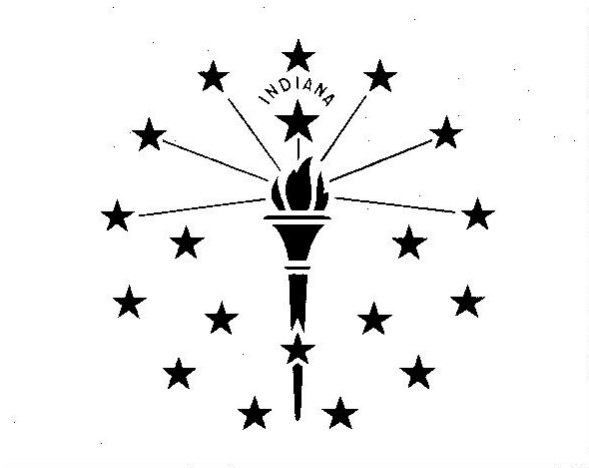


Indiana Section of the Mathematical Association of America

Spring 2005 Newsletter



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Upcoming Meeting Schedule

Section Meetings

- *Fall 2005*: Depauw University (Greencastle, IN), November 5, 2005
- *Spring 2006*: Taylor University (Upland, IN), March 17-18, 2006
- *Fall 2006*: Valparaiso Univeristy (Valparaiso, IN), TBA
- *Spring 2007*: University of Indianapolis (Indianapolis, IN)
- *Fall 2008*: Manchester College (?)

National Meetings

- *Summer 2005*: Mathfest, Albuquerque, NM, August 4-6, 2005
- *Winter 2006*: AMS-MAA-SIAM Joint Meeting, San Antonio, TX, January 12-15, 2006
- *Summer 2006*: MathFest, Knoxville, TN, August 10-12, 2006

Other Meetings

Announcement: Ohio Section Short Course

The 2005 Summer Short Course will be Making the Math Visible: A Workshop Exploring Geometry and Its Connections to Algebra, Trigonometry and Art. This workshop will be presented by Sr. Barbara Reynolds, Professor of Mathematics and Computer Science at Cardinal Stritch University in Milwaukee, who calls herself "an artist whose palette is mathematics." The course will focus on using geometry to gain visual insight into trigonometric and algebraic relationships, as well as on the geometric foundations for various topics in art, and will involve hands-on experience with Geometer's Sketchpad. This course should be of particular interest to mathematics teachers, at all levels, who are interested in the visual aspects of mathematics. The workshop will take place June 27-29, 2005 at John Carroll University, in Cleveland, Ohio. Registration costs are \$150, with room and board additional. Visit the website <http://www.jcu.edu/math/shortcourse/> for registration and further information.

Statement from Amos Carpenter (Chair of the Indiana Section)

This year's Spring Meeting will be at Indiana University - Purdue University Fort Wayne, in Fort Wayne, Indiana. The invited speaker is Jim Tattersall, Providence College. His Friday night after dinner talk is about the *Episodes in the early history of the Lucasian Chair*. On Saturday afternoon he will talk about *Three mathematical vignettes; millennial, pontifical, and nyctaginaceous*. We will also have a wide variety of contributed talks.

On Friday and Saturday there will be a PMET (Preparing Mathematicians to Educate Teachers) mini-course run by Magnhild Lien from California State University Northridge. There will also be a Project NExT Workshop run by Will Turner (Wabash College) and Tom Langley (Rose-Hulman Institute of Technology). This is a follow-up workshop from our Fall 2004 Evansville Meeting (November 5-6, 2004).

On Friday afternoon we will host the annual Indiana College Mathematics Competition (ICMC). Registration for this competition is on-line at our section website, <http://www.maa.org/indiana/>.

Please continue to send all of your campus news to David Finn (Rose-Hulman Institute of Technology), our Newsletter Editor. It is nice to be able to read what is happening on our campuses.

I look forward to seeing you all in Fort Wayne.

Spring 2005 INMAA Meeting
at
Indiana University - Purdue University
Fort Wayne
April 1-2, 2005



MEETING REGISTRATION:

Registration can be made online at [INMAA Online Registration](#). This includes meal registration. The regular meeting registration fee, if you register before March 25th, is \$10. After March 25th, the registration fee is \$15. There is no registration fee for students.

The ICMC Team pre-registration form is due by March 25th, and can be found here [ICMC Team Pre-registration Form](#)

Information from the PMET Website

<p>Home About PMET Workshops Collaborations Regional Networks Resources Calendar Mini-grants</p> <p>Workshop Leaders <i>requires password</i></p> <p>Download MAA forms</p> <p>PMET Project Office Phone: 479-575-4682 Fax: 479-575-8630 email: bmadison@uark.edu</p>	<div data-bbox="412 306 699 401"></div> <p data-bbox="716 338 1198 405">Preparing Mathematicians to Educate Teachers</p> <hr/> <p data-bbox="440 491 1170 606">Preparing Mathematicians to Educate Teachers (PMET) is funded by DUE-0230847, a grant issued through the National Dissemination Track of the NSF Course, Curriculum and Laboratory Improvement Program (CCLI-ND).</p> <p data-bbox="428 653 1114 711">PMET Workshops 12 workshops in 2005! Workshop Dates & Online Applications</p> <p data-bbox="451 714 1157 772">View/Download 2005 Workshop Flyer.pdf -- lists all workshops, 76K, 1 page</p> <p data-bbox="482 772 1130 831">Deadline for workshop applications: April 11, 2005. Acceptance notifications sent via email by April 25, 2005.</p> <p data-bbox="524 863 1084 892">Read what participants say about PMET workshops!</p> <p data-bbox="428 940 1036 1005">2nd round of PMET mini-grants awarded. Read current Mini-grant summaries and progress reports.</p> <p data-bbox="428 1050 1157 1192">PMET is Seeking Examples of specific mathematics concepts that arise naturally in K-12 teaching but are not well treated in the undergraduate programs for teachers and are difficult for pre-service or in-service teachers. Send examples to Ed Dubinsky, email edd@math.kent.edu</p>	<p data-bbox="1265 300 1455 352">Preparing mathematicians...</p> <div data-bbox="1224 354 1495 541"></div> <p data-bbox="1252 615 1466 642">to educate teachers,</p> <div data-bbox="1224 644 1495 833"></div> <p data-bbox="1252 945 1466 997">...to teach America's students.</p> <div data-bbox="1224 999 1495 1192"></div>
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PMET is supported by a grant from the [National Science Foundation](#)



and is a project of the [Mathematical Association of America](#).



Sponsored by the Committee on the Mathematical Education of Teachers. Additional support from Texas Instruments. PMET planning funded by grants from ExxonMobil Foundation & the National Science Foundation.

