

11th Annual Kansas City Regional MATHEMATICS TECHNOLOGY EXPO

at the Richardson Science Center, Rockhurst University, Kansas City, MO
Friday and Saturday, October 5 and 6, 2001

Schedule of Events and Abstracts

We would like to thank Rockhurst University for the generous hospitality in providing the lecture hall, classrooms, and exhibitor area, as well as computers, Internet connections and audio visual equipment. We thank the Rockhurst students and faculty, who have given up their usual classrooms so that the EXPO could take place. Our thanks also go to the following individuals from Rockhurst for their technical support of the EXPO: Matt Heinrich, Director of Computing Services; Bryan Schrivener, Systems Integrator; and Steve Hoog, Audio/Visual/Multimedia Coordinator.

We thank the Kansas City Professional Development Council (KCPDC) for sponsoring many EXPO participants, and we thank Johnson County Community College for funding paper and printing for all EXPO mailings as well as the program booklet and other materials in the EXPO packets.

Registration in the lobby of Richardson Science Center:

Friday, 8:00 a.m. – 1:45 p.m., and Saturday, 8:00 a.m. – 1:00 p.m.

Complimentary continental breakfast:

Academic Systems and KAMATYC/AMATYC are sponsoring continental breakfasts both Friday and Saturday mornings in the registration area.

Lunches:

Friday and Saturday lunch buffets are both \$6.50 apiece. Lunches were ordered with pre-registration, but there may be some available for purchase at the EXPO registration table.

Technology Display Area located in the Conference Lounge, Room 206

Friday, 10:15 a.m. – 3:30 p.m.; Saturday, 8:00 a.m. – 2:45 p.m.

Hands-on Displays of Graphics Calculators and Mathematics Software:

TI-83 Plus Silver, TI-89, Academic Systems, Derive5, Scientific Notebook, Geometer's SketchPad, Mathematica 4.1, TI Interactive!, plus Internet access.

Textbook, Hardware, and Software Exhibitors:

Friday, 8:00 – 2:45 p.m.; Saturday, 8:00 a.m. – 1:00 p.m. (Not all exhibitors will be present on Saturday.)

Academic Systems, Addison Wesley, Carolina Biological Supply Company, MAA books, MacKichan Software, Prentice Hall, Tegrity, Texas Instruments, Thinkwell, and Wiley.

Free shuttle between the EXPO and the Plaza Hotel at Westport (previously known as the Best Western Seville)

A free shuttle will be provided this year for EXPO participants – once each morning and once each afternoon. On Friday, the shuttle will leave the Plaza Hotel at Westport at 8:00 a.m. to go to the EXPO, and it will leave the EXPO at 4:00 p.m. to return to the Plaza Hotel at Westport. On Saturday, the shuttle will leave the Plaza Hotel at Westport at 8:00 a.m. to go to the EXPO, and it will leave the EXPO at 2:30 p.m. to return to the Plaza Hotel at Westport.

FRIDAY, October 5, 2001

Welcome and Introductions

8:45 a.m. in **Room 115**

Marian VanVleet, 2001 EXPO Group Chair, Saint Mary College, Leavenworth, KS

Elizabeth Brent, Vice President for Student Development, Rockhurst University, Kansas City, MO

SESSION 1 – Keynote Address

Friday, 8:50 a.m. – 10:00 a.m.

Room 115

The Mathematical Sciences Digital Library (MathDL) and its Journal (JOMA)

David Smith

www.math.duke.edu/~das

Duke University, Durham, NC

In January 2001, the Journal of Online Mathematics and its Applications (www.joma.org) first appeared with a special issue focused on “mathlets”: small, self-contained, online, dynamic learning environments. By the time of the Math EXPO, JOMA's parent organization, MathDL, will be humming with activity at www.mathdl.org. JOMA and MathDL are the latest online services of the Mathematical Association of America (www.maa.org), and they are being provided with technical support from the Math Forum (www.mathforum.com), financial support from the National Science Foundation (www.nsf.gov), and contributed efforts of a large number of volunteers. This talk will describe how JOMA and MathDL will contribute to rapid changes in the ways mathematics is taught and learned.

Door prizes will be awarded directly following David Smith's address.

SESSION 2

Friday, 10:15 a.m. – 11:00 a.m.

2A. *Concepts or Mechanics? How the TI-89 Is Changing the Way I Teach Calculus*

Room 125 Kent Craghead, Colby Community College, Colby, KS

How has technology changed the way we teach, or has it? In this talk, the presenter will share his experience of teaching calculus using the reform textbook from the Harvard Consortium. Technology plays an important role in this textbook. The focus is on the concepts of the derivative and the definite integral, not on the numerous methods of how to calculate these quantities. Although the basic operations are taught, more time is spent on understanding these concepts numerically and graphically as well as algebraically. The presenter will illustrate how the TI-89 will evaluate the more complicated operations, which allows the students to focus more on translating an application into an appropriate operation and then on interpreting the results. Questions about what the value represents or what the units of the answer should be are common in this text. Not only does this change the teaching of the course, but it also changes the testing of the material. The exam questions need to test the students' knowledge of the calculus concepts, not the students' knowledge of their graphing calculators. Possible courses targeted: Calculus I, II, and III. The audience at the EXPO needs only a basic knowledge of graphing calculators.

