

GLENN M. LANGENBURG

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TITLE Forensic Scientist, Consultant

EDUCATION University of Lausanne, Switzerland; Ph.D. Forensic Science, 2012
University of Minnesota, M.S. Analytical Chemistry, 1999
Michigan State University, B.S. Forensic Science, 1993

EXPERIENCE

Aug 2012 – present: Elite Forensic Services, LLC
Owner, Primary Consultant, Instructor

Sep 2013 – Oct 2018: Minnesota Bureau of Criminal Apprehension Forensic Science
Laboratory, Drug Chemistry Section Supervisor

Jan 2000 – Sep 2013: Minnesota Bureau of Criminal Apprehension Forensic Science
Laboratory, Latent Print Section

Jan 2003 – Dec 2010: Metropolitan State University, Community Faculty

Sep 2003 – May 2005: Hamline University, Adjunct Faculty

Jun 1995 – Jan 2000: Pace Analytical Inc./3M Environmental Laboratory, Research Chemist

May 1993 – Sept 1993: Dundee Royal Infirmary Dept. of Forensic Medicine, Toxicology
Summer Internship

PROFESSIONAL ORGANIZATIONS

International Association for Identification (IAI)
National and Minnesota Division membership (since 2000)
Canadian Identification Society (CIS) (2002-2013)
Midwest Association of Forensic Scientists (MAFS) (since 2003)
Elected member to SWGFAST (Scientific Working Group for Friction
Ridge Analysis, Study, and Technology) (2004-2014)
Fingerprint Society (U.K.), fellow status (2006-2010)
IAI Committee—Standardization II Committee (2008-2010)
NIST-NIJ Committee—Expert Working Group on Human Factors in
Latent Print Analysis (2008-2011)

AWARDS/POSITIONS HELD/CERTIFICATIONS

Status as a certified latent print examiner (IAI) granted May 2003
Status as a certified fellow of criminalistics (ABC) granted July 2011
Editorial review board for Journal of Forensic Identification (since 2006)

Distinguished Member of the IAI Award (2007)
Recipient of Inaugural IFRG “Roland Menzel Award” (2007)
Ethics Committee for MAFS (2006-2010)
MAFS “New Scientist Award” (2002)
Minn. DPS Forensic Science Lab Service Recognition Award (2002)
MAFS Latent Print Section Coordinator (2002-2011)

PUBLISHED WORKS

- Dror, I; Langenburg, G. “Cannot Decide”: The Fine Line Between Appropriate Inconclusive Determinations Versus Unjustifiably Deciding Not To Decide. *J Forensic Sci*, **2018**; online, doi: 10.1111/1556-4029.13854.
- Langenburg, G. Addressing potential observer effects in forensic science: a perspective from a forensic scientist who uses linear sequential unmasking techniques. *Australian J of Forensic Sci*, **2017**; online, doi: 10.1080/00450618.2016.1259433.
- Liu, S; Mi, Z; Langenburg, G; Wu, J. Accuracy and reliability of feature selection by Chinese fingerprint examiners, *Forensic Sciences Research* **2017**, 2:4, 203-209, DOI: 10.1080/20961790.2017.1375449
- Patel, E.; Cicatiello, L.; Langenburg, G.; Francese, S.; et al. A proteomic approach for the rapid, multi-informative and reliable identification of blood. *Analyst* **2015**, doi: 10.1039/c5an02016f.
- Langenburg, G.; Hall, C.; Rosemarie, Q. Utilizing AFIS searching tools to reduce errors in fingerprint casework. *For Sci Intl* **2015**, 257, 123-33.
- Neumann, C.; Champod, C.; Yoo, M.; Genessay, T.; Langenburg, G. Quantifying the weight of fingerprint evidence through the spatial relationship, directions and types of minutiae observed on fingermarks. *For Sci Intl* **2015**, 248, 154-171.
- Langenburg, G.; Neumann, C.; Champod, C. A comment on “Experimental results of fingerprint comparison validity and reliability: A review and critical analysis”. *Science & Justice – Letters to the Editor* **2014**, 54, 393-395.
- Langenburg, G.; Bochet, F.; Ford, S. A Report of Statistics from Latent Print Casework. *Forensic Science Policy & Management: An International Journal* **2014**, 5(1-2), 15-37.
- Sheets, H.D.; Torres, A.; Langenburg, G.; Bush, P.J.; Bush, M.A. Distortion in Fingerprints: A Statistical Investigation Using Shape Measurement Tools. *J Forensic Sci* **2014**, 59(4), 1113-1120.
- Sheets, H.D., Gross, S., Langenburg, G., Bush, P.J., and Bush, M.A. Shape measurement tools in footwear analysis: A statistical investigation of accidental characteristics over time. *For Sci Intl*, **2013**, 232 (1-3), 84-91.
- Neumann, C; Champod, C; Yoo, M; Genessay, T; Langenburg, G. Improving the Understanding and the Reliability of the Concept of “Sufficiency” in Friction Ridge

Examination. Final Report to U.S. Dept. of Justice-National Institute of Justice, Washington, D.C. July 2013. Award Grant 2010-DN-BX-K267.

