Proposal to
The Ohio Department of Higher Education
Chancellor's Council on Graduate Studies (CCGS)
For a new program:

Master of Science in Forensic Science (MSFS)

Bowling Green State University

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INTRODUCTION

The Graduate College, the Department of Human Services (Criminal Justice Program) in the College of Health and Human Services, and the Departments of Chemistry and Biological Sciences in the College of Arts and Sciences at Bowling Green State University propose to institute a new degree program leading to the **Master of Science in Forensic Science (MSFS**). The proposed interdisciplinary program is a "professionally-oriented graduate degree program" and, as such, will prepare individuals to apply forensic science techniques in the gathering and analysis of crime evidence in ways that make their results admissible and understandable in legal proceedings. Two groups of potential students are targeted by the program. The first group is current undergraduate students who wish to pursue specialized education in forensic science topics. The second is in-service personnel who need to further develop their skills and knowledge in forensic science techniques that are needed in the field and are necessary for advancement or those who wish to move into forensic science work in their chosen field.

The rationale for this proposal is derived from contemporary and complementary issues of high levels of crime, advances in scientific methods for uncovering evidence and identifying criminal offenders, and the relative lack of preparation in putting together the scientific advances and the requirements of the legal/criminal justice system. The contemporary criminal justice system and educational programs in criminal justice, law, biological sciences, and chemistry are ill-prepared to address the fast moving and emerging issues related to forensic crime evidence. Largely driven by the popular media, modern society is expecting (and almost requiring) every criminal court case to provide laboratory-based scientific certainty of all the facts involved in a crime and the guilt of an accused. The legal system is struggling to keep up with these demands, particularly in light of the still emerging area of forensic science.

The contemporary criminal justice system and the criminal courts (and to some degree the civil courts) face new problems and issues for which few of its practitioners have received adequate preparation to assume entry positions in the forensic arena or the ongoing education and training required to keep pace with the rapidly emerging technology and changing demands of society and the courts. One major example of this ever changing landscape is the push to find new methods for DNA analysis of current and past case evidence. The recent announcement of "rapid DNA" technology and its potential impact on criminal identification and national security raises a wide range of scientific and legal issues for which current forensic scientists and investigators are ill-prepared. Another major issue faced by the criminal justice system and the courts is the steady rise in emerging new designer drugs. Forensic science is at the forefront of the identification of these new drugs. Unfortunately, there is a serious need for more staff prepared to undertake such research and prepare reports and cases for the courts. These and other emerging scientific issues place a burden the system for which it is unprepared. Beyond training in laboratory methods and techniques, forensic scientists need much more training in legal issues. Among the educational needs is work on case law as it relates to forensic laboratory testing; how to make complicated scientific analyses understandable for jury members and the general public; testifying in court; ethical issues in forensic science; and managing forensic science laboratories.

The MSFS will focus on forensic science with three major areas of specialization: Forensic Biology (FB), Forensic Chemistry (FC) and Forensic Investigations (FI) (Criminal Justice). This approach recognizes the diversity of expertise and challenges in forensic science within the justice arena. The degree differs from an entry-level program in that the emphasis is on developing advanced forensic expertise and leadership skills for individuals in agencies/organizations that provide forensic services in the criminal justice field. One target group for prospective students includes personnel within the forensic science field who are required to develop new skills and increase professional knowledge necessary to keep up with the ever changing methods/technology in forensic examination and investigation, and for preparing individuals to lead crime laboratories or investigative organizations. Another target population includes current undergraduate students who wish to pursue graduate study in forensic science. Graduates of the MSFS will be prepared to assume positions in both government agencies and private organizations dealing with forensic evidence. Students will be exposed to the collection of crime-scene evidence, conducting tests on evidence and preparing reports for investigators and prosecutors, and testifying in court.

ACADEMIC QUALITY

Faculty

As an interdisciplinary program, the MSFS draws on faculty from a range of BGSU programs/departments, with the primary faculty housed in Criminal Justice, Chemistry, Biological Sciences, and Medical Laboratory Sciences. A total of 14 current faculty from Chemistry, Biological Sciences and Medical Laboratory Science will contribute to the laboratory specializations of Forensic Chemistry and Forensic Biology. These individuals include Drs. John Cable, Jon Sprague, M. Ahmad Chaudhry, Stephania Messersmith, Andrew Torelli, Ksenija Glusac, Ron Woodruff, Hans Wildschutte, Scott Rogers, Daniel Pavuk, Helen Michaels, Robert Huber, Carol Heckman and Paul Morris. Four full-time Criminal Justice faculty will be active in the Forensic Investigations component of the degree and/or contributing legal coursework to the laboratory specializations. These faculty are Drs. Michael Buerger, Steven Lab, Phil Stinson and John Liederbach. The following represents a brief outline of each faculty member's expertise and full curriculum vitae appear in Appendix A.

> **Dr. Michael Buerger** is Professor of Criminal Justice and a former police officer. He holds a Ph.D. in Criminal Justice from Rutgers University's School of Criminal Justice, and was a Visiting Fellow at the National Institute of Justice. In addition to being the field coordinator for two major NIJ research projects in Minneapolis (the RECAP Experiment and the original Hot Spots of Crime Experiment), he was the Research Director for the Jersey City (NJ) Police Department under the NIJ Locally-Initiated Research Partnerships initiative. He was a member of the site teams for the Urban Institute's national evaluation of the Clinton administration's 100,000 Cops on the Street program, and participated in an exchange program with An Garda Siochana. A charter member of the Futures Working Group, he was an external assessor for the review of the F.B.I. National Academy. He has authored more than 40 journal articles and book chapters, in addition to numerous articles for practitioner journals and more than 30 technical reports for agencies.

