

Dennis P. Groth

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Date: May 1, 2009

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Education

Ph.D. in Computer Science, Indiana University, May 2002

B.S. in Computer Science, Loyola University of Chicago, 1983

Academic Experience – Indiana University, Bloomington

2009-	Associate Vice Provost for Undergraduate Education, Indiana University Bloomington
2008-	Associate Dean for Undergraduate Studies, School of Informatics
2008-	Associate Professor, School of Informatics Adjunct Associate Professor, Department of Computer Science
2006-2008	Director, Undergraduate Studies, Department of Informatics
2002-2008	Assistant Professor, School of Informatics
2001-2002	Lecturer, School of Informatics
1998-2001	Associate Instructor, Department of Computer Science
1997-1998	Course Instructor, Department of Computer Science

Research Interests

Visual Analytics
Information Visualization
Human Computer Interaction
Data Mining
Data Modeling

Edited Journals/Collections

- Dennis P. Groth and Kristy Streefkerk: *Provenance and Annotation for Visual Exploration Systems*, IEEE Transactions on Visualization and Computer Graphics, Special Issue on Visual Analytics, Volume 12, Number 6, 2006, pp. 1500-1510.
- Dennis P. Groth: *An Evaluation of a Rule-Based Language for Classification Queries*, Springer-Verlag, Lecture Notes in Computer Science, No. 3392, 2005, pp. 79-97.
- Paul W. Purdom, Dirk Van Gucht and Dennis P. Groth: *Average Case Analysis of the Apriori Algorithm*, SIAM Journal of Computing, Volume 33, Number 5, 2004, pp. 1223-1260.
- Dennis P. Groth and Edward L. Robertson: *Discovering Frequent Itemsets in the Presence of Highly Frequent Items*, Web-Knowledge Management and Decision Support - Selected Papers from the 14th International Conference on the Applications of Prolog, Springer-Verlag, Lecture Notes in Artificial Intelligence, No. 2543, 2003, pp. 258-271.

Refereed Conference and Workshop Papers

- Dennis P. Groth: *Tracking and Organizing Visual Exploration Activities across Systems and Tools*, 11th International Conference on Information Visualization, Zurich, Switzerland, July, 2007, pp. 11-16.
- Dennis P. Groth and Matthew P. Hottell: *How Students Perceive Risk: A Study of Senior Capstone Project Teams*, 20th IEEE Conference on Software Engineering Education and Training (CSEE&T), Dublin, Ireland, July, 2007, pp. 45-54.
- Amanda Stephano, Dennis P. Groth: *USEable Security: Interface Design Strategies for Improving Security*, 3rd International Workshop on Visualization for Computer Security, Fairfax, Virginia, November, 2006.
- Dennis P. Groth: *Visualizing Distributions and Classifier Accuracy*, 10th International Conference on Information Visualization, London, U.K., July, 2006, pp. 389-394.
- Dennis P. Groth and Matthew P. Hottell: *Designing and Developing an Informatics Capstone Project Course*, 19th IEEE Conference on Software Engineering Education and Training (CSEE&T), Oahu, HI, April, 2006, pp. 61-68.
- Benjamin W. Murphy and Dennis P. Groth, *Augmenting Internet Browser History with Contextual Visual Representations*, HCI International Conference, Las Vegas, NV, July, 2005.
- Anthony Faiola and Dennis P. Groth: *Enhancing 3D File Search with Landscapes and Personal Histories: Exploring the Possibilities of TerraSearch+*, 9th International Conference on Information Visualization (IV05), London, UK, July, 2005, pp. 613-618.
- Dennis P. Groth: *Tracking Personal Histories for Knowledge Discovery Tasks*, 1st International Workshop on Exploiting Context Histories in Smart Environments, Workshop at the 2005 Pervasive Computing Conference, Munich, Germany, March, 2005.
- Anthony Faiola, Timothy Altom and Dennis P. Groth, *Integrating the Visualization of Personal Histories of File Usage into 3D Landscapes: Enhancing Desktop File Searching Using TerraSearch+*, HCI International Conference, Las Vegas, NV, July, 2005.
- Dennis P. Groth: *Information Provenance and the Knowledge Rediscovery Problem*, 8th International Conference on Information Visualization (IV04), London, UK, July, 2004, pp. 345-351.
- Sean E. Ellis and Dennis P. Groth: *A Collaborative Annotation System for Data Visualization*, ACM Conference on Advanced Visual Interfaces (AVI), Gallipoli, Italy, May, 2004, pp. 411-414.
- Dennis P. Groth: *An Evaluation of a Rule-Based Language for Classification Queries*, 15th International Conference on Applications of Declarative Programming and Knowledge Management (INAdP), Berlin, Germany, March, 2004, pp. 193-202.
- Dennis P. Groth: *Visual Representation of Database Queries using Structural Similarity*, 7th International Conference on Information Visualization (IV03), London, UK, July, 2003, pp. 102-107.
- Dennis P. Groth: *Visualizing Query Structure*, Proceedings of the 18th ISCA International Conference on Computers and Their Applications (CATA), Honolulu, HI, USA, March 2003, pp.134-138.
- Dennis P. Groth and Edward L. Robertson: *An Integrated System for Database Visualization*, Proceedings of the 6th International Conference on Information Visualization (IV), London, UK, July 2002, pp. 462-467.

