skills have improved tenfold.

Spring 2009: Math 123—Calculus I

- I was always last in math class but now I feel like I actually understand the material. Prof. Kirkwood can teach math to a rock. I am that rock when it comes to math and I finally understand math thanks to Prof. Kirkwood. He is always willing to help students. Best math teacher I’ve ever had!

Fall 2009: Math 445—Complex Analysis

- This course make the subject matter understandable by breaking down new material into concepts we have been dealing with for years, which took away the daunting factor....

Spring 2013: Math 232—Linear Algebra

- He was extremely helpful in the classroom and outside of the classroom. He is one of the few professors that enjoy seeing a student understand and get it....

Spring 2013: Math 434—Advanced Calculus

- Professor Kirkwood is always very effective in his courses. The professor always moves at the pace we feel comfortable with and is extremely helpful with feedback and always available outside of class.

Spring 2014: Math 123—Calculus I

- Professor Kirkwood is a great math teacher. He was willing to help anyone and was always so excited about learning. He is an extremely helpful teacher and always cares about students.
- You are a wonderful professor. You’re caring, kind and patient. You create a classroom where everyone can thrive. Don’t change anything.

Spring 2014: Math 336—Vector Calculus

- Professor Kirkwood is great—so refreshing to see a professor who actually cares about how his students do in the class, and makes sure that each and every student will understand....
- Jim Kirkwood is my favorite Professor at Sweet Briar. He is one of the best Math teachers I have ever had throughout my life. He makes sure that all of his students understand the material before moving on and the way he teaches makes hard concepts easier to understand.

Fall 2014: Math 123—Calculus I

- Professor Kirkwood is an extremely effective teacher. He made this class fun and in the beginning of the semester, I dreaded the thought of Calculus.
- Even though Math is like a foreign language to me, Professor Kirkwood effectively broke down the material for me and helped me understand Calculus in a way that math teachers before could not. He makes learning the material easy and pain-free....

**Comments on some of Dr. Kirkwood’s books**

Professor Kirkwood’s success as an author of textbooks in pure and applied mathematics is a testament to his active scholarship. His book, “An Introduction to Analysis,” first published in 1989, is now in a second edition and is used at colleges and universities in the U.S. and Canada, as well as in The United Arab Emirates and Sweden. He has written special calculus texts for use at Sweet Briar...And his contributions to the recently published interdisciplinary text, “An Invitation to Biomathematics,” were critical to the success of the book. He is currently at work on an undergraduate textbook of mathematical physics, which will likely enjoy the same

success. Professor Kirkwood's books are unique in that they are written at a level requiring minimal introductory background, which makes them appropriate for undergraduate students interested in topics that are normally covered in graduate level courses. For the same reason, the textbooks are ideal for bridging the gap between undergraduate and graduate level curriculum.

**An excerpt from the SBC Faculty Personnel Committee's 2008 letter to President Muhlenfeld, recommending that Dr. Kirkwood be appointed a Cameron Fellow**

...I will also mention that I am familiar with [Dr. Kirkwood's] books on mathematical analysis, introductory stochastic processes, and mathematical methods in physics; each of the books is intended for advanced undergraduate mathematics or physical science majors. I believe the books reflect his sensitivity to students beginning the transition from undergraduate to graduate/professional training, and that they draw on his special experience with students at this level. These are excellent books for good students.

**Dr. Lawrence E. Thomas, Professor of Mathematics Emeritus, University of Virginia**

I was the editor of Jim Kirkwood's text, "Mathematical Physics with Partial Differential Equations," which has done remarkably well both in terms of sales and feedback from users that we have received. The book has done so well that Elsevier is now working with Dr. Kirkwood to produce a second edition. Jim Kirkwood is an exceptional author who has a great deal of expertise. I look forward to his future contributions to students and professionals alike.

**Patricia Osborn, Senior Acquisitions Editor, Elsevier Books Division**

**Excerpts from Facebook postings about by Dr. Kirkwood from Sweet Briar alumnae and students after the March 2015 announcement of Sweet Briar's closing**

I thought Calculus was going to be the hardest class I would ever take. But Professor Jim Kirkwood works tirelessly for his students, ensuring that they understand the material and helping them feel confident about math. He is truly an amazing professor.

