The Tennessee Governor’s School for Scientific Models and Data Analysis

Sunday, May 29th through Friday, July 1st, 2011

Annual Report to the Governor and the People of the State of Tennessee

Dr. Jack Rhoton, Director
Angela Haga, Assistant Director

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Center of Excellence in Mathematics and Science Education

Prepared by:
Ms. Angela Haga
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Tennessee Governor's School for Scientific Models and Data Analysis Program Summary and Evaluation for 2011

I. The People: Leadership Team, Faculty and Staff, Counselors and Students

A. Leadership team: The year-round work of preparation for the 2011 Tennessee Governor's School for Scientific Models and Data Analysis was carried out by the director, Dr. Jack Rhoton, and the assistant director Ms. Angela Haga.

B. Faculty and staff: The for-credit faculty consisted of two (2) full-time East Tennessee State University faculty members: one from the Department of Mathematics, one from the Department of Biology. The faculty and staff biographies are in Appendix A.

C. Counselors: Five East Tennessee State University students served as resident counselors. Since they have more contact with the Scholars than any other staff member, the counselors are a crucial part of the GSSM&DA program. Each of the five (5) counselors was responsible for six (6) scholars with one counselor acting as a resident “counselor at large”. The biographies of the counselors are in Appendix B.

D. Students: The thirty (30) Scholars who attended represented sixteen (16) Tennessee counties. There were sixteen (16) females and fourteen (14) males. Seventeen (17) of the students were rising seniors and thirteen (13) were rising juniors. A statistical breakdown of the student body, including the counties from which the Scholars came, may be found in Appendix C.

II. The Program: Courses, Seminars and More

A. Academic courses: There were two (2) academic courses offered, one at 9:15am-12:00 noon and one in the afternoon 1:15-3:00pm. The curriculum was designed to expose the Scholars to a rich selection of mathematics and science courses consisting of general biology, symbiosis, and probability and statistics; descriptions of all of the courses are in Appendix D. The average for the group for BIOL 1110-011 course was (3 A's at 10%; 7 A-'s at 23%; 8 B+'s at 27%; 7 B's at 23%; 5 B-'s at 17%). The average for the group for MATH 1530-014 course was (30 A's at 100%).

B. Plenary sessions: The plenary sessions consisted of Dr. Rhoton, Ms. Haga, the resident counselors, and the GS scholars. The sessions started at 9:00am and were completed by 9:30am. The sessions were on Tuesday’s of the five (5) week period.

C. GS Scientific Models & Data Analysis Web site: Ms. Haga is in charge of the website and is updating it periodically with pertinent information regarding the 2011 Governor’s School and the upcoming 2012 Governor’s School.
III. The Rest of the Experience: Culture, Fun, and Competition Embedded in Science

A. Scholars had the opportunity to participate in the following field trips: The Gray Fossil Site in Gray, TN; Warriors Path State Park (Spider Study) in Kingsport, TN; ETSU Medical School Labs in Johnson City, TN; AEROJET in Jonesborough, TN; Historic Jonesborough in Jonesborough, TN; Roan Mountain State Park in Roan Mountain, TN; Bays Mountain State Park in Kingsport, TN; Eastman Chemical Company in Kingsport, TN and the Carter Family Fold in Hiltons, VA.

B. The staff worked hard to create a learning community, putting students together with each other as well as with the staff and GS Scientific Models & Data Analysis faculty in informal settings such as project group meetings, open time, activities with counselors, and the plenary meetings.

C. The food services provider, ARAMARK, prepared meals while scholars were on campus (breakfast, lunch, dinner). The opening and closing banquets also contributed a sense of formality and accomplishment to the program; Scholars had the opportunity to speak at the closing banquet which was held at the Millennium Centre Ballroom here in Johnson City.

D. An ice cream and cake party celebrating the Scholar birthdays falling within the School provided a brief escape from the students’ studies.

E. A memory “Yearbook” featuring pictures taken throughout the Governor’s School program created by Ms. Haga and was given to all of the Scholars and counselors for a keepsake at the closing luncheon.

F. Ms. Haga also compiled the photos that were taken during the five (5) week Governor’s School program into a “Movie” w/music that was shown during the closing ceremonies and she will incorporate the photos (movie) onto a DVD that will be mailed to all the graduating scholars and counselors at a later date.

IV. The Results: Scholar Evaluations

The Scholars’ satisfaction with the 2011 GS Scientific Models & Data Analysis program is reflected in the overall rating of the program, with 87 percent of the Scholars rating the program as either “excellent” (5) “very good” (4) or “good” (3) a cumulative rating of 4.33 out of 5. Evaluations of various aspects of the program were rated as follows:

A. Overall Program: 4.33 / 5
B. Academic component/workload: 4.17 / 5
C. Faculty/courses: 3.50 / 5
D. Counselors: 3.17 / 5
E. On-Campus meals: 4.00 / 5
F. Dormitory Lodging: 4.30 / 5
Student Evaluation comment results are attached as Appendix E. Virtually all of the Scholars wrote specific responses to the “overall feedback” question on the evaluation. A complete, unedited text of those comments is attached, with the numerical specifics, as Appendix F.

V. The Strengths: Four Keys to Successful Outcomes

A. A dedicated, talented, and interested faculty and staff who enjoyed working with these gifted and talented rising juniors and seniors.

B. Highly motivated students. All thirty (30) Scholars’ who began the program completed it. Each of those thirty (30) earned the full seven (7) hours of credit.

C. The successful class for Scientific Models and Data Analysis was a for-credit program, which included academic and interpersonal/social components. A full 87 percent of the students thought the balance of activities were “Excellent”, “Very Good,” or “Good” and the university courses offered were carefully selected as likely to “count” as part of the general education requirements at virtually any institution the students might later attend.

D. The work of the director Dr. Jack Rhoton, the instructors, professors, counselors and, especially, the GS Scientific Models & Data Analysis assistant director Angela Haga.

