Program of Activities
For the Fall Meeting of the

Mathematical Association of America

Ohio Section

Fall, 2011
The University of Findlay
Findlay, Ohio
October 21 – 22, 2011

MAA Ohio Section

Program

Except where noted, all activities will take place in Winebrenner Theological Seminary (WTS). Committee meetings are in Alumni Memorial Union (AMU)

Friday, October 21, 2011

12:00 – 4:00	Registration	WTS lobby
1:00 – 4:30	Vendor and Book Exhibits	WTS auditorium
12:15 – 1:15	Committee Meetings: CONSTUM (Student Members) CONCUR (Curriculum) CONTEAL (Teacher Education and Licensure) CONSACT (Section Activities) CENTENNIAL COMMITTEE	 AMU Endly AMU Slough AMU Terry AMU Brachendorf AMU 8
1:25 – 1:45	Welcome and Announcements	WTS auditorium
1:45 – 2:45	Invited Address: **"How I Escaped the Peter Principle!!**" Richard Little, Baldwin-Wallace College	WTS auditorium
2:45 – 3:10	Break	WTS auditorium
3:10 – 3:15	Centennial Minute: **"Origins of Ohio Section Committees"** David Kullman, Miami University	WTS auditorium
3:15 – 4:15	Invited Address: **"A Geometrical Puppetshow: Some things you really can't see without computer graphics"** George K. Francis, University of Illinois Urbana-Champaign	WTS auditorium
4:25 – 6:00	**Contributed Paper Sessions**	WTS 251, 252, 253
4:25 – 6:00	Executive Committee Meeting	AMU Endly
6:00 – 6:30	Social Time	AMU Multipurpose Room
6:30 – 7:45	Banquet	AMU Multipurpose Room
7:50 – 8:30	Invited Address: **"In praise of serendipity: a tale of a geometric inequality"** Sergei Tabachnikov, Pennsylvania State University	AMU Multipurpose Room

Saturday activities will take place in the in Winebrenner Theological Seminary (WTS) except where noted

Saturday, October 22

8:00 – 10:30	Registration and Book Exhibits	WTS lobby
8:00 – 8:50	Coffee and Donuts	WTS auditorium
8:05 – 8:50	Executive Committee Meeting (if necessary) Local Arrangements Committee	AMU Slough AMU Terry
9:00 – 10:00	Invited Address: **"5-dimensional geometry is not like 2-dimensional geometry (and 3 and 4 are somewhere in between)**" Mark Meckes, Case Western Reserve University	WTS auditorium
10:00 – 10:30	Break	WTS auditorium
10:35 – 11:30	**Contributed Paper Sessions**	WTS 251, 252
11:40-12:40	Invited Address: **"Flavors of Bicycle Mathematics"** Sergei Tabachnikov, Pennsylvania State University	WTS auditorium
12:40	Closing Remarks	WTS auditorium

Additional Information

There will be an art display from the Mazza Museum (at The University of Findlay) at the banquet on Friday.

For those who have registered for the workshop on GeoGebra, it will be held following the meeting, from 1:15 PM to 3:15 PM. The workshop starts in Frost 122 (Malcolm Lecture Hall), and continues in Gardner Fine Arts Pavilion room 110.

Abstracts of Invited Addresses

Friday, October 21, 2011

Speaker: Richard Little, Baldwin-Wallace College
Title: How I Escaped the Peter Principle!!
Abstract: Part 1: MEMOIR (As seen through rose colored glasses.)
Part 2: CONFESSION (Should the award be vacated ?)
Part 3: TRIBUTES (Examples of valuable teaching strategies gleaned from truly distinguished teachers,which I have assimilated, with some modification, and offer for your consideration.)

Speaker: George K. Francis, University of Illinois Urbana- Champaign
Title: A Geometrical Puppetshow: Some things you really can't see without computer graphics
Abstract: From fractals to chaos, there are many familiar mathematical phenomena we use computers to visualize. But there are topological deformations (homotopies), such as the contraction of Zeeman's Duncehat, and the Eversion of the Sphere, which become generally accessible only with the help of computer graphics. In this talk we shall review 23 years of exploring these visual gems by the puppeteers in the illiMath Collective.