- Langenburg, G; Neumann, C; Meagher, S; Funk, C; Avila, J. Presenting Probabilities in the Courtroom: A Moot Court Exercise. *Journal of Forensic Identification* **2013**, 63(2), 424-488.
- Langenburg, G. The consideration of fingerprint probabilities in the courtroom. *Australian Journal of Forensic Sciences*, **2013**, doi:10.1080/00450618.2013.784360.
- Langenburg, G; Hall, C. "Friction Ridge Skin: Comparison and Identification" in Wiley Encyclopedia of Forensic Science, eds A. Jamieson and A.A. Moenssens, John Wiley: Chichester. DOI: 10.1002/9780470061589.fsa355.pub2. Published 15th March 2013.
- Praska, N; Langenburg, G. Reactions of latent prints exposed to blood. *Forensic Sci Intl*, **2013**, 224, 51-58.
- Langenburg, G. A Critical Analysis and Study of the ACE-V Process. PhD thesis, Ecole des Sciences Criminelles / Institut de Police Scientifique, Université de Lausanne, Switzerland, **2012**.
- Langenburg, G., Champod, C., Gennessay, T. Informing the Judgments of Fingerprint Analysts Using Quality Metric and Statistical Assessment Tools. *Forensic Sci Intl*, **2012**, 219 (1-3), 183-198; doi:10.1016/j.forsciint.2011.12.017.
- Neumann, C; Langenburg, G, et al. Operational benefits and challenge of the use of fingerprint statistical models: a field study. *Forensic Sci Intl*, **2011**, 212, 32-46.
- Langenburg, G; Champod, C. The GYRO System—A Recommended Approach to More Transparent Documentation. *Journal of Forensic Identification* **2011** 61 (4), 373-384.
- Mnookin, J., Langenburg, G, et al. The Need for a Research Culture in the Forensic Sciences. *UCLA Law Review*, **2011**, 58 (3), 725-779.
- Langenburg, G. Scientific Research Supporting the Foundations of Friction Ridge Examinations”, Chapter 14 in *The Fingerprint Source Book*; Eds.: McRoberts, A; Fitzpatrick, F., U.S. Department of Justice, National Institute of Justice, Washington, D.C., **2011**.
- Langenburg, G., Champod, C., Gennessay, T. Jones, J. Informing the Judgments of Fingerprint Analysts Using Quality Metric and Statistical Assessment Tools, Summary Report to the Midwest Forensics Resource Center. Midwest Forensic Resource Center (MFRC) Research and Development Program Summary, 2010, November, 42-44.
- Dror, I, Langenburg, G., et al. Cognitive issues in fingerprint analysts: inter- and intra-expert consistency and effect of a ‘target’ comparison. *Forensic Sci Intl*, 2010, 208, 10-17.
- Langenburg, G. Friction Ridge Skin: Comparison and Identification. In *Wiley Encyclopedia of Forensic Science*, eds. Jamieson, A; Moenssens, A. John Wiley & Sons, Ltd, U.K., 2009.
- Langenburg, G; Champod, C; Wertheim, P. Testing for potential contextual bias effects during the verification stage of the ACE-V methodology when conducting fingerprint comparisons” *J Forensic Sci* 2009, 54 (3), 583-590.

- Langenburg, G. A performance study of the ACE-V process: A pilot study to measure the accuracy, precision, repeatability, reproducibility, and biasability of conclusion resulting from the ACE-V process, *J Forensic Identification* **2009**, 59 (2), 219-257.
- Langenburg, G. Deposition of Bloody Fingermarks” *J Forensic Ident.* **2008** 58 (3), 355-389.
- Langenburg, G. Letter to Editor re: Saks and Koehler “The Coming Paradigm Shift in Forensic Science”, *Science*, 3 Feb **2006**, vol 311.
- Langenburg, G. A Report of Latent Print Examiner Accuracy During Comparison Training Exercises” *J Forensic Identification* **2006**, 56 (1), 55-93.
- Langenburg, G. “Ask the Expert” column for *Scientific American*, 292 (5), May **2005**.
- Langenburg, G. Pilot Study: A Statistical Analysis of the ACE-V Methodology—the Analysis Stage,” *J Forensic Identification* **54** (1), **2004**, 64-79.
- Langenburg, G. Defense Against the Dark Arts: Defending Against the Critic’s Curse, *The Chesapeake Examiner* **2003**, 41, Spring volume.