Dr. John Cable is an Associate Professor of Chemistry, Chair of the Department of Chemistry, and a principal member of the Center for Photochemical Sciences. He earned a PhD in Chemistry from Cornell University in 1986 and completed a Postdoctoral Research Associate appointment at the University of Chicago. His research interests are focused on high-resolution spectroscopy to probe the electronic and molecular structure of conformationally flexible organic molecules. His teaching responsibilities have largely been in the area of general and physical chemistry.

Dr. M. Ahmad Chaudhry is Professor and Chair of the Department of Public and Allied Health. He received a Ph.D. in Molecular Biology from University of Manchester, UK. Dr. Chaudhry has authored 45 peer reviewed scientific papers. He has participated in national and international scientific conferences and have presented his work 47 times. His research papers have been widely cited by many authors. Dr. Chaudhry received close to $1M from various state and federal grant funding agencies. He has reviewed over 100 manuscripts that were submitted for publication to 41 international scientific journals. He has reviewed research grants for National Institute of Health, Medical Research Council, UK, Cancer Research Campaign, UK, Welcome Trust, UK, Ophthalmic Research Institute of Australia, Ireland Health Research Board, and Danish Council for Independent Research. He is currently serving on editorial board of *Recent Patents on DNA & Gene Sequences*, *World Journal of Methodology*, *The Scientific World Journal*, and *Journal of Microbiology and Biology Education*. Dr. Chaudhry has given talks and has chaired symposiums at international conferences. He has received numerous scholarly nominations and invitations. He has mentored 28 undergraduate and graduate students and 5 postdoctoral fellows. Students have co-authored 9 articles with him and have presented 14 times at state or national conferences. Dr. Chaudhry is member of the Radiation Research Society, American Association for the Advancement of Sciences, and American Association for Cancer Research.

Dr. Ksenija Glusac is an Associate Professor of Chemistry. She earned a PhD in Chemistry from the University of Florida in 2004. She was an American Chemical Society/Petroleum Research Fund Postdoctoral Fellow at Stanford University with Prof. Michael Fayer. Her research investigates flavin-based water oxidation catalysts that might be employed for solar-driven water splitting. She has been recognized by BGSU with an Outstanding Young Scholar Award and by the National Science Foundation with a CAREER Award.

Dr. Carl Heckman is a Professor of Biological Sciences with specific research interests in cell biology and the role of ruffling in growth control. She earned her Ph.D. in Cell Biology from the University of Massachusetts, Amherst. Her laboratory has developed a theory of preneoplasia, which explains how a cell takes the first step to becoming a cancer cell.

Dr. Robert Huber is a Professor of Biological Sciences and holds a Ph.D. from Texas Tech University. His laboratory investigates the behavioral significance of amines in complex behavioral phenomena such aggression and drug addiction. Using simpler systems approaches he studies these behaviors in invertebrates with a combination of

neuroethological, pharmacological, and molecular approaches. He has interest in the neurochemical mechanisms underlying motivational states in behavior.

Dr. Steven Lab is Professor of Criminal Justice and Chair of the Department of Human Services. Dr. Lab holds a Ph.D. in Criminology from the Florida State University School of Criminology and Criminal Justice. Dr. Lab is the author or coauthor of five books, the editor/coeditor of two readers, and coeditor of one encyclopedia. He is the author of over 50 articles or book chapters and has presented over 70 papers to academic or professional societies. He is a past editor of the *Journal of Crime and Justice* and has been an assistant editor or on the editorial boards of several additional journals. Dr. Lab has been a visiting professor at the Jill Dando Institute of Crime Science of the University College London and at Keele University in Staffordshire, England, as well as a Visiting Fellow at Loughborough University (England) and a Research Consultant with the Perpetuity Research Group at Leicester University (England). Dr. Lab has received grant funding for several large research projects from the National Institute of Justice. He has served as a consultant to the Ohio Attorney General's Office, the Arizona Governor's Office, and various offices of the U.S. Department of Justice. Dr. Lab is also a past-president of the Academy of Criminal Justice Sciences.

Dr. John Liederbach earned his Ph.D. in Criminal Justice from the University of Cincinnati in 2002 and came to BGSU as an Associate Professor in 2007. His primary research interest is police behavior, and the focus of his published research is varieties of police behavior across community types, racial profiling, the processing of citizen complaints, police-media relations, and police crime. He has also published research on white-collar crime, including studies focused on medical malpractice and the mortgage default crisis. He has consulted with various police organizations through the Caruth Police Institute at Dallas, a public-private partnership to improve policing. He is currently co-investigator for a research project funded by the National Institute of Justice (NIJ) at the US Department of Justice entitled *Police Integrity Lost: A Study of Law Enforcement Officers Arrested*. He has published in a variety of journals including *Justice Quarterly*, *Police Quarterly*, and *Criminal Justice Policy Review*. He is coauthor of *Digital Crime/Digital Terrorism* and *Police Patrol Allocation and Deployment* (Pearson). He teaches graduate courses on law enforcement and special topics, and undergraduate courses on research methods and senior seminar. He also serves as the CRJU internship coordinator.

Dr. Stephania Messersmith is Lecturer of Chemistry and the Coordinator for STEM in the College of Arts and Sciences. She earned a PhD in Chemistry from the University of Toledo. Her primary teaching responsibilities lie in the areas of analytical and physical chemistry and include a number of laboratory experiences such as the Integrated Analytical and Physical Laboratory taken by all chemistry majors. She also developed a general education course for the natural sciences domain that provides a broad introduction to forensic science.

Dr. Helen Michaels is an Associate Professor of Biological Sciences. She holds her Ph.D. from the University of Illinois, Urbana-Champaign. Her research interests include

conservation biology, conservation genetics, restoration, molecular ecology, molecular systematics & evolution, plant-pollinator interactions, plant physiological and evolutionary ecology.

