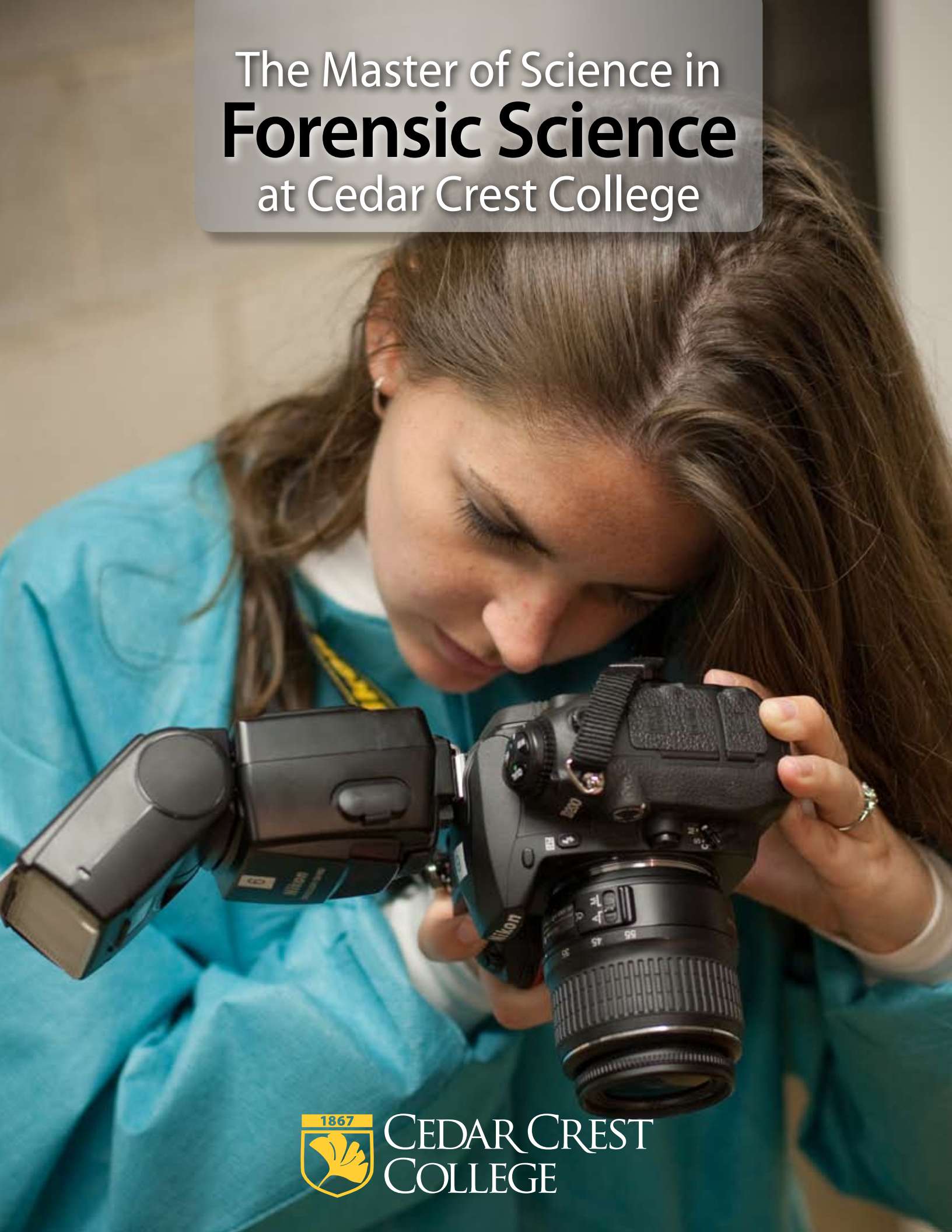
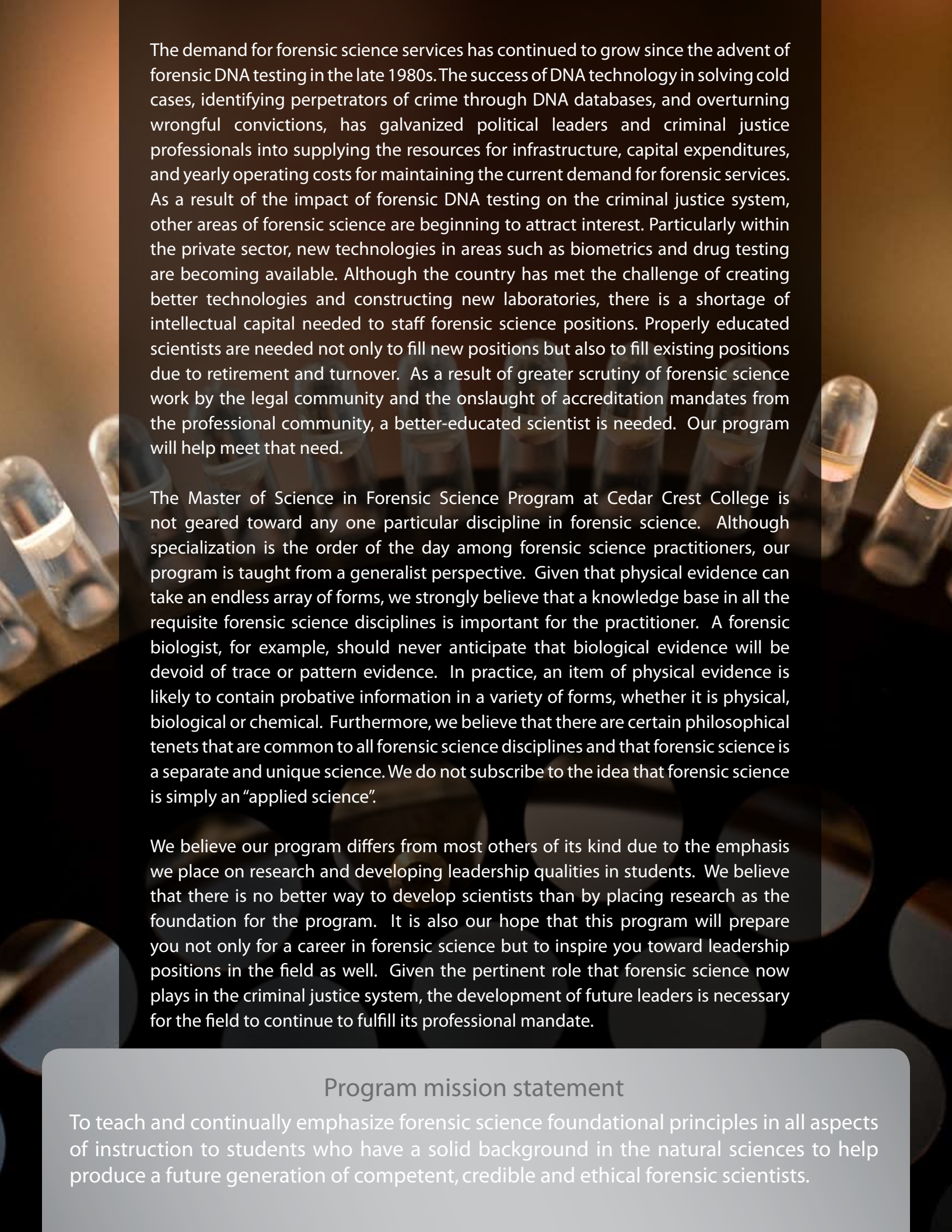