Speaker: Sergei Tabachnikov, Pennsylvania State University
Title: In praise of serendipity: a tale of a geometric inequality
Abstract: This is the story how I discovered (but couldn't prove) a geometric inequality: the average absolute curvature of a closed immersed plane curve is not less than that of a convex curve that surrounds it. This was finally proved by Lagarias and Richardson, in a 30 page long paper. If the outer curve is a circle, there are several simple and elegant proofs, and I will present four of them.

Saturday, October 22, 2011

Speaker: Mark Meckes, Case Western Reserve University
Title: 5-dimensional geometry is not like 2-dimensional geometry (and 3 and 4 are somewhere in between)
Abstract: There are many different ways to measure how "big" a geometric shape is, and their relationships are sometimes surprising. I will discuss three different problems (Shephard's problem, the Busemann-Petty problem, and one that I proposed several years ago) asking about monotonicity relationships among volumes. For example, Shephard's problem asks, if K and L are origin-symmetric convex bodies and every shadow cast by K has bigger area than the shadow cast by L in the same direction, is the volume of K bigger than that of L? In all three problems, the answer turns out to be yes in two dimensions, but surprisingly, no in five or more dimensions. In three and four dimensions the answer is different depending on the problem**.**

Speaker: Sergei Tabachnikov, Pennsylvania State University
Title: Flavors of Bicycle Mathematics
Abstract: I shall discuss various aspects of bicycle motion. Here is a sampler:
1). Given the front and rear wheel tracks, can one always tell which way the bicycle went? Usually, one can, but sometimes one cannot. Surprisingly, this is related with how 2-dimensional bodies float.
2). Given a closed front wheel track, can one ride the bike so that the rear wheel track closes up as well? This depends on the geometry of the front wheel track. It has to do with fractional-linear transformations and hyperbolic geometry, with the isoperimetric inequality, and with how planimeters work.
3). Can one ride the bike so that the rear wheel tracks coincides with the front wheel one (other than going straight, of course)? Such "unicycle" tracks behave very chaotically.

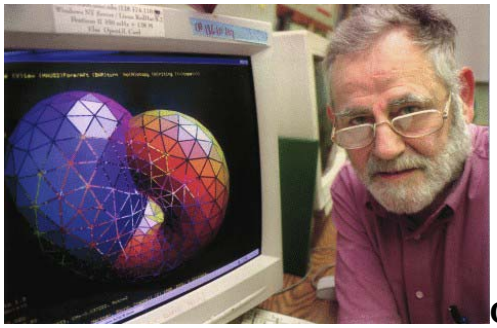
Brief Biographies of Invited Speakers

Richard Little, Baldwin-Wallace College

Richard A. Little has been a professor of math at Baldwin-Wallace since 1975. In addition to classes strictly related to mathematics and computer science, he has taught Honors classes as well as ―Enduring Questions for an Intercultural World,‖ a course required of all students in their freshman or sophomore year. He has received the Strosacker Award for Excellence in Teaching and the Student Senate Faculty Excellence Award from B-W. He was the recipient of the 2010 Ohio Section MAA Award for Distinguished College or University Teaching of Mathematics.

Dick holds a Ph.D. from Kent State University, masters‘ degrees from Harvard and Johns Hopkins universities and a bachelor‘s degree from Wittenberg University. In addition to his responsibilities at B-W, Dick is active in the leadership of several professional organizations, among them the National Council of Teachers of Mathematics, the Ohio Council of Teachers of Mathematics, and the Ohio Mathematics Education Leadership Council. As a long time member of the Ohio Section, Dick has at various times in the past served as newsletter editor, chair of the Program Committee, and President of the Section.

A man of many interests, Dick has taught in India and Nigeria, rafted the white water of the Grand Canyon, and walked the Great Wall of China.