Dr. Daniel Pavuk is a Lecturer in the Department of Biological Sciences. He received his Ph.D. in Entomology from the Ohio State University. His research interests are in population and community ecology of arthropods, parasitoid and predatory arthropod communities, and conservation biological control.

Dr. Scott Rogers received his Ph.D. from the University of Washington and is a Professor in the Department of Biological Sciences. His research interests include ancient DNA, ice , viruses, bacteria, and fungi; DNA/RNA preservation; Introns; and plant development. His lab has several concurrent focal areas of research. The projects have centered around the following areas: Characterization of microorganisms and nucleic acids from ancient and environmental ice; Characterization of DNA from ancient samples; Investigations of introns in fungi and fish; Extraction and preservation of nucleic acids; Evolutionary events in plants; Plant apical development; Phylogenetics of fungi; and Novel evolutionary strategies of microorganisms.

Dr. Jon Sprague earned his Ph.D. in Pharmacology and Toxicology from Purdue University in 1994 and came to BGSU in 2014 as the Director of the Ohio Attorney General's Center for the Future of Forensic Sciences. His primary research interest is in the areas of characterizing the pharmacologic and toxicologic effects of the synthetic cathinones (bath salts). Before joining BGSU, he served as Director of Research at Ferris State University, he was also Dean and Professor of Pharmacology at the Raabe College of Pharmacy at Ohio Northern University (ONU). Dr. Sprague has also served as Chair and Professor of Pharmacology at the Virginia College of Osteopathic Medicine, Virginia Tech University.

Dr. Philip Stinson is an associate professor of Criminal Justice. Dr. Stinson earned a Ph.D. in Criminology from Indiana University of Pennsylvania and a J.D. from the University of the District of Columbia. Prior to joining the faculty at Bowling Green State University in 2009, he previously worked as a police officer, juvenile detention counselor, and attorney. His research articles have been published in numerous refereed journals, including *Criminal Justice Policy Review*, *International Journal of Police Science and Management*, *Journal of Crime and Justice*, *Police Quarterly*, *Policing: An International Journal of Police Strategies & Management*, and *The Prison Journal*. Dr. Stinson is a past Managing Editor of *Criminal Justice Policy Review* and currently serves on the journal's Editorial Board. Dr. Stinson is currently the principal investigator of a large police integrity research study funded by the National Institute of Justice at the U.S. Department of Justice. He also serves as a member of the Standing Review Panel for Research and Evaluation in Justice Studies at the National Institute of Justice.

Dr. Andrew Torelli is an Assistant Professor of Chemistry. He earned a PhD in Biophysics and Structural Biology from the University of Rochester in 2008. He was a Postdoctoral Associate at Cornell University with Prof. Steven Ealick. His research

interests are focused on biomacromolecular X-ray crystallography and its application to structure/function relationships in various iron-sulfur cluster containing enzymes.

Dr. Hans Wildschutte, Ph.D., is an Assistant Professor of Biological Sciences and is a graduate of the University of Pittsburgh's School of Medicine. His research interests include environmental microbiology; microbial populations; genetic diversity; virulence factors; and bacterial interactions. His laboratory is currently focused on exploring the genetic diversity of aquatic microbial communities with an emphasis on ecological interactions that impact their evolution.

In addition to the above, the university has added two new faculty positions (one in Biological Science and one in Chemistry) and is conducting a search (during 2015-16 AY) for 1 additional faculty member in Criminal Justice in support of the MSFS. The new faculty will hold the following qualifications:

1) All hold an appropriate degree in the targeted discipline.
2) Practical experience working in a forensic science laboratory or investigative capacity has been/is being sought (although not required).

Additional instructional support will come from professionals with advanced degrees and currently working in various forensic science positions. Foremost among these individuals will be current staff of the Ohio BCI, whose new Bowling Green laboratory is located on the BGSU campus. These individuals will assist by teaching courses, guest lecturing, team teaching courses, supervising students on field placements, and participating as external members of graduate committees. As a result of their advanced degrees and years of professional expertise, these individuals will be able to earn Adjunct Graduate Faculty status in order to participate in graduate educational instruction. Their practical expertise will greatly enhance the educational experience of the MSFS students.

The MSFS will be administered out of the office of the Graduate College and will have access to the office staff of the Graduate College and the Ohio Attorney General's Center for the Future of Forensic Science, which consists of 17 full-time classified staff and work-study student assistance. These offices handle the routine support functions for administration and faculty in the program. Other assistance can be drawn from the support staff in the Departments of Chemistry, Biological Sciences, and Human Services.

Students

Prospective students for the MSFS program will come from two primary sources. The first is professionals within federal, state, and local agencies and organizations that conduct forensic science services to the criminal justice system. The primary agency that will benefit is the Ohio Bureau of Criminal Investigation (BCI), although there are also more than a dozen local/regional public crime labs in Ohio that can benefit from this program. In addition, local police departments/agencies need investigators who have the training to identify and collect crime scene evidence for further testing and use in cases.

The second major group of prospective students is composed of recent undergraduates who wish to continue their academic studies in order to enhance both their knowledge and marketability in the forensic science field. BGSU's undergraduate programs in chemistry, biology and criminal justice will serve as a primary pool of potential applicants for the MSFS degree. As the only state-supported masters in forensic science in Ohio, it is expected that the MSFS will draw students from across the state (as well as the Midwest region). Undergraduates from other colleges and universities in Ohio with degrees in chemistry, biology, and criminal justice will be able to enhance their knowledge of and marketability for forensic science careers.

The MSFS program seeks to develop skills and knowledge needed by both groups of potential students to undertake the critical investigation and analysis of crimes needed by the criminal justice and legal systems at both the state and federal levels. These abilities require a greater focus on specific skills and knowledge than that typically received in undergraduate programs. As the field of forensic science continues to advance at a rapid pace, there is an acute need for professionals who have the training to find new methods of uncovering, documenting, analyzing, and testifying about both current and emerging problems and topics in the scientific legal community. The MSFS is being developed to address that need.