VI. Conclusion

This 2011 Governor’s School for Scientific Models and Data Analysis program was highly successful. We had a challenging curriculum, an enthusiastic faculty and staff, and a gifted and talented group of Scholars. The Governor’s Schools are among Tennessee’s best investments, and the entire Scientific Models and Data Analysis team is already looking forward to an even better program in 2012.
APPENDIX A

2011 Faculty and Staff Bios
The Tennessee Governor's School for Scientific Models and Data Analysis

Primary Instructors

Dr. Karl Joplin

Karl Joplin is an Associate Professor in the department of Biological Sciences, College of Arts and Sciences at East Tennessee State University (ETSU). He received his BS from the University of Washington, his MS in Entomology and his Ph.D. in the Molecular. Cellular and Developmental Biology program at the Ohio State University. He did postdoctoral research at OSU before joining the faculty at ETSU. Karl’s undergraduate instructional experience is at a primarily undergraduate institution and includes 1) non-majors biology, 2) General Biology for Majors I and II, 3) General Entomology, 4) Recombinant DNA Laboratory, 5) Evolution, and 6) Honors Great Ideas in Science. His research interests involve Molecular and Physiological Aspects of Diapause in insects, Respiratory Physiology during insect development, and developmental and environmental effects on insect behavior. He has chaired 7 MS projects. He is currently the program director of a HHMI grant SYMBIOSIS: An Introductory Integrated Mathematics and Biology Curriculum. This is a three semester introductory level course that gives the students credit for biology, statistics and calculus.

Dr. Jeff Knisley

Jeff Knisley is an Associate Professor in the department of Mathematical and Statistical Sciences, College of Arts and Sciences at East Tennessee State University (ETSU). He received his BA degree from Carson Newman College, and his MS and Ph.D. degrees in Operator Theory and Applied Mathematics from Vanderbilt University. His work experience includes the Oak Ridge National Laboratory, where he was part of a team that developed applications of neural networks and artificial intelligence. Jeff’s undergraduate instructional experience is at a primarily undergraduate institution, although he frequently offers graduate courses such as Applied Math and Operations Research. His research interests are in computational neuroscience and its applications, although he also has publications in bioinformatics, signal processing, and operator theory. He has experience in Java, C++, LaTeX, Maple, Mathematica, and web development using JavaScript, CSS, ASP, and PHP. He has written or co-written several software packages and applications, including ArborVT with Lee Glenn, a neuroscience data analysis tool whose development was funded by the NIH. He is currently a PI on the HHMI grant SYMBIOSIS: An Introductory Integrated Mathematics and Biology Curriculum, and the NSF grant Talent Expansion in Quantitative Biology.

knisleyj@etsu.edu http://faculty.etsu.edu/knisleyj/
Support Faculty and Staff

Several ETSU math and science faculty as well as other resource individuals provided special learning sessions that enhanced and enriched the classroom studies. All of the ETSU faculty provided “experimental design” sessions in which they shared their research and the experimental design they used to carry out the research. These sessions provided excellence background information for students as they designed and carried out their own research projects. The students also experienced an array of off-campus trips ranging from studies at the Gray Fossil Site to the AEROJET Ordnance Tennessee Laboratories. The individuals who led these sessions are also included. A brief bio for each of these individuals is provided below.

Mrs. Jennifer Bauer

Ms. Bauer was born in Baltimore, Maryland. She relocated to beautiful East Tennessee not long after graduating from high school. She soon became immersed in the beauty and the biology of the S. Appalachian Mountains and found herself wanting to learn all she could about this very diverse environment. East Tennessee State University is her alma mater, three times over, completing a Bachelors Degree in Biology and Art, followed by an MS in Science Education, and an MA in Teaching. Writing soon became a passion and she has now authored 4 books; *A Naturalists’ Teaching Manual; Roan Mountain: A Passage of Time 1st and 2nd Editions*; and *Wildlife, Wildflowers, and Wild Activities-Exploring S. Appalachia*. Jennifer is also a frequent contributor to the Tennessee Conservationist magazine. She is employed as a Park Manager at Sycamore Shoals State Historic Area in Elizabethton, beginning her career in the role of Park Interpretive Specialist at Roan Mountain State Park for 21 years prior to promotion. Of the utmost importance to her in her professional and personal life, is becoming a good environmental and cultural educator, coupled to a strong belief in the importance of conservation and preservation. She is in her 4th year of serving on the board of directors of the Elizabethton/Carter County Chamber of Commerce. The first weekend of May, each year, she directs and organizes the Roan Mountain Spring Naturalists Rally, 2009 being its 51st year. In her “spare” time, she finds herself weaving, learning the banjo, watercolor painting, clogging, and being outdoors as much as possible. Most importantly, she loves to spend as much time as possible with her two daughters, a 2 year old granddaughter, and her husband. She may be contacted at 423-543-5808 or jennifer.bauer@state.tn.us.

Mr. Ken Childress

Mr. Childress is the Department Supervisor for the Nature Interpretive Services Department at Bays Mountain State Park in Kingsport, TN. He was responsible for arranging our tour and scheduling the viewing of the wolves and raptors habitats, he also arranged for the GS students to attend the Nature Program and viewing the area fauna and flora.

Dr. Gary Henson

Dr. Henson has been involved in astronomy research and education for over 25 years. As a research astronomer, he has studied Variable Stars using observatories in New Mexico, Arizona, Oregon, and at ETSU. As an educator he has taught not only at the university level, but has contributed much to public outreach programs throughout his career. He currently serves
as the director of both the ETSU Harry D. Powell Observatory and ETSU Planetarium and received the 2004 Distinguished Faculty Award for Service at ETSU. Dr. Henson is the Assistant Professor, ETSU Faculty since 1989, B.S. - University of Central Arkansas, M.S. - University of New Mexico, Ph.D. - University of Oregon (1989). Professional Interests: Visible & infrared photometry and polarimetry of variable stars. He may be contacted at 423-439-6906 or hensong@etsu.edu.

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**Dr. Fred Hossler**

Dr. Hossler is currently a professor in the department of Anatomy and Cell Biology at the James H. Quillen College of Medicine at East Tennessee State University in Johnson City, TN. Dr. Hossler received his B.S. (Biology) degree in 1963 at Muhlenberg College in Allentown, PA, his M.S. (Microbiology) degree in 1965 at Penn. State University in State College, PA, his Ph.D. (Pathobiology) in 1971 at the University of Colorado Medical Center in Denver, CO, and his Post Doctorate (Cell Biology) in 1974 at Yale University in New Haven, CT. He may be contacted at 423-439-2011 or hossler@etsu.edu or Semtemman@aol.com

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**Dr. Thomas (T.J.) Jones**

Dr. Jones is currently working in the biological sciences department at East Tennessee State University and specialized in Behavioral Ecology, Neuroethology, and Science Education. In 1990 Dr. Jones received his B.S. in Biology from the Cleveland State University, and in 1993, he received his M.S. in Biology. In 2000, Dr. Jones received his Ph.D. in Evolution, Ecology, and Evolutionary Biology from the Ohio State University. Dr. Jones has a broad-based research program in the areas of animal behavior, ecology, population genetics, and neuroethology. Specifically, he is interested in the evolution of cooperation, sociality and dispersal strategies. He may be contacted at 423-439-6930 or jonestc@etsu.edu.