The Master of Science in
Forensic Science
at Cedar Crest College



CEDAR CREST
COLLEGE



The demand for forensic science services has continued to grow since the advent of forensic DNA testing in the late 1980s. The success of DNA technology in solving cold cases, identifying perpetrators of crime through DNA databases, and overturning wrongful convictions, has galvanized political leaders and criminal justice professionals into supplying the resources for infrastructure, capital expenditures, and yearly operating costs for maintaining the current demand for forensic services. As a result of the impact of forensic DNA testing on the criminal justice system, other areas of forensic science are beginning to attract interest. Particularly within the private sector, new technologies in areas such as biometrics and drug testing are becoming available. Although the country has met the challenge of creating better technologies and constructing new laboratories, there is a shortage of intellectual capital needed to staff forensic science positions. Properly educated scientists are needed not only to fill new positions but also to fill existing positions due to retirement and turnover. As a result of greater scrutiny of forensic science work by the legal community and the onslaught of accreditation mandates from the professional community, a better-educated scientist is needed. Our program will help meet that need.

The Master of Science in Forensic Science Program at Cedar Crest College is not geared toward any one particular discipline in forensic science. Although specialization is the order of the day among forensic science practitioners, our program is taught from a generalist perspective. Given that physical evidence can take an endless array of forms, we strongly believe that a knowledge base in all the requisite forensic science disciplines is important for the practitioner. A forensic biologist, for example, should never anticipate that biological evidence will be devoid of trace or pattern evidence. In practice, an item of physical evidence is likely to contain probative information in a variety of forms, whether it is physical, biological or chemical. Furthermore, we believe that there are certain philosophical tenets that are common to all forensic science disciplines and that forensic science is a separate and unique science. We do not subscribe to the idea that forensic science is simply an “applied science”.

We believe our program differs from most others of its kind due to the emphasis we place on research and developing leadership qualities in students. We believe that there is no better way to develop scientists than by placing research as the foundation for the program. It is also our hope that this program will prepare you not only for a career in forensic science but to inspire you toward leadership positions in the field as well. Given the pertinent role that forensic science now plays in the criminal justice system, the development of future leaders is necessary for the field to continue to fulfill its professional mandate.

Program mission statement

To teach and continually emphasize forensic science foundational principles in all aspects of instruction to students who have a solid background in the natural sciences to help produce a future generation of competent, credible and ethical forensic scientists.

Philosophy of Graduate Education at Cedar Crest College

Building upon the college's tradition of teaching excellence, graduate education at Cedar Crest aspires to provide students with the expertise, judgment, vision, and inspiration to participate actively and responsibly within the diverse communities and dynamic knowledge networks wherein their professional lives will unfold. Institutionally, this commitment rests upon four values which serve as the foundation for the college's philosophy of graduate education:

Scholarship: Graduate programs should ensure that students master the theoretical perspectives, methodological techniques, and professional practices essential to the production of knowledge within their disciplines. This includes exposing students to an expanded definition of scholarship, which moves beyond the traditional emphasis upon discovery to include the integration, application and dissemination of knowledge within and across disciplines.

Innovation: Graduate programs should ensure that students recognize the role that creativity, and the entrepreneurial spirit more generally, plays as a catalyst for the advancement of knowledge. While programs should acknowledge the value of risk-taking as an inherent element of scholarly practice, students also should learn that professional conduct must be tempered by an ethic of responsibility for the communities within which they live, work and learn.

Collaboration: Graduate programs should ensure that students understand how the revolution in information technology is profoundly altering the nature of professional practice by empowering epistemic communities from around the world to respond to issues of local, national and global significance. Programs should equip students with the communications and technological skills needed to collaborate within the context of transnational and interdisciplinary networks that serve as sites for the production, application and dissemination of knowledge.

Professionalism: Graduate programs should impress upon students that graduate school itself is but the prelude to a lifetime of ongoing professional development. Faculty should convey this message by modeling professional practices within the context of an active research agenda and other forms of scholarly activity which contribute to the production, dissemination and application of knowledge within and across disciplines. Similarly, the college should demonstrate its commitment to educational leadership by providing academic programs, faculty, and the graduate community more generally, with the institutional support needed to sustain high levels of academic achievement in the face of evolving professional, societal, and global standards.

The History of Forensic Science Education at Cedar Crest College

Cedar Crest College continues its commitment to forensic science education through the inception of the Master of Science in Forensic Science Program in 2007. In the past decade, Cedar Crest College has developed both a nationally recognized undergraduate forensic science program and a Forensic Science Training Institute. The undergraduate forensic science program has produced over 100 graduates many of whom are now forensic science professionals. In 2004, the undergraduate forensic science program was one of five programs that received accreditation through the Forensic Science Educational Programs Accreditation Commission (FEPAC) in the commission's inaugural accreditation cycle. Since then, the program has expanded its faculty and resources and continues to be a leader in forensic science undergraduate education.

