Robert N. Talbert

Grand Valley State University
Department of Mathematics
A-2-168 Mackinac Hall
Allendale, MI 49401

Phone: 616.331.8968
Email: talbertr@gvsu.edu
Twitter: @RobertTalbert
Homepage: http://rtalbert.org

Areas of Interest

Cryptography, category theory, computer science; scholarship of teaching and learning including the inverted classroom, peer instruction, and use of technology to support active learning environments.

Education

Ph.D. Mathematics, Vanderbilt University, 1997. Dissertation: *Stratified and equivariant homology via homotopy colimits*, advised by Efstratios Prassidis. Areas of emphasis: Algebraic and geometric topology, category theory, ring theory, lattice theory, universal algebra.

M.S. Mathematics, Vanderbilt University, 1994. Qualifying paper: *The Leray-Serre spectral sequence, equivariance, and cohomology*.

B.S. Mathematics (*magna cum laude in cursu honorum*), Tennessee Technological University, 1992.

Awards

Distinguished Educator Award, American Society for Engineering Education Mathematics Division, 2015.

Pew Teaching with Technology Award, Grand Valley State University, 2015.

Nominee from GVSU for Michigan Distinguished Professor of the Year, 2015.

Employment

Associate Professor of Mathematics, Grand Valley State University 2011–present.

Assistant/Associate Professor of Mathematics and Computing Science, Franklin College 2001–2011.

Assistant Professor of Mathematics, Bethel College (Indiana) 1997–2001.

Master Teaching Fellow, Vanderbilt University Center for Teaching 1996–1997.

Adjunct Faculty, Nashville State Community College 1995–1996.

Graduate Teaching Scholar, Vanderbilt University 1993–1997.

Teaching

Courses taught or scheduled at GVSU

MTH 201 (Calculus); MTH 202 (Calclulus 2); MTH 203 (Calculus 3); MTH 210 (Communicating in Mathematics); MTH 225 (Discrete Structures for Computer Science 1); MTH 227 (Linear Algebra 1); MTH 310 (Modern Algebra); MTH 312 (Cryptography and Privacy); MTH 325 (Discrete Structures for Computer Science 2); MTH 410 (Modern Algebra 2).

Directed student projects at GVSU

Elliptic curve cryptography (Christopher Grow, Winter 2012 for MTH 499).

Fixed points and 2-cycles in columnar transposition ciphers (Beth Bjorkman, Summer 2012 for McNair Scholars Program and Fall 2012 for MTH 496).

Courses taught prior to GVSU

Franklin College: Quantitative Reasoning; Functions and Models; Calculus; Calculus II; Calculus III; Differential Equations; Linear Algebra; Methods of Problem Solving; Topics in Geometry; Modern Algebra; Special Topics (Cryptology); Computer Tools for Problem Solving; Operations Research; Cryptology, Privacy and Leadership; The Life and Works of C.S. Lewis.

Bethel College: College Algebra; Applied Calculus; Calculus I; Calculus II; Calculus III; Differential Equations; Modern Geometry; Abstract Algebra I; Abstract Algebra II; Topology; Christianity and the Life of the Mind.

Vanderbilt University: Calculus for Business and Life Science; Calculus I and II (liberal arts track); Calculus I and II (Science and Engineering track); Calculus III (Science and Engineering track).

Nashville State Community College: Algebra; Elementary Statistics; Business Mathematics.

Directed student projects prior to GVSU

Risk management and forecasting; Hyperbolic geometry and trigonometry; Elliptic curve cryptography; Computer investigations in geometry; Technology law; Geometry in art, architecture, and nature; Introduction to number theory; Mathematical methods in artificial intelligence; Taxicab geometry; Finite fields and applications; Computer modeling of hyperbolic geometry.

Scholarship

Scholarship in progress

Flipped Learning in the University Classroom: A Users Guide. Book in progress, Stylus Publications (estimated publication date in 2017).

Effects of flipped instruction on university remedial mathematics students with learning disabilities (with Amy Schelling, College of Education).

Cognitive and metacognitive effects of flipped instruction in university Calculus (with Marcia Frobish, Mathematics Department).

Self-study: The λ-calculus, type theory, and functional programming.