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**Dr. Debra Knisley**

Dr. Knisley is an Associate Professor in the department of Mathematical and Statistical Sciences, College of Arts and Sciences at East Tennessee State University. She received her B.S. in Secondary Education/Mathematics in 1976 from the Tennessee Technological University, her M.S. in Mathematics in 1979 from the Tennessee Technological University, and her Ph.D. in Mathematics in 1989 from the University of Memphis. Dr. Knisley has previously worked with the James H. Quillen College of Medicine in Johnson City, TN as an NSF Sponsored Visiting Researcher- in the Department of Molecular Biology and Biochemistry (2005-2006), the University of Memphis in Memphis, TN as an Adjunct Professor in the Department of Mathematical Sciences (1988-1989 while completing her dissertation), the Tennessee Technological University in Cookeville, TN as an Instructor in the Department of Mathematics (1985-1988), and at the University of Memphis in Memphis, TN as a Graduate Teaching Assistant (1982-1985). She may be contacted at 423-439-6975 or knisleyd@etsu.edu; http://faculty.etsu.edu/knisleyd/
**Dr. Hugh Miller**

Dr. Miller earned his bachelor degree in Microbiology from ETSU in 1979. In 1986 he earned a Ph. D. in biochemistry from the University of Tennessee at Knoxville. After a postdoctoral fellowship at the Medical University of South Carolina, he joined the faculty of the Biological Sciences Department in 1988. While at ETSU, Dr. Miller has mentored several undergraduates and graduate students. In addition, he has been involved with curriculum issues by serving on both the College and University Curriculum committees. During academic year 2005/2006, he served the department of Biological Sciences in the capacity of Interim Chair. Recently, he has been involved in several funded educational grants including the NSF funded ATE grant, NSF funded Talent Expansion in Quantitative Biology, and the HHMI funded Symbiosis grant. Also, he serves the department one of two undergraduate advisors. During the Governor’s School, Dr. Miller was responsible for organizing and running the laboratory component of the Symbiosis course. He may be contacted at 423-439-6922 or millerh@etsu.edu.

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**Dr. Darrell Moore**

Dr. Moore is an Associate Professor in the Department of Biological Sciences at East Tennessee State University. He teaches courses in Experimental Animal Behavior, Animal Physiology, Biology for Majors II, Topics in Organismal Biology, and Neurobiology. His research interests are primarily concerned with determining how the nervous system controls behavior (neuroethology). Because the nervous system is so complex in the vertebrates, he has relied upon relatively simple animals (such as insects and crustaceans) as model systems. His other interests include environmental influences on circadian rhythms in flies (with Dr. Karl Joplin), insect neuroanatomy (requires microdissection), and aggressive behavior and establishment of dominance hierarchies in crayfish. He may be contacted at 423-439-8390 or moored@etsu.edu.

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**Dr. Diane R. Nelson**

Dr. Nelson is Professor Emerita of Biological Sciences at East Tennessee State University, having retired in May 2003 after 35 years of service. In 1993, she received the ETSU Distinguished Faculty Award, the university’s highest award for combined achievements in teaching, research, and service. In April 2000 she was selected by the Association of Southeastern Biologists as the recipient of the Meritorious Teaching Award, the society’s most prestigious award. Although she “officially” retired from ETSU, she continues to conduct research, teach workshops, and provide service to her profession. She teaches Marine Biology occasionally at ETSU and gives programs for the Johnson City Hands-On Museum as well as for numerous civic organizations, churches, and public schools in the Tri-Cities area. She is also Curator of Invertebrates and Science Education Consultant for the ETSU and General Shale Brick Natural History Museum at the Gray Fossil Site. She may be contacted at nelson@etsu.edu.
Dr. Jack Rhoton

Dr. Jack Rhoton has dedicated nearly 20 years at East Tennessee State University, building a nationally recognized professional development program for science education, K-16. Prior to joining ETSU in 1987, Rhoton had 15 years of experience in public school settings in which he served as a high school science teacher and K-12 science supervisor. Known for his creative approaches to investigating science education issues, his work focuses on the preparation of pre-service and in-service teachers of science and mathematics. His efforts have impacted university faculty members; K-12 teachers; and elementary, middle and high school students. He has received nearly six million dollars in grant funding to support math and science education in Northeast Tennessee. A prolific science education author, he has published five books and sixty journal articles, and he has made numerous presentations at the local, state, and national levels. Further, thousands of students have been positively affected as a result of his many endeavors. Rhoton has served as president of the National Science Education Leadership Association (NSELA), Tennessee Academy of Science (TAS), and the Tennessee Science Teachers Association (TSTA). He has also served as program chair for the National Science Teachers Association (NSTA) area Conferences and as an NSTA board member, editor of a series of NSTA/NSELA publications, including the Science Educator Journal. He has received many honors, including the National Science Education Leadership Outstanding Science Education Leadership Award, National Science Teachers Association Distinguished Service Award, East Tennessee State University Distinguished Faculty Award, Tennessee Academy of Science Outstanding Science Teacher Award, and the Tennessee Science Teachers Association Distinguished Educator of the Year Award. He may be contacted at 423-439-7589 or rhotonj@etsu.edu.

Mitch Robinson, Ph.D.

Dr. Robinson is the Associate Dean for Graduate Studies. He is currently Associate Dean for Graduate Studies and Professor of Biochemistry and Molecular Biology and at the James H. Quillen College of Medicine. He is a native of western North Carolina and holds a B.S. degree from the University of North Carolina at Chapel Hill and a Ph.D. from Wake Forest University. As Associate Dean, he oversees admissions, curriculum and all academic activities in the M.S. and Ph.D. graduate programs in the College of Medicine. Dr. Robinson is active in teaching a variety of subjects in both the graduate and medical curriculum including intermediary metabolism, lipid metabolism, biochemistry and scientific ethics. He currently serves as the course director for the Medical Biochemistry course taught to all first year medical students. He may be contacted at 423-439-2028 or robinson@etsu.edu.