The Cedar Crest College Forensic Science Training Institute has become a leader in the continuing education of forensic science professionals. Since 2003, the Cedar Crest College Forensic Science Training Institute has contributed to the training of over 400 forensic scientists from around the nation by providing training in 1 to 5 day workshops in a variety of forensic science disciplines. In addition to the faculty at Cedar Crest College, some of the most well known professionals in forensic science have contributed to the instruction of workshops at the Institute.

The development of a master's program in forensic science will not only continue the College's commitment to excellence in forensic science education but will also provide the opportunity for students and faculty to contribute meaningfully to forensic science in the area of research. Since the inception of the program in 2007, program students have given 29 presentations at regional, national and international conferences and have been authors on 4 peer-reviewed publications based on research associated with their master's theses. It is through this emphasis on research that the program hopes to further the development of not only the scientific abilities but the leadership qualities of students as well. Given the pertinent role that Forensic Science now plays in the criminal justice system, the development of future leaders is necessary for Forensic Science to continue to fulfill its professional mandate.

Faculty Members

Dr. Lawrence Quarino, Associate Professor, Program Director

Dr. Thomas Brettell, Assistant Professor of Chemistry

Dr. K. Joy Karnas, Associate Professor of Biology, Director of Genetic Engineering

Dr. Jacqueline Speir, Assistant Professor

Dr. Marianne Staretz, Associate Professor

Student Awards

Several of our master's students have received awards from professional organizations for academic excellence. The list of recipients in 2007 and 2008 include:

Lindsay Carbone – Recipient of a \$20,000 Innov-X Systems Academic & Research Relations Grant Award (2008).

Michelle De Paola '10 – Recipient of the 2007 New Jersey Association of Forensic Scientists scholarship.

Stacie Kaufman '09 – Recipient of the 2008 George Neighbor Memorial Scholarship from the Northeastern Association of Forensic Scientists.

Christina Mulligan '09 – Recipient of the 2007 George Neighbor Memorial Scholarship from the Northeastern Association of Forensic Scientists.

Megan Zellner '08 – Winner of the 2007 Northeastern Association of Forensic Scientists Collegiate Competition.

Where Can You Find Our Graduates?

Graduates of our program can be found working or studying at the following agencies, corporations, and universities in a vast variety of capacities. These include:

Chemistry Technician, Pennsylvania State Police Crime Laboratory (Greensburg, PA).

Criminalist, New York City Office of Chief Medical Examiner, Department of Forensic Biology.

Criminalist, New York City Police Department Forensic Science Laboratory.

Doctoral Student, Florida International University, Forensic Chemistry Ph.D. Program.

Forensic Chemist, Office of Chief Medical Examiner, Forensic Science Laboratory (Wilmington, DE)

Forensic DNA Examiner, U.S. Army Criminal Investigation Laboratory (Forest Park, GA)

Forensic Scientist, Atlantic Laboratories (Bensalem, PA)

Laboratory Technician, Westchester County Crime Laboratory (Valhalla, NY)

Research Scientist, Bristol-Myers Squibb Pharmaceuticals Company (Princeton, NJ).

Research Scientist, L'Oreal Cosmetics (Clark, NJ).

Research Technician, University of the Sciences (Philadelphia, PA)

Student Presentations at Professional Scientific Conferences

Students are encouraged to present their master's thesis research at professional regional and national conferences. Program students have presented at meetings of the American Academy of Forensic Sciences, Northeastern Association of Forensic Scientists and the Pennsylvania Academy of the Sciences. Below is the list of recent presentations by our graduate students.

Kimberly Moran, *mRNA Decay in Biological Fluids for Crime Scene Stain Identification and Estimation of Time of Deposition*, Eighty-sixth Annual Meeting of the Pennsylvania Academy of Sciences, Camp Hill, PA, 2010.

Kristin Allard, *Validity of Angle of Impact/Incidence Determinations Made From Very Small Bloodstains*, Sixty-second Annual Meeting of the American Academy of Forensic Sciences, Seattle, 2010.

Jillian Conte, *Synthesis of Fluoromethcathiones*, Sixty-second Annual Meeting of the American Academy of Forensic Sciences, Seattle, 2010.

Kelsey Dougherty, *Development of a Method for Detecting Papain in Adulterated Urine Samples*, Sixty-second Annual Meeting of the American Academy of Forensic Sciences, Seattle, 2010.

Roxanne Holowienka, *Differentiation of Tire Rubber by Pyrolysis-Gas Chromatography/Mass Spectroscopy*, Sixty-second Annual Meeting of the American Academy of Forensic Sciences, Seattle, 2010.

Taylor Grazulewicz, *The Investigation of Adamantanes in Various Petroleum Distillates*, Sixty-second Annual Meeting of the American Academy of Forensic Sciences, Seattle, 2010.

Rachel Soda, *Re-Evaluating Previously Published Methods for Determining the Volume of Dried Bloodstains and Its Height of Fall*, Sixty-second Annual Meeting of the American Academy of Forensic Sciences, Seattle, 2010.

Monica Cawley, *Developing a Statistical Model for Fingerprint Comparisons Utilizing Fingerprint Data from Monozygotic Twins*, Thirty-Fifth Annual Meeting of the Northeastern Association of Forensic Scientists, Long Branch, NJ, 2009.

Vanessa Gauger, *The Simultaneous Detection of Benzodiazepines, Opiates, and Cocaine and their Metabolites in Urine Using an Oxime-TMS Derivative for Gas Chromatography/Mass Spectroscopy Analysis*, Thirty-Fifth Annual Meeting of the Northeastern Association of Forensic Scientists, Long Branch, NJ, 2009.

Michelle Shortell, *Investigation and Separation of Interferences from Fire Debris Analysis by Solid Phase Extraction*, Thirty-Fifth Annual Meeting of the Northeastern Association of Forensic Scientists, Long Branch, NJ, 2009.

Lindsay Carbone, *Evaluating the Presence and Dangers Associated With Heavy Metals in Commonly Encountered Consumer Products*, Sixty-First Annual Meeting of the American Academy of Forensic Sciences, Denver, 2009.

Lisa Karwacki, *LC/MS/MS Method to Differentiate Dyes in Diesel Fuel*, Sixty-First Annual Meeting of the American Academy of Forensic Sciences, Denver, 2009.