Admissions

Individuals admitted into the degree program for the FB/FC specializations will be required to hold an undergraduate degree in biology, chemistry, or other closely related field. Additional requirements will include a minimum undergraduate GPA of 3.00 (on a 4.00 scale) and a satisfactory score on the Graduate Record Examination.

Individuals admitted into the degree program for the FI specialization will be required to hold an undergraduate degree in criminal justice or other closely related field. Case-by-case exceptions to this requirement will be made to accommodate individuals who have a wealth of practical experience and background as employees in the criminal justice/forensic field. Additional requirements will include a minimum undergraduate GPA of 3.00 (on a 4.00 scale). The GRE is not required for admission to criminal justice masters degree programs (nor many Ph.D. programs) nationally, thus will not be required for the FI specialization. Alternative indicators used to predict success of these applicants include the submission of a written statement indicating their interest and background relevant to FI, as well as evidence of past work in forensic/law enforcement investigation work.

All applicants for the MSFS must submit two letters of recommendation addressed to the Graduate Coordinator. These letters should come from individuals with knowledge of the applicant's qualifications and ability to successfully complete graduate study. Applicants must submit a written statement of interest and expectations. This should address the expectations and future goals of the applicant. Where appropriate, this statement should provide information on on-educational experiences, specialized training, or other matters which make the candidate suitable for admission.

The MSFS program expects to enroll 8 full-time students in the Forensic Biology (FB) and Forensic Chemistry (FC) specializations combined and 20 full-time students in the Forensic

Investigations (FI) specialization each year. A total of 7 part-time students (2 in FB/FC and 5 in FI) will be enrolled each year. The number of students in FB/FC is dictated by the number of faculty available to supervise forensic research projects, as well as the number of possible laboratory field placements available. Full-time FB/FC students will be expected to enroll in three courses (9 semester hours) per term and FI students will be expected to enroll in four courses (12 semester hours) per term, with part-time students enrolling in half those credit hours each semester. This load will allow FI students to complete the degree in one calendar year, and FB/FC students to finish in two calendar years (due to the research component needed in those specializations).

Curriculum

The MSFS degree has three basic curricula representing the different specializations. The degree requires the completion of 36 credit hours of coursework. This corresponds to the guidelines promulgated by the Forensic Science Education Programs Accreditation Commission (FEPAC). There are four Common Core courses for all students in the MSFS. These common core courses expose all students to broad issues involved in forensic work. Specifically, these students will be required to take: a forensic survey course that introduces topics such as forensic accounting, digital forensics, cyber-crime, forensic psychology, and entomology; a course on law, evidence and procedure; a criminalistics course that includes topics on questioned documents, firearms/ballistics, and crime scene mapping/analysis; and an ethics class. Beyond this core are courses specific to the three specializations of Forensic Biology (FB), Forensic Chemistry (FC), and Forensic Investigations (FI). Students must select one of these specialization areas when applying to the program.

Common Core Courses (12 credit hours) (Abridged course descriptions can be found in Appendix B).

FORI 5010. Elements of Forensic Science (3). Introduction to philosophical considerations and historic landmarks in the discipline; overview of major sub-disciplines in forensic science; examination of the role of expert witnesses and their importance. Course will focus on the various subdisciplines in the forensic sciences. Recent developments and changes in these subdisciplines will be discussed.

FORI 5100. Criminalistics (3). This course will introduce the student to some of the various forms of evidence that traditionally constitute “trace” and/or comparative evidence, including fingerprints, ballistics, and questioned documents.

FORI 5400. Law, Evidence and Procedure (3). This class provides an overview and examination of the legal aspects of physical evidence including rules of evidence, procedural rules, and the role of expert witnesses. The course also includes direct and cross-examination of students in a moot court setting.

CRJU 6510 Seminar in Criminal Justice Ethics (3 credits). The course will discuss ethics, morality, and values and how they manifest themselves in the criminal justice system. The course will discuss a variety of dilemmas facing criminal justice agencies

and practitioners. Students will be challenged to consider their own values vis-a-sis their roles as social control agents and members of a democratic society.

FB/FC Specializations

These specializations respond to the guidelines promulgated by the Forensic Science Education Programs Accreditation Commission (FEPAC) and require a minimum of 36 semester hours beyond the bachelor's degree, which includes a capstone of either a thesis (Plan I) or experiential research project (Plan II). The cornerstone of this specialization is training in laboratory methods for the scientific analysis of crime scene evidence in accord with requirements for the use of the results in legal proceedings. While students in these specializations may choose to focus in either biological or chemical topics, there is an expectation that the graduates will have the knowledge and ability to work in both laboratory settings.

While the FB/FC curricula are designed to guarantee the graduate has the basic skills and knowledge needed for working in forensic settings, the coursework is designed to deal with the rapidly changing nature of both crime and scientific methods for analyzing crime evidence. It is imperative that students are able to identify emerging problems and methods for addressing those issues (such as the ever changing nature of designer drugs or the emerging DNA technologies). The thesis/research project component of the degree is specifically meant as a vehicle for students to undertake such investigation. A typical component of the thesis/research project would be an accompanying field placement in a working forensic laboratory where the student can undergo further training, assist on active cases, and investigate new methods of completing forensic tests. The BCI has indicated that it will provide placements for students through the Ohio Attorney General's Center for the Future of Forensic Sciences.

It is also important that FB/FC students are exposed to broader issues involved in forensic work. Specifically, these students will be required to take: a forensic survey course that introduces topics such as forensic accounting, digital forensics, cybercrime, forensic psychology, and entomology; a course on law, evidence and procedure; and a criminalistics course that includes topics on questioned documents, firearms/ballistics, and crime scene mapping/analysis. Available electives will include courses on forensic laboratory management, case law, and ethics.