Refereed Conference and Workshop Papers (continued)

- Chris M. Giannella, Mehmet M. Dalkilic, Dennis P. Groth and Edward L. Robertson: *Improving Query Evaluation with Approximate Functional Dependency Based Decompositions*, Proceedings of the 19th British National Conference on Databases (BNCOD), Sheffield, UK, July 2002, pp. 26-41.
- Dennis P. Groth and Edward L. Robertson: *An Entropy-Based Approach to Visualizing Database Structure*, The Sixth IFIP Working Conference on Visual Database Systems (VDB), Brisbane, Australia, May 2002, pp. 157-170.
- Dennis P. Groth and Edward L. Robertson: *Discovering Frequent Itemsets in the Presence of Highly Frequent Items*, Rule Based Data Mining Workshop, in conjunction with the 14th International Conference on the Applications of Prolog (INAP), Tokyo, Japan, October 2001, pp. 237-245.
- Dennis P. Groth and Edward L. Robertson: *It's All About Process: Project-Oriented Teaching of Software Engineering*, 14th Conference on Software Engineering Education and Training (CSEE&T), Charlotte, NC, USA, February 2001, pp. 7-17.
- Dennis P. Groth and Edward L. Robertson: *Architectural Support for Database Visualization*, New Paradigms for Information Visualization and Manipulation (NPIV), Washington, DC, USA, November 1998, pp. 53-55.

Edited Books

- Ebad Banissi, Liz Stuart, Mikael Jern, Gennady Andrienko, Francis T. Marchese, Nasrullah Memon, Reda Alhaji, Theodor G. Wyeld, Remo Aslak Burkhard, Georges Grinstein, Dennis P. Groth, Anna Ursyn, Carsten Maple, Anthony Faiola and Brock Craft, Editors: *Proceedings of the 12th International Conference on Information Visualization*, IEEE Computer Society, London, UK, July, 2008.
- Ebad Banissi, Remo A. Burkhard, Georges Grinstein, Urska Cvek, Marjan Trutschi, Liz Stuart, Theodor G. Wyeld, Gennady Andrienko, Jason Dykes, Mikael Jern, Dennis P. Groth and Anna Ursyn, Editors: *Proceedings of the 11th International Conference on Information Visualization*, IEEE Computer Society, Zurich, Switzerland, July, 2007.