Article in preparation: Talbert, R. (2014) Technology as a tool for self-regulated learning in an inverted calculus course. Currently seeking publication venue.

Peer-reviewed publications

Talbert, R. (2015) "Flipped Calculus: A Gateway to Lifelong Learning in Mathematics". In *Best Practices for Flipping the College Classroom*, J. Waldrop and M. Bowdon, editors, Routledge Press, 29–43.

Bjorkman, B. and Talbert, R. (2015) Fixed points of columnar transpositions. *Journal of Discrete Mathematical Sciences and Cryptography* 18(5):541–557.

Talbert, R. (2015) Inverting the transition-to-proof course. *PRIMUS: Problems, Resources, and Issues in Undergraduate Mathematical Studies* 25(8):614–626.

Talbert, R. (2014) The inverted classroom in introductory calculus: Best practices and potential benefits for the preparation of engineers. *Proceedings of the American Society for Engineering Education 2014 Annual Conference*. **Winner of Best Paper Award 2014, ASEE Mathematics Division.**

Talbert, R. (2013) Inverting the linear algebra classroom. Inverting the linear algebra classroom. *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 24:5, 361-374, DOI: 10.1080/10511970.2014.883457

Talbert, R. (2013) Learning MATLAB in the inverted classroom. *Computers in Education Journal*, **4**(2): 89–100.

Talbert, R. (2006) The cycle structure and order of the rail fence cipher. *Cryptologia*, **30**(2):159–172.

Talbert, R. (1999) An isomorphism between Bredon and Quinn homology via homotopy colimits. *Forum Mathematicum*, **11**:591–616.

Other publications

Talbert, R. (2015) "Four Assessment Strategies for the Flipped Learning Environment". *Faculty Focus*, 10 August 2015, `http://bit.ly/1OtJ8Zi`.

Talbert, R. (2012) The inverted classroom. *Colleagues*, Vol. 9: Iss. 1, Article 7. `http://scholarworks.gvsu.edu/colleagues/vol9/iss1/7/`.

Talbert, R. (2011) Using MATLAB to teach problem-solving techniques to first-year liberal arts students. *Mathworks News and Notes*, Fall issue.

Gash, J. and Talbert, R. (2011) Integrating spreadsheets, visualization tools, and computational knowledge engines in a liberal arts calculus course. *Proceedings of the Twenty-Second International Conference on Technology in Collegiate Mathematics*: `http://archives.math.utk.edu/ICTCM/i/22/C004.html`.

Talbert, R. (2011) Teaching MATLAB to a non-canonical audience. *Proceedings of the Twenty-Second International Conference on Technology in Collegiate Mathematics*: `http://archives.math.utk.edu/ICTCM/i/22/C006.html`.

Talbert, R. (2009) A tale of two wikis: Upper-level mathematics meets Web 2.0.*Proceedings of the Twentieth International Conference on Technology in Collegiate Mathematics*: `http://archives.math.utk.edu/ICTCM/i/20/C009.html`.

Book reviews

Integrating Educational Technology into Teaching by M.D. Roblyer, for Pearson, Inc., December 2015.

Virtual Reality and Animation for MATLAB and Simulink Users: Visualization of Dynamic Models and Control Simulations for INFORMS Journal on Computing: `http://www.informs.org/Pubs/IJOC/Book-Reviews/Volume-24-2012`.

Elliptic Curves: Number Theory and Cryptography for MAA Reviews, `http://tinyurl.com/4cr5r3`, 22 August 2008.

Finite Fields and Applications for MAA Reviews, `http://tinyurl.com/4w5eqt`, 21 May 2008.

Online publications

Author of **Casting Out Nines** blog (`http://rtalbert.org/blog`), on mathematics, teaching, and technology. The blog was a sponsored publication of the *Chronicle of Higher Education* until August 2015 (`http://chronicle.com/blognetwork/castingoutnines`).

Monthly contributor to **re:Learning** blog (formerly *Wired Campus*) on teaching with technology, published by the *Chronicle of Higher Education*.

Invited talks, workshops, and panel participation

"Specifications Grading: Restructure Assessments for Your College Course". Webinar through Higher Ed Hero, December 2015.