Dr. Edith Seier

Seier is an Associate Professor of Mathematics/Statistics at East Tennessee State University. She received her Ph.D. in Statistics in 1998 from the University of Wyoming. Dr. Seier is currently teaching the following courses: Statistical Modeling, Applications of Statistics, Probability & Statistics (Algebra based), Probability & Statistics (Calculus based), and Time Series. Her areas of interest are: Kurtosis and variability, Statistical Consulting & Data Analysis, Teaching Statistics with an active learning approach, and Applications of Statistics to Biology, Public Health and Medicine. She may be contacted at 423-439-5812 or seier@etsu.edu.
Mr. Doug Taylor

Mr. Taylor is the Assistant Dean of Admissions & Records at the James H. Quillen College of Medicine at East Tennessee State University. He oversees the day-to-day operation of Admissions and Records and has been in Admissions for many years and is not only exceptionally qualified, but also eager to offer his assistance. He may be contacted at 423-439-2033 or sacom@etsu.edu.

Dr. Lev Yampolski

Dr. Yampolski is an Associate Professor in the Biological Sciences Department at East Tennessee State University. His Ph.D. is from the N.I. Vavilov Institute of General Genetics, Russian Academy of Sciences. His research interests include the evolutionary role of mutations and mutational biases, the evolution of life-histories and mating systems and speciation. His study of organisms of choice are Drosophila and Daphnia. He may be contacted at 423-439-4359 or yampolsk@etsu.edu.

Dr. Michael Zavada

Dr. Zavada was born and raised in Bridgeport, Connecticut. He received his B.S. and M.S. degree in Botany / Palynology from Arizona State University, Tempe. He received a B.A. in Slavic Languages, and a Ph.D. in Ecology and Evolutionary Biology from the University of Connecticut, Storrs. He spent one year as a Fulbright Scholar in Skopje, Macedonia at the Geologic Institute, and the Center for Foreign Languages. He did post-doctoral work at Indiana University, Bloomington, and Ohio State University, Columbus. He has served on the faculties of The University of the Witwatersrand, Johannesburg, South Africa, The University of Louisiana-Lafayette, was Professor and Chairman of the Department of Biology at Providence College, Providence, RI, and is currently the Chairman of Biological Sciences at East Tennessee State University and a member of the Center of Excellence in Paleontology. His field research has taken him throughout North America, South America, and Africa, including Madagascar. He has received over $1.7 million in grants including grants from the National Science Foundation, National Institute of Health, NASA, American Philosophical Society, and National Geographic Society. He has published over 75 papers. In addition to his academic interests, he played baseball at Arizona State University, participates in a variety of sports, and outdoor activities, enjoys travel, and is an instrument rated private pilot. He may be contacted at 423-439-6919 or zavadam@etsu.edu.
APPENDIX B

2011 Counselor Bios
The Tennessee Governor’s School for Scientific Models and Data Analysis

Randy L. Dunlap- (Lead Counselor)
Randy is a licensed Real Estate agent serving the Tri Cities area. Randy has worked in many different segments of the housing market from building houses to representing corporate clients. Randy was a fireman for the Johnson City Department of Safety prior to his Real Estate career. Randy attended East Tennessee State University, and the University of Tennessee where he majored in animal science. His experience in youth programs is extensive including serving as a director, basketball commissioner, and trustee for local youth organizations. In his spare time he enjoys skiing, swimming, motorsports, and high school basketball.

Jerry M. Agan, III
Jerry is a 20 year old junior at Tennessee Technological University in Cookeville, TN majoring in Agriculture. Jerry is currently employed by TTU as a resident assistant, a peer mentor for freshmen, and an Ambassador for the College of Agriculture and Human Ecology. In his summers, he operates a small lawn care/home maintenance business in which he owns. He has worked for Carter County as a tutor in their “Runway” program and has volunteered over 200 hours for the American Red Cross and is a regular volunteer for Habitat for Humanity. He is an active member and leader in several clubs and professional organizations such as a lifetime member of both Alpha Lambda Delta Honors Fraternity and Delta Tau Alpha Agriculture Honors Society. In his free time, he enjoys spending time with his younger sisters, hiking, and fishing.

Alyson B. Houghton
My name is Alyson Houghton. I am a 19-year-old Junior at Tennessee Technological University, in Cookeville TN. My major is Business and Marketing. I have volunteered for several years with the American Red Cross and Habitat for Humanity. I have also volunteered for local disaster relief. I worked for the Carter County Runway Program during high school. I enjoy long
walks, hiking, fishing, going to the lake, spending time with family and friends, working with people, and being outside in general.

Amanda A. Ferguson-Roller
Amanda is 19 years old and has worked as a color guard instructor for Abingdon high and Virginia high for the past three years. She will be attending the Southeast Culinary and Hospitality College in the fall. Hobbies that she enjoys include dancing, drawing, painting, color guard, cooking, baking, and reading.

Robert “Chad” Roller
My name is Robert Roller, but I go by my middle name, Chad. I am 24 years old and married to my wonderful wife Amanda. I have my B.S. in Physics and am currently working on my Masters in Teaching at ETSU. I hope to teach high school physics and chemistry and firmly believe that science education is highly needed in all students’ educations. I’m pretty much a huge nerd, but I like to have fun. I am looking forward to being your counselor for governor’s school. I am available to help in certain subjects, so feel free to ask me any questions. Hope to see you soon. see for Phi Theta Kappa and enjoys DJ’ing, reading, kayaking, and going to the gym.
# 2011 Student Demographics

## Student Name, High School, City, & County

<table>
<thead>
<tr>
<th>Student Name</th>
<th>High School</th>
<th>City, County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alami Wateen</td>
<td>Oak Ridge High School</td>
<td>Oak Ridge, Anderson</td>
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<tr>
<td>Baugh Michaela</td>
<td>Ooltewah High School</td>
<td>Chattanooga, Hamilton</td>
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<tr>
<td>Bright Christopher</td>
<td>Powell High School</td>
<td>Knoxville, Knox</td>
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<td>Bu Tom</td>
<td>Montgomery Bell Academy</td>
<td>Franklin, Williamson</td>
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<td>Cain Matthew</td>
<td>Siegel High School</td>
<td>Dowelltown, DeKalb</td>
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<td>Cho Kyoung-A</td>
<td>Oak Ridge High School</td>
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<td>Talbott, Hamblen</td>
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<td>Cutright Connor</td>
<td>Merrol Hyde Magnet School</td>
<td>Hendersonville, Sumner</td>
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<td>Farr Nathan</td>
<td>Webb School of Knoxville</td>
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<td>Gatlinburg-Pittman High School</td>
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# 2011 Student Demographics

**High School, Student Name, City, County & City**

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## 2011 Student Demographics

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APPENDIX C

2011 Statistical Summary

The Tennessee Governor's School for Scientific Models and Data Analysis
(30 attendees/62 applicants)