PMET Minicourse

Organizer: Dr. Magnhild Lien

California State University Northridge

- Brief introduction of PMET (Preparing Mathematicians to Educate Teachers)
 - PMET Goals
 - Background Reports
 - PMET activities
- Finding deeper mathematics understanding in standard K-12 problems
 - Minicourse participants will look at some basic problems and analyze the mathematical thinking behind the problems
 - References will be given for such problems at the elementary curriculum as well as the secondary curriculum.
- Capstone Course as part of a mathematics department's curriculum for prospective secondary teachers.
 - Brief discussion of the CBMS MET (Mathematical Education of Teachers) report's recommendation on Capstone Course
 - Discuss various designs of a Capstone Course. Participants are encouraged to read chapters 5 and 9 of the MET report in preparation for the minicourse. The report can be found on http://www.cbmsweb.org/MET_Document/index.htm
 - Participants will be asked to share any experience, if any, they have with Capstone courses at their institution.

Magnhild Lien (<http://www.csun.edu/~vcmth00s>), professor of Mathematics at California State University Northridge (CSUN), received her Ph.D. in Mathematics from University of Iowa in 1984. Her area of specialization is low dimensional topology with emphasis on knot theory. She is currently in her seventh year as Department Chair of the Mathematics Department at CSUN. She served on the Board of the Southern California-Nevada Section of the MAA for four years, the last year 2002/03 as Section Chair. Dr. Lien is one of the organizers of the newly established SoCal Section NExT. She is a member of the Management Council of the NSF funded MAA project PMET (Preparing Mathematicians to Educate Teachers), and she is one of the two PMET regional coordinators for California. She was a co-director for the San Diego PMET workshop in summer 2004 and will co-direct the San Diego PMET workshop again this summer. (<http://home.sandiego.edu/~pmyers/PMET/index.htm>) Dr. Lien is a member of the Professional Development of the MAA. She was a co-director of the Mathematics Preparation Initiative supported by a grant from the Office of the CSU Chancellor. In 1997, she organized and directed a four-week residential summer program for women in mathematics, which was funded by a grant from the National Security Agency. She has been a mentor for young women mathematicians at the Association for Women in Mathematics Workshops at two annual AMS-MAA meetings. In addition to articles published in mathematics research journals, she has written an article on the CSUN summer mathematics program for Math Horizon and written two papers entitled: Influences on Female Math Majors' Choice of Discipline and Gender-Typing of Science Occupations.

Invited Talks by James Tattersall

Friday April 1st, 7:45-8:45 pm in the Walb Union Ballroom

EPISODES IN THE EARLY HISTORY OF THE LUCASIAN CHAIR

In 1663, Henry Lucas, the long-time secretary to the Chancellor of the University of Cambridge, made a bequest, subsequently granted by Charles II, to endow a chair in mathematics. A number of conditions were attached to the Chair. Among the more prominent Lucasian professors were Newton, Babbage, Stokes, Dirac, and Hawking. We focus attention on the early Lucasians. Many of whom were very diligent in carrying out their Lucasian responsibilities but as history has shown such was not always the case. In the process, we uncover several untold stories and some interesting mathematics.

Saturday April 2nd, 1:45 - 2:45 pm in Science Building 168

THREE MATHEMATICAL VIGNETTES; MILLENNIAL, PONTIFICAL, AND NYCTAGINACEOUS

Two first century (A.D.) manuscripts, the Introduction to Arithmetic, by Nicomachus of Gerasa and Mathematics Useful for Understanding Plato by Theon of Smyrna were the main sources of knowledge of formal Greek arithmetic in the Middle Ages. The books are philosophical in nature, contain few original results and no formal proofs. They abound, however, in intriguing number theoretic observations. We discuss and extend some of the results found in these ancient volumes. Secondly, we discuss the mathematics of Gerbert the Great, a tenth century educator. We end with the achievements and adventures of Louis Antoine de Bougainville, mathematician, explorer, and student of D'Alembert.

Jim Tattersall received his undergraduate degree in mathematics from the University of Virginia in 1963, a Master's degree in mathematics from the University of Massachusetts in 1965, and a Ph.D. degree in mathematics from the University of Oklahoma in 1971. On a number of occasions he has been a visiting scholar at the Department of Pure Mathematics and Mathematical Statistics at Cambridge University. He spent the summer of 1991 as a visiting mathematician at the American Mathematical Society. In 1995 1996, he spent eighteen months as a visiting professor at the U.S. Military Academy at West Point. He was given awards for distinguished service (1992) and distinguished college teaching (1997) from the Northeastern Section of the MAA. He is former President of Canadian Society for History and Philosophy of Mathematics, the Archivist/Historian of NES/MAA, and the Associate Secretary of the Mathematical Association of America.

Directions to the Indiana University Purdue University Fort Wayne Campus

From I-69 North

If you are taking I-69 from the north, watch for exit 112B-A, which is the Coldwater Road South/Coldwater Road North exit. Take Coldwater Rd. south for about 1.5 miles until you reach E. Coliseum Blvd. Turn left onto E. Coliseum Blvd. and go for about 1.5 miles until you reach Crescent Ave. (the second traffic light after the bridge). Turn left onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From I-69 South

If you are taking I-69 from the south, watch for exit 111A. Merge south onto Lima Rd. Take Lima Rd. about a mile until you reach Coliseum Blvd. Turn left onto Coliseum Blvd. and go for about 2 miles until you reach Crescent Ave. (the second traffic light after the bridge). Turn left onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From Fort Wayne International Airport