TRAINING

In-house Training at the BCA (core training)

Latent Print Training (Jan 2000-Nov 2000)	Approx. 1700 hours
Courtroom Testimony Workshop (Nov 2001)	24 hours
Crime Scene Training (May 2000-present)	Approx. 500 hours

External Courses

Advanced Ridgeology Comparison Techniques (Wertheim, Oct 2000)	40 hours
Forensic Ridgeology (Ashbaugh, Nov 2000)	40 hours
Demystifying Palm Prints (Smith, Sep 2003)	24 hours
Courtroom Testimony Techniques (Smith, Sep 2003)	16 hours
MAFS Bloodspatter Course-- <u>Audited</u> (Epstein and Laber, Apr 2002)	24 hours
MAFS Bloodspatter Course (Epstein and Laber, Apr 2003)	50 hours
ASCLD-LAB-International Assessor Training Course (Jun 2007)	40 hours
Analysis of Distortion in Latent Prints (Maceo, Jun 2008)	16 hours
Current Issues in Drug Chemistry (Astor, et al., Oct 2014)	8 hours

Conferences

IAI Educational Conferences (each **40 hours** of lectures, panels, workshops):

2000, Charlestown, WV, included 3 workshops:

-Digital Imaging	4 hours
-Bloodstain Pattern Reconstruction	4 hours
-Collection and Preservation of Footwear Evidence	4 hours

2001, Miami, FL, included 4 workshops:

-Introduction to Bloodstain Pattern Recognition	4 hours
-Photography	3.5 hours
-Painting with Light (night photography)	3 hours
-Event Reconstruction (BPA)	2 hours

2002, Las Vegas, NV

-Presented "ACE-V: A Statistical Analysis" poster

2003, Ottawa, ON, Canada

-Presented "ACE-V: A Statistical Analysis, Results of Study"

-Presented "Defense Against the Dark Arts: Defending Against the Critic's Curse"

2004, St. Louis, MO

-Conducted a 2-hour on-site research study for ACE-V project

- Presented "ACE-V: A Statistical Analysis, Results of Study"

- Presented "Defense Against the Dark Arts 2: How to Get Rid of That Boggart in Your Closet"

2005, Dallas, TX

- Presented "ACE-V: A Statistical Analysis, Results of Study A+C Stages"

- Presented "Analysis of Factors During the Deposition of Impressions in a Blood Matrix"

- Presented "A Report of Latent Print Examiner Accuracy During Comparison Training Exercises". Co-presented with Kasey Wertheim

- Requested Panel participant “Latent Print Examiner Training Standards”
- 2006, Boston, MA
- Presented “RSW-Lite: Are You Ready for the IAI Certification Exam?” (lecture and two 4-hour workshops). Co-presented with Pat Wertheim
 - Presented “Defense Against the Dark Arts 3: Arithmancy and the Science of Latent Print Comparisons”
- 2007, San Diego, CA
- Presented “Testing for Potential Contextual Bias During the Verification Stage of the ACE-V Methodology in Fingerprint Examinations”
 - Presented “Demystifying Probabilities: An Exercise in Probability Theory for Latent Print Examiners”
 - Co-hosted workshop with Champod, Neumann, and Chamberlain: “From Fingerprint Examination to Fingerprint Statistics”. Two 4-hour workshops, 30 students ea.
- 2008, Louisville, KY
- Presented “Defense Against the Dark Arts 4: The Confundus Errata Charm”
 - Presented “Demystifying Probabilities: An Exercise in Probability Theory for Latent Print Examiners”
 - Co-hosted workshop with Neumann, and Chamberlain: “From Fingerprint Examination to Fingerprint Statistics”. Two 4-hour workshops, 20 students ea.
 - Co-hosted workshop with Josh Bergeron: “RSW-Lite: Are You Ready for the IAI Certification Exam?”(two 4-hour workshops).
- 2009, Tampa Bay, FL
- Co-hosted workshop with Neumann: “From Fingerprint Examination to Fingerprint Statistics”. 4-hour workshops, 28 students.
 - Co-hosted workshop with Amanda Atkins: “RSW-Lite: Are You Ready for the IAI Certification Exam?”(two 4-hour workshops).
 - Co-hosted workshop with Neumann: “Fingerprint Statistics and Probabilities Made Simple” (4-hour workshop, 40 students).
- 2010, Spokane, WA
- Co-hosted workshop with Neumann: “From Fingerprint Examination to Fingerprint Statistics”. 4-hour workshops, 28 students.
 - Co-hosted workshop with Neumann: “Probabilities in the Courtroom”(4-hour workshop, 20 students).
 - Co-hosted workshop with Neumann: “Fingerprint Statistics and Probabilities Made Simple” (4-hour workshop, 36 students).
 - Panels: “Examiner Disagreement and Conflict Resolution” (2.5 hours) and “Standardization 2 Committee Report” (2 hours).
 - Lecture: “Informing the Judgments of Fingerprint Experts Using Quality Metric and Statistical Evaluation Tools” (1 hour).
- 2011, Milwaukee, WI
- Co-hosted workshop with Neumann: “From Fingerprint Examination to Fingerprint Statistics”. 4-hour workshops, 28 students.
 - Co-hosted workshop with Neumann: “Fingerprint Statistics and Probabilities Made Simple” (4-hour workshop, 36 students).
 - “RSW-Lite: Are You Ready for the IAI Certification Exam?”(two 4-hour workshops).
 - Panels: “Moot Court Exercise: Introducing Probabilities in the Courtroom” (4 hours).
 - Lecture: “Defense Against the Dark Arts 5: Muggles, OWLS, and NEWTS” (1 hour).