"Adventures in Online Calculus". Invited talk to Valparaiso University Mathematics Department Colloquium, Valparaiso, IN December 2015. `http://rtalbert.org/adventures`

"Adventures in Online Calculus". Invited talk to GVSU Mathematics Department seminar, Allendale, MI December 2015. `http://rtalbert.org/adventures`

Facilitator, GVSU Faculty Teaching Roundtable on standards-based and specifications grading, Allendale, MI November 2015.

"Flipped learning workshop". Workshop for Technology Enhanced Instruction Community of Practice, PATH Group, Bethlehem, PA October 2015.

"Twenty-First Century Technology for Twenty-First Century Learners". UWI/Guardian Group Premium Teaching Open Lecture, Kingston, Jamaica October 2015.

"Teaching with Technology: Reimagining the University Classroom for the 21st Century". Workshop for faculty at the University of the West Indies, Kingston, Jamaica October 2015.

"Rethinking Class Time Using Accessible Technology". Invited keynote, Kansas City Regional Mathematics Technology Expo, Kansas City, MO October 2015.

"Crafting a Sustainable Career through Better Teaching". Invited address, Missouri Section Project NExT, Kansas City, MO October 2015.

"Creating Flipped Learning Experiences in the College Mathematics Classroom". Two-day minicourse offered at MAA MathFest, Washington, DC August 2015.

"Assessment Strategies for Flipped Learning Experiences". Webinar through Magna Publications, September 2015.

"Implementing and Assessing Flipped Learning in Face-to-Face and Online Contexts". Invited keynote, Hybrid Learning Network, Holland, MI June 2015.

"An ABC for Effective Flipped Learning". Invited keynote, Innovation Insights in Quantitative Business, Toronto, Canada May 2015.

"Self-Regulated Learning in the Calculus Classroom". Invited address to Project ADVANCE cohort, Syracuse and New York City, NY May 2015.

"Best Practices in Flipped Learning Design", Webinar for Magna Publications, March 2015.

"Exploring the flipped learning model". Workshop given to faculty at Lenoir-Rhyne University, Hickory NC January 2015.

"Exploring the flipped learning model". Workshop given to faculty at Wilfrid Laurier University, Waterloo ON December 2014. `http://roberttalbert.github.io/wlu`

"Students at the center: The why and the how of student-centered, inquiry-focused instruction." Keynote presentation to faculty at Lenoir-Rhyne University, Hickory NC January 2015. `http://roberttalbert.github.io/lenoirrhyne`

Three videos on the role of lecture and construction of screencasts for *An Introduction to Evidence-Based Undergraduate STEM Teaching*, massively open online course offered through Coursera, October–December 2014.

"(Re:)Designing Class for Flipped Learning Experiences". Invited talk to faculty at California Polytechnic University, San Luis Obispo CA October 2014. `http://roberttalbert.github.io/calpoly`

"Flipping the college classroom". Webinar given through Higher Ed Hero, October 2014.

"Formative pre-assessment in a flipped mathematics class using online tools". Invited talk to faculty at Leeds University, Leeds, UK (online), September 2014. `http://roberttalbert.github.io/leeds`

"(Re:)Designing Class for Flipped Learning Experiences". Webinar to faculty at Mount Aloysius College (PA), September 2014. `http://roberttalbert.github.io/mtaloysius`

Workshop facilitator on the flipped classroom, GVSU Fall Teaching Conference, Grand Rapids, MI August 2014.

"Flipping the university mathematics classroom: A gateway to lifelong learning." Invited keynote address at Workshop on Innovations in University Mathematics Teaching, Cardiff University, Cardiff, Wales UK July 2014. `http://roberttalbert.github.io/cardiffuniv`

"The conditions for invention: Using educational technology to make us more human". Plenary address, Appalachian College Association Teaching and Learning Institute, Hickory, NC June 2014.

"(Re:)Designing class for flipped learning experiences". Workshop given at at Appalachian College Association Teaching and Learning Institute, Hickory, NC June 2014.

"Four things I wish I had known about the flipped classroom". Keynote address to faculty at Ecole Centrale Paris, Paris, France (online) June 2014.

Plenary speaker and instructor-in-residence, Appalachian College Association Teaching and Learning Institute, Hickory, NC June 2014.