**Alice Van Derveer, SBC Class of 2018**

Sweet Briar has given me many beautiful things. One of those things has been a family away from home. Professor Kirkwood, thank you for not only giving me knowledge in mathematics, but for giving me knowledge in all aspects of life. Your office was always open from early morning hours to late at night, always ready to answer a question about calc, or to just listen about life's ups and downs and give a big hug. Every Sweet Briar woman who has had the chance to be in one of your classes or sit in your office knows how lucky she is to have had you as a mentor. Thank you for being part of my Sweet Briar family.

**Jona Cumani, SBC Class of 2018**

I love Dr. Kirkwood. I remember him beginning class often by saying, "This is so easy. This is so easy, you'll get this right away. Watch this. See, this is so easy." He was so disarmingly humble and incredibly intelligent at the same time. I still hear his voice when I'm doing math at work for a client. I'm a financial advisor so there are a lot of ratios and creating and solving equations. Thanks to him it is so easy. **Kathlyn Michelle Pierce, SBC Class of 2002**

I took Calc 1 with Dr. Kirkwood (and was terrified—bc I was terrible at math—but had to take it to get an Econ degree). Because of Dr. Kirkwood's teaching methods I got a B+ and a huge appreciate for learning new things! **Brenda Elze, SBC Class of 1999**

I hated math in HS but Dr. Kirkwood (my first year advisor) challenged me to take his class and asked me to change my mind or I could drop without penalty...I couldn't believe how much I

enjoyed Math after taking his class. This is what Sweet Briar is all about, compassionate and gifted educators.

**Kylene Smith DeFrate, SBC Class of 2003**

**Additional Statements of Support from Sweet Briar Graduates and Current Students**

Professor Kirkwood was my academic advisor and I had the privilege of taking many of his courses to complete my degree. His teaching embodies what it means to empower students and prepare them for their professional endeavors. At Sweet Briar, Professor Kirkwood identified my personal strengths as a student and for my soon to be profession and nourished them. Through his teaching, I learned that I could conquer any technical subject and I have carried this with me throughout my career as an Engineer. Professor Kirkwood has the ability to teach the most complicated concepts in the most clear and easily digestible way. Professor Kirkwood could teach rocket science to a five year old. Almost 20 years after I graduated, Professor Kirkwood continues to support and mentor me in my career.

**Janeen Sharma, Human Factors Engineer, Kaiser Permanente; SBC Class of 1996**

Professor Kirkwood was one of the best professors I have ever had. He was the most genuine and warm man I have ever met. When he worked with students he was patient, and always made sure they left understanding the material, never once did he talk down to someone who didn't understand or make them feel stupid for not comprehending. There were many times when I, as a math major, went to him for help, regardless of whether he was teaching the class or not. His door was always open to all students, and he celebrated not only our mathematical triumphs, but also our life accomplishments with us. When I was struggling with which career path to take during my last year at Sweet Briar, Professor Kirkwood was the voice of reason and support. He supported my dreams and goals. I am now currently a full time Director of Children and Youth Ministries at Redwood United Methodist Church in Rocky Mount, VA, and I am also taking Masters classes at Hollins University in order to get my M.A.T. in Secondary Mathematics. I would have never thought this possible if not for Professor Kirkwood.

**Jessica Fortner, SBC Class of 2015**

Everyday Professor Kirkwood makes me look forward to my mathematics class with him. Mathematics became interesting to me because I finally understand it through his way of teaching. For me, what grabs my attention is how excited he is to teach math to us and how rewarding it is for him to know that we understand it. He wants to see us succeed and gives us the tools we need to do so. Something about him makes students want to push themselves. Kirkwood doesn't just give you confidence in mathematics, he wants to see you succeed in all the classes you are taking.

**Makayla Benjamin, SBC Class of 2018**

I was never a particularly strong math student, but Professor Kirkwood taught in a very methodical, clear fashion that made calculus much easier to comprehend. He constantly checked to make sure no student was being left behind in understanding new material and he consistently offered help outside of class. Additionally, Professor Kirkwood goes above and beyond in his role for the Sweet Briar community. He is one of the kindest people I have ever met and it is professors like him that make Sweet Briar unlike any other college. Knowing that he was working so hard over the summer to ensure that all students would be able to get the classes they needed in the fall was a huge factor in many students' decisions to return. I especially looked forward to returning to Sweet Briar for my senior year knowing that he was amongst the faculty that would also be returning. Professor Kirkwood is not only a terrific teacher; he is also an exceptional person.

**Hailey Montalbano, SBC Class of 2016**