2012, Phoenix, AZ

- Workshop: “Demystifying Error Rates” (two 4-hour workshops, 30 students).
- Workshop: “Applying and Understand the SWGFAST ACE-V Methodology Standard” (two 2-hour workshops, 30 students).
- Lecture: “A Critical Analysis and Study of the ACE-V Process” (1 hour).

2013, Providence, RI

- Workshop: “Demystifying Error Rates” (two 4-hour workshops, 20 students).
- Workshop: “Applying and Understanding the SWGFAST ACE-V Methodology Standard” (two 2-hour workshops, 20 students).
- Lecture: “Exclusions and Sufficiency Decisions” with John Black (1 hr).
- Lecture: “The Integration of Technology and ACE-V” (1 hour)

2014, Minneapolis, MN

- Workshop: “Demystifying Error Rates” (4-hour workshop, 30 students).
- Workshop: “Applying and Understanding the SWGFAST ACE-V Methodology Standard” (two 2-hour workshops, 35 students total).
- Workshop: “Understanding and Deconstructing the SWGFAST “Articulation of the Identification Decision” document (two 2-hour workshops, 35 students total).
- Lecture: “Using Case Specific AFIS to Reduce Errors” with Carey Hall (30 mins).
- Lecture: “Double Loop Podcast – Live! Panel” (90 mins)

2015, Sacramento, CA

- Workshop: “Practical Answers to Court Questions” (4-hour workshop, 30 students)
co-instructor: Carey Hall
- Workshop: “Applying and Understanding the SWGFAST ACE-V Methodology Standard” (2-hour workshop, 30 students total)
- Workshop: “Understanding and Deconstructing the SWGFAST “Articulation of the Identification Decision” document (2-hour workshop, 15 students total)
- Lecture: “Defense Against the Dark Arts 6: The Confundus Charm” (60 mins)
- Lecture: “Double Loop Podcast – Live! Panel” (90 mins)
- Lecture: “Exclusion Decision” Discussion Panel hosted by John Black (60 mins)

2016, Webinar for European Division of the IAI

- Presentation: “A Critical Review of the ACE-V Process” (2 hours)

2017, Atlanta, GA

- Workshop: Making Sense of the PCAST statistics (2 hours)
- Workshop: An Overview of the ACE-V Process (4 hours)
- Lecture: Linear Sequential Unmasking (1 hour)

2018, San Antonio, TX

- Lecture: Using AFIS Technology to Increase Efficiency and Accuracy (30 mins)

MAFS Educational Conferences:

2001, Minneapolis, MN

- Presented “Latent Prints and Daubert: US v. Mitchell and More...”

2002, Milwaukee, WI

- Presented “ACE-V: A Statistical Analysis” poster
- Co-hosted workshop “Current Daubert Issues” with Larry Olson 8 hours

2014, Minneapolis, MN

- Presented “Strengthening the Underpinnings of Forensic Science – The Need for Validation Studies”
- Workshop: “Demystifying Error Rates” 4 hours

-Co-hosted Workshop: “Designing, Executing, and Reporting Validation Studies” with
Holly Long 4 hours

Additional Forensic Science Conferences:

Minnesota Division IAI (Duluth, MN, Sep 2000)	16 hours
Indiana Division IAI (Fort Wayne, IN, Oct 2004) Presented: “ACE-V: A Statistical Analysis, Results of Study”	18 hours
American Board of Forensic Document Examiners Symposium Las Vegas, NV, Jul 2002 Presented “Defense Against the Dark Arts: Defending Against the Critic’s Curse”	24 hours
American Academy of Forensic Sciences Chicago, IL, Feb 2002 Presented “The Daubert Trilogy: Daubert, Joiner, and Kumho”	8 hours
Toronto Forensic Identification Services Annual Conference Toronto, ON, Canada, Feb 2002 Co-presented “Daubert Issues and Latent Prints” with Kasey Wertheim	16 hours
Fingerprint Society Annual Educational Conference Brighton, England, United Kingdom, Mar 2005 Presented “Defence Against the Dark Arts: Defending Against the Critic’s Curse”	20 hours
Canadian Identification Society Educational Conference Calgary, Alberta, Canada, Jul 2005 Presented “A Statistical Analysis of the ACE-V Methodology, A + C”	24 hours
Human Identification e-Symposium Online symposium hosted in London, England, U.K. Presented “Fingerprint Detection Errors: A Report of Latent Print Examiner Accuracy”	4 hours
Fingerprint Society Annual Educational Conference Tulliallan Castle, Fife, Scotland, United Kingdom, Mar 2006 Presented “A Statistical Analysis of the ACE-V Methodology, A + C”	16 hours
Midwestern States Divisions of the IAI Davenport, IA, Apr 2006 Presented “Defense Against the Dark Arts: Defending Against the Critic’s Curse”	8 hours
Northwest Pacific Division of the IAI Boise, ID, May 2006 Presented “Defense Against the Dark Arts: 1 & 2”	8 hours
Florida Division of the IAI St. Petersburg, FL, Oct. 2006 Presented “Overview of the ACE-V Methodology” (2 hours) Presented “Errors and Bias: Are We As Good As We Think	8 hours