Short Papers/Poster Presentations/Demonstrations

- Kayce N. Reed and Dennis P. Groth: *Looking Good on the Web: Evaluating the Visual Impact of Political Websites*, Student Research Competition, ACM Sig-CHI Conference, Florence, Italy, April, 2008.
- Nathan C. Rahn, Youn-Kyun Lim and Dennis P. Groth: *Redesigning Video Analysis: An Interactive Ink Annotation Tool*, Work in Progress, ACM Sig-CHI Conference, Florence, Italy, April, 2008.
- Kayce N. Reed and Dennis P. Groth: *Perception of Congress on the Web: Data Analysis Inspired by the Red Versus Blue United States Map*, Workshop on Social Data Analysis, ACM Sig-CHI Conference, Florence, Italy, April, 2008.
- Dennis P. Groth, Helen H. Hu, Betty Lauer and Hwajung Lee: *Improving Computer Science Diversity through Summer Camps*, ACM Conference on Computer Science Education (SIGCSE), Portland, OR, USA, March, 2008.

Short Papers/Poster Presentations/Demonstrations (continued)

- William R. Hazlewood and Dennis P. Groth: *A Pervasive Computing Workshop for Pre-Collegiate Students: Separating Design and Implementation*, 7th International Conference on Ubiquitous Computing, Orange County, CA, September, 2006.
- Dennis P. Groth and Matthew P. Hottell: *Work in Progress: Informatics Capstones*, Frontiers in Education Conference, Indianapolis, IN, October, 2005.
- Vasudha Chandrasekaran, Dennis P. Groth and Yvonne Rogers: *INFUSE: An Inquiry-Based Field Learning Framework*, 4th International Conference on Interface Design and Children, Boulder, CO, June, 2005.
- Dennis P. Groth and Benjamin W. Murphy: *Tracking User Interactions Within Visualizations*, IEEE Symposium on Information Visualization, Austin, TX, October, 2004.
- Leah Sandvoss and Dennis P. Groth: *Report generator and analysis tool for Reciprocal Net crystallographers*, 226th American Chemical Society National Meeting, New York, NY, September, 2003.
- Leah Sandvoss and Dennis P. Groth: *An Informatics Tool for Crystallography Administrators*, 15th International Conference on Scientific and Statistical Databases (SSDBM), Cambridge, MA, July, 2003, pp. 255-257.
- Dennis P. Groth and Edward L. Robertson: *An Integrated Approach for Database Visualization*, Advanced Visual Interfaces (AVI), Trento, Italy, May 2002, pp. 365-366.

Textbooks

- Dennis P. Groth and Arijit Sengupta: *Introduction to Database Applications: A problem-solving approach*, McGraw-Hill Custom Publishing, 1998.

Technical Reports

- Amanda Stephano and Dennis P. Groth: *USEable Security: Interface Design Strategies for Improving Security*, Indiana University School of Informatics Technical Report, August, 2006.
- Paul W. Purdom, Dirk Van Gucht and Dennis P. Groth: *Average Case Analysis of the Apriori Algorithm*, Indiana University Computer Science, Technical Report No. 529, February, 2003.
- Dennis P. Groth: *Architectural Support for Database Visualization*, Ph.D. Thesis, Indiana University Computer Science, Technical Report No. 561, May, 2002.
- Chris M. Giannella, Mehmet M. Dalkilic, Dennis P. Groth and Edward L. Robertson: *Using Horizontal-Vertical Decompositions to Improve Query Evaluation*, Indiana University Computer Science, Technical Report No. 558, January, 2002.
- Dennis P. Groth and Edward L. Robertson: *It's All About Process: Project-Oriented Teaching of Software Engineering*, Indiana University Computer Science, Technical Report No. 532, 1999.