The curriculum is such that most students will complete all degree requirements in 20 months (2 academic years and one summer). This represents 4 semesters of full-time class work, including the completion of a thesis/research project. The program curriculum also allows students to complete the requirements as part-time students over a longer period of time.

FB/FC Required Courses (6 credit hours)

CHEM 5540. Instrumental Methods of Analysis. Theory of instrumental methods of analysis including electroanalytical, spectroscopic, and chromatographic methods.

BIOL 5460. Light and Electron Microscopy (3). Theory and practice of scanning electron microscopy applicable to structural/compositional research. Critical point drying,

sample coating techniques, backscattered electron detection, energy dispersive x-ray microanalysis, and computational analysis of data.

FB Requirements (12 credit hours)

BIOL 5030. Advanced Microbiology (3). The biochemistry, genetics, and molecular biology of cellular structures and processes in selected prokaryotes.

BIOL 6210 Molecular Genetics I (3). Fundamental principles of molecular biology, focusing on mechanisms of gene regulation and methods in molecular genetic analysis. Both prokaryotic and eukaryotic systems are presented.

FSCI 5200 Forensic and Molecular Biology (3). Examination of biological evidence in crime laboratory, including identification of bloodstains and semen stains, and DNA typing of blood, bloodstains, and other body fluids.

FSCI 6200 Advanced Forensic and Molecular Biology (3 credits). Expand upon the basics of Forensic Biology. Students will further explore methods discussed, but not practiced in FSCI 5200. There will be a lab component, providing students hands-on experience with techniques commonly used in a forensic biology laboratory.

FC Requirements (9 credit hours)

CHEM 5450. Biochemistry (3). Structure, function, chemical, and physical properties of biomolecules with an emphasis on biomacromolecules.

CHEM 5770. Forensic Chemistry (3). Three one hour lectures and one three hour lab per week. Qualitative, quantitative, and comparative analysis of forensic samples. Topics include drugs, toxicology, arson,explosives, firearms, colorants, polymers, glass, fingerprint development, and documents. Prerequisites: CHEM 2010, CHEM 4080 and CHEM 4540.

FSCI 5300 Pharmacology/Toxicology of Drug Addiction (3 credits). This course was created to assist students in understanding why some drugs are addictive, how addiction can be treated, and the social and toxicologic consequences of drug addiction.

FB Electives *(students choose 6 credit hours from the list below)*

BIOL 5320 Plant Taxonomy and Forensic Applications (3 credits). This course examines the use of botanical material to identify illicit plants or to ascertain possible links between a suspect, victim and a crime scene, including locating crime scenes, determining the time of events, and establishing evidence.

BIOL 5490. Epidemiology (3 credits). Distribution and determinants of health and

disease in humans. Methods of studying those factors that influence change in the determinants of disease.

BIOL 5690 Medical Entomology (3 credits). Biology and identification of disease-carrying, toxic, and parasitic arthropods.

BIOL 6030 Advanced Biostatistics (3). Principles of experimental design and methods of univariate/multivariate statistical analysis of biological data.

FSCI 6700. Forensic Laboratory Management (3 credits). This course covers theory, practical application and evaluation of forensic laboratory management principles, including issues of quality assurance, research and information systems.

FSCI 6900. Topics in Laboratory Forensics (3 credits). The systematic study of selected topics in laboratory forensics. May be repeated.

FSCI 6910. Directed Individual Study in Laboratory Forensics (1-3 credits). Readings or research on a topic or problem approved by the supervising instructor. May be repeated.

FSCI 6990. Thesis Research (1-3 credits). Credit is for thesis research. Thesis proposal must be submitted to the graduate director for approval prior to submission to the graduate college. May be repeated.

Other electives chosen in consultation with the student's academic advisor.

FC Electives (students choose 9 credit hours from the list below)

CHEM 5660. Spectrographic Methods in Organic Chemistry (3). Organic structure determination by spectroscopic techniques, with emphasis on infrared, ultraviolet, and nuclear magnetic resonance spectroscopy, and mass spectrometry. Also includes a brief introduction to related spectroscopic methods. Prerequisite: CHEM 3440. Pre/corequisite: CHEM 5050.

CHEM 6250 Advanced Analytical Chemistry (3). Principles of chemical separations and chromatographic analysis. Mass spectrometry instrumentation and applications. Strategies for interpretation of mass spectrographic data.

FSCI 6700. Forensic Laboratory Management (3 credits). This course covers theory, practical application and evaluation of forensic laboratory management principles, including issues of quality assurance, research and information systems.

FSCI 6900. Topics in Laboratory Forensics (3 credits). The systematic study of selected topics in laboratory forensics. May be repeated.

FSCI 6910. Directed Individual Study in Laboratory Forensics (1-3 credits). Readings or research on a topic or problem approved by the supervising instructor. May be repeated.

FSCI 6990. Thesis Research (1-3 credits). Credit is for thesis research. Thesis proposal must be submitted to the graduate director for approval prior to submission to the graduate college. May be repeated.

Other electives chosen in consultation with the student's academic advisor.

Thesis Option: This option requires the student to undertake original research and prepare and defend a written thesis based on the findings of the research. Students electing this option will be required to enroll for 6 thesis hours in addition to the other course requirements. Typically the thesis will require at least 1 additional semester to complete. Students must select a thesis committee consisting of at least 2 members, both of whom must be a faculty member. Students may add a professional in the field as an outside third member.

Experiential Research Project Option: Students choosing this option will undertake a research project accompanying either a field placement in a working forensic laboratory or by working on an on-campus project where the student can undergo further training, assist on active cases, and/or investigate new methods of completing forensic tests. While not mandatory, this option will most likely take place in the new Ohio BCI laboratory. Students will make a presentation of their work and be assessed by program faculty. Students participating in this option will enroll in 1-3 credit hours of FSCI 6910 depending on the scope of the project.