George K. Francis, University of Illinois Urbana- Champaign

George Francis joined the University of Illinois faculty in 1968. His research papers are in low-dimensional topology, geometry, analysis, statistics, control theory, and geometrical computer graphics. In addition to courses in these fields, he has taught logic, mathematical biology, and catastrophe theory. Professor Francis' work on descriptive

topology, A Topological Picturebook (Springer Verlag, 1987, PB 2006), has been translated into Japanese and Russian. He is a professor in the Mathematics Department, the Beckman Institute, and the Campus Honors Program, and he is a senior research scientist at the National Center for Supercomputing Applications . He collaborates with computer artists and graphics programmers on immersive virtual environments at SIGGRAPH, Conferences, and Museums.

Sergei Tabachnikov, Pennsylvania State University

Sergei Tabachnikov, now at Pennsylvania State University, was educated in the Soviet Union, and he has a PhD from Moscow State University (1987). Since 1990, he has been teaching at U.S. universities. In the 1980‘s, he was involved in two major educational projects in Russia: the Mathematics School by Correspondence, a.k.a. Gelfand's School, and the "Kvant" (Quantum) magazine, a physics and mathematics monthly for advanced high school students and undergraduate students (in 1988-90, Sergei was the Head of its Mathematics Department). In addition to doing research in differential topology and dynamical systems, Tabachnikov is the Director of the Mathematics Advanced Study Semesters program (MASS) at Penn State. Since 2011, he has been the Notes Editor of the American Mathematical Monthly. Tabachnikov has authored five books and about 100 research and expository papers.

Mark Meckes, Case Western Reserve University

Mark Meckes earned his B.S. and Ph.D. from Case Western Reserve University in 1999 and 2003. After three years as a lecturer at Stanford University and a year visiting Cornell University, he is back at Case as an assistant professor. His main research interests are convex geometry and random matrix theory. Mark lives in Shaker Heights, Ohio with his wife Elizabeth (also a mathematician at Case) and their children, Juliette and Peter.

Contributed Paper Sessions
Friday 4:25—6:00

Time	**Session A** Room WTS 251 Session Chair: Adam Parker	**Session B** Room WTS 252 Session Chair: Anne Albert	**Session B** Room WTS 253 Session Chair: Judy McCrory
4:25 – 4:40	***Why Do We Use "slope" for "m"?*** Abstract #1 *Fred Rickey* *U.S. Military Academy and Bowling Green University*	***Using* ALEKS *to Teach Developmental Mathematics*** Abstract #2 *Cathy Stoffer* *Ashland University*	***A Unified Digital Solution in the Classroom*** Abstract #3 *Daniel Grundei* *Cengage Learning*
4:45 – 5:00	***Paths of Melody Lines on Circles*** Abstract #4 *Joseph Mileski* *Ohio Northern University*	***Bring Your Lecture Notes to Life*** Abstract #5 *James D. Anderson* *University of Toledo*	
5:05 – 5:20	***Guarding a Koch Fractal Art Gallery*** Abstract #6 *Lauren Cassell* *Ohio Northern University*	***Construction of Catacaustics Using Geogebra*** Abstract #7 *Irina A. Boyadzhiev* *The Ohio State University*	***Slip Away to the Ohio Section Meeting and Still Hold Class!*** Abstract #8 *Carl Spitznagel* *John Carroll University*
5:25 – 5:40	***An Overview of the Development of the Theory of Series up to 18th Century*** Abstract #9 *Weiping Li* *Walsh University*	***Error Results on Cylindrical Two-domain Advection-diffusion Model with a Permeable Membra*ne** Abstract #10 *Shelly M McGee* *The University of Findlay*	***"Did you receive your invite to the wedding of Bourbaki's daughter?"*** Abstract #11 *Thomas Dence* *AshlandUniversity*
5:45 – 6:00	***Being Hit by a Bus from Above*** Abstract #12 *Thomas Hern* *Bowling Green State University - Main*	***Non-transitive Dice*** Abstract #13 *M B Rao* *University of Cincinnati*	