GENDER:  FEMALES- 16/34  
MALES –  14/28

CLASS 2010-2011:  JUNIORS- 13/24  
SENIORS-  17/38

ETHNIC BREAKDOWN:
AFRICAN AMERICAN/BLACK- 1/5  
ARAB- 1/1  
ASIAN-AMERICAN/PACIFIC ISLANDER- 5/15  
CAUCASIAN/WHITE - 22/38  
INDIAN- 0/1  
PREFER NOT TO RESPOND - 1/2

HIGH SCHOOLS REPRESENTED:  24/43

COUNTIES REPRESENTED:  16/22  (95 Counties in Tennessee)

ANDERSON- 2/3  
BEDFORD- 2/3  
BLOUNT- 0/1  
DEKALB – 1/1  
DICKSON- 1/1  
HAMMBLEN- 1/2  
HAMILTON- 3/6  
HUMPHREY’S- 1/1  
KNOX- 3/7  
MADISON- 0/1  
MARION- 0/1  
MARSHALL- 1/1  
MCMINN- 1/3  
ROBERTSON- 0/1  
RUTHERFORD- 0/3  
SEVIER- 1/1  
SHELBY- 3/10  
SULLIVAN -1/2  
SUMNER- 2/3  
WASHINGTON- 4/5  
WILLIAMSON- 3/5  
WILSON- 0/1
APPENDIX D

2011 Course Offerings
The Tennessee Governor’s School for Scientific Models and Data Analysis

Goal and Objectives
The overarching goal of the Governor’s School in *Scientific Models and Data Analysis* was to broaden the student’s appreciation and knowledge of biology and mathematics through exposure to and integration of a wide range of contemporary biological and mathematical topics. In each case, model building and data analysis will played a critical role and was interwoven in a statistical and biological context. Students were engaged in the scientific method via hands-on research experiences. Resources from ETSU’s strong undergraduate science and mathematics program, research laboratories, and local schools were used to accomplish these objectives. In addition, the program made use of resources from industry, governmental agencies, and academic science establishments. Thus the school provided a series of courses, laboratories, projects, field trips, seminars, lectures, and other activities centered on mathematics, statistics, and biology. The curriculum consisted of courses BIOL-1110-1111 (4 credits, biological science for majors) and MATH 1530 (3 credits, probability and statistics), which were taught in the integrated fashion. The activities of the Governor’s School covered the approved syllabi for these courses and met the required number of contact hours, while extending the scholars’ intellect in directions not possible during a regular school year.

Course Work
We are guided by the conviction that today’s students are attracted to science and mathematics when these are seen as interconnected fields rather than as separate bodies of knowledge. Thus, thirty talented rising juniors/seniors from across the state were immersed in scientific instruction and inquiry in several interdisciplinary fields of science. These included: biology, bioinformatics, mathematics, statistics, and systems ecology. Second, connections between these fields were seen through the ubiquity of mathematical modeling, data analysis, and the need for high level computation. Last but not least, students gained a healthy respect for many disciplines and thus have a variety of career choices to consider as they get ready to enter college. In a nutshell, the students experienced a renaissance style Governor’s School that prepared them for many possible career options. Specific courses are described below:

**9:30-12:00pm Course**

**Math 1530--Probability and Statistics (3 hrs.)**
Prerequisite(s): Two years of high school algebra. Descriptive statistics and its relevance, including probability, experimentation, measurement, sampling and survey, informal statistical inference, and hypothesis testing are included.

**1:00-3:00pm Course**

**BIOL 1110--Biology for Science Majors- Lecture I (3 hrs.)**
Core requisite: BIOL 1111. The principles of molecular and cellular biology, including metabolism and genetic inheritance. Designed for biology majors, minors, and others who plan to take upper-level courses for which this is a prerequisite. This course contains three (3) hours of lecture and two hours of lab. A common grade will be given in BIOL 1110/11.

**BIOL 1111--Biology for Science Majors- Lab I (1 hr.)**
Core requisite(s): BIOL 1110. Laboratory exercises to gain the ability to identify and use the processes of biological science with materials corresponding to Biology for Science Majors Lecture I. This course contains one (2) two-hour lab per week. A common grade will be given in BIOL 1110/11.
**Objectives:**

*To present Biology as a science that is dependent on quantitative analysis of data.* The course covers aspects of biology such as Introduction to the cell and cell growth, effects of size increase on organisms, Mendelian genetics, DNA replication and genomic content and how these characteristics can change over time by Evolutionary processes.  *To introduce probability, descriptive statistics and statistical inference in the context of the study of Biology.* The course covers the typical content of an introductory statistics course plus some additional topics. The notion of statistical inference is introduced very early in the course by means of randomization tests and the exact sampling distribution of the sample proportion based on the Binomial distribution. The examples in probability are mainly oriented toward topics of interest in genetics and bio-informatics at an elementary level.

**IBMS 1100** is the first course in a 3 course sequence that integrates biology, statistics, and mathematics, As a result, the mathematics and statistics is introduced, explored, and developed in biological contexts, including surface area to volume ratios, isometric and allometric scaling, fractals in biology, and difference equations and discrete systems in genetics, evolution, and the study of DNA.  Pre-calculus concepts and limits are also introduced and developed in IBMS 1100, both due to the natural contexts which arise for doing so (such as log-log plots) and because a major goal of the Symbiosis project is to spread the coverage of calculus I across 2 semesters as a way of promoting greater student success in both calculus comprehension and skill development.

**Teaching method:** Lectures were prepared mainly in power-point. Hands-on class activities and data analysis in the computer lab were used when appropriate on addition to the wet/dry lab component.

**Textbook:** Complete class notes, on addition to power point presentations, were written for this course by the instructors under a grant from HHMI, they are available from the D2L platform.

**Statistical software:** Minitab, R, Maple, Java Applications, Image J, Web-based Applets and Activities

**Module 1. - The Scientific Method**

The study of *Biology* is introduced. Aspects of what hypotheses are and how they are tested leads into statistical inference. Examples of hypothesis testing such as von Helmont’s plant growth test and Stanley Prussiner’s Prion Hypothesis are discussed. An introduction of Arbovirus infection of Yellow Fever leads to a discussion of viruses and definition of life. The hypothesis of whether AIDS can be transmitted by mosquitoes is used as an example of the use of quantitative biology. The five themes of biology are introduced as the thread of further modules.