We Are, Or As Bad As They Say We Are?" (2 hours)

- American Board of Forensic Document Examiners (ABFDE) 8 hours
Daubert Symposium
Las Vegas, NV, Nov. 2006
Presented "Statistical Analysis of ACE-V Methodology: A,C,V Studies" (1 hour)
Presented "Error Rates: A Report of Latent Print Examiner Accuracy (1 hour)"
- International Fingerprint Research Group (IFRG) 40 hours
Canberra, Australia, Mar. 2007
(By invitation, for recognition of research contributions)
Presented "Testing for Potential Contextual Bias Effects During the Verification Stage of the ACE-V Methodology"
Presented "Analysis of Factors During the Deposition of Impressions in a Blood Matrix"
- Canadian Identification Society Educational Conference 40 hours
Montreal, Quebec, Canada, Jul 2007
Presented "Testing the ACE-V Methodology" (1.5 hours)
Presented "Error Rates: A Report of Latent Print Examiner Accuracy (1.0 hour)"
- Wisconsin Association for Identification 6 hours
Milwaukee, WI, Mar 2008
Presented "Fingerprints 101-Basic Development Techniques" (2.0 hours)
Presented "Current Issues for Fingerprint Examiners" (2.0 hours)
- Tri-State National Society for Histotechnology Educational Conference 6 hours
Bloomington, MN, Apr 2008
Presented "Top 10 Misconceptions about Crime Scene Investigation" (1.0 hour)
- Midwest Crime Laboratory Directors' Meeting and MFRC Annual Symposium 16 hours
Bemidji, MN, Apr 2008
Presented "Pilot Studies: Close Non-Match Study and Method Performance Study" (2 hours)
Presented "Testing for Potential Contextual Bias Effects During the Verification Stage of the ACE-V Methodology" (30 minutes)
- The NIJ Conference 2008 1.5 hours
Arlington, VA, Jul 2008
Panel: "Whose Print Is It Really? Does Confirmation Bias Affect the Answer?"
Panel Members: Itiel Dror, Sargur Srihari, and Glenn Langenburg
- International Fingerprint Research Group (IFRG) 40 hours
Lausanne, Switzerland, June 2009
Presented "A Method Performance Study of the ACE-V Process" (30 minutes)
- American Academy of Forensic Sciences (AAFS) 2010 16 hours
Seattle, WA (presented 2.5 hours)
Co-presented with C. Neumann "On the Conclusions of Handwriting Identification"

Co-presented with C. Neumann “Moving Towards Using Statistics for Fingerprint Evidence in the Courtroom”

- Canadian Identification Society Educational Conference 6 hours
Orillia, Ontario, Canada, Sept 2010
Presented “Informing Judgments of Fingerprint Experts...” (2.0 hours)
Workshop “Fingerprint Examination Tools To Aid in Documentation and Greater Transparency” (4.0 hours)
- National Forensic Academy Symposium 4 hours
Nashville, TN, Dec. 2010
Presented “Current Challenges to Forensic Science and Issues of Bias”
Short presentation and panel discussion.
- American Academy of Forensic Sciences (AAFS) Feb 2011 16 hours
Chicago, IL
Co-presented with C. Neumann “Legal and Management Challenges Raised by Current Changes in the Fingerprint Community.” (1.5 hours)
- International Fingerprint Research Group (IFRG) 40 hours
Linköping, Sweden, June 2011
Presented “Informing the Judgments of Fingerprint Examiners” (30 minutes)
- New Jersey Academy of Forensic Science (May 2011) 8 hours
Atlantic City, NJ
Presented “Research Demonstrating the Reliability of ACE-V” (1.5 hours)
- NEC Users Fingerprint Educational Conference (Aug 2011) 6 hours
Las Vegas, NV
Presented “Demystifying Error Rates” (1.5 hours)
Presented “Research Demonstrating the Reliability of ACE-V” (1.5 hours)
- Canadian Identification Society (Sep 2011) 4 hours
Ottawa, Ontario, Canada
Presented “Research Demonstrating Reliability of ACE-V” (2.0 hours)
- Tri-State IAI Educational Conference (Oct 2011) 20 hours
Tucson, AZ
Workshop “Demystifying Error Rates” (4.0 hours)
Workshop “Probabilities Made Easy” (4.0 hours)
Presented “Research Demonstrating the Reliability of ACE-V” (2.0 hours)
- Florida Division IAI Educational Conference (Oct 2011) 16 hours
Panama City, FL
Workshop “Demystifying Error Rates” (4.0 hours)
Workshop “Probabilities Made Easy” (4.0 hours)
Presented “Research Demonstrating the Reliability of ACE-V” (2.0 hours)
- Australian Academy of Forensic Science (Dec 2011) 16 hours
Sydney, Australia