Workshop on flipping the classroom for GVSU faculty, with Matt Roberts. Grand Valley State University, Grand Rapids, MI May 2014.

Facilitator, Workshop on the inverted classroom. Delta College, University Center, MI February 2014.

Panelist, "Assessment in Non-Traditional Classrooms". Joint Meetings of the AMS/MAA, Baltimore, MD January 2014.

Facilitator, roundtable discussion on the flipped classroom, GVSU Faculty Teaching Roundtable, November 2013.

"Deconstructing columnar transposition ciphers". Mathematics Colloquium, Hope College, Holland, MI November 2013.

"Deconstructing columnar transposition ciphers". Mathematics Colloquium, Andrews University, Berrien Springs, MI October 2013.

"The inverted classroom and peer instruction: Designing classes for meaningful learning experiences." Keynote address, Michigan Mathematical Association of Two-Year Colleges, Auburn Hills, MI October 2013.

"Giving your class an inverted classroom makeover". Workshop for Michigan Mathematical Association of Two-Year Colleges, Auburn Hills, MI October 2013.

"Flipping the college classroom: Transforming students into active learners". Webinar for the Higher Ed Hero network, October 2013.

"Better learning through voting". Workshop at Ferris State University, Big Rapids, MI August 2013.

"Teaching and learning in the inverted classroom". Workshop for faculty retreat at Lindsey Wilson College, Columbia, KY August 2013.

"Teaching human beings". Plenary address, Appalachian College Association Teaching and Learning Institute, Ferrum, VA June 2013.

"Inverting the classroom to improve student learning and engagement". Workshop given at at Appalachian College Association Teaching and Learning Institute, Ferrum, VA June 2013.

Participant in panel discussion on inquiry-based learning, Indiana MAA Section meeting, Indianapolis, IN October 2012.

"Flip Your College Classroom: Increase Engagement and Experiential Learning". Webinar given through Higher Ed Hero network, October 2012.

"Finding your next job". Panel discussion presentation on Issues for Early Career Mathematicians, Mathematical Association of America MathFest, Madison, WI August 2012.

"Five questions about columnar transposition ciphers". Guest presentation to Mathematics REU participants, Grand Valley State University, June 2012.

"Flipping the Classroom: Overturning the Traditional Lecture". Webinar given with Ike Shipley for The Blended Librarian, May 2012.

"Flipping the College Classroom." Webinar sponsored by Cengage Learning, March 2012.

"Flipping the College Classroom." Webinar given through American Mathematical Association of Two-Year Colleges, September 2011.

"Inverting the Classroom, Improving Student Learning". Presentation to graduate student teaching seminar, Mathematics Department, Indiana University Purdue University Indianapolis, Indianapolis, IN, March 2011.

"Inquiry-Based MATLAB for General First-Year Students". International Conference on Technology in Collegiate Mathematics, Denver, CO, March 2011. `http://bit.ly/g9ob42`

"Using Web-Based Presentation Tools to Promote Visual Thinking". Workshop given at the Center for Research on Learning and Teaching, University of Michigan, Ann Arbor, MI, January 2011. `http://bit.ly/eI081T`

"Deconstructing Columnar Transposition Ciphers". Department of Mathematical Sciences Faculty Colloquium; Ball State University, Muncie, IN, April 2009. `http://www.slideshare.net/rtalbert/deconstructing-columnar-transposition-ciphers`

"The Digital Signature Algorithm". Guest lecture to MATH 390: Cryptography; Benedictine University, Lisle, IL, April 2008.

"Protecting Ourselves with Mathematics: An Overview of Cryptology". PBenedictine University Math Club; Benedictine University, Lisle, IL, April 2008.

Contributed talks

"Flipped Infrastructures for Inquiry-Based Learning". Legacy of R.L. Moore/IBL Conference, Austin, TX June 2015.

"The inverted classroom in introductory calculus: Best practices and potential benefits for the preparation of engineers." Mathematics Division paper session, American Society for Engineering Education annual conference, Indianapolis, IN June 2014.

"Peer instruction in linear algebra". Session on Innovative and Effective Ways to Teach Linear Algebra, Joint Meetings of AMS/MAA, Baltimore, MD January 2014.