Presenter: Joe Yanik, Emporia State University, Emporia, KS

2B. *Tell Me, I Will Forget – Show Me, I Will Remember: Math for Elementary and*

Room 203 *Middle School Teacher Education*

Jay Jahangiri, Kent State University – Geauga Campus, Burton, OH, <http://www.kent.edu/>

Funded by the Kent State University's College of Education Grant, which is phase II of an earlier project, the presenter and an education graduate student teamed up to develop both curriculum goals and instructional practices for two mathematics courses for pre-service elementary and middle school teachers. The topics of the courses include Number Theory, Set Theory, Algebra, Graphing, Geometry, Statistics, Probability, and Combinatorics. They have been using a variety of math software, such as Derive, Geometer's SketchPad and Minitab, as well as integrating both an inquiry-based teaching and the use of

cooperative groups to facilitate student learning. A careful and well-planned combination of lecture and hands-on teaching methodology was implemented. The presenter will share their findings regarding teaching practices, students' learning and changing attitudes, and the conduct of the class. He will provide the audience with a description of their initial goals and types of activities used for the grant. He invites members from the EXPO audience to comment on their interpretations and recommendations.

Presider: Libby Holmgren, Johnson County Community College, Overland Park, KS

2C. ***Practical Uses of Java Applets in the Mathematics Classroom***

Room 205 LaShall Bates, graduate student in Computer Science, University of Arkansas, Fayetteville, AR,
<http://csce.uark.edu/~crane>

Linda Hand, Missouri Southern State College, Joplin, MO

Java is a powerful tool that is used to create interactive applets that allow students to experience mathematics. It is not necessary to know Java to use the many applets already created and posted on the Internet for free use. The presenters will discuss how to incorporate Java applets into the classroom setting and how to locate them on the Internet. Useful for all course levels.

Presider: David Ewing, Central Missouri State University, Warrensburg, MO

2D. ***Using Mathematica as a Teaching and Learning Tool in Upper Division Mathematics Courses***

Room 302 Paula Shorter, Anita Salem, John Koelzer, Rockhurst University, Kansas City, MO

At Rockhurst University, mathematics majors are first exposed to *Mathematica* in a three-semester calculus sequence. Almost on a daily basis, students and teachers in these courses use *Mathematica* to help visualize and discover key concepts. As students progress through the sequence, they become more proficient at independently using *Mathematica*.

Given the background that the Rockhurst math majors receive in the calculus sequence, the faculty can make significant use of *Mathematica* as a teaching and learning tool in upper division mathematics courses as well. They can extend many of the successful pedagogical principles into these upper division courses, making these courses more interactive. *Mathematica* is also a powerful computational tool that permits the study of non-contrived, non-trivial, real world problems in upper division courses. In many of the upper division courses, *Mathematica* is being utilized in examinations.

In this presentation, the speakers will provide specific examples of how they use *Mathematica* in the following upper division mathematics courses: Probability and Statistics I and II, Differential Equations, Linear Algebra, Introduction to Abstract Mathematics, and Mathematics Senior Seminar. They will also discuss the rationale concerning the use of *Mathematica*, general pedagogical principles, and the observed effectiveness of teaching various upper division concepts using *Mathematica*.

Presider: Carl Anderson, Johnson County Community College, Overland Park, KS

2E. ***Using Maple to Introduce the Mathematics of Quantum Mechanics in a Freshman Science Class***

Room 306

Joseph J. Pavelites, William Woods University, Fulton, MO

Mathematical prerequisites for entry-level college science classes (such as introductory chemistry, physics, and physical science) are often no more than college algebra or a marginal score on the math portion of the ACT. Often, this forces science instructors to introduce both the scientific principles and the mathematical underpinnings for a given topic, with little successful understanding of either, or to gloss over concepts in favor of expediency. This is most evident with quantum mechanics. Using *Maple* mathematical software, science students can be introduced to the mathematical form of wave functions, polar and spherical coordinates, radial distribution functions, Linear Combinations of Atomic Orbitals (LCAO), etc., in support of a greater understanding of one the greatest scientific discoveries of all time. A discussion will be presented of how *Maple* is used in support of lecture material, how it can augment or replace typical laboratory experiments, and how students can "challenge" their textbooks.