What is *Statistics?* Role of statistics in the scientific method. An introduction to the role of mathematics and statistics in science in general. Randomization test to test the hypothesis of equal means (medians, variances) of two populations based on experimental data. Why do we study probability? Basic definitions: random experiment, sample space, event. Definitions of probability: classical, relative frequency, axiomatic definition and its consequences; independent events; replicates of a random experiment; Pascal triangle and basic combinatorics. Types of random variables, mass or probability function and density functions. Discrete probability distributions; binomial distribution; applying the binomial distribution to do test of hypothesis about a population proportion. First glance at the limit concept (probability as limit of a relative frequency, along with difficulties in using such a definition). First glance at mathematical models.
Module 2. - The Cell and Statistics
Introduction to the cell. What is the cell and why are they small? What is the concept of multicellularity? The organization of the cell and what are the consequences of the components functions. TANSTAAFL (There ain’t no such thing as a free lunch), a more wide ranging discussion of consequences starting from the more formally known Second Law of Thermodynamics. The transmission of information into and out of the cell. The cell cycle and mitosis as a consequence of cell growth, repair and quiescence. Data production: observational studies and experiments. Basic definitions: population, sample, individual, variables (categorical & quantitative).

Displaying and summarizing data for categorical variables, tables and graphs, relative risk, odds ratio, measuring agreement in matched-pairs situations. Displaying and summarizing data for quantitative variables, tables and graphs for one, two and several variables at the time. What are the data telling us? How to decide between the different statistical graphs? Location (mean vs. median, five number summaries) and variability statistics. Sources of variability. Looking at paired data. Correlation. What is statistical inference? Introducing the idea of sampling variability and sampling distribution. Exact sampling distribution of a sample proportion (based on the Binomial distribution) and its application to hypothesis testing and estimating with confidence. Bootstrapping to do inference about a population mean. Randomization or permutation test to test hypotheses about a parameter (mean, median or variance) in two populations.

Module 3.- Size and Scale
What happens to an organism as it grows bigger? Can ants really toss locomotives off the tracks? Can King Kong jump off the Empire State Building? Can Tyrannosaurus rex really run at 80 kph? This module examines the functions that describe what happens when organisms grow (or shrink). Included are organism size as a determining factor in shape, the differences between isometry and allometry, problems with isometric scaling in biology, bacteria size, shape, organization, cell wall structure, and other characteristics. Exponential growth of bacterial populations. Biological models with mass as the independent variable. Area, volume, and surface area to volume ratio. Isometric scaling, slope, equations of lines, allometry and power laws. Limits as tools for approximation. The exponential function. Logarithms. Linear regression and transformed variables. Normal distribution, Fractal Geometry as it relates to biological organisms and the surface area to volume ratio.

Module 4- Mendelian Genetics
Why was Gregor Mendel able to elucidate the laws that determine how organisms pass genetic information from one generation to the next? This crucial process was discovered and then ignored for almost 40 years and yet was the key that Darwin was missing to explain Evolution. The data and processes that Mendel used to determine these principles are examined. In this context, Meiosis is described as the cellular equivalent of Mendelian Laws.


Module 5- DNA genetics
Mendelian Laws describe how information is passed from generation to generation, but the molecular processes were not determined until the nature and structure of DNA was described. The structure of this molecule and the consequences of replication are covered. Is DNA the same in different organisms? Quantitative tools to look at the composition of the information are developed. DNA as nucleotide sequences, nucleotide frequency, GC content. Independence and conditional probability in the DNA environment. Transition matrix, graph to represent transition matrices. Probability of a given sequence of nucleotides, repeats of a single nucleotide, length of the repeat, geometric distribution. Palindromes, probability of any palindrome and of specific palindromes, space in between palindromes. Comparing two sequences of nucleotides. Similarities that happen just by chance. Random walks (and their use in testing for similarities). Sampling distribution of the sample mean and its use in confidence interval estimation and hypotheses testing. Approximated distribution (normal) of the sample proportion and its use in confidence interval estimation and hypotheses testing. Necessary sample size calculation in the case of
estimation based on desired precision and confidence and the case of testing hypothesis based on the desired power. The t-student distribution and its application to inference for the sample mean.

**Module 6 - Evolution**

“Nothing in Biology makes sense, except in the light of Evolution” by Theodosius Dobzhansky is the quote that sums up the importance of Evolution to Biology. The genetic basis of Evolution has been described and the applications of these principles to examples are covered, i.e. applications of probability and statistics to populations. Evolution as it relates to population size and density. The Wright-fisher model with the Hardy-Weinberg equations as a special case: rigorous development of the limit concept; continuity; discrete dynamical systems; effect of sample size in the Chi-square test; an introduction to graphs and their use in genetics.
Governor’s School Student Projects

Students had the opportunity to be engaged in a variety of research projects. The projects centered around the following topics: Fly Longevity, Spiders, Bootstrap/Clustering, and the Cancer Cells/Cell Culture, Activity, Theory, Computation and Genetics. In each project, model building and data analysis played a critical role and was interwoven in a statistical and biological context. Listed below is a brief description of each project as well as the names of students involved in the research. The students reported their research findings to their parents and university faculty on the last day of the Governor’s School.

**Dr. Joplin: (Fly Longevity)**

1. Michael Nolte
2. Rachel Smith
3. Kyle Ward

The life history of organisms demonstrates that different factors influence their life span. A mortality study was conducted showing the different survivorship curves that male and female flesh flies, Sarcophaga crassipalpis, exhibit during their life span. The hypothesis is that they will show a similar rate of mortality during their life span. The data suggests that females have a very different ‘S’ curve than males. Data collection and statistical analysis were performed by the students.

**Dr. (TJ) Jones: (Spiders)**

1. Kyle Lashlee
2. Paige Stull

The distribution of the variably social spider, Anelosimus studiosis, may have a bearing on the distribution of sociality. Students conducted a transect survey of a shoreline habitat at Warrior’s State Park in Kingsport, Tennessee. Distances between webs and the volume of each web were recorded. The data were analyzed by nearest neighbor analysis, correlations between web volume and distance and sociality.

**Dr. Knisley: (Bootstrapping/Clustering)**

1. Sarah Harirforoosh
2. Alexandria Ingram
3. Steven Nguyen

When data is not distributed according to a bell curve or any other known distribution, then the data itself can be used to suggest an empirical distribution. The process for doing this is called bootstrapping, and in this presentation, it is applied to some non-bell shaped curve data in anthropology.

**Dr. Hugh Miller: (Cancer Cells/Cell Culture)**

1. Michaela Baugh
2. Tom Bu
3. Veronica Go
4. Daven Horne
5. Emily Mantlo
6. Angel Paine

A lymphoma cell line called U937 appears to have heterogeneous sizes. The students tried to answer the question; does the size of U937 cells change as the cells age in culture? Cells that had been cultured for various times were applied to microscope slides and images of random fields were captured. Cell areas were analyzed using the Image J software.