Stacie Kaufman, *DNA Recovery from Fired and Unfired Cartridges*, Sixty-First Annual Meeting of the American Academy of Forensic Sciences, Denver, 2009.

Christina Mulligan, *The Analysis of Various Types of Cotton and Polyester as Swabbing Mediums for Low Copy Number DNA Recovery*, Sixty-First Annual Meeting of the American Academy of Forensic Sciences, Denver, 2009.

Allison Taylor, *The Development of a Screening Method for Biological Samples Using a Real-Time PCR Assay for HLA-DQA1*, Sixty-First Annual Meeting of the American Academy of Forensic Sciences, Denver, 2009.

Heather Wert, *The Detection of Diamondoid Compounds in Ignitable Liquid Residues by Gas Chromatography/Mass Spectrometry, Part II*, Sixty-First Annual Meeting of the American Academy of Forensic Sciences, Denver, 2009.



Christina Mulligan and program director, Lawrence Quarino, at the 2008 Annual Meeting of the Northeastern Association of Forensic Scientists luncheon where Christina was awarded the George Neighbor Scholarship Award.

Alumna Spotlight

Christina Mulligan '09

The forensic science program at Cedar Crest College is undeniably the best forensic program in the field. It rigorously prepares its students for successful employment and produces strong, versatile scientists. The program's multi-discipline/generalist structure offers several benefits. Each student has the chance to study each discipline in forensic science, making their multi-faceted background attractive to potential employers. Rather than obtaining a specialty in one aspect of forensic science, the students who graduate from the program are well-prepared and qualified candidates for jobs in several areas of forensic science. In addition, the generalist structure allows each student to appreciate how each individual discipline working together as a whole produces an effective and efficient science.

Some attractive qualities about the program include the wonderful professors who, with years of knowledge and expertise in the forensic science field, dedicate their time to providing each and every student a one-on-one hands-on educational experience. The opportunity for students to perform independent research and subsequently graduate with a thesis as well as potential publications in renowned forensic science journals, the program's capability to fund students' research presentations at professional forensic science conferences (regional, national, and international), and ultimately helping its graduates be several steps ahead of students graduating from similar programs are all additional reasons I loved the program at Cedar Crest. Above all, Cedar Crest offers a challenging program with highly qualified professors that mold their forensic science students into exceptional criminalists. The knowledge and confidence that graduates of the forensic science program at Cedar Crest College gain is unparalleled and it is apparent when graduates from Cedar Crest enter the workforce.

Cedar Crest has definitely prepared me for a successful career in the field. The program not only provided me with the solid scientific and forensic background (both conceptual through classroom learning and experimental with hands-on experience using forensic science instrumentation) that I needed to enter the workforce but provided the means for a job offer. Attending forensic science conferences is a great way to showcase one's talents and increase visibility and understanding of the field through social networking, which is the way that a number of graduates, including myself, receive job offers. I have the forensic science program at Cedar Crest College and its wonderful, dedicated professors to thank for my wonderful job as a Forensic DNA Analyst at the United States Army Criminal Investigation Laboratory. Without the experience and learning obtained at Cedar Crest College, I would not be as confident and comfortable in my position providing forensic DNA analysis for the United States Armed Forces.

Partnerships

The Cedar Crest College Forensic Science Program works closely with many forensic science laboratories and academic programs on research, consultation, and training. Partners include:

- John Jay College of Criminal Justice
- New Jersey State Police Office of Forensic Sciences
- New York City Police Department Laboratory
- West Virginia University
- Willow Laboratories (Lynn, MA)

Literature

Cedar Crest College has a wide variety of primary literature sources available for student use. In both the Cedar Crest College Cressman library and on-line students have access to over 200 textbooks on topics related to forensic science. The program also maintains subscriptions to several forensic science journals. Journals include:

- Canadian Society of Forensic Science Journal
- Forensic Science International
- Forensic Science International Genetics
- Journal of Clinical Forensic Medicine
- Journal of Forensic and Legal Medicine
- Journal of Forensic Identification
- Journal of Forensic Science
- Legal Medicine
- Science and Justice



Instrumentation

Many research opportunities exist at Cedar Crest because of the wide variety of instrumentation and other equipment available for student use. The list of available instrumentation and equipment include:

Biology/DNA Analysis

- 310 Capillary Electrophoresis Genetic Analyzer
- Immunoassay Technology - BioRad ImmunoWash Model 1575; BioRad Microplate Reader 680
- Real-time PCR - Corbett Rotor-Gene 6000 Real-Time Rotary Analyzer
- Thermal Cyclers - Applied Biosystems Veriti, Perkin Elmer 2700, Perkin Elmer 2720

Chromatography/Spectroscopy

- Atomic Absorption - Buck Scientific ACCUSYS 211 Atomic Absorption Spectrophotometer
- Fluorimetry - Turner Quantech Digital Filter Fluorometer; Hitachi F2500 Fluorometer
- Fourier Transform Infrared Spectroscopy - Nicolet Impact 410 FTIR; Perkin Elmer 1600 Series FTIR
- SensIR IlluminatIR (micro-FTIR)
- Gas Chromatography - Hewlett Packard 5890A GC; Buck Scientific 310
- GC/MS - Agilent Technologies 6890N Network GC System/5973 Network Mass Selective Detector
- High Performance Liquid Chromatograph - Buck Scientific BLC-20 HPLC; Waters 490 HPLC
- LC/MS/MS - Applied Biosystems 3200 Q Trap
- Mass Spectrometer- Finnigan INCOS 50 Mass Spectrometer
- Near Infrared Spectroscopy - Foss 6500 Near IR Spectrometer
- Nuclear Magnetic Resonance - Varian EM-390, 90-mHz, CW NMR Spectrometer
- Pyrolysis GC/MS - CDS Pyroprobe 5000
- UV/Visible Spectrophotometry - Beckman Coulter DU 800 Spectrophotometer; Cecil 2041 UV/Vis Spectrophotometer; Unicam Helios Alpha UV/Vis Spectrophotometer

Crime Scene/Photography

- Digital Cameras - Fuji IS Pro IR/UV; Nikon D70; Nikon D200
- Megamaxx™ 3 Watt Alternative Light System
- Sirchie Electrostatic Dust Print Lifter

Microscopy

- Fluorescence Microscopy - Leica DM1000 Fluorescent Light Microscope
- Polarized Light Microscopy - Leica DMEP Polarizing Light Microscopes
- Scanning Electron Microscopy (SEM-EDS) - Philips XL-20 Scanning Electron Microscope w/EDS
- Stereoscopes - Leica model S6E Stereomicroscopes

PROGRAM REQUIREMENTS

First Year Courses

Students in the forensic science program must complete undergraduate prerequisites in biochemistry, genetics, instrumental analysis (lab component required), and statistics. Students accepted into the program without these courses must register for these courses at the undergraduate level during the first year. In addition, students will need background in forensic pattern evidence, trace evidence analysis, microscopy, and forensic biology. Students without sufficient undergraduate background in any of these areas will also be asked to register for undergraduate courses offering this background during the first year.