Courses Targeted: Introductory Physical Science, Basic Algebra / College Algebra. The EXPO talk is presented at college freshman level.

Presider: Richard Gill, Blue Valley High School, Stilwell, KS

SESSION 3 *Exhibitors and Technology Display Area*

Friday, 11:00 a.m. – 11:45 a.m.

Lobby and Room 206

This time is provided especially so that EXPO participants will have a chance to visit both the Exhibitors in the lobby of the Richardson Science Center and the Technology Display Area (TDA) located in the EXPO Conference Lounge, Room 206. In the TDA, participants can have hands-on experience with a variety of calculators and software packages that are being used in EXPO presentations. Extra handouts from EXPO sessions will be made available in the Conference Lounge. The Exhibitors Area and the Conference Lounge will also be open at other times during the EXPO.

Technology Display Area: Nic LaHue

SESSION 4

Friday, 11:45 a.m. – 12:30 p.m.

4A.

Discussion: Power Without Guidance? Portable Mathematics Devices

Room 203

**Carl Anderson, Johnson County Community College, Overland Park, KS,
Nic LaHue, Penn Valley Community College, Kansas City, MO**

Calculators and palmtop computers allow students to carry algebra systems in their pockets instead of in their heads. With this capability so readily available, how do we guide students to use this technology wisely? Do we allow the technology to be used for homework? Do we forbid it on tests? Do we ban it completely?

4B.

Discussion: Calculus in the Post-Reform Era

Room 205

**Joe Yanik, Emporia State University, Emporia, KS, www.emporia.edu/math-cs/yanikjoe/
Marian VanVleet, Saint Mary College, Leavenworth, KS**

The Calculus Reform movement is more than a decade old and it is time to take stock. The reform methods tend to raise the level of work and the level of difficulty for teachers and for students. Has Calculus Reform been a success? Does research suggest it is the better way to go? What has worked and what has not? Would you, could you, return to more traditional methods of teaching calculus? Where should we go from here?

4C.

Discussion: Memorable Mistakes in Teaching With Technology – Save Others From the Same Fate

Room 302

**Mike Brown, Longview Community College, Lee's Summit, MO,
Libby Holmgren, Johnson County Community College, Overland Park, KS,
<http://web.jccc.net/academic/math/faculty/holmgren.htm>**

Though our technology intentions are always good, sometimes the best laid plans of college and high school math instructors go awry. At times, we learn even more from our mistakes than we do from our successes. What have you learned that you will never do again? Or, how will you modify what you did, so that it turns into a good learning experience for the students next time? Or, what will you do so that you can prepare more efficiently next time? Come share your experiences, and save others from the same fate; and hear from other EXPO participants, and save yourself.

4D.

Discussion: What Do We Need to Know about Online Teaching?

Room 306

**Richard Delaware, University of Missouri – Kansas City, <http://d.faculty.umkc.edu/delawarer/>
Andy Bennett, Kansas State University, Manhattan, KS, www.math.ksu.edu/~bennett**

Some people (usually teachers) think teaching online offers opportunities for more communication with students. Some people (usually administrators) think teaching online offers opportunities to teach more cheaply. While the practice of lecturing has been refined over centuries (never mind what it has been refined into), we are all just beginning to experiment with online teaching. What are the questions we should be asking (and answering) about online teaching as we carry out these experiments?

LUNCH

Friday, 12:30 p.m. – 1:45 p.m. in Massman Hall

SESSION 5

Friday, 1:45 p.m. – 2:30 p.m.

5A. *A Parametric Look at the Conic Sections With Graphing Calculators*

Room 125 Charles Ames, Tulsa Community College, Broken Arrow, OK

Using a graphing calculator, the presenter will demonstrate the usefulness of graphing the conic sections parametrically. Parametric graphs give the ability to easily graph active inverses of any conic sections as well as any standard conic section. Rotations will be discussed as time permits. (The demonstration will be with the Sharp EL9600c, although the methods shown can be easily adapted to any graphing calculator.)

Presenter: Keith Brandt, Rockhurst University, Kansas City, MO

5B. *Exploring TI-Interactive! from the Student Perspective*

Room 203 Richard Gill, Blue Valley High School, Stilwell, KS

Participants will experience how a student can use *TI Interactive!* to solve problems, explore a new concept, prepare reports or projects, and do “homework” problems that show “all the work” (provided that the software is available at home). Participants do not need previous experience with *TI Interactive!* Prior knowledge of the TI-83 graphing calculator is desirable but not necessary. Participants will be encouraged to explore at their own pace during the EXPO session.