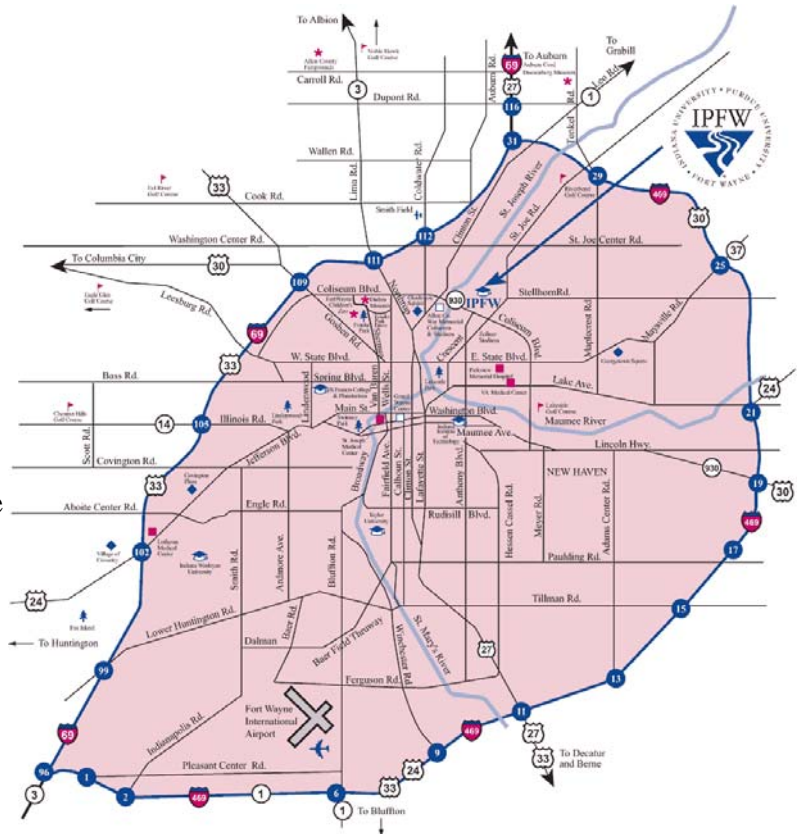
Leaving the airport, start by going east on Ferguson Rd. Take Ferguson Rd. about a mile until you reach Bluffton Rd.. Turn left and take Bluffton Rd. (SR-1) about a mile to Baer Field Thruway. Turn right onto Baer Field Thruway and go about 3 miles until you reach E. Paulding Rd. Then take E. Paulding Rd. for about 1 mile until you get to S. Anthony Blvd. Turn left onto S. Anthony Blvd, taking it north for approximately 6 miles until you reach E. Coliseum Blvd. When you get to the intersection at E. Coliseum Blvd., make sure you are in the right lane. Once you pass through the intersection, you will be on the IPFW campus.

From US-24 West

If you are taking US-24 from the west, watch for the exit to I-69. Take I-69 north and watch for exit 111A. Merge south onto Lima Rd. Take Lima Rd. about a mile until you reach W. Coliseum Blvd. Turn left onto W. Coliseum Blvd. and go for about 2 miles until you reach Crescent Ave. (the second traffic light after the bridge). Turn left onto Crescent Ave. until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From US-24 East

If you are taking US-24 from the east, watch for I-469 as you approach Fort Wayne. Where I-469, US-24, and Lake Avenue meet, you will want to take Lake Ave. west for about 6 miles until you reach Coliseum Blvd. Turn right onto Coliseum Blvd. and go for about 2.5 miles until you get to Crescent Ave. Turn right onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.



From SR-3 North

Take SR-3 (Lima Rd.) south until you reach W. Coliseum Blvd. Turn left onto W. Coliseum Blvd. and go for about 2 miles until you reach Crescent Ave. (the second traffic light after the bridge). Turn left onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From SR-1 South

If you are taking SR-1 (Bluffton Road) from the south, watch for I-469. Continue on Bluffton Rd. for about 3.5 miles and watch for Baer Field Thruway. Turn right onto Baer Field Thruway and go about 3 miles until you reach E. Paulding Rd. Then take E. Paulding Rd. for about a mile until you get to S. Anthony Blvd. Turn left onto S. Anthony Blvd, taking it north for approximately 6 miles until you reach E. Coliseum Blvd. When you get to the intersection at E. Coliseum Blvd., make sure you are in the right lane. Once you pass through the intersection, you will be on the IPFW campus.

From US-33 North

If you are taking US-33 from the north, US-33 will merge with US-30. Take US-30 east (passing I-69) until it intersects with W. Coliseum Blvd. Take W. Coliseum Blvd. about 4.5 miles until you reach the intersection with Crescent Ave. (the second traffic light after the bridge). Turn left onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From US-27/US-33 South

If you are taking US-27/US-33 from the south, watch for I-469. Continue to take US-27/US-33 north until you see S. Anthony Blvd., about 2 miles from I-469. Turn right onto S. Anthony Blvd. and go about 8 miles until you reach E. Coliseum Blvd. When you get to the intersection at E. Coliseum Blvd., make sure you are in the right lane. Once you pass through the intersection, you will be on the IPFW campus.

From US-30 West

If you are taking US-30 from the west, continue taking US-30 east (passing I-69) until it intersects with W. Coliseum Blvd. Take W. Coliseum Blvd. about 4.5 miles until you reach the intersection with Crescent Ave. (the second traffic light after the bridge). Turn left onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From US-30 East

Take US-30 west to Fort Wayne. When you see I-469, continue on US-30 (also SR-930) until the intersection with Lincoln Highway in New Haven. Take Lincoln Highway about 3 miles and watch for the exit to Coliseum Blvd. Take Coliseum Blvd. north about 4 miles until you get to Crescent Ave. (Coliseum Blvd. will begin curving to the northeast after E. State Blvd.) Turn right onto Crescent Ave. and go until you reach the next intersection (immediately after you go under the IPFW Pedestrian Bridge). Turn left onto the IPFW campus.

From US-37 North

If you are taking US-37 from the north, watch for I-469. Continue on US-37 (Maysville Rd.) until you see Stelhorn Rd., about a mile from I-469. Turn right onto Stelhorn Rd. and go for about 4 miles until you reach Crescent Ave. Turn left onto Crescent Ave. and watch for the next intersection before the IPFW Pedestrian Bridge. At the intersection, turn right onto the IPFW campus.

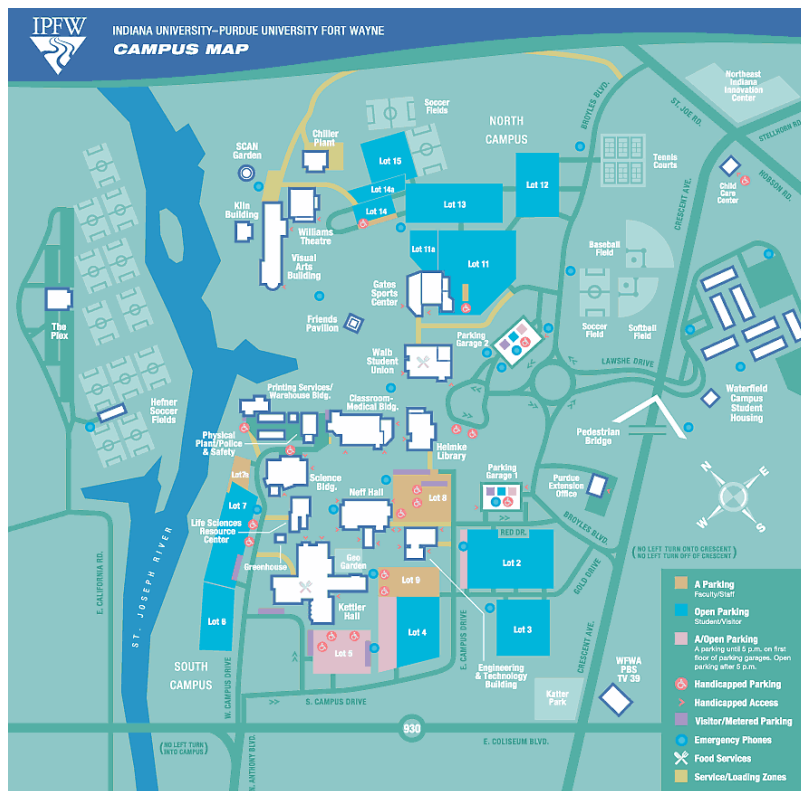
Campus Map

A campus map of the IPFW is shown to the right, and can be found by following the links below

[Color Version](#)
[Black & White Version](#)

Parking on Campus

There is plenty of free parking all over campus. Lot 7 and Parking Garage 1 (see the Campus Map) are close to the Science Building. However, the "A" spaces (see map), marked with green stripes on the pavement, are reserved for IPFW permit holders.