Grants / Funding – Research

- Knowledge Discovery through Provenance Collection, Representation, and Use in the Lilly Science Grid, April, 2008 – January, 2009, \$67,878 (Co-PI)
- Human Factors Evaluation of IROS3, U.S. Navy, SAIC, December, 2005 –September, 2006, \$90,032 (PI).
- An Itanium2 Environment for Grid-Based Data Mining, Hewlett Packard Corporation, April, 2004 – August, 2005, \$123,080 (PI).
- Collaborative Research: Science of Search: Data Search, Analytics, and Architecture Center (DSAAC), National Science Foundation, July, 2006 – June, 2007, \$10,000 (Senior Personnel).
- Tablet PC, Hewlett Packard, \$3,198 (PI).
- Tablet PC, Microsoft Research, \$2,500 (PI).

Grants / Funding – Teaching and Learning

- Computing with Tablet PC's, Hewlett Packard, December, 2008, \$8,000 (PI)
- Informatics Podcasts, IU Teaching and Learning, April, 2008 – December, 2009, \$3,487 (PI).
- Development of an online Informatics outreach website, SBC Excelerator Program, January, 2005 – December, 2006, \$25,000 (PI).
- Integrating Project Management Tools and Techniques with OnCourse CL, IU SBC Fellows Program, March, 2006 – December, 2006, \$15,000 (PI).
- Enhancing the Capstone Experience for Informatics Undergraduate Students, IU Summer Instructional Development Fellowship Program, June, 2007 – August, 2007, \$8,000 (PI).
- Examining the Relationship between Perceived Project Risk and the use of Collaborative Learning Environments, IU SBC Fellows Program, October, 2005 – March, 2006, \$3,800 (PI).
- Transitioning Capstone Projects to OnCourseCL and ePortfolio, IU SBC Fellows Program, June, 2005 – September, 2005, \$2,500 (PI).
- Access versus Effective Use of Technology in a High Needs Elementary School, Smarter Kids Foundation, April, 2006 – June, 2006, \$2,100 (PI).
- IU Service Learning Fellowship, Community Outreach and Partnership for Service Learning, October, 2005, \$1,000 (PI).

Awards

- Indiana University Summer Instructional Development Fellow, 2007
- First Finalist - State of Indiana Techpoint Mira Award for Contribution to Technology Education, 2006
- Indiana University SBC Fellow - Implementing Innovation, 2006
- Nomination for Indiana University Students Choice Award, 2006
- Indiana University Trustees Award for Teaching Excellence, 2005
- Indiana University SBC Fellow - Preparing for Innovation, 2005
- Indiana University SBC Fellow - Examining Innovation, 2005
- Indiana University Service Learning Fellow 2005
- Nomination for Indiana University Students Choice Award, 2005
- Nomination for Indiana University Students Choice Award, 2004
- Indiana University School of Informatics Teaching Excellence Award, 2003
- Indiana University Computer Science Teaching Excellence Award, 1999

Affiliations

- ACM, IEEE, SIAM, IV Society

Service

School and Department Level Committees and Service

Informatics Facilities Committee (2002-2003, 2003-2004, 2004-2005, 2006-2007, 2007-2008)

Informatics Academic Council (2006-2007, 2007-2008)

Chair – Informatics Undergrad Program Committee (2006-2007, 2007-2008)

Informatics Undergrad Program Committee (2002-2003, 2003-2004, 2004-2005, 2005-2006)

Co-Chair Undergraduate Education Strategic Planning Committee (2007)

Diversity Strategic Planning Committee (2007)

Informatics Merit Review Committee (2005)

Informatics Corporate Outreach Taskforce (2002-2003, 2003-2004, 2004-2005)

Faculty sponsor for the Informatics club (2003-2004, 2004-2005)

Graduate Student Orientation (2003, 2004, 2005, 2006)

New Faculty Orientation (2003, 2004, 2005)

Undergraduate Enrollment Task Force (2005)

Diversity Committee (2006-2007)

Informatics Diversity Recruitment (2004-2005)

Diversity Hiring Committee (2003-2004)

Data and Information Hiring Committee (2003-2004)

HCI Director Hiring Committee (2004-2005)

Career Services Associate Director Hiring Committee (2006)

Career Services Director Hiring Committee (2007)