FI Specialization

This specialization responds to the need for investigators in the field to have training in the identification and proper collection of potential evidence found at crime scenes. The scientific and legal considerations of such identification and collection consistently undergo considerable change which requires new training and preparation. This specialization requires a minimum of 36 semester hours beyond the bachelor's degree, which includes either a thesis (Plan 1) or development of a research portfolio (Plan II). This specialization includes exposure to laboratory methods and issues without the in-depth training needed by the laboratory scientists as in the FC/FB specializations.

While the FI curriculum is designed to guarantee the graduate has the basic skills and knowledge needed for undertaking forensic field investigations, coursework is designed to deal with the rapidly changing nature of both crime and scientific methods for analyzing crime evidence. It is imperative that students are able to identify emerging problems and methods for addressing those issues (such as the ever changing nature of designer drugs or the emerging DNA technologies). The thesis/research project component of the degree is specifically meant as a vehicle for students to undertake such investigation. A typical component of the thesis/research project would be an accompanying field placement in a working forensic laboratory where the student can undergo further training, assist on active cases, and investigate new methods of completing forensic tests. The BCI has indicated that it will provide placements for students.

The FI curriculum is such that most students will complete all degree requirements in 12 months (1 academic year and one summer) of full-time study. Students choosing to undertake a thesis project may need to spend an extra academic term to complete the research. Students may also elect to undertake a cooperative placement in a forensic investigative setting after completion of the required coursework (thus extending the time to degree completion).

FI Required Courses (6 credit hours)

FORI 5200 Crime Scene Techniques (3 credits). The course provides consideration of the different "crime scene" dimensions, needs, and techniques for investigating different crime types. An overview of traditional crime scene work precedes individual inquiries into specific criminal activities that pose special problems, and demand more specific techniques.

CRJU 5150 Data and Statistical Analysis in Criminal Justice (3). This course focuses on various methods of data and statistical analysis found in criminal justice research. Topics covered include methodology, measurement of variables, central tendency, probability, sampling distributions, correlation coefficients, and multiple regression.

FI Electives (students choose 18 credit hours from the list below)

FORI 5450 Forensic Science and the Law (3 credits). An exploration of case law and legal standards pertaining to emerging issues and topics in forensic investigations and forensic science. Topics include expert evidence rules, statistical inference, DNA evidence, expert testimony, forensic science, medical causation, and ethical issues.

FORI 5800 Sex Trafficking and Pornography (3 credits). This course focuses forensic investigation and prosecution of sex trafficking and pornography cases. It includes an overview of historical, policy, legal matters, forensic investigation, physical evidence, interviewing, interrogation, and testifying in criminal cases.

FORI 5900 Exploitation Crime (3 credits). This course examines financial exploitation and fraud and provides an overview of different forms and perpetrators, law enforcement responses, and considerations for forensic investigation and prosecution.

FORI 6100 Death Investigation (3 credits). This course examines the realm of medical-legal death investigation, including study of crime scene and autopsy phases of a case and the relationship between the medical examiner and other participants in the overall investigative process.

FORI 6150 Organized Crime and Criminal Networks (3credits). Organized crime and criminal networks involve local, national, or transnational groups of centralized criminal enterprises. This course explores criminal organizations with an emphasis on historical and contemporary syndicates within the United States and abroad.

FORI 6300 Cold Case Investigation (3 credits). Examination of the investigative process and techniques for solving previously closed cases or those cases awaiting the development of new evidence. Topics include the identification of promising cold cases for examination, the use of data bases for uncovering new leads, and other methods for solving the cases.

FORI 6400 Cybercrime and Digital Forensics (3 credits). This course covers the basic concepts of cybercrime and digital forensics including computer forensic examination, the techniques required for conducting a forensic analysis on computer systems and data, and legal considerations in recovering/restoring data for litigation and various fraud-based investigations.

FORI 6500 Criminal Profiling and Behavioral Analysis (3 credits). This course examines the foundations and limits of the behavioral analysis exercise known as "criminal profiling."

FORI 6600 Intelligence and Homeland Security (3 credits). This class introduces the student to the wide array of predictive and investigative techniques employed to detect, identify, and defeat or deflect criminal enterprise or terroristic threats. International and domestic applications are part of the course content, supplemented with introductions to private security techniques for loss prevention.

FORI 6700 Forensic Casework Practicum (3 credits). Students will manage mock cases involving multiple types of evidence. They will collect, analyze and interpret the evidence. Written reports on the case will be submitted to evaluation during a mock court trail.

FORI 6900 Topics in Forensic Investigation (3 credits). The systematic study of selected topics in forensic investigation. May be repeated.

FORI 6910 Directed Individual Study in Forensic Investigation (1-3 credits). Readings or research on a topic or problem approved by the supervising instructor. May be repeated.

FORI 6990 Thesis Research (1-3 credits). Credit is for thesis research. Thesis proposal must be submitted to the graduate director for approval prior to submission to the graduate college. May be repeated.

Other elective courses as approved by Graduate Coordinator.

Thesis Option: This option requires the student to undertake original research and prepare and defend a written thesis based on the findings of the research. Students electing this option will be required to enroll for a minimum of 3 thesis hours in addition to the other course requirements. Typically the thesis will require at least 1 additional semester to complete. Students must select a thesis committee consisting of at least 2 members, both of whom must be a faculty member. Students may add a professional in the field as an outside third member.

Portfolio Option: Students may choose to compile a portfolio of research work/papers as a capstone project in lieu of completing a thesis. Students choosing this option will develop formal written projects in FSCI 5010, 5050 and 5100, as well as any three FORI elective courses of their choice. Once these projects are completed, the student will write a reflective paper addressing the issues and needs that they see remain to be addressed in the forensic investigative field. This portfolio will be assessed by a faculty committee.