Onsite Registration

The MAA meeting will be held in the Science Building. On campus registration will be held on the first floor of the Science Building (follow signs to find registration). Registration will begin beginning at 3:00 p.m. on Friday and 7:00 a.m. on Saturday. The onsite registration fee is \$15. All participants, including students, are expected to sign-in at the registration table.

Meal Reservations

Reservations must be made online through the [INMAA Online Registration](http://www.maa.org/indiana) found by visiting the INMAA site <http://www.maa.org/indiana>. Advanced reservation is required for lunch and dinner and must be made no later March 25, 2005. Dinner is \$21 and lunch is \$12.

ICMC Registration:

Pre-registration is required to guarantee participation in the ICMC, though space may be available for teams not registering on the day of the event. To pre-register visit the site [ICMC Preregistration](#). There is a \$5.00 fee for each team, to be paid through the on-line registration process.

PMET Workshop Registration:

The workshop is free, but participant must register by visiting the <http://www.maa.org/indiana/> and following the link [PMET Pre-Registration](#). The registration deadline is March 30th.

Area Accommodations

The following local hotels offer special corporate rates to IPFW, it is expected that the quoted rates will hold for the meeting.

Amerisuites

111 W. Washington Center Road
Fort Wayne, Indiana 46825
(260)471-8522

All suites \$69.00

Comfort Suites North

I-69, Exit 116
3302 East Dupont Road
Ft Wayne, IN 46825
(260) 480-7030
Fax: (260) 480-7090

Monday-Thursday \$75.00

Friday-Sunday \$65.00

Canterbury Green Executive Suites

2613 Abbey Drive
Fort Wayne, Indiana 46835
(260) 485-9619

1 bedroom, 1 bath \$69.00

2 bedrooms, 2 baths \$79.00

3 bedrooms, 2 baths \$89.00

Roebuck Inn

1 Adult \$69.00

2 Adults \$79.00

Courtyard By Marriott

1619 West Washington Center Road
Fort Wayne, Indiana 46818
(260) 489-1500

Weekend/Group rates available

Corporate Rate \$99.00

Don Hall's Guesthouse

1313 W. Washington Center Road
Fort Wayne, Indiana 46825
(260) 489-2524

Single Room \$59.00

Double Room \$69.00

Fairfield Inn

5710 Challenger Parkway
Fort Wayne, Indiana 46818
(260) 489-0050

Queen Room	\$59.00-\$69.00
Double/King	\$59.00-\$69.00

Fort Wayne Hilton at Grand WayneCtr.

1020 South Calhoun Street
Fort Wayne, IN 46802
(260) 420-1100

Single Room	\$79.00
Double Room	\$79.00

Fort Wayne Marriott

305 E. Washington Center Road
Fort Wayne, Indiana 46825
(260) 484-0411

(based on availability)

Single Room	\$69.00
Double Room	\$79.00

Holiday Inn Hotel & Suites

300 E. Washington Boulevard
Fort Wayne, IN 46802
(260) 422-5511
Corp. ID #100190613

Single/Double Room	\$69.00
2-Room Suite	\$89.00

Residence Inn

4919 Lima Road
Fort Wayne, Indiana 46808
(260) 484-4700

1-BR Studio, Queen 1-4 days	\$109.00/day
2-BR Penthouse, Queens 1-4 days	\$139.00/day

(Additional discount for longer stays)

Signature Inn

1734 W. Washington Center Rd.
Ft Wayne, IN 46818
(260) 489-5554

Monday-Thursday	\$61.00
Friday-Sunday	\$57.00

Program for Spring Meeting of the Indiana Section of the MAA

Schedule and Abstracts of the Contributed Papers follow

Friday, April 1, 2005

Time	Event	Place
3:00-4:30	Meeting Registration	Science Building Lobby
3:00-3:50	ICMC Registration	Science Building Lobby
3:00-6:00	MAA Book Sale	Science Building 176
4:00-4:15	ICMC Instructions	Kettler Hall G46
4:00-4:15	ICMC Competition	Various Rooms
4:00-6:00	PMET Mini-Course Mahnild Lien, California State University, Northridge	Science Building G20
4:30-5:30	INMAA Executive Board Meeting	Science Building 178

Next Two Tables are for Parallel Sessions

Time	Event	Place
4:00-4:25	Visualizing real surfaces in the complex projective plane Adam Coffman, IPFW	Science Building 168
4:30-4:55	On solutions of families of Diopantine equations Alain Togbe, Purdue University North Central	Sciene Building 168
5:00-5:25	Fredholm integral equations and its applications S heon Yound Kang, Purdue University North Central	Science Building 168
5:30-5:55	Graph theory of Blackwork embroidery Joshua Holden, Rose-Hulman Institute of Technology	Science Building 168

Time	Event	Place
4:00-4:25	Teaching the different interpretations of probability Mark Inlow, Rose-Hulman Institute of Technology	Science Building G30
4:30-4:55	WeBwork - a web based homework delivery system Robert Riehemann, Thomas More College	Science Building G30
5:00-5:25	Generalized Linear Models in Actuarial Science Curtis Gary Dean, Ball State University	Science Building G30
5:30-5:55	Asymptotics for the zeros of the generalized Bessel polynomials Amos Carpenter, Butler University	Science Building G30

Time	Event	Place
6:30-7:30	BANQUET	Walb Union Ballroom
7:30-7:45	AWARDS	Walb Union Ballroom
7:45-8:45	Episodes in the early history of the Lucasian Chair Jim Tattersall, Providence College	Walb Union Building