**Dr. Joplin: (Activity)**

1. Wateen Alami
2. Christopher Bright
3. Drew Farr
4. Samantha Murr
5. Kyoung-A Cho
The activity of organisms is influenced by many factors in the environment, both internal and external. The students test the hypothesis that stress has an effect on activity by comparing stressed and unstressed flies. Students separated flies into male and females cages and measured the activity of individual flies for 18 days using an automatic activity monitor. Half the males and half the females were stressed at 40°C for an hour before monitoring activity. Data collection and statistical analysis were performed by the students.

**Dr. Knisley: (Theory)**
1. Bradford Fisher
2. Chelsea Peryman

In May 2011, NASA's gravitational B explorer mission was completed and the data confirms that geodetic precession and framedragging does occur, thus confirming Einstein's theory of general relativity and its prediction that earth induces a curvature of the spacetime that surrounds it. While highly advanced overall, the phenomenon of geodetic precession is not only accessible using only high school algebra, but also can in many aspects be derived theoretically with such a background.

**Dr. Knisley: (Computation)**
1. Connor Cutright
2. Benjamin Jewett
3. Daniel Jung
4. Russell Olmsted

One of the most pressing societal needs in our country is the improvement of our transportation systems. In particular, especially in larger metropolitan statistical areas, traffic jams and extended commute times are common. In 2009, the math department at MIT showed that often such traffic jams are due to soliton wave propagation – a phenomenon they call a *jamiton*. To counteract the always unnecessary jamitons, it is becoming apparent that our roads and highways themselves will need to become much smarter than they are now. Computational models of smart roadways will be essential to this activity.

**Dr. Lev Yampolsky: (Genetics)**
1. Matthew Cain
2. Alyssa Culver
3. Savannah Flori
4. Emily Guenther
5. Eva Pray

Gene expression is a trait both plastic and evolvable. Does selection in a novel or stressful environment shape the gene expression profile of an organism? Can adaptation to such environments be explained by heritable changes in gene expression? Which genes respond to selection more readily - the ones with little plastic response (because plasticity shields gene expression from selection), or the ones with a strong plastic response (because of canalization effect)?

Not all amino acid substitutions are made equal. Some substitutions are conservative, others are radical. Combining site-directed mutagenesis data from different proteins, we obtained a matrix of amino acid exchangeability. This matrix well predicts effects of single amino acid substitutions on protein function and allows to address some interesting questions about protein evolution. This project is a continuing cooperation with Arlin Stoltzfus (UMD/NIST Center for Advanced Research in Biotechnology).
APPENDIX E

2011 Student Evaluation Results
The Tennessee Governor’s School for Scientific Models and Data Analysis

I. Overall Program

Your overall rating of the 2011 Governor’s School for Scientific Models and Data Analysis Program is that it was:

- Excellent 12/30 40%
- Very good 08/30 27%
- Good 06/30 20%
- Fair 04/30 13%
- Unsatisfactory/poor 00/30 0%

II. Academic Component/Workload

The opportunity to earn seven hours of university academic credit was:

What is the level of your satisfaction with the Governor’s School Program offered as a university credit program?

- The for-credit aspect is very important to me 21/30 70%
- I am neutral on the for-credit aspect 04/30 13%
- I would have preferred that the program be offered on a non-credit basis 00/30 0%
- Not sure 02/30 07%
- No answer 03/30 10%

III. Core Educational Program

Did you find the material covered interesting?

- All of the time 04/30 13%
- Most of the time 09/30 30%
- Some of the time 11/30 37%
- Occasionally 06/30 20%
- Not at all 00/30 00%

Do you think the academic material provided was useful to your learning the course material?

- All of the time 06/30 20%
- Most of the time 13/30 43%
- Some of the time 02/30 07%
- Occasionally 08/30 27%
- Not at all 01/30 03%

The division of time spent on classroom lectures, team projects and homework was well-balanced:

- All of the time 04/30 13%
- Most of the time 10/30 33%
- Some of the time 08/30 27%
Occasionally---------------- 06/30  20%
Not at all------------------ 02/30  07%

In general, did you have enough time (in and out-of class) to finish all of your homework and project assignments:
Yes------------------------ 22/30  73%
No------------------------- 08/30  27%

Weekly tests appropriately covered material presented in class and in-class learning exercises:
All of the time------------ 13/30  25%
Most of the time---------- 07/30  58%
Some of the time--------- 10/30  17%
Occasionally-------------- 00/30  00%
Not at all----------------- 00/30  00%

You feel that the scores you earned on tests reflected the actual extent to which you mastered course material:
Very closely-------------- 09/30  30%
Somewhat------------------ 13/30  43%
Not very much------------- 07/30  23%
Not at all---------------- 01/30  03%

The assigned team design projects were interesting and contributed to your learning experience:
All of the time------------ 05/30  17%
Most of the time--------- 17/30  57%
Some of the time------- 08/30  26%
Occasionally-------------- 00/30  00%
Not at all----------------- 00/30  00%

IV. On-Campus Meals

Did you feel that the food served on-campus was of good variety and quality:
Excellent------------------- 05/30  17%
Very Good------------------ 09/30  08%
Good----------------------- 10/30  50%
Fair------------------------ 03/30  25%
Poor/Unacceptable--------- 03/30  17%

V. Dormitory Lodging

You feel that your stay in the Luntsford Apartments dormitory was:
Excellent------------------ 17/30  57%
Very Good------------------ 04/30  13%
Good---------------------- 05/30  17%
Fair----------------------- 04/30  13%
Poor/Unacceptable--------- 00/30  00%
VI. Faculty (Professor)/Courses

The teaching effectiveness and general helpfulness of Professor Dr. Karl Joplin was:

- Excellent: 03/30, 10%
- Very good: 06/30, 20%
- Good: 08/30, 27%
- Fair: 05/30, 16%
- Poor/Unacceptable: 08/30, 27%

The teaching effectiveness and general helpfulness of Professor Dr. Jeff Knisley was:

- Excellent: 12/30, 40%
- Very good: 08/30, 27%
- Good: 04/30, 13%
- Fair: 06/30, 20%
- Poor/Unacceptable: 00/30, 0%

VII. Resident Counselors

The effectiveness and helpfulness of the five Governor's School Counselors (as a group) in providing dormitory oversight and in accompanying you on group activities were:

- Excellent: 08/30, 27%
- Very Good: 09/30, 30%
- Good: 02/30, 06%
- Fair: 07/30, 23%
- Poor/Unacceptable: 04/30, 13%

VIII. Special Activities

The following activities included in the 2011 Governor's School for Scientific Models and Data Analysis Program were of substantial value and should be repeated in future programs: Based on “Excellent”, “Very Good”, and “Good”.