Contributed Paper Sessions

Saturday 10:20—11:35

Time	**Session A** Room WTS 251 Session Chair: Pam Warton	**Session B** Room WTS 252 Session Chair: David Singer
10:35 – 10:50	***Teaching Statistical Thinking*** Abstract #14 *Jim Albert* *Bowling Green State University - Main*	***Decomposition of a Complete Graph into Paths with No Subsystems*** Abstract #15 *Chandra Dinavahi* *The University of Findlay*
10:55 – 11:10	***Mathematicians' Misconceptions of Statistics*** Abstract #16 *Laurence D Robinson* *Ohio Northern University*	***Sierpinski, Riesel, and Lucas Numbers*** Abstract #17 *Daniel Baczkowski* *The University of Findlay*
11:15 – 11:30	***Numerical Method for Semilinear Parabolic Interface Problems*** Abstract #17 *Champike Attanayake* *Miami University - Middletown*	***Tessellations and Technology: Using Geogebra to Teach About Angles and Mappings*** Abstract #18 *Justin Young* *Ashland University*

Abstracts of Contributed Papers

Friday 4:25 – 4:40

Why Do We Use "slope" for "m"?

Fred Rickey
Professor Emeritus of Mathematics
United States Military Academy, West Point, NY
Distinguished Teaching Professor Emeritus, Bowling Green State University.
fred.rickey@me.com

Abstract #1: Wait,Wait . . . Don't Tell Me! Before I do, I will explain why your answer to this perennial question about "m" and "slope' is wrong. Searching for "firsts" is a waste of a historian's time (more than 20 years in my case), but we have persisted. We have not found any instances of this usage in the eighteenth century but "slope" is defined in the Mathematical Dictionary and Cyclopedia of Mathematical Science (1855) by Charles Davies, one of my precursors at West Point, and his son-in-law William G. Peck. Rather than just dealing with the historically uninteresting question of who was first, we shall discuss the historical development of equations of straight lines and the more important question of why we introduce definitions at all. This work is joint with Tina Hartley.

Using ALEKS to Teach Developmental Mathematics

Cathy Stoffer, Ph.D.
Director OCTM State Tournament of Mathematics
Ashland University Coordinator of Developmental Mathematics and Mathematics Tutoring
Ashland University Associate Professor of Mathematics
CSTOFFER@ashland.edu

Abstract #2: Abstract: Has your department wondered how to teach a remedial mathematics course to students with different backgrounds and levels of understanding? Ashland University is in the third year of using ALEKS, an online individualized course. ALEKS is working very well. I will demonstrate ALEKS and share how our classes are organized.

Friday 4:25 – 4:55

A Unified Digital Solution in the Classroom

Daniel Grundei
Digital Solutions Manager - Cengage Learning
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Abstract #3: Higher Education is rapidly transitioning from the traditional classroom experience to the integration of various digital solutions to maximize the learning outcomes of today's digital natives. Cengage Learning is at the center of this transition as the digital leader in the Higher Education industry. This session will highlight ways to integrate our online homework system, Enhanced WebAssign, into your Mathematics courses coupled with other digital resources such as a dynamic, social YouBook that offers faculty the ability to communicate with students through a customizable, digital book.

This digital integration offers faculty more tools to manage their course while saving considerable time. For students, these digital resources meet them where they're at and facilitating all learning styles, while driving down the cost of course materials.

Friday 4:45 – 5:00

Paths of Melody Lines on Circles

Joseph Mileski
Ohio Northern University
j-mileski@onu.edu

Abstract #4: In this talk, we will be looking at the angles between musical phrases. We will be showing how to convert a musical line into a sequence of vectors, and how to find the circular path for that sequence. This senior research in progress is bound to make you think about the next tune that pops into your head.

Bring Your Lecture Notes to Life

James D Anderson
University of Toledo
jim.anderson@utoledo.edu

Abstract #5: I will show some of the Maple animations that I have created in order to help students visualize the mathematics being presented in lecture. I will provide the Maple commands for creating these animations. If you use something other than Maple, then there should be similar commands for the Maple commands. Then I will discuss how you can create your own animations.

Friday 5:05 – 5:20

Guarding a Koch Fractal Art Gallery

Lauren Cassell
Ohio Northern University
l-cassell@onu.edu

Abstract #6: We present an adaptation of Victor Klee's art gallery problem to a Koch fractal art gallery. We develop and solve a system of difference equations for the number of watchmen necessary to guard the n'th stage Koch approximant art gallery and use this solution to show that the density of watchmen per side of our Koch fractal art gallery satisfies Chvital's inequality.