Students must also register for Thesis Prospectus (FSC 500, 2 credits) during the spring semester.

Master's Thesis Research Program

Students will be required to perform their master's thesis research during the summer between the first and second year. Research can be performed on campus or at an external laboratory (requires prior approval from the program director). Cedar Crest College offers two summer sessions and students will be required to register for both sessions (FSC 501 and 502, 4 credits/session). Students will perform thesis research under the tutelage of a faculty member and will be expected to work full time during both sessions.



Second Year Courses

Although some graduate classes may be taken in the first year (depending on the amount of prerequisites needed), the second year of the curriculum will be dedicated to completing the coursework for the degree. Students will also be required to give a research seminar and to complete the writing of their thesis during the second year.

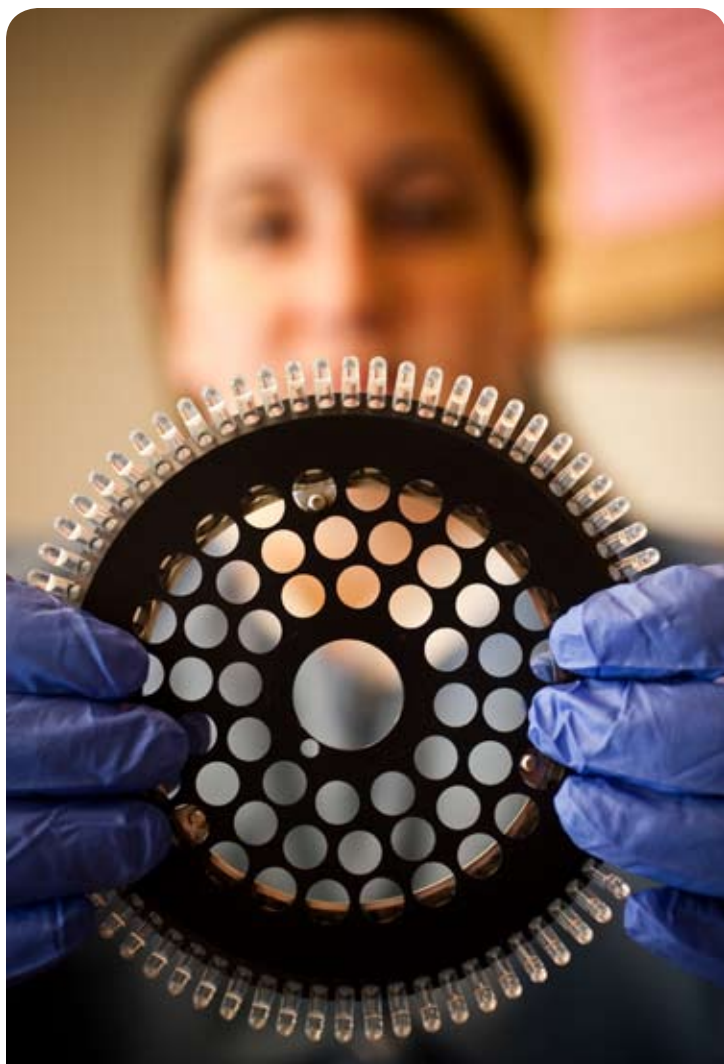
Graduate Courses

FSC 503	Graduate Seminar I	1 credit
FSC 504	Graduate Seminar II	1 credit
FSC 505	Separations Chemistry	2 credits
FSC 506	Analytical Spectroscopy	2 credits
FSC 507	Forensic Chemistry	3 credits
FSC 508	Forensic Toxicology	3 credits
FSC 509	Advanced Crime Scene Reconstruction	1 credit
FSC 510	Recent Advances in Forensic Biology	3 credits
FSC 511	Molecular Biology	3 credits
FSC 512	Forensic Science Administration	2 credits
FSC 513	Advanced Microscopy	3 credits
FSC 514	Legal and Ethical Issues in the Forensic Sciences	2 credits
FSC 515	Advanced Forensic Pattern Analysis	2 credits
FSC 599	Research*	1 credit

*each semester of second year

Academic Progress

Students receiving a grade of C in any class must repeat that class. No more than one repeat is allowed for any one class. Any student that receives more than 3 C's or receives a failing grade in any one course will be dismissed from the program.



Dr. Lawrence Quarino, Associate Professor, Program Director

Education

B.S. Biology, Saint Peter's College
 M.S. Forensic Science, John Jay College of Criminal Justice
 Ph.D. Forensic Science, City University of New York

Prior Professional Experience

New Jersey State Police (1986-1990)
 New York City Medical Examiner's Office (1990-2001)

Recent Publications

C. Mulligan, S. Kaufman, L. Quarino, *The Utility of Polyester and Cotton as Swabbing Substrates for the Removal of Cellular Material from Surfaces*, Journal of Forensic Sciences, In Press, 2011.

N. Deitz, L. Quarino, *Differentiation of Blue Gel Inks Using Adobe Photoshop*, Journal of Forensic Identification, Vol. 60, No. 3, 2010.

M. Zellner, L. Quarino, *Differentiation of Twenty-One Glitter Lip Glosses by Pyrolysis-Gas Chromatography/Mass Spectroscopy*, Journal of Forensic Sciences, Vol. 54, No. 5, 2009.