Saturday, April 2nd, 2005

Time	Event	Place
7:00 - 8:00	Chairs and Liaisons Breakfast	Don Hall's Guesthouse
8:00 - 9:00	Meeting Registration	Science Building Lobby
8:00 - 3:00	MAA Book Sale	Science Building 176
9:00 - 11:00	PMET Mini-Course Mahnild Lien, California State University, Northridge	Science Building G20
9:00 - 9:05	Welcome by Chancellor Michael A Wartell of IPFW	Science Building 168
9:05 - 9:55	Periodic trajectories for evolutionary type equations in general Banach spaces Mitch Voisei, Tri-State University	Science Building 168

Next Two Tables are for Parallel Sessions

Time	Event	Place
10:00 - 10:25	Equal area functions Jared Laughlin, Purdue University	Science Building 168
10:30 - 10:55	The Properties of bipartite self-complementary graphs Laura Stellfox, Valparaiso University	Science Building G30
11:00 - 12:00	In-service training programs for K-12 teachers: A round table discussion Zsuzsanna Szaniszlá, Valparaiso University Colleen M Hoover, St Mary's College Mary K Porter, St Mary's College	Science Building G34

Time	Event	Place
10:00 - 10:25	Geometric Modelling: An applied geometry course David Finn, Rose-Hulman Institute of Technology	Science Building 168
10:30 - 10:55	The Knight's closed tour on a chessboard Rozalia Tadjer, Goshen College	Science Building 168
11:00 - 11:35	Tripods and Diskos, two new geometric puzzle games Jeremiah Farrell, Butler University	Science Building 168
11:35 - 12:00	Fair division with money David Housman, Goshen College	Science Building 168

Time	Event	Place
12:00 - 12:55	LUNCH	Walk Union Ballroom
1:00 - 1:30	INMAA Business Meeting	Science Building 168
1:30 - 1:45	ICMC Competition Results	Science Building 168
1:45 - 2:45	Three mathematical vignettes; millennial, pontifical, and nyctaginaceous Jim Tattersall, Providence College	Science Building 168

Abstracts for the April 1-2, 2005 Indiana Section Meeting of the Mathematical Association of America

Indiana University - Purdue University Fort Wayne
Fort Wayne, Indiana
Friday and Saturday, April 1-2, 2005

Friday, April 1, 2005

Science Building 168

4:00-4:25

Visualizing real surfaces in the complex projective plane

Adam Coffman, IPFW

Abstract:

The complex projective plane uses two complex numbers in its local coordinate system, so it's four-dimensional. I will show some pictures that illustrate how two-dimensional surfaces intersect complex lines in the complex projective plane.

4:30-4:55

On solutions of families of Diophantine equations

Alain Togbe, Purdue University North Central

Abstract:

In this talk, we discuss Baker's method for solving families of Diophantine equations, particularly families of Thue equations. We give a survey of the results obtained since 1990.

5:00-5:25

Fredholm integral equation and its applications

Sheon Young Kang, Purdue University North Central

Abstract:

A new Gauss type Quadrature based on Clenshaw-Curtis Quadrature for Fredholm Integral Equations of the Second kind $x(t) + \int_a^b k(t,s)x(s)ds = y(t)$ whose kernel is either discontinuous or not smooth along the main diagonal. This new numerical approximation scheme is of spectral accuracy when $k(t,s)$ is infinitely differentiable away from the diagonal. Application to integro-differential Schroedinger Equation is given.

5:30-5:55

The graph theory of Blackwork embroidery

Joshua Holden, Rose-Hulman Institute of Technology

Abstract:

Blackwork embroidery, also known as "Spanish stitch" or "Holbein stitch", is a needlework technique often associated with Elizabethan England. The patterns used in Blackwork generally are strongly geometric, and are traversed in a way that can be easily described by graph theory. We will characterize these graph traversals and present some algorithms that may be of practical use to needleworkers as well as theoretical interest.

Science Building G30

4:00-4:25

Teaching the different interpretations of probability

Mark Inlow, Rose-Hulman Institute of Technology

Abstract:

In this talk we present different interpretations of probability and advocate teaching these interpretations more thoroughly in undergraduate probability and statistics courses. In particular, we argue that these interpretations be emphasized in statistics courses which (typically) teach methods based on the frequentist interpretation.

4:30-4:55

WeBWork - A web based homework delivery system

Bogdan Vajiac, Indiana University Northwest

Abstract:

WebWork is a cost effective homework delivery system that improved traditional homework by

allowing immediate feedback to students and by encouraging cooperation (it gives individualized problems). This talk will present the benefits of the WebWork system and the results we got by implementing it at Indiana University Northwest.

5:00-5:25

Generalized linear models in actuarial science

Curtis Gary Dean, Ball State University

Abstract:

Generalized Linear Models (GLMs) have greatly expanded the range of real world problems that can be analyzed compared to classical linear models. GLMs are particularly useful to actuaries who are applying these models to handle a variety of business problems. This talk will provide a basic description of GLMs and give several examples of their uses.

5:30-5:55

Asymptotics for the zeros of the generalized Bessel polynomials

Amos Carpenter, Butler University

Abstract:

We will investigate the location of the zeros of the normalized generalized Bessel polynomials and the normalized reversed generalized Bessel polynomials. Also, the rate at which these zeros approach certain well-defined curves is investigated. On the basis of numerical computations and graphs, new conjectures are proposed.

Walb Union Ballroom

7:45-8:45

Episodes in the early history of the Lucasian Chair

Jim Tattersall, Providence College

Abstract:

In 1663, Henry Lucas, the long-time secretary to the Chancellor of the University of Cambridge, made a bequest, subsequently granted by Charles II, to endow a chair in mathematics. A number of conditions were attached to the Chair. Among the more prominent Lucasian professors were Newton, Babbage, Stokes, Dirac, and Hawking. We focus attention on the early Lucasians. Many of whom were very diligent in carrying out their Lucasian responsibilities but as history has shown such was not always the case. In the process, we uncover several untold stories and some interesting mathematics.

Saturday, April 2, 2005

Science Building 168

9:05-9:55

Periodic trajectories for evolutionary type equations in general Banach spaces

Mitch Voisei, Tri-State University

Abstract:

The existence of periodic solutions for the evolution equation $y'(t) + Ay(t) \ni F(t, y(t)) + f(t)$, $t \geq 0$, $y(0) = y(T)$ is investigated under considerably simple assumptions on A and F . Here X is a Banach space, $A : D(A) \subset X \rightarrow 2^X$ is m -accretive, $-A$ generates a compact semigroup, F is a Caratheodory mapping which is periodic in its first argument and has a sublinear growth toward infinity. Two examples concerning nonlinear parabolic equations are presented.