Construction of Catacaustics using GeoGebra

Irina A Boyadzhiev
The Ohio State University
boyadzhiev.1@osu.edu

Abstract #7: If light rays from a source are reflected from a curve C, the envelope of the reflected rays is called the catacaustic of the curve C. Using the free application GeoGebra, I shall demonstrate geometric constructions of the catacaustics of the conics. Through experimental studies I will show that the catacaustics in some special cases are cardioids, nephroids and Tschirnhausen cubics. The constructions will include a light source point on a finite or infinite distance.

Slip Away to the Ohio Section Meeting and Still Hold Class!

Carl Spitznagel
John Carroll University
spitz@jcu.edu

Abstract #8: Using a *Livescribe Echo smartpen* you can record a virtual class lecture, with your voice synchronized to your handwriting much like a live class session. Students can attend the class at their convenience, seeing your writing unfold in real time, as they hear your explanations. The hardware cost is modest, and no expensive software is required, either for you or for your students. This talk will cover the basics of this exciting technology

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Friday 5:25 – 5:40

An Overview of the Development of the Theory of Series up to 18th Century

Weiping Li
Walsh University
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Abstract #9: We review the development of the theory of series from the works of ancient Greek, Chinese mathematicians to the work by English mathematician Brook Taylor on Taylor series.

Error Results on Cylindrical Two-domain Advection-diffusion Model with a Permeable Membrane

Shelly M McGee
The University of Findlay
mcgee@findlay.edu

Abstract #10: Modeling chemical transport in cylindrical coordinates is of importance because it can be used to simulate chemical transport in blood flow, which can be used to investigate how artery deformations influence where drugs and macronutrients go in blood flow. It is thought that oxygen gets depleted near arterial walls with an outward shape, and this leads to atherosclerosis near that deformation. A finite difference model has been developed to model the advection-diffusion equation in cylindrical coordinates on two-domains, which is separated by a permeable membrane. The model is tested on several exact equations and the errors are calculated and compared with error bounds derived and presented previously. An application will be presented, and future directions will discussed.

Did you receive your invite to the wedding of Bourbaki's daughter?

Thomas P. Dence
Ashland University
tdence@ashland.edu

Abstract #11: If not, stop by my talk and I'll show you what you missed.

Friday 5:45 – 6:00

Being Hit by a Bus from Above

Thomas Hern
Bowling Green State University - Main
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Abstract #12: Not all problems have nice, stable solutions. The recent experience of the landing location of the NASA Upper Atmosphere Research Satellite is an illustration. Some problems inherently do not have nice solutions, no matter the quality of the algorithm or software. Such problems are called ill-conditioned. We describe this concept in the context of linear algebra, which is often not covered in main stream courses. Such uncertainty often bothers mathematicians..

Non-transitive Dice

M B Rao
University of Cincinnati
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Abstract #13: Bradley Efron, in early sixties, presented four (A, B, C, and D)six-sided dice with faces numbered differently so that Die A beats Die B with probability 2/3, Die B beats Die C with probability 2/3, and Die C beats Die D with probability 2/3. However, Die D beats Die A with probability 2/3. This is surprising. In this talk, various facets of construction non-transitive dice will be presented.

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Saturday 10:35 – 10:50

Teaching Statistical Thinking

Jim Albert
Bowling Green State University - Main
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Abstract #14: Most introductory statistics courses teach many topics and procedures, but it is unclear if they lead to desired student outcomes. Students are unable to remember what they learn and are not able to transfer their knowledge to new material outside of the class. Basically, they do not appear to be developing the desired goals of statistical thinking.
The CATALST project is a new type of introductory statistics course being developed at the University of Minnesota designed to promote deep conceptual understanding, problem solving ability, retention, and transfer of learning. This curriculum is currently being used by the speaker in a probability and statistics class for secondary education mathematics majors. In this talk, I'll describe some of the MEAs (model eliciting activities) of CATALST and the use of the R statistical software to implement the simulations.