Presenter: Martha Hachl, Blue River Community College, Blue Springs, MO

5C. *Using Scientific Notebook to Allow Students to Duplicate the Lecture Experience*

Room 205 Jonathan Lewin, Kennesaw State University, Marietta, GA

The presenter will give a lecture style presentation while typing at a computer and projecting his computer image onto a projection screen. He will demonstrate the techniques he has used over the past few years, using his computer as a whiteboard and creating his lecture notes in a *Scientific Notebook* document as he teaches. He'll demonstrate the way in which such lecture notes can be published instantly on his website, thus allowing his students simple point and click access to the notes from any Windows computer with an internet connection and the completely free product, *Scientific Viewer*.

In addition, the presenter will demonstrate how lectures that are created on the computer screen in this way can be recorded into the form of sound movies, with the help of a \$30 software product called *Hypercam*. These can then be provided to the students on CDs.

The presentation at the EXPO will itself be recorded as a sound movie. After the conference, the presenter will burn the CDs at his school and send the CDs from his presentation to the EXPO participants.

Presenter: Mark Whisler, Cloud County Community College, Concordia, KS

5D. *Polynomial Interpolation with Multiple Nodes – A Determinant Approach with Mathematica*

Room 302 Radwan Al-Jarrah, Southwestern Oklahoma State University, Weatherford, OK,

<http://www.swosu.edu/~aljarrr/>

Suppose we are given the distinct nodes x_0, x_1, \dots, x_n and the numbers $y_0, y_0^1, \dots, y_0^{\alpha_0}; y_1, y_1^1, \dots, y_1^{\alpha_1}; \dots; y_n, y_n^1, \dots, y_n^{\alpha_n}$; and we are required to construct a polynomial $P(x)$ of lowest possible degree which satisfies the conditions (*) $P^{(r)}(x_i) = y_i^{(r)}$ for $i = 0, 1, 2, \dots, n; r = 0, 1, 2, \dots, \alpha_i$. This sort of interpolation problem was first studied by C. Hermite in 1878. It is also known that this problem has a unique solution. For example, if $n = 0$, the solution is given by a Taylor polynomial; and if the α_i s are all zero, the solution is given by a LaGrange interpolation polynomial. In this talk, the presenter will revisit the problem (*) as a linear system of equations, and investigate the solution using a determinant approach (Cramer's Rule).

In the investigations, *Mathematica* is used in evaluating determinants with small values of n and α_i s before we arrive at the general form. Anyone with some knowledge of differentiation, mathematical induction, and solving linear systems using Cramer's rule should be able to follow this talk.

Presenter: Carl Anderson, Johnson County Community College, Overland Park, KS

5E.
Room 306

Enhance Mathematics Instruction with Word, Excel, and PowerPoint

Merrill B. Goldberg, Rockhurst University, Kansas City, MO

The Finite Mathematics course at Rockhurst University presents Discrete Probability, including Combinatorics; Conditional Probability; Expected Value and Mathematics of Finance, including Annuities; preceded by review material on functions, linear equations, and exponential growth models. The presenter has developed materials to replace the traditional textbook completely, using Word, Excel and PowerPoint.

Novel uses for Microsoft Office include problem sets with answers, as "form letters" using Excel as the data source so that answers are calculated; individualized quizzes, with answer keys, also as "form letters" using Excel to calculate answers; "answer checkers," in the form of spreadsheets to calculate answers for equations of lines; various math of finance formulas; spreadsheets with "comments," to indicate how particular calculations were performed, especially useful for loan amortizations; animated Power Point presentations, to illustrate time value of money concepts relating to annuities, amortization of a loan, and a review of formulas for probability.

The presenter will show some of the lecture demonstrations (PowerPoint animations, interactive spreadsheets, etc.) and share the insights into features of Microsoft that increase the appeal and usefulness to students. He will distribute printed copies of sample quizzes and show how to produce multiple forms of similar problems either as one-page quizzes or several problems on a single page.

Presenter: Libby Holmgren, Johnson County Community College, Overland Park, KS

SESSION 6

Friday, 2:45 p.m. – 3:30 p.m.

6A.
Room 125

Data Collection and Analysis Using Casio's EA-100 and Cassiopeia A-22T Palmtop Computer

Phillip Embree, William Woods University, Fulton, MO

The presenter will demonstrate and participants will have hands-on experience with this exciting cutting edge technology to perform data collection and analysis. Using these hand-held computers and data collection devices, participants will graph collected data and compare to the appropriate regression model.

Presenter: Ken Eichman, Longview Community College, Lee's Summit, MO

6B.
Room 203

Exploring TI-Interactive! from the Teacher Perspective

Richard Gill, Blue Valley High School, Stilwell, KS

Participants will experience how *TI Interactive!* can be a useful tool for producing extra practice sheets, tests, long term assignments, quizzes, etc. Participants who were not able to attend the 5B talk, "*TI Interactive!* from the Student Perspective," will have access to examples of how *TI Interactive!* can be used for exploration and discovery in the classroom. Participants do not need previous experience with *TI Interactive!* Prior knowledge of the TI-83 graphing calculator is desirable but not necessary. Participants will be encouraged to explore at their own pace.