"A different kind of math: Addressing student difficulties with proof by flipping the transition-to-proof course". Session on Flipping the Classroom, Joint Meetings of AMS/MAA, Baltimore, MD January 2014.

"Technology as a tool for self-regulated learning in an inverted calculus class". Session on Teaching With Technology: Impact, Evaluation, and Reflection, Joint Meetings of AMS/MAA, Baltimore, MD January 2014.

"Inverting the transition-to-proof course". Session on Research on the Teaching and Learning of Undergraduate Mathematics, Joint Meetings of AMS/MAA, Baltimore, MD January 2014.

"Clickers without the clickers: Using the web and students' personal devices for classroom response." GVSU Fall Teaching and Learning Conference, Grand Rapids, MI August 2013.

"Making student learning visible in real time with peer instruction and web-based classroom response systems". GVSU Scholarship of Teaching and Learning Academy, Grand Rapids, MI May 2013.

"Transitioning to proofs in the inverted classroom". Mathematical Association of America, Michigan Section meeting, Sault Ste. Marie, MI May 2013.

"Using iPads to enhance the teaching and learning of mathematics". GVSU Math in Action, Allendale, MI February 2013.

"Learning MATLAB in the inverted classroom." American Society for Engineering Education Annual Conference, San Antonio, TX June 2012.

"Classroom response systems in mathematics: Learning math better through voting". GVSU Math in Action, Allendale, MI February 2012.

"Making proofs click: Classroom response systems in transition-to-proof courses". American Mathematical Society/Mathematical Association of America Joint Meetings, Boston, MA January 2012.

"So you created a screencast. Now what?" Techsmith, Inc. ScreencastCamp 2011, Okemos, MI August 2011.

"Inquiry-based MATLAB for general first-year students". International Conference on Technology in Collegiate Mathematics, Denver, CO March 2011.

"Inverting the linear algebra classroom". American Mathematical Society/Mathematical Association of America Joint Meetings, New Orleans, LA January 2011.

"A brief fly-through of cryptology for first-year students using active learning and common technology". American Mathematical Society/Mathematical Association of America Joint Meetings, New Orleans, LA January 2011.

"Teaching MATLAB to a Non-Canonical Audience". International Conference on Technology in Collegiate Mathematics, Chicago, IL March 2010.

"Integrating Spreadsheets, Visualization Tools, and Computational Knowledge Engines in a Liberal Arts Calculus Course" (with J. Gash). International Conference on Technology in Collegiate Mathematics, Chicago, IL March 2010.

"A Tale of Two Wikis: Upper-Level Mathematics Courses meet Web 2.0". International Conference on Technology in Collegiate Mathematics, San Antonio, TX March 2008.

List of contributed talks prior to 2008 available upon request

Books

Talbert, R. (2007) *Test Bank* to accompany *A Mathematical View of Our World*. Thomson Higher Education, Belmont, CA 2007.

Online course materials

Jupyter notebooks for MTH 325: Discrete Structures for Computer Science 2. Created during Winter 2016 semester. Repository at `https://github.com/RobertTalbert/discretecs/tree/master/lessons`.

Screencasts for MTH 201: Calculus. `http://bit.ly/GVSUCalculus`. Created collaboratively in August-November 2013 with Prof. Marcia Frobish.

Screencasts for MTH 210: Communicating in Mathematics. `http://www.youtube.com/playlist?list=PL2419488168AE7001`. Created July-November 2012.

Grants

Michigan Association for Computer Users in Learning Grant, "Technology for the Implementation of Peer Instruction and Interactive Engagement Pedagogies in Calculus and Discrete Structures", June 2014, $1200.

GVSU Center for Scholarly and Creative Excellence, Dissemination Grant, May 2014, $750.

Co-Principal Investigator (with Scott Grissom, Shannon Biros, and Shaily Menon), National Science Foundation WIDER grant DUE-1256384, "EAGER: GVSU Inventory of Instructional Practices" September 2012, $137,893.

GVSU Pew Technology Enhancement Grant 13-250, "Implementing a Bring-Your-Own-Device Classroom Response System in Linear Algebra" October 2012, $2510.

GVSU Center for Scholarly and Creative Excellence, Faculty Scholarly Dissemination Grant-in-Aid, January 2012, $500.