Decomposition of a Complete Graph into Paths with No Subsystems

Chandra Dinavahi
The University of Findlay
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Abstract #15: Decomposing a complete graph into paths of any length was settled by Dr.Tarsi (1983). In this talk we will extend this into decomposing a complete graph into paths of any length with the additional property of containing no sub-systems. A G-decomposition of a complete graph, T = (V;D) is said to contain no proper subsystem if there does not exist a G-decomposition, S = (V _1,D_1) of a complete graph K_v where, V_1,V and D_1,D and |V| > |V_1| > 1. In this talk we will explore the special case of when the length of path is odd. We will use some of Tarsi's constructions along with so many new constructions.

Saturday 10:55 – 11:10

Mathematicians' Misconceptions of Statistics

Laurence D Robinson
Ohio Northern University
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Abstract #16: Having taken a single introductory applied statistics course as an undergraduate, I began my graduate studies in statistics with a two-course probability theory / mathematical statistics sequence. I clearly recall that my perception of what statistics was really all about at that stage of my education was extremely incomplete, and that I had many misconceptions regarding the field of statistics. It took many more years of courses and study for me to develop a real sense of 'what it's all about.' It is my impression that the limited background which I had acquired at that time is similar to that possessed by many professors of mathematics, and that consequently such professors typically have various misconceptions regarding statistics. In this talk I will discuss some of these misconceptions and their consequences.

Sierpinski, Riesel, and Lucas Numbers

Daniel Baczkowski
The University of Findlay
baczkowski@findlay.edu

Abstract #17: We show that there are infinitely many Sierpinski numbers in the sequence of Lucas numbers. We also show that there are infinitely many Riesel numbers in the sequence of Lucas numbers. Finally, we show that there are infinitely many Lucas numbers that are not a sum of two prime powers.

Saturday 11:15 – 11:30

Numerical Method for Semilinear Parabolic Interface Problemsgs

Champike Attanayake
Miami University – Middletown
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Abstract #18: In this talk we analyze an immersed interface finite element method for second order semilinear parabolic interface problems. Convergence of the semi discrete solution to the exact solution is shown to be of the optimal order in L2 and energy norms. Further, fully discrete scheme based on backward Euler method is studied and optimal error in L2 norm is established..

Tessellations and Technology: Using Geogebra to Teach About Angles and Mappings

Justin Young
Ashland University
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Abstract #19: I will discuss a project in which students use the geometry of rigid motions to produce Escher-style tessellations, both by hand and by using the dynamic mathematical program GeoGebra. This project is part of our Geometry for Middle Grades Teachers course.
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About The University of Findlay

The University of Findlay was founded in 1882 as Findlay College by the citizens of Findlay and the Churches of God, General Conference. From its inception, the institution has served the higher education needs of students through programs of study that focus on career preparation and are grounded in the liberal arts.