10:00-10:25

Geometric modelling: An applied geometry course

David Finn, Rose-Hulman Institute of Technology

Abstract:

Over the past few years, the speaker has been teaching a course on geometric modelling as the principal applied geometry course at Rose-Hulman. The course covers some of the

mathematical methods for describing physical and virtual objects used in computer-aided geometric design, CAD/CAM systems and computer graphics. The prerequisite for the course is only multivariable calculus. This course has generated interest among students from various majors to pursue additional studies in projective geometry, differential geometry, and computational geometry. This talk describes the course, some of the materials from the course, and the motivation used to generate interest in additional courses in geometry.

10:30-10:55

The Knight's closed tour on a chessboard

Rozalia Tadjer, Goshen College

Abstract:

In this presentation, I am going to talk about the knight's closed tour on a $m \times n$ board. A closed tour is a Hamilton circuit - each square of the board is visited only once and the knight's last move takes it back to the first square. There are some specific properties of the board, which ensure a closed tour, specified in the following theorem: a board supports a closed (knight's) tour if and only if its area mn is an even integer > 2 and neither m , nor n is 1, 2, or 4. I will explain the proof in one direction and show an example of the second direction.

11:00-11:35

Tripes and Diskos, two new geometric puzzle-games

Jeremiah Farrell, Butler University

Abstract:

Both puzzle-games were designed for students at the Indiana School for the Blind but are of interest to sighted persons as well. We explore the geometry behind the two and generalize to similar games. There are many open questions - some of which may be suitable for undergraduate research projects.

11:35-12:00

Fair division with money

David Housman, Goshen College

Abstract:

An inheritance is to be divided evenly among siblings. Different siblings may value different objects differently (e.g., the pianist sister who lives next door would value the baby grand piano more than the brother who lives a thousand miles away and never liked the sound of a piano), and siblings are willing to give or receive money as one way to make the division fair. The literature has proposed several division methods and fairness properties for division methods to have. This talk will review some of that literature and provide some results showing how compatible various properties are.

Science Building G30

10:00-10:25

Equal area functions

Jared Laughlin, Purdue University

Abstract:

An Equal Area Function is a function where the area of the triangle formed by a tangent line and the positive coordinate axes is independent of the point of tangency. One such function is $f(x) = 1/x$. In this talk we shall try to answer the following two questions: Is it possible to find all such functions? How does all this generalize to higher dimensions?

10:30-10:55

Properties of bipartite self-complementary graphs

Laura Stellfox, Valparaiso University

Abstract:

A bipartite graph is a graph where the vertex set can be decomposed into two subsets U and V such that each edge of G joins a vertex of U to a vertex of V . A bipartite graph is denoted as

$G(U, V)$. Given a bipartite graph $G(U, V)$, its bipartite-complement is the bipartite graph $\bar{G}(U, V)$ with the same vertex set as G , but with the edge set $\{uv | u \in U, v \in V, \text{ and } uv \notin E(G)\}$. A bipartite graph G is bipartite self-complementary if G is isomorphic to \bar{G} . In my talk, I explore general properties of bipartite self-complementary graphs.

Science Building G34

11:00-12:00

In-service training programs for K-12 teachers: A round table discussion

Zsuzsanna Szaniszló, Valparaiso University

Colleen M Hoover, St Mary's College

Mary K Porter, St Mary's College

Abstract:

The purpose of this session is to share ideas and experiences of successful training programs involving mathematical context and pedagogy. The format of the session will be roundtable discussion. Everyone with interest in such programs is welcome to participate in this discussion.

Science Building 168

1:45-2:45

Three mathematical vignettes; millennial, pontifical, and nyctaginaceous

Jim Tattersall, Providence College

Abstract:

Two first century (A.D.) manuscripts, the "Introduction to Arithmetic," by Nicomachus of Gerasa and "Mathematics Useful for Understanding Plato" by Theon of Smyrna were the main sources of knowledge of formal Greek arithmetic in the Middle Ages. The books are philosophical in nature, contain few original results and no formal proofs. They abound, however, in intriguing number theoretic observations. We discuss and extend some of the results found in these ancient volumes. Secondly, we discuss the mathematics of Gerbert the Great, a tenth century educator. We end with the achievements and adventures of Louis Antoine de Bougainville, mathematician, explorer, and student of D'Alembert.

Project NExT-Indiana

Project NExT-IN (New Experiences in Teaching), a program of the Indiana section of the Mathematical Association of America which is an offshoot of the national Project NExT, is a year-long program geared toward new or recent doctoral recipients in the mathematical sciences who are employed by Indiana colleges or universities. While the national Project NExT requires applicants to be no more than two years removed from confirmation of their doctorate, we at Project NExT-IN will accept applications from any faculty interested in participating. We especially encourage those who are new to their section and those who are pre-tenure to apply. Through a series of workshops in conjunction with the Fall tri-section meeting and the Indiana section meeting in the Spring, as well as through informal chats, participants will explore key aspects of life in academia while building lasting relationships with other participants and with senior faculty mentors from around the region. The following topics are representative of issues to be addressed

- Beginning and maintaining a research program
- Balancing teaching, research and service
- Undergraduate mathematics education

- Undergraduate research opportunities
- Grant writing

Workshops for this year will be held on **November 5-6, 2004** at the **University of Evansville** (Indiana/Illinois/Kentucky Tri-Section meeting), and on **April 1-2, 2005** at **Indiana University - Purdue University Fort Wayne**. For more information or an application see the website at:

<http://www.rose-hulman.edu/~langley/NExT-IN/announcement>

or contact Tom Langley (thomas.langley@rose-hulman.edu) or William Turner (turnerw@wabash.edu).

INDIANA COLLEGE MATHEMATICS COMPETITION (ICMC)

Preregistration for 2005 ICMC

For the 2005 ICMC at Indiana University Purdue University Fort Wayne, we strongly recommend that teams pre-register, so that the host institution can reserve enough rooms for the contest. Teams that pre-register will be guaranteed admission to the contest, while those teams that register on-site will be granted admission provided that space is available.

To preregister, please visit the Section website <http://www.maa.org/indiana> in January

Team results for the 2004 ICMC

There were 42 teams participating. The top four teams were Rose-Hulman, Taylor University, Ball State University and Indiana University. Congratulations to these teams and thanks to all who participated. More details on the results can be found at the Section Website <http://www.maa.org/indiana>

Solutions for the Spring 2004 ICMC

Solutions for the Spring 2004 contest may be found in pdf format at <http://www.maa.org/indiana>. The problems and the solutions are also given also below.