Service

Regional, national, and international service activities

Editorial board, *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 2015–present.

Chair, *ad hoc* committee on social media, Mathematical Association of America, 2016.

Associate editor, *Fields Mathematics Education Journal*, 2014–present.

Guest co-editor, Special Issue on Teaching with Technology, *PRIMUS: Problems, Resources, and Issues in Mathematics Undergraduate Studies*, 2014.

Chair, American Society for Engineering Education Mathematics Division 2013–2014.

Program Chair and Chair-elect, American Society for Engineering Education Mathematics Division, 2012–2013.

Director of Mathematical Association of America Project NExT, Michigan Section 2013–2014.

Editorial review board member of *Mathematics Exchange* journal 2010–present.

GVSU service activities

Faculty Teaching and Learning Center Advisory Council, 2014–present; chair 2015–2016.

University Academic Policy and Standards Committee, 2014–present.

Mathematics Department Student Affairs Committee, 2014–present, chair 2015–2016.

Faculty advisor, National Society of Collegiate Scholars GVSU chapter, 2014–2015.

Leader of Faculty Learning Community on the Inverted Classroom, 2013–2014.

Department Web Administrator, Mathematics Department 2012–2014.

Instructional Resources Coordinator, Mathematics Department 2011–present.

Social Media coordinator, Mathematics Department 2011–2015.

Seminar Coordinator, Mathematics Department 2011–2012; Co-Coordinator 2013–2014.

New faculty mentor, Mathematics Department, 2013–2014.

Election Committee (*ad hoc* to coordinate special election to fill Assistant Chair position), Mathematics Department Winter 2013.

Mathematics Department Curriculum Committee, 2012–2013.

Service activities prior to GVSU

Director, Dual-Degree Program in Engineering, Franklin College 2006–2011.

Promotion and Tenure Committee, Franklin College 2006–2011 (Chair, 2008–2009).

Mentor, High School Dual-Enrollment Programs, Franklin College 2007–2010.

Curricular Assessment and Planning Committee, Franklin College 2002–2006 (Chair, 2003–2006).

Administrative Committee, Bethel College 1999–2001.

Strategic Planning Committee, Bethel College 1998–2001.

Director, Honors Program, Bethel College 1998–2001.

Financial Aid Committee, Bethel College 1997–1998.

Professional Development

Coursework

Introduction to Functional Programmng. Online course offered by edX; completed with certificate January 2015.

The Data Scientist's Toolbox. Online course offered by Coursera; completed November 2014.

Programming Foundations with Python. Online course offered by Udacity; completed September 2014.

CS 215: Algorithms. Online course offered by Udacity; completed with certificate with highest distinction May 2014.

History and Future of (Mostly) Higher Education. Online course offered by Duke University through Coursera; completed with certificate with distinction January 2014.

Cryptography I. Online course offered by Stanford University through Coursera; completed with certificate August 2013.

Securing Digital Democracy. Online course offered by the University of Michigan through Coursera; completed with certificate December 2012.

CS 101: Introduction to Computer Science. Online course offered by Udacity; completed with certificate April 2012.

Workshops and minicourses

The mathematics of paper folding. Mathematical Association of America MathFest, Madison, WI August 2012.

Discrete and computational geometry. American Mathematical Society/Mathematical Association of America Joint Meetings, Boston, MA January 2012.

Getting started in engineering education research. American Society for Engineering Education minicourse, Louisville, KY, June 2010.

New course development

MTH 225 and MTH 325, Discrete Structures for Computer Science 1–2, development of Jupyter notebook-based online platform for textbook and student work, implemented Winter and Fall 2016.

Online section of MTH 201: Calculus, offered in Spring/Summer 2015 Spring/Summer 2016.

MTH 312: Cryptography and Privacy. First offering at GVSU in Winter 2014 as part of Information, Innovation, and Technology theme in General Education curriculum.

Professional Memberships

Michigan Association for Computer Users in Learning, 2014–present.

American Society for Engineering Education 2010–present.

Association for Computing Machinery special interest group in Computer Science Education (ACM-SIGCSE), 2012–present.

Mathematical Association of America 1997–present.

Mathematical Association of America, Michigan section 2011–present.

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