Presented “Making Sense of Fingerprint Evidence-Introduction of Probabilities into the Courtroom” (30 min)	
Australian Federal Police (Dec 2011) Canberra, Australia Presented “Research Demonstrating the Reliability of ACE-V” (3.0 hours)	3 hours
California Division IAI Educational Conference (May 2012) San Diego, CA Workshop “Demystifying Error Rates” (4.0 hours) Workshop “An Overview of the ACE-V Process” (4.0 hours) Presented “Research Demonstrating the Reliability of ACE-V” (2.0 hours)	16 hours
Impression and Pattern Evidence Symposium-NIJ (Aug 2012) “A Critical Analysis and Study of the ACE-V Process” “Effective Report Writing” (part of panel/workshop) “Understanding Sufficiency in Fingerprint Examinations”	3 hours
Colloque International sur la Criminalistique Trois Rivieres, ENPQ, Quebec “Research Demonstrating the Reliability of ACE-V” (1.0 hours) “Presenting Probabilities in the Courtroom” (1.0 hours) Panel: “The Future of Probabilities in Forensic Science”	28 hours
Fingerprint Society Annual Conference (Mar 2014) Glasgow, Scotland, U.K. Presented “The Integration of Technology and ACE-V” (1.0 hours) Presented “Presenting Probabilities in the Courtroom” (30 mins)	16 hours
California Division IAI Educational Conference (May 2014) Riverside, CA Workshop: “Understanding and Deconstructing the SWGFAST “Articulation of the Identification Decision” document (2.0 hours) Presented “Statistics from Latent Print Case Work” (2.0 hours) Panel: “Five Years after the NAS Report – Perspectives” (2.0 hours)	16 hours
European Network of Forensic Science Institutes (ENFSI) Fingerprint Working Group Oslo, Norway Presented: “A Critical Analysis and Study of the ACE-V Process” (1 hour) Co-presented: “Fingerprint Comparison Workshop” with Siobhan Green (4 hours)	20 hrs
MorphoTrak Users Conference (May 2016) Costa Mesa, CA Presented: “The Integration of Technology and ACE-V” (1.0 hours) Workshop: “A Critical Review of the ACE-V Process” (2.0 hours)	8 hours
Australian/New Zealand Forensic Science Society Conference (Sep 2016) Presented: “Addressing potential observer effects in forensic science: a perspective from a forensic scientist who uses linear sequential unmasking techniques.” (1.0 hour)	24 hours

International Fingerprint Research Group (Oct 2017) Beijing, China Presented “Unlocking the Secrets of Bloody Fingermarks” (0.5 hour) Presented “Multi-Informative and Specific Blood Detection” (0.5 hour) Presented “Using Case Specific AFIS to Reduce Errors in Casework” (0.5 hour)	40 hours
International Pattern and Trace Evidence Symposium (IPTES) (Jan 2018) Arlington, VA Co-presented workshop (with Cedric Neumann, Norah Rudin, Keith Inman, and Patrick Buzzini) “Foundations of the Interpretations of Pattern and Trace Evidence” (8 hours)	24 hours
European Academy of Forensic Science (Sep 2018) Co-presented with Christophe Champod “Fingerprint and Probabilities Workshop” (8 hours)	32 hours
European Network of Forensic Science Institutes (Sep 2018) Expert Fingerprint Working Group Co-presented with Christophe Champod “Fingerprint and Probabilities Workshop” (8 hours)	28 hours

Legal Seminars:

DePaul School of Law (Chicago, IL, Apr 2002), attended 8 hours on Daubert issues

Minnesota Bar CLE (Minneapolis, MN, May 2003)

Presented “Latent Prints and Daubert: US v. Mitchell and Plaza...”

Presented “IAFIS-Integrated Automated Fingerprint Identification System”

Minnesota Prosecutors Educational Seminar (Golden Valley, MN, Jul 2003)

Presented “Latent Prints and Daubert: US v. Mitchell and Plaza...”