Notable Appointments

2006-Present Commissioner, Forensic Science Educational Programs Accreditation Commission
 2003-2008 Board of Directors, American Board of Criminalistics

The fundamental mission of our master's program is to offer the student the best possible graduate education in forensic science. I want to instill in our students a commitment to excellence and to help create the next generation of leaders in the profession. The program at Cedar Crest is generalist-based because we believe that a commonality exists between all types of physical evidence, regardless of their physical, chemical, or biological nature. This commonality is based on the premise that in any given crime, evidence of many different forms is created. To understand the event, all the evidence must be considered. It is hard to solve the puzzle, when parts of the puzzle are left out. I am interested in creating forensic scientists, not just forensic biologists or forensic chemists.

I am also a strong proponent of master's thesis research. As a program, I believe it is extremely important to contribute to the body of knowledge in the field. I also believe that the best way to train scientists is through research. On several occasions, laboratory directors have told me that they prefer to hire employees who have performed a master's thesis because they can think better and are better able to solve problems than those who have not.

I also believe in providing students with as many opportunities as possible to publicly speak given that the most important function of a forensic scientist is providing expert testimony in courts of law. Through seminars, presentations at scientific conferences, and moot court exercises, students will learn the communication skills necessary for anyone preparing for a career in forensic science.

As a former supervisor at the Department of Forensic Biology in the New York City Medical Examiner's Office, I watched the DNA revolution unfold

and transform forensic science. In my own professional lifetime, I've seen forensic science ascend to the front lines of the criminal justice system. Despite the success of the last few decades, many areas of forensic science need improvement. As a profession, we have not yet met our full potential. I entered teaching because I want to inspire students to become the future leaders of the profession who will continue to move forensic science forward and to continually improve our rapidly changing field. It is the sole reason for why I do what I do.

Dr. Thomas Brettell, Assistant Professor of Chemistry

Education

B.A. Chemistry, Drew University
 M.S. Chemistry, Lehigh University
 Ph.D. Analytical Chemistry, Villanova University

Prior Professional Experience

New Jersey State Police (1976-2007)

Recent Publications

M. R. Wood, T. A. Brettell, H. W. Thompson, R.A. Lalancette, *The Hydrated and the Anhydrous Gold(III) Tetrachloride Salts of L-Ecgonine: Important Forensic Toxicology Markers for Cocaine*, Acta Cryst, Section C66, m4-m8, 2010.

T. A. Brettell, J. M. Butler, J. R. Almirall, *Application Reviews - Forensic Science*, Analytical Chemistry, Vol. 81, No. 12, 2009.

L. A. Quarino, T. A. Brettell, *Current Issues in Forensic Science Higher Education*, Journal of Analytical and Bioanalytical Chemistry, Vol. 394 (8), 2009.

M. R. Wood, T. A. Brettell, H. W. Thompson, R.A. Lalancette, *The hydrochloride salt of L-ecgonine, a congener of cocaine*, Acta Cryst, E64, o525, 2008.

Notable Appointments

2008-Present Editorial Board - *Forensic Science Policy & Management: An International Journal*
 2003-Present National Safety Council's Committee on Alcohol and Other Drugs
 2005-2006 ASCLD/LAB Board of Directors – Treasurer
 2004-2006 New Jersey Governors' Advisory Council Against Sexual Violence
 2004-2006 Co-Chair of NJ Attorney General's Commission on Forensic Science
 2003-2006 Technical Advisory Board – New Jersey Violent Death Reporting System

I joined the faculty here at Cedar Crest College after retiring as the Director of the New Jersey State Police Office of Forensic Science with 31 years of experience in the field. I do not view myself as in 'Retirement' but starting my career in academia. While working as a Forensic Scientist I taught forensic science courses as an adjunct faculty and truly loved teaching.

With my background as a professional in the forensic science field I work to bridge the theory between the textbook and actual casework, with an enthusiasm and credibility that the students can appreciate. Because of this connection and good, open communication, they are able to grasp the knowledge from both a theoretical and practical aspect.

In addition to my teaching, my current professional involvement and mentoring of students in their research, is an experience from which the students benefit. I believe my present professional involvement adds to my knowledge and skills as a teacher and mentor. This experience allows me to provide the necessary foundation to train and mentor future forensic scientists and chemists. I view my mentoring relationship seriously, and as a lifelong bond with the student that will continue and build as a professional relationship in their career. Teaching and mentoring in both the undergraduate and graduate program allows for the best opportunity to share my knowledge and experience to my students on a one-on-one basis..

Dr. K. Joy Karnas,

Associate Professor of Biology, Director of Genetic Engineering

Education

B.S. College of William and Mary

M.A. College of William and Mary

Ph.D. University of Arizona

Select Presentations

K. Moran, K.J. Karnas, mRNA *Decay in Biological Fluids for Crime Scene Stain Identification and Estimation of Time of Deposition*, Eighty-sixth Annual Meeting of the Pennsylvania Academy of Sciences, Camp Hill, PA, 2010.

C. Massafra, K.J. Karnas, A. Reese, K. Kathley-Dutt, *Differentiation of Sources of Bitemarks Using Staphylococcus epidermidis Recovered from the Oral Cavity*, Thirty-third Annual Meeting of the Northeastern Association of Forensic Scientists, Bolton Landing, NY, November 2007.

My career path brought me to Cedar Crest College in the Fall of 2001. It was an obvious choice for me, as the college exemplifies everything that I believe an academic institution should be. The primary focus here is the education of future leaders. Teaching is the primary responsibility of faculty, and in the sciences it is required that all faculty include students in their research labs. Additionally, there are many opportunities for faculty to participate in interdisciplinary initiatives. As a professor in the Department of Biological Sciences, I love that I can work with forensic science students in both the classroom and laboratory, and participate in science education programs. At a small college like Cedar Crest, I feel that it is important and noteworthy that faculty from different departments have the flexibility to work with these students who have interdisciplinary interests.

Science literacy is essential for individuals at all academic levels. While I primarily work with undergraduate Genetic Engineering majors, I also regularly teach the Molecular Biology course for the Master's in Forensic Science Program and mentor research projects for freshman biology students. I have coordinated grant-funded internships for college students to explore careers in science education, and have worked as a content specialist

for the grant-funded DaVinci Institutes for the professional development of elementary school teachers. The latter program encourages teachers to use the pedagogical inquiry-based learning process to teach science, engaging students and facilitating the learning process. In addition, since so little time in elementary school is dedicated to science, we help teachers find ways to incorporate science education into all facets of learning—literacy, mathematics, art, social studies, etc. Finally, I love visiting elementary school classrooms and inspiring students to explore the world around them—working with children is an amazing experience.