Location and Agency Interrelationships

An obvious important motivating force for Bowling Green State University's new educational programs in forensic science was the agreement between Ohio Attorney General, Mike DeWine, and BGSU President, Mary Ellen Mazey, to construct a new, State of Ohio, Bureau of Criminal Investigation (BCI) forensic science laboratory and investigation facility on the BGSU campus. This partnership of state government and state-supported higher education is highly relevant for both (a) academic education and research training of future forensic scientists, and (b) professional education and development of current forensic scientists and forensic laboratory management staff. Currently, there is no comprehensive graduate education for forensic scientists in the State of Ohio nor a comprehensive professional education program. The Ohio BCI tends to hire its masters level forensic scientists and laboratory staff principally from the two nearest out-of-state programs at Michigan State University, East Lansing, Michigan (132 miles, two hour drive from Bowling Green) and at Marshall University, Huntington, West Virginia (308 miles from Bowling Green, 4½ hour drive).[1] The significant labor force needs in Ohio's 21 state, county and municipal forensic science laboratories necessitates a state university based Master of Forensic Science degree program.[2] This is crucial because surveys of forensic science lab directors have demonstrated their strong preference for hiring lab staff who have Masters degrees in forensic science.[3] However, currently, only about 1/3 of the BCI lab staff across the state have Masters degrees.[4]

Another advantage for implementing an MSFS degree program at Bowling Green State University is the proximity of the new BCI facility to BGSU's departments of Biological Sciences and Chemistry. Employees in the new BCI facility will be a three minute walk from biology and chemistry faculty and laboratories, and correspondingly, BGSU faculty and graduate students will have the same short walk in reverse. This proximity is a key component and advantage for mutual involvement in academic programs, research, and professional education. Lab staff, faculty, and graduate students will be able to work on common issues and problems. Graduate students will be able to receive in-person mentoring from BCI forensic scientists. BCI forensic scientists with appropriate qualifications will be hired to teach specialized graduate

[1] Meeting with BCI Director Tom Stickrath, BCI Laboratory Director Karen Kwek, and BCI Director of Administration Erin Reed at Bowling Green State University, January 22, 2014.
[2] See The Forensic Science Institute of Ohio WWW page about "Public Forensic Laboratories in Ohio" at http://www.ohio.edu/fsio/ohioforensiclabs.html
[3] J.A. Siegel. 1988. The appropriate educational background for entry level forensic scientists: A survey of practitioners. *Journal of Forensic Sciences* 33(4):1065-1068.
[4] Stickrath et al meeting, January 22, 2014

forensic science courses in the academic programs and joint professional development seminars can be developed.[5]

All of these activities will be stimulated and supported by the new Ohio Attorney General's Center for the Future of Forensic Science at Bowling Green State University (the Center), a collaborative organization involving both BCI and BGSU. The Center has already hired a nationally known toxicologist to serve as Center Director and is undertaking a search for an accomplished forensic science scholar as the Center's Distinguished Scholar. Since the new BCI laboratory will bring Northwest Ohio law enforcement executives and officers onto campus in the normal course of their business (for example, delivering evidence, attending meetings, participating in training sessions), BGSU will be able to expand and increase its network of professional contacts in the fields of forensic science and criminal justice. This has two advantages for the university. One is that some of these enhanced interactions can lead to guest lecturer invitations to participate in forensic science and criminal justice classes and educational programs. The second advantage is that the enhanced interactions are a potentially fruitful source of prospective graduate students in forensic science and criminal justice. BCI forensic science staff with Bachelor's degrees (about 2/3 of the BCI lab staff) will be recruited to consider enrolling in the forensic science Master's degree program. Other forensic agency staff in counties and municipalities will also have the same opportunity through their contact with the BCI laboratory. Still other agency staff will have the opportunity to extend their forensic science education through professional development courses conducted through Ohio Attorney General's Center for the Future of Forensic Sciences.

These interrelationships and collaborations represent new opportunities for both the Ohio Bureau of Criminal Investigation and Bowling Green State University to address some of the shortcomings of forensic science education identified in the 2009 National Academy of Science report on *Strengthening Forensic Science in the United States: A Path Forward*.[6]

Computational Resources

BGSU's Office of Information Technology Services provides faculty, students, and administrative offices/personnel with a variety of information services, from desktop and laptop computers for faculty and staff, computer work labs for faculty, graduate students, and undergraduate students, telephone communications, digital classroom technology and virtual learning environments, digital media and digital imaging, access to cloud computing environments, administrative and financial data collection and information systems, and user training and support. Some specific services relevant to the MS in Forensic Science are identified below.

Network

[5] E-mail communication from Michelle Peace, PhD., Interim Chair, Virginia Commonwealth University Department of Forensic Science, February 3, 2014. See http://www.has.vcu.edu/forensics/pdfs/570schedule.pdf

[6] National Research Council, Committee on Identifying the Needs of the Forensic Sciences Community. (2009). *Strengthening Forensic Science in the United States: A Path Forward*. NCJRS Document #228091. Washington, DC: The National Academies Press. See especially Chapter 8, "Education and Training in Forensic Science," pp. 217-239.

BGSU uses OARnet and Time Warner for our Internet Service Providers. We have a 10 gigabyte capacity directly to any building on campus and multiple gigabytes to the desktop if needed. This is true of wired and secured wireless access. There is no additional cost for this Network.

Servers
BGSU has on premise physical and virtual servers available for faculty and graduate students to use. There is no additional cost for these servers. BGSU has off-premise virtual servers of various capacity for faculty and graduate students. There is an additional cost for these servers.