Hamline School of Law, CLE (Duluth, MN, Jun 2004)

Presented “Fingerprint Science in the Courtroom”

Hamline School of Law and the Innocence Project, CLE (St. Paul, MN, May 2005)

Presented “Fingerprint Science in the Courtroom”, (Forensics 411)

Hamline School of Law and the Innocence Project, CLE (St. Paul, MN, June 2006)

Presented “Latent Print Examinations: Errancy, Entropy, and Epitasis”, (Forensics 411)

Attorney General’s Office CLE (St. Paul, MN, Dec. 2006)

Presented “Recent Legal Challenges to Fingerprint Evidence” (20 minutes)

Minnesota Public Defenders Association (Hinckley, MN, Feb. 2007)

Presented “Latent Print Evidence: Scientific and Legal Perspectives” (2 hours)

Minnesota Law Clerks Association (Eagan, MN, May 2007)
Presented “The Most Important Things Attorneys Should Know about Forensic Science” (2 hours)

Minnesota Bar CLE (Minneapolis, MN, June 2007)
Attended: Dynamite Handling of Expert Witnesses (8 hours)

Hamline School of Law and the Innocence Project, CLE (St. Paul, MN, May 2008)
Presented “Latent Print Evidence: Scientific and Legal Perspectives” (1 hour)

Minnesota State-Court Interpreters Conference (Minneapolis, MN, May 2008)
Presented “Overview of the Forensic Sciences for Court Interpreters” (3 hours)

Idaho State-Court Interpreters Conference (Boise, ID, September 2008)
Presented “Overview of the Forensic Sciences for Court Interpreters” (3 hours)

Upper Midwest Translators and Interpreter Assoc. (Minneapolis, MN, Mar 2009)
Presented “Overview of the Forensic Sciences for Court Interpreters” (3 hours)

UCLA School of Law Forensic Science: A Blueprint for the Future (L.A., CA, Feb 2010)
Presented “The Future of Fingerprint Science” and sat on a panel (1.5 hours)

Minnesota CLE: Criminal Justice Institute (St. Paul, MN, Aug 2010)
Presented “Update of Research and Recent Challenges in Fingerprint Science” (1 hour)

Minnesota Chapter of the Innocence Project (St. Paul, MN, Mar 2011)
Presented “Recent challenges to latent print admissibility and the response” (2 hours)

Arizona Forensic Science Academy (Phoenix, AZ, Oct 2011 and Nov 2012)
Presented “Research Demonstrating the Reliability of ACE-V” (3.5 hours)

Actual Innocence & Wrongful Convictions CLE (Plano, TX, 2012)
Presented “Cognitive Bias in Forensic Science” (2 hours)

Minnesota CLE: Criminal Justice Institute (St. Paul, MN, Aug 2014)
Co-Presented “Understanding Uncertainty of Measurement” (1 hour) (BCA)

Cook County Public Defender Training (Chicago, IL, May 2015)
Fingerprint clinic “Fingerprint Evidence – Strengths and Limitations” (8 hours)

Cook County Public Defender Annual Conference (Chicago, IL, May 2015), 2 days
Bias in Forensic Science: “Fingerprint Evidence – Strengths and Limitations” (90 min)

National Forensic College (New York City, NY, June 2016) (attended 3 days)
Research in Fingerprint Evidence – Strengths and Limitations (90 min)

Cook County Public Defender Training (Chicago, IL, July 2016)
Fingerprint clinic “Fingerprint Evidence 2 – Sufficiency, Distortion, Digital” (8 hours)

Criminal Justice Institute CLE (Minneapolis, MN Aug 2017)
Implementation of Microcrystal Testing in Drug Chemistry (1 hour)

Professionally Instructed Training Courses

BCA Basic and Advanced Latent Print Courses (2/yr 2000-2005)		24 hours ea.
BCA Crime Scene Latent Print Recovery lecture (1/yr since 2002-2005)		2 hours ea.
Ridgeology Science Workshop (RSW) (*with Kasey Wertheim)		40 hours ea.
-*Arlington, TX; November 2004	(17 students)	
-*West Palm Beach, FL; February 2005	(27 students)	
-Broomfield, CO; August 2005	(30 students)	
-Hamilton Twshp, NJ; June 2006	(19 students)	
-Seattle, WA; August 2006	(25 students)	
-Las Vegas Metro PD; November 2006	(17 students, 2 audits)	
-Richfield, OH; December 2006	(14 students)	
-Atlanta, GA; June 2009	(10 students)	
Ridgeology Science Workshop (RSW-Plus!) (with Joshua Bergeron)		40 hours
-Worcester, MA; May 2006	(21 students)	
-Fort Collins, CO; April 2007	(36 students)	
-Mesa, AZ; December 2007	(37 students)	
Advanced ACE-V Applications (AAA)		
-Lausanne, Switzerland, October 2006	(16 students)	24 hours
-Bern, Switzerland, October 2006	(26 students)	24 hours
-Quantico, VA, August 2007	(25 students)	40 hours
-Lansing, MI, October 2007	(36 students)	40 hours
-West Covina, CA, March 2008	(28 students)	40 hours
-West Palm Beach, FL, May 2008	(31 students)	40 hours
-Los Angeles, CA, June 2008	(27 students)	40 hours
-Downey, CA, July 2008	(20 students)	40 hours
-Portland, OR, August 2008	(18 students)	40 hours
-Culver City, CA, November 2008	(23 students)	40 hours
-Mesa, AZ, December 2008	(33 students)	40 hours
-Los Angeles, CA, February 2009	(19 students)	40 hours
-Largo, FL (NFSTC) March 2009	(19 students)	40 hours
-Clarksburg, WV, June 2009	(28 students)	40 hours
-Lausanne, Switzerland, August 2009	(15 students)	30 hours
-Bern, Switzerland, September 2009	(15 students)	30 hours
-Clarksburg, WV, September 2009	(28 students)	40 hours
-Culver City, CA, October 2009	(15 students)	40 hours
-Livonia, MI (NFSTC) March 2010	(8 students)	40 hours
-Largo, FL (NFSTC) April 2010	(15 students)	40 hours