ICMC April 2nd, 2004 Problems

1. Partition the set $\{1, 2, 3, 4, 5\}$ into two arbitrarily chosen sets. Prove that one of the sets contains two numbers and their difference.
2. Suppose $a > 1$,

1. Show the series $\sum_{n=0}^{\infty} \frac{2^n}{a^{2^n} + 1}$ converges.
2. Determine to what value this series converges.
3. Let A be a 4×4 matrix such that each entry of A is either 2 or -1 . Let $d = \det(A)$; clearly, d is an integer. Show that d is divisible by 27.
4. Let a_1, a_2, \dots, a_n be a finite sequence of real numbers. Form a sequence of length $n - 1$ be average two consecutive terms of the sequence $\frac{a_1+a_2}{2}, \frac{a_2+a_3}{2}, \dots, \frac{a_{n-1}+a_n}{2}$. Continue this process of averaging two consecutive terms until you have only one term left. Show that this final term is $\frac{\sum_{i=0}^{n-1} \binom{n-1}{i} a_{i+1}}{2^{n-1}}$.
5. Let P be the center of a square with side \overline{AC} . Let B be a point in the exterior of the square such that $\triangle ABC$ is a right triangle with hypotenuse \overline{AC} . Prove: \overline{BP} bisects $\angle CBP$.
6. Two ferryboats start at the same instant from opposite sides of a river, travelling across the water on routes at right angles to the shores. Each travels at constant speed, but one is faster than the other. They pass at a point 720 yards from the nearest shore. Both boats remain at their slips 10 minutes before starting back. On their return trips, they meet 400 yards from the nearest shore. How wide is the river?

Solutions to ICMC 2004

1. Partition the set $\{1, 2, 3, 4, 5\}$ into two arbitrarily chosen sets. Prove that one of the sets contains two numbers and their difference.

We attempt to partition $\{1, 2, 3, 4, 5\}$ into two sets A and B in such a way that neither set contains two numbers and their difference. Thus, 2 cannot be in the same set as either 1 or 4, else we would have $2 - 1 = 1$ or $4 - 2 = 2$. So, put 2 in A and put 1 and 4 in B . If we put 3 in B , then we have $4 - 3 = 1$. So 3 must go in A . Similarly, placing 5 in B leads to $5 - 4 = 1$; thus 5 cannot be in B . However, 5 cannot be in A either, since $5 - 3 = 2$. We have reached a contradiction. Hence, no matter how the sets are constructed, one of the two sets must contain two numbers and their difference.

2. Suppose $a > 1$,

(a) Show the series $\sum_{n=0}^{\infty} \frac{2^n}{a^{2^n} + 1}$ converges.

Since $\lim_{n \rightarrow \infty} \left| \frac{2^{n+1}}{a^{2^{n+1}} + 1} / \frac{2^n}{a^{2^n} + 1} \right| = \lim_{n \rightarrow \infty} \left(\frac{2^{n+1}}{2^n} \cdot \frac{a^{2^n} + 1}{a^{2^{n+1}} + 1} \right) = 2 \lim_{n \rightarrow \infty} \frac{1 + \frac{1}{a^{2^n}}}{a^{2^n} + \frac{1}{a^{2^n}}} = 0$, this

series converges by the ratio test.

(b) Determine to what value this series converges.

Since

$$\begin{aligned} \frac{2^n}{a^{2^{n+1}} + 1} &= \frac{2^n(a^{2^n} - 1)}{a^{2^n} + 1} (a^{2^n} - 1) \\ &= \frac{2^n(a^{2^n} - 1) + 2^{n+1} - 2^{n+1}}{a^{2^n} + 1} (a^{2^n} - 1) \\ &= \frac{2^n(a^{2^n} + 1) - 2^{n+1}}{a^{2^n} + 1} (a^{2^n} - 1) \\ &= \frac{2^n}{a^{2^n} - 1} - \frac{2^{n+1}}{a^{2^{n+1}} - 1} \end{aligned}$$

the sum $\sum_{n=0}^{\infty} \frac{2^n}{a^{2^n} + 1} = \sum_{n=0}^{\infty} \left(\frac{2^n}{a^{2^n} - 1} - \frac{2^{n+1}}{a^{2^{n+1}} - 1} \right)$ is telescoping. Hence,

$$\sum_{n=0}^{\infty} \frac{2^n}{a^{2^n} + 1} = \frac{2^0}{a^{2^0} - 1} = \frac{1}{a - 1}.$$

3. Let A be a 4×4 matrix such that each entry of A is either 2 or -1 . Let $d = \det(A)$; clearly, d is an integer. Show that d is divisible by 27.

Let B be the matrix obtained from A by subtracting row one of A from each of the other three rows. Then $\det(A) = \det(B)$. Each entry in the last three rows of B is $-3, 0$, or 3 , and therefore divisible by 3. Now let C be the matrix obtained from B by dividing each of the entries in the last three rows of B by 3. All of the entries of C are integer, giving $\det(C)$ is an integer. Moreover,

$\det(A) = \det(B) = 27 \det(C)$. So, $\det(A)$ is divisible by 27.

4. Let a_1, a_2, \dots, a_n be a finite sequence of real numbers. Form a sequence of length $n - 1$ be average two consecutive terms of the sequence $\frac{a_1 + a_2}{2}, \frac{a_2 + a_3}{2}, \dots, \frac{a_{n-1} + a_n}{2}$. Continue this process of averaging two consecutive terms until you have only one term left. Show that this final term is

$$\frac{\sum_{i=0}^{n-1} \binom{n-1}{i} a_{i+1}}{2^{n-1}}.$$

By induction on n , the length of the sequence: If $n = 1$, then $a_1 = (\sum_{i=0}^0 \binom{1-1}{i} a_{i+1})/2^{1-1}$. So, assume that for any sequence of length $k \leq n$, we will have the final term $\frac{\sum_{i=0}^{n-1} \binom{n-1}{i} a_{i+1}}{2^{n-1}}$. We must now prove it for a sequence of length $k = n + 1$. After the first step, we have the sequence $\frac{a_1+a_2}{2}$, $\frac{a_2+a_3}{2}$, \dots , $\frac{a_{n-1}+a_n}{2}$, which is a sequence of length n . Thus, by the inductive hypothesis, the final term will be

$$\begin{aligned} \frac{\sum_{i=0}^{n-1} \binom{n-1}{i} \left(\frac{a_{i+1}+a_{i+2}}{2}\right)}{2^{n-1}} &= \frac{\sum_{i=0}^{n-1} \binom{n-1}{i} (a_{i+1} + a_{i+2})}{2^n} \\ &= \frac{\sum_{i=0}^{n-1} \binom{n-1}{i} a_{i+1} + \sum_{i=0}^{n-1} \binom{n-1}{i} a_{i+2}}{2^n} \\ &= \frac{a_1 + \sum_{i=1}^{n-1} \binom{n-1}{i} a_{i+1} + \sum_{i=0}^{n-2} \binom{n-1}{i} a_{i+2} + a_{n+1}}{2^n} \\ &= \frac{a_1 + \sum_{i=0}^{n-2} \binom{n-1}{i+1} a_{i+2} + \sum_{i=0}^{n-2} \binom{n-1}{i} a_{i+2} + a_{n+1}}{2^n} \\ &= \frac{a_1 + \sum_{i=0}^{n-2} \left(\binom{n-1}{i+1} + \binom{n-1}{i} \right) a_{i+2} + a_{n+1}}{2^n} \\ &= \frac{a_1 + \sum_{i=1}^{n-2} \binom{n}{i+1} a_{i+1} + a_{n+1}}{2^n} \\ &= \frac{\sum_{i=0}^n \binom{n}{i} a_{i+1}}{2^n} \end{aligned}$$

5. Let P be the center of a square with side \overline{AC} . Let B be a point in the exterior of the square such that $\triangle ABC$ is a right triangle with hypotenuse \overline{AC} . Prove: \overline{BP} bisects $\angle CBP$.