Presenter: Martha Haehl, Blue River Community College, Blue Springs, MO

6C.
Room 205

Creating Interactive Courseware using Authorware from Macromedia

Steve Klassen, Missouri Western State College, St. Joseph, MO, www.mwsc.edu/~klassen

This presentation is an introduction to creating your own interactive, multimedia content using Macromedia's *Authorware* software. The presenter will illustrate the use of *Authorware*'s flow line and icons to create pages, add basic interactivity, include audio and motion, and provide navigation between pages. The resulting content may be packaged and distributed or streamed over the Internet. *Authorware* is a very powerful authoring program for creating computer-based training and is available to educators at a greatly discounted price. By demonstrating basic features of the software, this talk helps participants to decide if they are ready to create customized tutorials for their own students. This talk applies to all levels/areas of the curriculum. Students using the courseware only need Windows/Internet familiarity.

Presenter: Keith Brandt, Rockhurst University, Kansas City, MO

6D.

Room 302

Teaching a Graduate Mathematics Class (Number Theory, Chaos) over the Internet

Joe Yanik, Emporia State University, Emporia, KS, www.emporia.edu/math-cs/yanikjoe/

In the spring semester of 2001 the presenter taught an experimental mathematics class over the Internet as part of the Emporia graduate program. With the exception of four Saturday meetings, which were used primarily for testing and orientation, all interaction was done over the Internet through discussion groups, web pages, and downloadable documents. Based on the success of this experiment the presenter will follow this up with another course in the fall of 2001. He will discuss the course and his observations about the advantages and disadvantages of teaching a course in this manner. For the past few years the presenter has been working on developing tools to make it easier to create mathematical activities using Java. Although the courses discussed in the talk will be graduate courses, the focus of the discussion will be on the distance learning experience, which could apply to any course. Level of technical expertise expected of the EXPO audience: None.

Presenter: Richard Delaware, University of Missouri - Kansas City, Kansas City, MO

6E.

Room 306

Group Projects in Calculus Using the TI-83 and Maple

Kevin Charlwood, Washburn University, Topeka, KS

The presenter and EXPO participants will explore some calculus projects that appeal to the use of technology in some form (either TI-83 graphics calculators or the computer algebra system *Maple*). Some of the projects are individual in nature, and some are designed for small groups of up to four students. The goal is for students to make use of appropriate technology when needed, but to also realize when they need to do the necessary theoretical work. By looking at several computations aided by technology, students gain an understanding of the underlying theory. Targeted courses: Three-semester or four-quarter calculus sequence, or high school AP calculus. Expertise expected: The usual expectation is for students to come to calculus classes familiar with the use of a graphing calculator to solve problems in algebra and trigonometry to avoid spending class time on the "basics." The notions of limit, derivative, etc., are explored in class on graphing calculators as the concepts are developed. *Maple* is introduced in first-semester calculus, with no expectation that students have prior knowledge of a CAS.

EXPO participants should have some familiarity with the uses of graphing calculators and hopefully some experience incorporating a CAS into one or more of their courses.

Presenter: Carl Anderson, Johnson County Community College, Overland Park, KS

POST-SESSIONS for KAMATYC and MOMATYC

Room 306 KAMATYC – informal meeting

Room 302 MOMATYC – informal meeting

All interested KAMATYC and MOMATYC participants will adjourn to supper, following the meetings.

SATURDAY, October 6, 2001

SESSION 7

Saturday, 9:00 a.m. – 9:45 a.m.

7A. ***Creating Custom Activities with the Vernier LabPro***

Room 125 **Chuck Pheatt, Emporia State University, Emporia, KS, pheatt.emporia.edu/**

The *LabPro* interface unit from Vernier Software & Technology is a versatile and flexible data collection device. *Logger Pro* software is available from Vernier for conducting a number of canned experiments. Many times instructors would like to expand or customize experiments to better suit the concept or principle being illustrated. To generate custom experiments using the *LabPro* device, a significant command of the Visual Basic language is required. The speaker has written a number of Visual Basic components that will aid instructors in developing their own customized experiments. These components require a minimum of experience and expertise in programming using the Visual Basic language. This talk is applicable to any course in which data acquisition is used. No previous programming experience is required. www.emporia.edu/math-cs/oldpages/cpheatt.htm

Presider: Uwe Conrad, Cowley County Community College – Wichita Campus, Wichita, KS

7B. ***Realtime Interactive Algebra and Geometry Via the Internet***

Room 203 **David Ewing, Central Missouri State University, Warrensburg, MO**

Come explore the possibilities and problems of teaching high school or college algebra and geometry via the Internet. There will be classroom demonstrations using web pages, bulletin boards, and existing Internet resources. There will also be demonstrations of real time interaction, teaching and learning via chat rooms, and online software like Microsoft's *Netmeeting* or CU-SeeMe.