Informatics Organizational Structure Committee (2006)

University Level Committees and Service

Bloomington Faculty Council (2005-2007, 2007-2009)

University Faculty Council (2006-2007, 2007-2008)

Chair - Bloomington Technology Policy Committee (2006-2007, 2007-2008)

Co-Chair - Indiana University Technology Policy Committee (2006-2007, 2007-2008)

University Information Technology Services Quality Council (2007-2008)

Bloomington Technology Policy Committee (2005-2006)

Research Institute Review Committee for AISRI (2002)

Professional Service

PC Member: Intl Information Visualization Conf. (2004, 2005, 2006, 2007)

Symposium Chair: HCI and Information Visualization (2005, 2006, 2007)

Symposium Chair: Visual Data Mining (2005, 2006, 2007)

Grant Reviewing Service

NSF Proposal Review Panelist (2004, 2005, 2006, 2007)

Indiana 21st Century Fund Proposal Reviewer (2006)

France-Berkeley Fund (2007)

Reviewer: Communications of the ACM, Annual Review of Information Science and Technology (ARIST), International Information Visualization Conference, Computer Graphics, Imaging and Visualization Conference, Conference on Human Factors in Computing (CHI), User Interface System Technology (UIST), Journal of Digital Libraries, Journal of Data and Knowledge Engineering, Transactions on Information Systems (TOIS), and many others.

Courses Taught at Indiana University

Course	Term	Enrollment	Grad/Undergrad
I494 – Capstone 1	Fall 2008	70	Undergrad
B669/I590 – Data and Search	Spring 2008	33	Grad
I590 – Visual Analytics	Spring 2008	25	Grad
I495 – Capstone 2	Spring 2008	83	Undergrad
I450 – Capstone 1	Fall 2007	85	Undergrad
I451 – Capstone 2	Spring 2007	78	Undergrad
I450 – Capstone 1	Fall 2006	78	Undergrad
I451 – Capstone 2	Spring 2006	104	Undergrad
I450 – Capstone 1	Fall 2005	106	Undergrad
I451 – Capstone 2	Spring 2005	111	Undergrad
I450 – Capstone 1	Fall 2004	115	Undergrad
I451 – Capstone 2	Spring 2004	132	Undergrad
I450 – Capstone 1	Fall 2003	138	Undergrad
I451 – Capstone 2	Spring 2003	61	Undergrad
I450 – Capstone 1	Fall 2002	65	Undergrad
I590 – Informatics Tech	Fall 2002	19	Grad
I451 – Capstone 2	Spring 2002	15	Undergrad
I450 – Capstone 1	Fall 2001	16	Undergrad
I111 – Intro to Databases	Spring 2001	68	Undergrad
P466/566 – SW Eng 2	Spring 1998	21	Grad/Undergrad
B666 – SW Eng Mgmt 2	Spring 1998	2	Grad
P465/566 – SW Eng 1	Fall 1997	32	Grad/Undergrad
B665 – SW Eng Mgmt 1	Fall 1997	2	Grad

Graduate Capstone/Thesis Supervision

Student	Year	Area	Current Location
Kayce Reed	2008	MS/HCI	Interaction Design, Bloomington, IN
Erik Johnson	2008	MS/HCI	Interaction Design, Chicago, IL
Eldridge Doubleday	2007	MS/HCI	Interaction Design, Bloomington, IN
Vamsi Gadey	2007	MS/HCI	Interaction Design, Ebay, San Jose, CA
Dave Kintgen	2007	MS/HCI	Consultant, Cyber, Indianapolis, IN
Jackie Bauer	2006	MS/HCI	Interaction Design, SiteWorx, Reston, VA
Amanda Stephano	2006	MS/HCI	Consultant, Accenture, Chicago, IL
Vasudha Chandrasekaran	2005	MS/HCI	User Experience, Microsoft, Redmond, WA
Ben Murphy	2005	MS/HCI	Interaction Design, Abelson-Taylor, Chicago, IL
Sean Ellis	2004	MS/HCI	CTO, XPert Solutions, Grand Rapids, MI
Megan Lewis	2004	MS/HCI	Student, IU Law, Bloomington, IN
Christie Flynn	2004	MS/HCI	Interaction Design, Intel, Portland, OR
Paul White	2004	MS/Bioinformatics	SW Support, IU, Bloomington, IN