-Los Angeles, CA, June 2010	(35 students)	40 hours
-New York City, NYPD, October 2010	(25 students)	40 hours
-Brooksville, FL, November 2010	(21 students)	40 hours
-Meridian, MS (USACIL), January 2011	(8 students)	40 hours
-Pittsburg, CA, August 2011	(22 students)	40 hours
-Chantilly, VA, September 2011	(30 students)	40 hours
-Largo, FL (NFSTC) February 2012	(15 students)	40 hours
-Baton Rouge, LA, March 2012	(28 students)	40 hours
-Denver, CO, April 2012	(34 students)	40 hours
-Torrance, CA, August 2012	(18 students)	40 hours
-New York City, NY, October 2012	(30 students)	40 hours
-Largo, FL (NFSTC) October 2012	(15 students)	40 hours
-Fort Lauderdale, FL, December 2012	(40 students)	40 hours
-Los Angeles, CA January 2013	(18 students)	40 hours
-Glendale, CA February 2013	(15 students)	40 hours
-Chula Vista, CA April 2013	(35 students)	40 hours
-Mesa, AZ Oct 2013	(20 students)	40 hours
-Lausanne, Switzerland Nov 2013	(17 students)	40 hours
-Bern, Switzerland Nov 2013	(16 students)	40 hours
-Decatur, GA Dec 2013	(17 students)	40 hours
-Las Vegas, LV, March 2014	(38 students)	40 hours
-Hillsboro, OR, Sep 2014	(16 students)	40 hours
-Taipei, Taiwan, March 2015	(35 students - modified)	32 hours
-Maynard, MA, June 2017	(25 students)	40 hours
-Northfield, MI, Oct 2017	(20 students)	40 hours
-Laguna Hills, CA, Feb 2018	(28 students)	40 hours
-Sanford, FL, Apr 2018	(28 students)	40 hours

Statistics Applied to Ridgeology and the ACE-V Methodology (with Cedric Neumann)

-Las Vegas, NV, April 2008	(13 students)	40 hours
-St. Paul, MN, August 2008	(17 students)	40 hours
-St. Paul, MN, May 2009	(30 students)	24 hours
-Portland, OR, March 2010	(27 students)	40 hours
-Clarksburg, WV, June 2010	(39 students)	40 hours
-Mesa, AZ, May 2011	(25 students)	40 hours
-Kissimmee, FL, December 2011	(16 students)	24 hours
-Albany, NY, March 2012	(28 students)	40 hours
-Boise, ID, November 2012	(23 students)	40 hours
-Denver, CO, March 2013	(18 students)	40 hours
-Alameda Co, CA, May 2013	(20 students)	40 hours
-San Diego, CA, August 2013	(18 students)	40 hours

Understanding Exclusion and Sufficiency Decisions (with John Black)

-Tucson AZ, April 2014	(24 students)	32 hours
-Ft. Lauderdale, FL, Aug. 2014	(36 students)	32 hours
-Clackamas, OR, Oct. 2014	(40 students)	32 hours
-Olathe, KS, Dec. 2014	(26 students)	32 hours

-Denver, CO, April 2015	(31 students)	32 hours
-Los Angeles, CA, May 2015	(34 students)	36 hours
-Milwaukee, WI, June 2015	(25 students)	36 hours
-Pennsylvania, PA, July 2015	(28 students)	36 hours
-Carlsbad, CA, Sep. 2015	(32 students)	36 hours
-Northville, MI, Oct. 2015	(25 students)	32 hours
-Las Vegas, NV, Nov. 2015	(19 students)	36 hours
-Dublin, CA, Mar. 2016	(30 students)	36 hours
-Edmonton, AB, Canada, Apr. 2016	(43 students)	36 hours
-Maynard, MA, June 2016	(32 students)	36 hours
-New York, NY, Oct 2016	(25 students)	36 hours
-Sanford, FL, Mar 2017	(28 students)	36 hours
-Torrance, CA, Apr 2017	(29 students)	36 hours
-Honolulu, HI, Jun 2018 (solo)	(15 students)	36 hours