Since P is the center of the square, $\triangle APC$ will also be a right triangle. Construct a circle with diameter \overline{AC} ; both point B and P will be on this circle. (This is because the circle that circumscribes a right triangle has its center the midpoint of the hypotenuse.) Since \overline{AP} and \overline{PC} are equal chords of this circle, the arcs AP and PC are equal. Thus $\angle ABP$ and $\angle CBP$ are equal.

6. Two ferryboats start at the same instant from opposite sides of a river, travelling across the water on routes at right angles to the shores. Each travels at constant speed, but one is faster than the other. They pass at a point 720 yards from the nearest shore. Both boats remain at their slips 10 minutes before starting back. On their return trips, they meet 400 yards from the nearest shore. How wide is the river?

Since both boats remain in their slips for the same amount of the time, this information does not enter

into the solution of the problem. When the ferryboats meet for the first time, the combined distance the boats have travelled is equal to the width of the river. Then the boats reach the opposite shore, the combined distance the boats have travelled equals two widths of the river. When they meet a second time, the combined distances the boats have travelled is three widths of the river. Since the boats move at a constant speed, it follows that each boat has travelled three times as far as when they first met and had travelled a combined distance of one river width. The show boat had travelled 720 yards when the boats first met. Thus, by the second meeting, the slow boat has travelled $3 \times 720 = 2160$ yards. Since this second meeting occurs at the point when the slow boat has moved 400 yards from the far shore, it follows that the width of the river is given by $2160 - 400 = 1760$ yards.

SECTION NEWS

Butler University

Dr. Judi Morrel, Head of the Department of Mathematics and Actuarial Science, is on sabbatical for the Spring and Summer of 2005. Dr. Amos Carpenter is acting as the Department Head while Dr. Morrel is on sabbatical.

SECTION AWARDS

2004 Awards

The 2004 Distinguished Service Award was received by Don Miller (St. Mary's College). There was no award given for Distinguished College or University Teaching of Mathematics by the Section in 2004.

Call for Nominations for the Indiana Section Award for Distinguished College or University Teaching of Mathematics

Nominations for the thirteenth annual Indiana Section Award for Distinguished College or University

Teaching of Mathematics are now being welcomed. The Indiana Section Selection Committee will choose one of the nominees for the Section Award. The awardee will be honored at the 2005 Spring Section meeting and will be widely recognized and acknowledged within the Section. The awardee will also be the official Section candidate for the pool of Section awardees from which the national recipients of the Deborah and Franklin Tepper Haimo Awards will be selected (except that one of the national winners may be selected from another source). There will be at most three national awardees, each of whom will be honored at the national MAA meeting in January 2006 and receive a \$1000 check and a certificate.

Anyone is entitled to make a nomination, but nominations from mathematics department chairs are especially solicited. Although it is not mandatory, involvement of a nominee in preparing the nomination packet is permitted and encouraged. However, self-nomination is not permitted. A previous nominee for this award who did not become a Section awardee can be nominated again. Indeed, the Section has instructed the selection committee that "meritorious nominations for the Distinguished Teaching Award which do not result in an award will be continued as active nominations for next year's Distinguished Teaching Award and, if again not successful, will be continued for a third year as well."

Eligibility

- College or university teachers assigned at least half-time during the academic year to teaching of a mathematical science in a public or private college or university (from two-year college teaching through teaching at the Ph.D. level) in the United States or Canada. Those on approved leave (sabbatical or other) during the academic year in which they are nominated qualify if they fulfilled the requirements in the previous year.
- At least five years teaching experience in a mathematical science.
- Membership in the Mathematical Association of America.

Guidelines for Nomination

Nominees should

- be widely recognized as extraordinarily successful in their teaching¹
- have teaching effectiveness that can be documented
- have had influence in their teaching beyond their own institution²
- foster curiosity and generate excitement about mathematics in their students

Nominations must be submitted on the official "Nomination Form," a copy of which may be obtained from David Housman by using the address listed below or by e-mail dhousman@goshen.edu. Please follow the instructions on the form precisely to assure uniformity in the selection process both at the Section and National levels. If a file on a Section awardee significantly exceeds the prescribed limits (as stated on page two of the Nomination Form), it will not be considered for a national award and will be returned to the Section.

Please send six copies of each nomination packet to:

David Housman, Department of Mathematics
Goshen College, Goshen, IN 46526

so as to be received no later than February 1, 2005.

The Section Selection Committee will select the Section awardee prior to February 15, 2005, at which time it will communicate its selection to the national selection committee so that the national committee can then make its selections. We look forward to your participation in this exciting MAA venture of taking substantive action to honor extraordinarily successful teaching. We want to see such teaching recognized at all post-secondary schools. We depend on you to help us identify those who merit such recognition.

Call for Nominations for the Indiana Section Distinguished Service Award

The Indiana Section Distinguished Service Award was established in 1992 to annually honor a member of the Section for his or her extraordinary contributions to the Section and outstanding efforts consistent with the stated purposes of the MAA and the Section, namely, assisting in promoting the interests of, and improving education in, the mathematical sciences in America, especially at the collegiate level.

The Service Award Committee is soliciting nominations for the 2005 award, which will be presented at the Section's Spring 2005 Meeting. If you wish to nominate an individual, please send a letter of nomination and support to

David Housman, Department of Mathematics
Goshen College, Goshen, IN 46526

so as to be received no later than February 1, 2005.

Footnotes:

¹ "teaching" should be interpreted in its broadest sense, not necessarily limited to classroom teaching (it may include activities such as preparing students for mathematical competitions at the college level, or attracting students to become majors in a mathematical science).

² "influence beyond their own institution" can take many forms, including demonstrated lasting impact on alumni, influence on the profession through curricular revisions in college mathematics teaching with national impact, influential innovative books on the teaching of college mathematics, etc.