Membership on PhD Advising Committees

Student	Graduated	Area	Note
John Springer	2007	CS	Database views and enterprise architecture
Steven Bogearns	2007	CS	Case-based reasoning
Nithya Vijayakumar	2007	CS	Grid computing and workflows
Ben Markines	current	CS	Web Structure, Search, and Visualization
Le-Shin Wu	current	CS	Peer-to-peer information retrieval
Fulya Erdinc	current	CS	Information Retrieval / Semantic Search

Curriculum and Outreach Development

- 1) Designed the undergraduate capstone course sequence. Undergraduate capstones are almost group (2-4 students) projects, all of which have been supervised by me. The following table provides a listing of the undergraduate capstone projects that I have supervised. In total, I have supervised 518 undergraduate seniors working on over 120 capstone projects.

2007	Hospital Physician Portal	Wireless Access GIS System	Sports Team/League Management Database	POS for local store
	RFID for Little 500 Race	Website for Restaurant Menu	Game Mod for Warcraft	Audio Streaming System
	Video Production	Multi-Projector Display Automation System	Report Tool for local business	E-Learning for sales force training
	Website for hobby store	Dynamic web page construction prototype	3D Animated Movie Scene	Land Development System
	Website for Introductory Course	Civic Engagement Portal		
2006	Civic Engagement Portal	Big Brothers/Sisters Website	Hospital Workflow	Congress Website
	Unreal Game Mod	Court System Analysis	Capstone Archive	iCycle RFID for Little 500
	Sakai Dashboard	Middleway House Website	Children's Museum Interactive Tour	Internet Parental Control System
	Affinity Card System	Waveform Analysis and Matching	Alumni Website	Personal Training Website
	Resume Building	Strategy Game	Clothing Store System	Soundproof Talent Show
	Radio Station Website	Basketball Tournament Bracket System	School Virtual Tour	Retirees Volunteer Program Site
	Rhinos Youth Club Site	Visual Search of Web Information		
2005	Adaptive Technology Center	Automated Route Finder	Civic Engagement Portal	Bioinformatics
	Biometrics	Bank Inventory System	Online Poker Game	Daphnia Phylogenetics
	Data Mining for Geology	Website Templates	Interactive 2D Flash Game	Informatics Concepts
	Outdorr Enthusiasts Website	Automated Work-Flow System	CD ROM Recruiting	Online Restaurant Menus
	Midi Sharing	Network Consulting	StopCampusRape.com	Real Estate Website
	Reunion Website	RFID Personnel Tracking	Bumper Sticker Website	Multimedia Tour for Local Factory
	Unreal Game Mod	Real Estate Consulting	Financial Mgmt System	Video Conferencing Analysis
2004	Arabidopsis Gene Mutation Analysis	Biological Data Management System	NeJame Pool Co. Website	CollegeRent
	Multimedia PC Custom Control	Exact Target Plugin	Eye Tracking HCI Study	Family Literacy Project
	Gaze Tracking Human Factors	Informatics Concepts	International Student Services	Integrated Radar System Analysis
	IU Community E-Learning	IU Community Building System	IU Optician/Technician	IU Students for Life
	IU Sublease	IU Dance Marathon Registration	Waste Management Database	Event Calendar
	Option 6 E-Learning	Rate Your Landlord	Sales Force Management	StopCampusRape.net
	Game MOD for Neverwinter Nights	TeamShare Collaboration	Tibetan Cultural Center Website	Vance Music Center Website
	Virtual Tour for Collins Center	Wonderlab Website		
2003	Business Simulation	Business Analysis	Campus News	Capstone Journal
	Cosmetics Store	Course Management Database	Dentist Website	Dorm Satisfaction Survey System
	WAP Bus Schedule	Historical Document Digital Library	SCUBA Store	Sheriff Reporting
	Software Repository	Auction System	Unreal Game MOD	Video Rental
	Wireless Startup Company			
2002	Hallmark Rentals Database	Plant Library	President's Physical Fitness Program	Resume Database