Presider: Richard Gill, Blue Valley High School, Stilwell, KS

7C. ***Web-Based Interactive Lessons Can Add PIZZAZZ To Classes, Web-Courses, And Even To Your Math Lab*** (A Commercial Demonstration)

Room 205 **Ron Given, Partnership Director, Academic Systems, Kansas City, MO**

Sometimes we need to make a topic fun in order for students to get the point. Adding interactive lessons to on-campus classes, web-based courses, or to your Math Lab actually serve a three-fold purpose: they provide a challenging venue for students, they save instructors time in repeating an instructional concept, and they also provide feedback to the instructor that the student actually spent time studying the assignment (and verify that they actually understand the material assigned). These plug-and-play interactive lesson modules can be used with any web-based tools or platform (like WebCT, Blackboard, eCollege, FrontPage) to save instructors time. **academic.com** provides a campus site-license for modules in Math, Statistics, and Study Skills. Participants will have hands-on access, and will also receive take-home material, to view the content (for a limited time) on their own campus.

Courses Targeted: Math Fundamentals, Beginning Algebra, Intermediate Algebra, College Algebra, Business Math, as well as review material for Statistics, Pre-Calculus, and Calculus. Current library listing is available at: <http://www.academic.com/Academic.com/Overview.asp>

Presider: Mike Brown, Longview Community College, Lee's Summit, MO

7D. ***EXPO Showcase: Animating the Web Using Flash from Macromedia***

Room 302 **Andy Bennett, Kansas State University, Manhattan, KS, www.math.ksu.edu/~bennett**

Macromedia Flash is the most popular software for adding animations to web pages. This showcase will demonstrate the use of Flash software to create animations for use on the web and in PowerPoint presentations.

Presider: Richard Delaware, University of Missouri – Kansas City, Kansas City, MO

7E. ***Instructional Computer Lab Exercises With MapleV: Bob Vila vs. Norm Abrahms Styles of Computer Exercises***

Room 306 **Mariah Birgen, Wartburg College, Waverly, IA, www.wartburg.edu/mcsp/birgen**

Several years ago, the Mathematics department at Wartburg College committed to teaching major courses using the CAS program, *MapleV*. In response to disappointing senior survey results, several faculty

members experimented with different styles of computer exercises. Attitudinal surveys were administered throughout the Calculus sequence. The presenter will demonstrate the uses of this CAS in Calculus, define both the Bob Vila and Norm Abrahms styles of computer exercises, and report on the results of the students' attitudinal adjustment. Possible Courses: Calculus, Differential Equations, Mathematical Modeling, other lower-division mathematics courses. Students are expected to have no knowledge of the CAS when the course begins. Students are expected to be comfortable with the use of computers and computer programs.

Presider: Marian VanVleet, Saint Mary College, Leavenworth, KS

SESSION 8

Saturday, 10:00 a.m. – 10:45 a.m.

8A. ***Using Mathematica to Identify Instability of the Coupled Differential Equations of Anharmonic Oscillators***

Room 125

Andreas Soemadi, Kirkwood Community College, Iowa City Campus, Iowa City, IA,

www.soemadi.com

"Coupled quartic anharmonic oscillators" refer to a system of differential equations derivable from this Hamiltonian:

$$H = \frac{p_1^2 + p_2^2 + x_1^2 + x_2^2}{2} + g(x_1^4 + x_2^4) + kx_1x_2 \quad \text{where } p_1, p_2 \text{ and } x_1, x_2 \text{ denote the momentums and the}$$

positions of each oscillator. During the summer of 2000, this was used in a Dynamics class and in a Direction of Modern Physics class, as a prime example illustrating the onset of chaos. Sensitive dependence on the initial conditions was the main issue. Yannick Meurice, Department of Physics and Astronomy at the University of Iowa, and the presenter worked together. The presenter will demonstrate with a computer how *Mathematica* is used to obtain Poincare sections and the Floquet multipliers to identify the onset of chaos or instability in the system of interest.

Presider: John Koelzer, Rockhurst University, Kansas City, MO

8B. ***A College Trigonometry Course on the Web***

Room 203

David Leach and Allan Wamsley, Jefferson College, Hillsboro, MO

Using WebCT, a web-based college-level trigonometry course has been implemented at Jefferson College. This session presents the development and implementation of the course, including a look at the integration of technologies that are used to satisfy different learning styles of students. Some means of measuring the effectiveness of the course are also addressed. A report of student progress and results for the first semester of implementation, along with issues surrounding the operation of the course, will be discussed. The session will conclude with a live demonstration of the course, its web site, and peripheral materials and technologies that are used to support the course, the instructor, and the students.