I chose my career in education primarily because of my own experiences as an undergraduate. I was influenced by a faculty who believed that a student-centered, interactive education provided the best learning environment. I have taken this lesson to heart and have created the same experience for my own students. In my lectures, I encourage students to analyze and interpret data as they develop a deeper understanding of the molecular basis of life, and I also promote classroom discussions centered on the ethics of genetic research and the applications of scientific research to societal issues. I believe that most learning is experiential in nature, and feel that laboratory hands-on training is essential. The majority of my coursework has a laboratory component in which students experience the technologies that we have discussed in lecture. In addition, I feel that original research provides an opportunity for students to explore the nature of science, from forming a research question to developing methodologies to answer that question, and then, finally, analyzing and contextualizing results.

Everything about my research lab is student-driven—while I oversee and mentor the projects, my students are the ones who conduct the majority of the research. The broad theme of my research is the molecular basis of gene expression, primarily the biosynthesis of lipoprotein particles (e.g. LDL and HDL) using an insect model, the tobacco hornworm (*Manduca sexta*) for study. Currently, I have students using *Manduca sexta* as a marker for environmental contaminants as they explore the molecular response of the tobacco hornworm to toxins in its diet. I have also worked with a forensic science student as she used polymorphic short tandem repeats in bacteria species to connect assailants and victims through bitemarks inflicted during a crime. I feel that research provides a great tool for education, an enriching experience that opens doors for students as they pursue careers in science.

Dr. Jacqueline Speir, Assistant Professor

Education

B.S. Biology, McGill University

M.S. Forensic Science, John Jay College of Criminal Justice, CUNY

Ph.D. Imaging Science, Rochester Institute of Technology (August 2010)

Prior Professional Experience

McCrone Research Institute (2004-2006)

John Jay College of Criminal Justice (2002-2004)

Recent Publications

J. Speir, J. Schott, A. Goodenough, S. Brown, *Validation of In-Water 3D Radiative Transfer using DIRSIG*, Hyperspectral Image and Signal

Processing: Evolution in Remote Sensing, WHISPERS 14-16 June 2010. pp. In Press.

J. Speir, *A Case Study: The Observation of Dispersed Extinction in Fibrous Richterite/Winchite*. The Microscope. Vol. 54, 1st Quarter, 2006, pp 25-29.

J. Speir, *Cleaning, Maintenance and Adjustment of the Light Microscope*. The Microscope. Vol. 54, 2nd Quarter, 2006, pp 61-70.

Reflecting on my academic and professional choices, the path that has led me to a career within the field of Forensic Science is neither obvious, nor linear. I first earned an undergraduate degree in Biology, with a major in Neurobiology and a minor in Neuroscience, from McGill University in Quebec, Canada. After completing this degree I started working at a metabolic laboratory while taking night classes in criminal justice. My interest was piqued and I decided to pursue a Masters of Science in Forensic Science at John Jay College of Criminal Justice in New York, New York. I truly believe that this singular experience strongly shaped my views on graduate education, and in a larger context, the role research plays in shaping young scientists. Somewhat surprisingly, it also fostered an intense appreciation for the polarizing light microscope, which led to two years of teaching and research at the McCrone Research Institute (McRI) in Chicago, Illinois.

While at McRI, I became increasingly interested in scientific digital imaging, which led me to the Rochester Institute of Technology, and the prospect of an advanced degree in Imaging Science. This experience proved to be tremendously rewarding, allowing me to pursue interests in a scientific discipline that at first seemed considerably outside of my comfort zone. Coincidentally, both Imaging and Forensic Science share a common theme, in that both disciplines borrow and then find novel ways to expand upon the scientific foundations of other fields (including but not limited to chemistry, chemometrics, biology, physics, optics, mathematics, statistics, engineering and computer graphics).

Throughout this journey, I have repeatedly found that the higher the educational degree, regardless of the actual field, the more the role of the teacher and the student begin to merge into a single team. I strongly believe that the graduate educational experience should be fundamentally different from the undergraduate experience and that it is a disservice to the student if one is simply an extension of the other. The graduate experience, whether at the Masters or Ph.D. level, should both blend and blur the role of the teacher and the student, such that neither role is mutually exclusive. The student must make the transition from an individual that receives to one that contributes knowledge. In fact, a fulfilling graduate experience should give the student sufficient confidence and skill that they can go on to teach others about their specific area of expertise, learning to pose interesting scientific questions, and generate independent and innovative problem solving techniques. As for the "teacher", they have truly fulfilled their mentoring obligation when they begin to learn from the student. With it comes the added pleasure of watching as a former student transitions to their new role; that of a colleague.

Dr. Marianne Staretz, Associate Professor

Education

B.S. Biochemistry, University of Scranton (1986)

Ph.D. Bioorganic Chemistry, State University of New York, Binghamton, NY (1992)

Prior Professional Experience

American Health Foundation (1992-1997)

University of Scranton (1997-2000)

Select Publications/Presentations

M. Staretz, K. Dougherty, *Development of a Method for Detecting Papain in Urine*, Midatlantic Association of Forensic Scientists Annual Meeting, Pennsylvania State University, May, 2010.

M. Staretz, *Effect of Selenium Compounds on Microtubule Polymerization*, 234th ACS National Meeting, Boston, MA, August 19-23, 2007.

M. Staretz, A. Goodman, *Analysis of the Antioxidant Capacity of Common Beverages: An experiment for the undergraduate laboratory*, A. 236th ACS National Meeting, Philadelphia, PA, August 17-21, 2008.

I am somewhat unique compared to other faculty in the forensic science graduate program in that my official training was not in the area of forensic science. I have a BS in Biochemistry and a Ph.D. in Bioorganic Chemistry. My doctoral research was in the area of drug-protein interactions. I then went on to do some research in the area of carcinogenesis and toxicology.

I came to Cedar Crest College after doing research for several years because I was ready to share what I had learned. I knew from my teaching experiences in graduate school that teaching was my passion. I always intended to enter academics but needed those few years of research to broaden my knowledge base. The Cedar Crest dedication to education eventually brought me here.