- ETSU Campus Arboretum/Planetarium (Dr. Timothy McDowell)--------- 12/30, 40%
- Warriors Path State Park for Spider Study (Dr. Thomas T.J. Jones)------ 25/30, 83%
- ETSU Planetarium/Observatory (Dr. Gary Henson)----------------------- 27/30, 90%
- ETSU Medical School Laboratory (Dr. Mitch Robinson)------------------ 30/30, 100%
- Gray Fossil Site, Paleontology Dig (Dr. Michael Zavada)-------------- 18/30, 60%
- Eastman Chemical Company, Kingsport, TN (Ms. Angela Haga)----------- 28/30, 93%
- AEROJET Ordnance Tennessee (Mary Jane Greene/Ms. Angela Haga)------ 29/30, 97%
- Historic Jonesborough, Jonesborough, TN (Dr. Jack Rhoton)------------ 19/30, 63%
- Roan Mountain State Park, Roan Mountain, TN (Jennifer Bauer)-------- 22/30, 73%
- Bays Mountain State Park, Kingsport, TN (Dr. Jack Rhoton)------------- 25/30, 83%
- The Carter Family Fold, Hiltons, VA (Dr. Jack Rhoton)----------------- 27/30, 90%
- Off-campus meal events----------------------------------------------- 25/30, 83%
- Activities at the ETSU main library------------------------------------ 10/30, 33%
APPENDIX F

2011 Comments (Field Trips)
The Tennessee Governor’s School for Scientific Models and Data Analysis

**COMMENTS:** Opinions of scholars

**ETSU Campus Arboretum** (Dr. Timothy McDowell)

Comments:
- Wasn’t one of my favorites/ slightly dull.
- Done too early into the program.

**Warriors Path State Park for Spider Study** (Dr. Thomas T.J. Jones)

Comments:
- Very exciting/ loved canoeing.
- Canoeing was my favorite

**ETSU Planetarium/Observatory** (Dr. Gary Henson)

Comments:
- The program was interesting/ informative.
- Awesome job done by Dr. Henson.

**ETSU Medical School Laboratory** (Dr. Mitch Robinson)

Comments:
- Even though I couldn’t stomach the bodies, I felt it was a good experience.
- I enjoyed the cadaver.
- It was awful how we had to walk there and get all sweaty and disgusting.
- I liked the morgue.
- I loved the gross anatomy lab, this was my favorite field trip!

**Gray Fossil Site, Paleontology Dig** (Dr. Michael Zavada)

Comments:
- Hands-On is needed—it felt like another lecture.
- Hoped to get to dig, but fun regardless.
- I did not find this field trip fun or related to our Governor’s school.
- I would have liked to participate in the paleontology dig instead of just looking at the site.

**Eastman Chemical Company, Kingsport, TN** (Ms. Tanya Foreman/Ms. Angela Haga)

Comments:
- Loved it! Got cool water bottle made with Triton.
- Made us realize how much chemists do.

**AEROJET Ordnance Tennessee** (Mary Jane Greene/Angela Haga)

Comments:
- Enjoyed it most.
- Made me want to be an aerospace engineer.
**Historic Jonesborough, Jonesborough, TN (Dr. Jack Rhoton)**

**Comments:**
- Could have been more organized, but it was fun.
- Buggy ride was fun.
- I loved that it was just a relaxing field trip.
- Loved it!

**Roan Mountain State Park, Roan Mountain, TN (Jennifer Bauer)**

**Comments:**
- Loved it.
- This was by far my favorite trip. Fabulous view.
- Favorite!
- Nice to smell the fresh air.

**Bays Mountain State Park, Kingsport, TN (Dr. Jack Rhoton)**

**Comments:**
- This was the best one!!!
- Favorite place.
- Great!
- I enjoyed the wolves.
- Got to feed the wolves!

**The Carter Family Fold, Hiltons, VA (Dr. Jack Rhoton)**

**Comments:**
- Enjoyed dancing for the most part.
- I had a blast!
- You should not force everyone to dance.

**On-campus meal events**

**Comments:**
- It was edible, but got old really quick. There was not much selection that was vegetarian. Looking forward to real food!
- It took a while to get used to the food, but the overall quality was okay.
- It kind of made me sick.
- It was the same every day…
- Cafeteria food was awful!
- It got old after 4 weeks.

**Luntsford Apartments (Dorm)**

**Comments:**
- The apartments were in great shape. They were just a bit far from our classes and the Culp Center.
- Decent, best weren’t the best, maybe mold? I had allergy problems.
- Fabulous accommodations.
- Sinks were clogged.
- Loved the dorms! Private bathrooms are very nice!
Overall Program Evaluation

Comments:

• The classes, professors, and students who participated in Governor’s school were excellent. Also, the research in actions and field trips were great. However, this was not an actual college experience. We were highly confined and limited in what we were able to do on campus. Counselors were too strict, when we were all good students.

• I really liked it.

• Overall, it was enriching.

• This was an entirely new experience for me, and it provided me with a chance to preview college life. The classes were excellent, and the field trips proved to be both relaxing and educational.

• I have had a great time here and would come back if I could.

• I thought the program was good overall, however the biology component was disappointing.

• Some field trips were fun. Everything else was me…. Food was poor. Other students were cool.

• I enjoyed this school a lot. The classes and field trips were more than I expected.

• I enjoyed the experience because of the kids. They were all very fun. Some counselors were good too, but the rules made this experience not as fun as it could have been.

• I think the teachers should be more interactive with the students. The rules were too strict outside of the classroom. The projects were good. Some of the directions were vague.

• I wasn’t expecting such strict rules. I expected to have some degree of freedom when working on projects with our professors. The overall program was excellent, though!

• We are a different class than the year before and should have more freedom unless we deserve punishment.

• Counselors – good. Classes- math was great/ biology was poor. Projects- great

• I felt that the level of “security” was unnecessary. Also, I think students should have more freedom. The # of planned activities were overwhelming and took away time for homework.

• I just want to say thanks to all of the teachers. You have helped me learn a lot. I really enjoyed this summer.

• The counselors held the rules well, though as the rules were strict and unforgiving at times.

• One of the major problems I had is that we never had enough time to work on anything. We would have projects, labs, assignments, and a test, and some counselor activity all due on the same with other planned activities to do too…. Just wasn’t enough time to do anything.