- 2) Developed and direct the Informatics summer camp. This camp is designed to introduce high school students to the broad area of Informatics. Students are predominantly from groups traditionally under-represented in information technology (ethnic minorities, low-income, first generation, and women). The camp has expanded each year, and has received partial support from the Dr. Mike Mirro Foundation, as well as the John Deere Foundation.

	2004	2005	2006	2007
# of Students	10	18	32	36
States	Indiana	Indiana Tennessee Illinois	Indiana N. Carolina Kentucky Illinois Hawaii Ohio	Indiana N. Carolina Illinois

Students attending the Informatics summer camp

- 3) Developed and deliver introductory and hands-on lab experiences for the IU Pathfinders summer camps. These students from middle schools and high schools are also from groups traditionally under-represented in information technology (ethnic minorities, low-income, first generation, and women). Over the last 4 years I have hosted over 500 students for these introductory sessions.
- 4) Developed an introduction to bioinformatics for high school students (also traditionally underrepresented) attending the Jim Holland Summer Enrichment program in Biology. This activity started in 2003, and has involved more than 200 students in the last 4 years. Co-delivered the material with Dr. Mehmet Dalkilic in 2005 and 2006.
- 5) Developed an introductory elective for the IU Groups program. The IU Groups program brings students to campus the summer prior to their freshman year for a six week course of study on mathematics, composition and general study skills. The Groups program prepares students that are considered at a higher risk for not completing the Baccalaureate, and is drawn from a predominantly first generation, ethnic minority and low income population of students. The informatics elective has been very popular with the students and has led to increased interest in the Informatics and Computer Science programs. Students in 2006 continued into Informatics courses at a higher than 50% rate.

	2005	2006	2007
# of Students	12	15	17

Students enrolled in Informatics summer elective for IU Groups program.

Industrial Experience

Prior to entering graduate school, I had substantial industry experience. Highlights from this experience are below:

1995 – 1996 Independent Software Development Consultant

- Designed and developed custom client/server applications, primarily within the pharmaceutical industry.

1994 – 1995 Director, Crawford Consulting, Inc.

- Responsible for Chicago regional business activities, including:
 - Customer and Proposal management
 - Hiring and staff development
- Researched and performed due diligence review for acquisition of a software company.

1990 – 1994 Manager, Systems Development, Moore Advanced Services, a Unit of Moore Business Forms

- Designed and developed electronic form based systems as the major component of a strategy to assist customers of Moore Business Forms decrease their reliance on pre-printed business forms.
- Managed five separate development groups in different geographical locations simultaneously.
- Provided presentations to customers and prospective business partners in support of sales activity. Presented technical and strategic topics at several professional seminars, including, XPLOR and Uniface user group.
- Developed annual strategic plan for system development, including financial, resource and product planning.
- Designed and developed an EDI ANSI X.12 based supply chain management system. With two coworkers, received U.S. Patent #5694551 for the system process.

1984 – 1990 Project Manager, Spectrum Healthcare Solutions, a Partnership of Baxter Healthcare and IBM Corporations

- Managed a team of programmers and analysts developing remote electronic linkages between physician offices and hospital systems. Implemented solutions at more than 75 major health care facilities.
- Managed a team of programmers developing electronic insurance claim processing software.
- Developed the IBM Doctor's Office Manager System physician practice management system. Systems were sold to more than 10,000 offices.

1983 – 1984 Consultant, Andrea Data Systems

- Developed custom applications for the wholesale distribution industry.