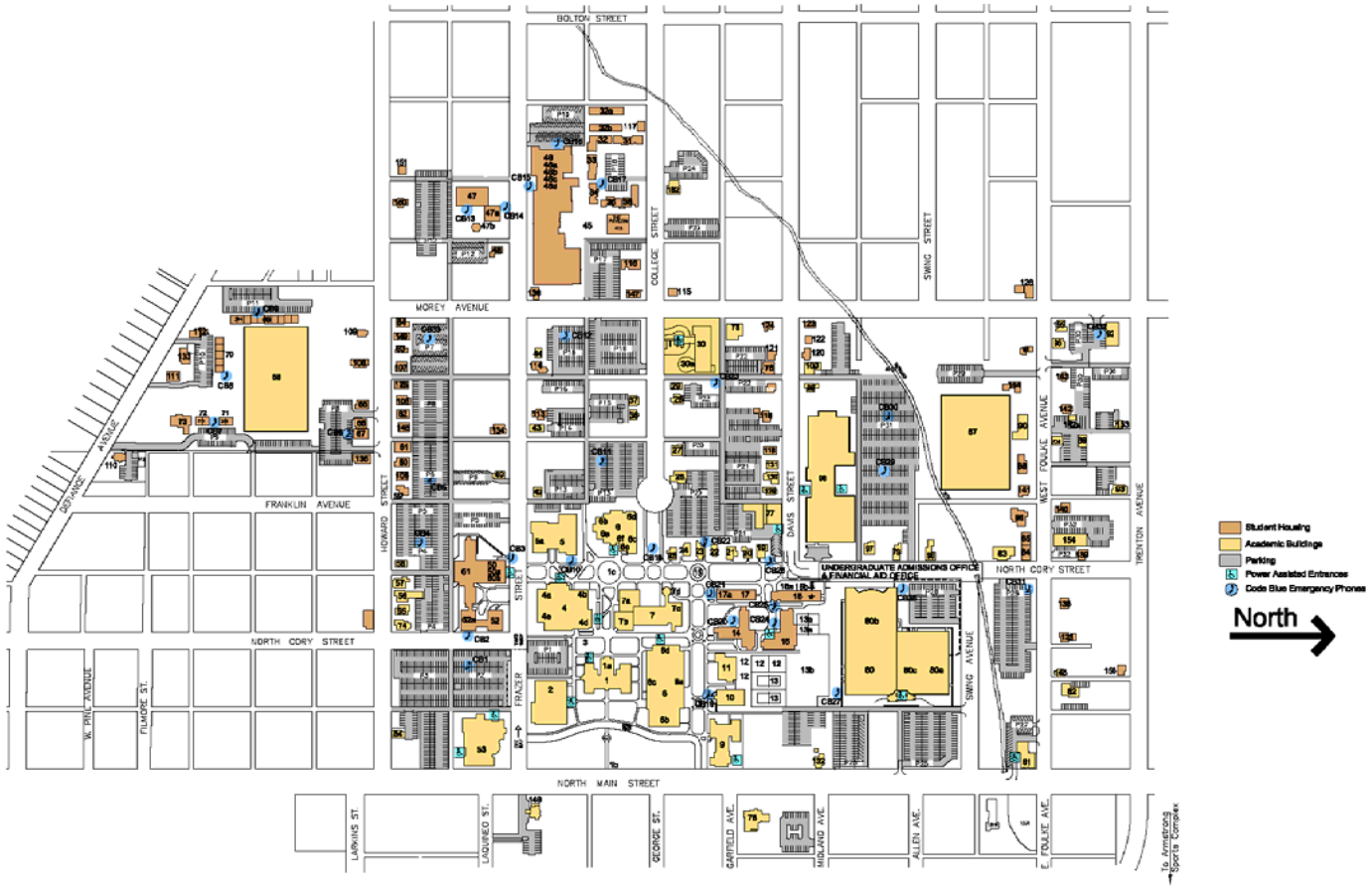
Today, The University of Findlay is a forward-looking private university that is constantly seeking ways to better serve students and the community. UF is continually adapting programs and teaching methods, and adopting new technology, to meet the needs of current students. With a total enrollment of approximately 3,900 full-time and part-time students, The University of Findlay is noted for its innovative, career-oriented programs in nearly 60 majors and nine graduate and professional degrees.

The Mathematics Department consists of eight full time faculty members. The University of Findlay offers students opportunities for study in the area of applied or pure mathematics in addition to supporting the College of Education‘s major in Adolescent/Young Adult Integrated Mathematics. The applied mathematics emphases prepare students for the actuarial field, engineering, system analysis, and operations research.

The Mathematics Faculty and the College of Sciences welcomes you to our beautiful campus for the fall section meeting.

THE UNIVERSITY OF FINDLAY

Campus Map



Map Prepared By Peterman Associates, Inc. 9/10

Notes

Acknowledgements

The Ohio Section would like to thank the faculty, staff, and students of the Mathematics Department at The University of Findlay for their efforts in hosting this meeting.

Save these Dates!

The spring meeting of the Ohio Section will be held Xavier University, Cincinnati on **April 13-14, 2012**. Featured speakers include

- Rachel Hall, Saint Joseph's University, Philadelphia
- Aparna Higgins, University of Dayton

And don't miss the special performance of

"Calculus: the Musical"

The Joint Mathematics Meetings will be in Boston, **January 4-7, 2012**. Registration begins: September 1, 2011.

The fall meeting of the Ohio Section will be held at Baldwin-Wallace College, Berea on **October 19-20, 2012**.