Presider: Rick Silvey, Saint Mary College, Leavenworth, KS

8C. ***Using Internet Data, Spreadsheets, and the Exponential Function for Personal Finance***

Room 205

Elizabeth Berman Appelbaum, Community Liaison for Mathematics, Blue Valley School District EXPO participants will gather data on the Internet on the cost of living (Consumer Price Index), and price of stocks (Standard and Poor index). The Consumer Price Index is the standard in the United States to adjust prices, wages, and pensions for inflation. Both indices grow exponentially, roughly speaking. The presenter will insert the data in a spreadsheet, graph it with a scatter plot, and fit an exponential function. Also graphed is the return of an investment at a fixed rate, like a certificate of deposit, and the value of an "investment" of cash kept under a mattress. The exponential function is used to predict cost of living, value of an investment, and value of investment adjusted for inflation.

Presider: Marian VanVleet, Saint Mary College, Leavenworth, KS

8D. ***Inserting Math into Traditional Technical/Vocational Classes with Interactive Television***

Room 302

V. Dean Brown, East Central College, Union, MO, www.ecc.cc.mo.us

In a joint effort between East Central College (ECC) in Union and Rolla Technical Institute (RTI) in Rolla, the speaker has been delivering mathematics lectures via ITV (Interactive Television) into traditional technical/vocational courses at RTI. For example, from an ITV classroom at ECC to an ITV

student classroom at RTI, two practical, self-contained mathematical lectures were delivered by the speaker to a machine tooling course taught by Max Vath, machine tooling instructor at RTI. The mathematics in the lectures consisted primarily of applied geometry and trigonometry. The lectures provided the students in the technical/vocational courses practical mathematical tools (using a hand-held calculator) that apply directly to their day-to-day work in their vocational field.

President: Tamatha Leuschen, Pembroke Hill Upper School, Kansas City, MO

8E.

Room 306

Good and Bad Practice Using Technology in Teaching Calculus

David Smith, Duke University, Durham, NC, www.math.duke.edu/~das

How do we know what goes on in students' minds? By reading and listening and observing very carefully and then reflecting on these observations. The presenter starts with reflections on two such observations of calculus students who are using technology. Then he describes some of the rich variety of practice under the heading "using technology," and discusses what is known about good and bad practice. This work is based in part on unpublished work from the Technology Transitions conference in 1997 and in part on joint work with David Tall, from the University of Warwick, and Cynthia Piez, from Pennsylvania State University, to be published later this year as "Technology and Calculus."

President: Anita Salem, Rockhurst University, Kansas City, MO

SESSION 9 – Invited Speaker

Saturday, 11:00 a.m. – 11:45 a.m.

Room 115

Presiding: Marian VanVleet, 2001 EXPO Group Chair, Saint Mary College, Leavenworth, KS

***Development of a State-Wide Web-Based
Instructional Support System for Mathematics***

Paul Eakin

www.ms.uky.edu/~paul/

University of Kentucky, Lexington, KY

At the University of Kentucky, Paul Eakin and his colleagues have experimented with technology in support of teaching elementary mathematics (primarily calculus) for almost two decades. Efforts today are focused on:

(1) enhancing communication, and (2) conserving faculty time.

They have consistently found that the applications which are effective and sustainable have at least one of these as an outcome and that many failures could be attributed to negative contribution in one of these areas.

This talk will report on a current project called "mathclass."

The development of the project is guided by these two principles. The technical hub is a large website:

www.mathclass.com (or www.mathclass.org).

Door prizes will be awarded directly following Paul Eakin's address.

LUNCH

Saturday, 11:45 a.m. – 1:00 p.m. in Massman Hall

SESSION 10

Saturday, 1:00 p.m. – 1:45 p.m.

10A.

Room 115

***A Course in Communicating Mathematics: An NSF/CCLI Project to Develop a Junior-level
Mathematics Problem Solving Course for Pre-service Math Teachers***

Paul Eakin, University of Kentucky, Lexington, KY, www.ms.uky.edu/~paul/

The presenter and his colleagues are working on an NSF/CCLI project to develop a junior-level mathematics problem solving course for pre-service math teachers, which revolves around actually creating the materials. The preliminary set of notes for the course was ready for use this fall. It is

part text - part CD, and they are working to figure out which part is which. As all text it would be about 300 pages. One of the things they do in the course is to make and insert 2-4 min. video clips of solutions and explanations. In the past they have used an ITV (Interactive Television) studio to make these video clip, but are now building a fully portable "laptop" version, which the presenter will have at the EXPO.

The presenter will do a brief demo and have it available for people to play with. He will do a "walkthrough" of the course and discuss the results to date. Undergraduate and graduate versions are in progress this fall.