How did I get involved in the forensic science program? Having been around the undergraduate forensic science program at Cedar Crest for a few years, it drew me in. As it draws the interest of many students, it also drew the interest of me. It is an enticing field for me, in part, because of the nature of the field but also because it is a field that is growing. There is much work that still needs to be done in the area of forensic science. The research component of the graduate program is making some novel and needed contributions to the field and our graduates are well trained to continue making those contributions to the field after they leave.

My involvement in the graduate program highlights the foundation of the field in the other sciences. I can take my background in Biochemistry and Toxicology and use it in the forensic science area. The graduate program emphasizes this aspect of forensic science and gives students the flexibility to venture into many different areas of forensic science.



Larry Quarino:

I am a strong believer in strong body and strong mind. My father took me to a Yankee game when I was six and I have been in love with sports ever since. I believe that many of life's lessons can be learned on the athletic field many of which apply to the classroom and to professional life. Athletics are an excellent blueprint for a life well lived. Just check the list of world and corporate leaders and you

will find that for many of them, athletics have played a key role in their life. Sports teach you to deal with adversity, to persevere, and that true success can only come from working hard. I have had the good fortune to be a part-time coach on Cedar Crest's women's softball team and have found that those players who work hard at athletics do the same in academics. Now if only I can convince my graduate students to come running with me in the morning!



Tom Brettell:

When I was a child I would place my small transistor radio under my pillow and listen to Richie Ashburn announce the Phillies games. My parents thought I was sleeping. Ever since I have been small I have been an avid baseball fan. I coached little league for 18 years, watching my three sons play at all different levels of organized sports. Now I go

watch them coach their high school varsity team. Parents ask me "Which one is your son?" and I answer "The Coach!" Now when there is no game to watch you can find me on the golf course, mostly in the 'rough'. When not grading exams or reading theses, you can find me tending to my lawn and shrubs, or of course, spoiling "Charlie", our 4 1/2 pound toy Chihuahua.



Joy Karnas:

I started jogging in college as a way to stay in shape, and even ran a few 5K's and a half-marathon while in graduate school. I met my husband through a bike touring company, and we used to regularly go for day-long biking trips. When I moved out west to complete my doctorate, I picked up hiking and camping as a weekend pastime—the only way to truly appreciate the beauty of this country is to get out

and walk up its mountains and down through its canyons. In more recent years, it's difficult to find time for day-hikes, as most of my free time is dedicated to my role as soccer mom! I have two young sons, so Saturday double-headers are fairly common in the fall and spring, and I have a feeling that in a few years, when she's old enough, my daughter will also pick up the sport. In the evening I can be found in my Allentown backyard oasis. I don't think anything is more fun or relaxing than digging in my garden!



Jacqueline Speir:

I've always really enjoyed spending time with my family. Growing up we would take skiing trips during the winter months, shing trips during the spring and summer months, and in between, get together for as many holidays as

possible. Even though life seems to become more busy with each passing day, we try to make time to visit as often as possible. My Dad and I still plan at least one fishing trip together every year, and this picture was taken by my sister while we toured Iceland together this past summer. I realize how lucky I am; family really does mean everything.



Marianne Staretz:

Hobbies?! With my current low supply of free time, any I do have is normally spent with my three children – ages 4-11. We enjoy swimming together. We recently installed a new pool. I am wondering if that was a good idea since we are now swimming even when temperatures are in the sixties (and the water is ice cold!). We play sports together – mostly kickball, baseball, and basketball. I enjoy watching them

play in the community baseball and basketball leagues. I help coach softball – well a slight exaggeration – I am mainly the bookkeeper for the team (that is about all I am capable of). I really enjoy cooking. It must be a chemistry connection because I know many other chemists who like to cook. I sometimes wonder though, why I spend the time cooking, since my kids won't eat anything that is not a chicken nugget!

Admission Requirements

The following criteria is recommended for admission:

- A Bachelor of Science degree from a regionally accredited college or university in a natural science (or equivalent coursework in a relevant discipline) including the following courses:
- Two semesters of general (freshman) chemistry and two semesters of organic chemistry
- Two semesters of calculus (differential and integral preferred)
- Two semesters of physics
- Two semesters of general (freshman) biology
- A minimum cumulative GPA of 3.0
- Completion of the GRE General Test (scores must be received by March 1st)
- Two letters of recommendation from individuals who can attest to the applicant's scientific ability.

Students under consideration for admission may be asked to interview with members of the forensic science faculty before acceptance to the program.

Applications received by January 2nd will be given admissions preference.

Maximum Period of Candidacy

Students have three years to complete the program from the date of matriculation unless exigent circumstances exist. Students requesting additional time to complete the program must submit a formal written request to the program director explaining the reason(s) for the extension request.

Transfer Credits

Students entering the program may transfer up to six graduate credits. Only courses listed in the curriculum will be considered.

Tuition and Fees 2009-2010

Application fee (non-refundable).....	\$50
Graduate Tuition per credit:	\$627
Masters Thesis Fee (non-refundable).....	\$300
Prerequisite courses that are required for the Master of Science in Forensic Science Program.....	per credit: \$795
Student Activity Fee	per semester: \$10
Technology Fee	\$100

Note to Fee Structure: The College reserves the right to change fees and charges when necessary. Books, supplies, lab materials and other program costs are not included in the tuition

Student Housing

Campus housing is available to female graduate students on a first-come, first-serve basis. Those students interested in campus housing should contact the Director of Residence Life at 610-606-4666, ext. 3351.

Financial Aid

Students accepted to the Master of Science in Forensic Science Program may apply for graduate level federal Stafford Loans. Please contact Student Financial Services at 610-606-4602 for more information.

For Additional Information contact:

The Forensic Science Program
Phone: 610-606-4661 or
Email: graduate@cedarcrest.edu

About Cedar Crest College

Founded in 1867, Cedar Crest College is located in a suburban, park-like setting in Allentown, Pennsylvania. U.S. News & World Report ranked Cedar Crest College among the Top 10 Comprehensive Colleges in the North. The magazine also listed the College as a "best value."

Cedar Crest College complies with all applicable federal and state legislation and does not discriminate in education programs or in employment on the basis of race, religion, national origin, age, gender, disability, or sexual orientation.