Presenter: Joe Yanik, Emporia State University, Emporia, KS

10B.

Room 125

Exponential Functions Projects Using the TI-86 and the TI-89 Calculators

Vincent Lempke, Central Community College, Columbus Campus, Columbus, NE

The presenter will demonstrate individual and class projects about understanding exponential functions with real-life applications. Projects include depletion of natural resources, radioactive decay, and the build-up and withdrawal of a retirement fund, using the solving capabilities of the TI-86 and/or the TI-89 calculator.

Presenter: Beth Edmonds, The Barstow School, Kansas City, MO

10C.

Room 203

A Little R & R: Using the Internet for Mathematical Resources

Tamatha Leuschen, Pembroke Hill Upper School, Kansas City, MO

The speaker will present current Internet sites that focus on mathematics. Sites introduced will contain information to be used as resource material for the classroom teacher, as well as research material for students. Each site will be assigned to a specific category, which will assist participants in determining if it is appropriate for their individual needs. Along with descriptions of each site, several site demonstrations will be provided. During the presentation session, participants will have the opportunity view and explore some of the sites.

Presenter: Marian VanVleet, Saint Mary College, Leavenworth, KS

10D.

Room 205

Workshop: Using Mathematica to Explore Abstract Algebra (This session will last until 2:45 p.m.)

Al Hibbard, Central College, Pella, IA, www.central.edu/homepages/hibbarda/hibbard.html

Using *Mathematica*, participants will explore using the AbstractAlgebra packages, a freely available suite of tools intended for interactive laboratory activities focusing on groups, rings, and morphisms. These activities are intended to expand upon or motivate classroom discussions. Since packages are read in that define the required functionality, no programming with *Mathematica* is necessary. Participants will also look at a collection of laboratory activities already written (and published) that take advantage of these packages.

This is intended for a one or two semester abstract algebra course, independent of the text of choice or whether one prefers groups first or rings first. There is no programming involved in using the packages; the focus is on the algebra. For students who are totally unfamiliar with *Mathematica*, there is an introductory lab that covers the basic concepts in using the program. For participants, it would be helpful to have had some minimal contact with *Mathematica* but no fluency is expected or needed. The web page for the Exploring AbstractAlgebra with *Mathematica* project is www.central.edu/eaam.html

Presenter: Keith Brandt, Rockhurst University, Kansas City, MO

10E.

Room 302

My Math Lab: A Complete Web-based Distance Learning Solution (A Commercial Presentation)

Carter Fenton, Addison Wesley

With technology in mathematics education rapidly evolving, educators are on a continual search for a simple and inexpensive way to integrate this technology into the math curriculum to improve student performance. Recent technological developments have enhanced both the teaching and learning of mathematics nationally. This session will focus on MyMathLab.com, a new and complete web-based distance learning solution including book-specific content, interactive tutorials and videos. Time will be allotted for a discussion of how this technology is actually integrated into the math curriculum as well as for Q & A.

Presenter: Rick Silvey, Saint Mary College, Leavenworth, KS

The 2001 EXPO Group:

- Marian VanVleet (1999, 2000, 2001 Chair), Saint Mary College, Leavenworth, KS, vanvlm@hub.smcks.edu
- Carl Anderson, Johnson County Community College, Overland Park, KS, canders@jccc.net
- Andy Bennett, Kansas State University, Manhattan, KS, bennett@math.ksu.edu
- Keith Brandt, Rockhurst University, Kansas City, MO, keith.brandt@rockhurst.edu
- Mike Brown, Longview Community College, Lee's Summit, MO, brownm@longview.cc.mo.us
- Richard Delaware (1993, 1994 Chair), University of Missouri – Kansas City, Kansas City, MO, RDelaware3141@cs.com
- Ken Eichman (1997, 1998 Chair), Longview Community College, Lee's Summit, MO, eichman@kcmetro.cc.mo.us
- David Ewing, Central Missouri State University, Warrensburg, MO, ewing@cmsul.cmsu.edu
- Richard Gill, Blue Valley High School, Stilwell, KS, rgilbvhs@hotmail.com
- Libby Holmgren (1995 & 1996 Chair, 2001 Recording Secretary), Johnson County Community College, Overland Park, KS, lholmgre@jccc.net
- Joe Kincaid, Peru State College, Peru, NE, Kincaid@pscosp.peru.edu
- John Koelzer (2001 Financial Secretary), Rockhurst University, Kansas City, MO, John.Koelzer@rockhurst.edu
- Nic LaHue (2001 Web Master), Penn Valley Community College, Kansas City, MO, Lahue@kcmetro.cc.mo.us
- Tamatha Leuschen, Pembroke Hill Upper School, Kansas City, MO, tleuschen@pembrokehill.org
- Joe Yanik, Emporia State University, Emporia, KS, yanikjoe@emporia.edu