Storage
BGSU has on premise storage for faculty and graduate students. There is no additional cost for this storage. BGSU has off-premise storage available for faculty and graduate students at our Disaster Recovery site in Columbus or through the Ohio Super Computer Center in Columbus. There may be an additional cost for this storage

Super Computer
BGSU faculty and graduate students have direct access to the 8000 node Ohio Super Computer for the use of 1 to all 8000 nodes. There is no additional cost for this service.

Desktop or Laptop computers
BGSU faculty and graduate students with teaching or research assistantships have access to a variety of Dell, HP, and Apple computers for their use. There is no cost to individuals for these computers.

Classrooms
The majority of classrooms on campus use a touch screen control panel for all technology in the room. Classrooms have at least one digital projector and screen or flat panels. Each classroom has wired and wireless access, internet, streaming media, audio and video systems. BGSU is currently engaged in a multi-year project to modernize all classrooms with state-of-the-art digital and computing resources to provide 21st century environments for instruction and learning.

Science and Research Laboratory equipment
The hardware and software for science laboratory equipment that is partially or wholly automated via internal boards and chips is the responsibility of the respective departments. Departments budget for purchase, maintenance, repair, and replacement of that equipment. Departmental policies are in place to determine who are authorized users of such equipment and the time allotted to each user or research group. Time on large, expensive equipment (e.g., scanning electron microscopes or GCMS's) is shared across relevant departments and users. General technology like extra computers or flat panels are available from central IT.

Application Software
BGSU has enterprise wide licenses for over 200 software packages including ChemDraw, Digisim, IDRISI, SAS and SPSS. There is no cost or rarely a minimal cost for these applications. If there were a need for a unique application software package, this is normally included as part of a funded grant or paid for by a department. ITS assists in the negotiation of the cost and

licensing of the software to obtain the best arrangements for the university, including the software renewal and placement in labs or offices.

Library

The BGSU Libraries have very successfully transitioned from a world of primarily print materials to electronic systems for finding and obtaining documents of all different types. A search of the BGSU Libraries materials, collections, and external resources cataloged under the term "forensic science" showed 51 separate types of documents (including books, periodicals, handbooks/manuals, curricula, standards, statistical methods, technology, data processing, study guides, history, case studies, study and teaching, Congresses, and more) containing 249 specific items. Of these 249 specific items (an item could have been a single book or all issues of a single journal), only three were published prior to the year 2000. The search also showed that there were another 12 sub-specialty categories available to search, including criminal investigation, forensic accounting, forensic acoustics, forensic anthropology, forensic ballistics, forensic chemistry, forensic geology, forensic hypnotism, forensic phonetics, forensic psychology, forensic statistics, and medical jurisprudence. Eleven of these sub-specialty categories (not including "criminal investigation") account for another 324 specific items, for a total of 573 titled items related to forensic science. Combining the single broader category of "criminal investigation" (of which forensic science is a subtopic) to the forensic science topics, another 616 titles are available, for a total of 1,189 criminal investigation/forensic science titles available. To emphasize again, a single journal title (for example, the *Journal of Forensic Sciences–JFS*) counts as only one of the 1,189 items, but *JFS* has been published since 1956, now in its 58th volume, with six issues per year, totaling approximately 343 separate issues, each with multiple articles.

The transition to a digital age library means that all of these 1,189 titles in the BGSU Libraries catalog are available either physically in print or electronically through a variety of networks like OCLC (Online Computer Library Center), OhioLINK, WorldCat, EBSCO Academic Search Complete, Google Scholar, Criminal Justice Abstracts, Homeland Digital Security Library, and NCJRS Abstracts. In other words, the forensic science collection available to BGSU through electronic and print sources is enormous and comprehensive. All students and faculty can conduct an exhaustive search for forensic science books, journals, research reports, and other documents. BGSU Libraries provides both online and in person assistance to faculty and graduate students in learning how to use these databases and search systems efficiently and effectively. Every academic department has a library liaison, usually a faculty member with an interest in enhancing the BGSU Libraries collections and services. Faculty and graduate students can talk with their department's library liaison representative to find out who in the BGSU Libraries they should contact about a specific search or other type of request. BGSU Libraries also maintains an online chat room allowing users to interact directly with library staff on the library's faculty services page.

Laboratories, Equipment

Several courses in the proposed MSFS program already exist in the Biology, Chemistry, or Criminal Justice graduate curricula (BIOL 6210; BIOL 5460; BIOL 5030; BIOL 5690; BIOL

6030; BIOL 5490; CHEM 5540; CHEM 5450; CHEM 5660; CRJU 6510; and CRJU 5150). In terms of the biology and chemistry courses, current faculty teach these laboratory courses in existing facilities. Likewise, the faculty who teach these courses have their own existing research laboratories.

The proposed MSFS curriculum in biology and chemistry will also introduce new courses in forensic microscopy, toxicology, drug analysis, and others. Existing teaching laboratory space in Life Sciences or Overman Hall or renovated space in Moseley Hall for science laboratory space will be used when these new courses commence.

Existing laboratory equipment can be used in many of the new courses, while donated equipment from the Ohio BCI and other sources has already been secured for use in the new program, both for the laboratory programs and the forensic investigations classes. The laboratory space and equipment will also be available for masters student research related to their theses or scientific projects.

Physical Facilities

Existing physical facilities can be used for the bulk of the program offerings. At the same time, new laboratory space is being constructed in Moseley Hall. This renovation will include space for forensic programming and will also free up space in Life Sciences and Overman Hall that can be used for forensic science.

Research Support Services

The Division of Research and Economic Development, led by Vice President for Research and Economic Development and Dean of the Graduate College Dr. Michael Y. Ogawa, supports the scientific, scholarly, and creative research activities of the faculty, staff, and students of Bowling Green State University. World class research is being performed by BGSU faculty in a number of units on campus. Illustrating the strong record that BGSU has in research-focused interdisciplinary centers and institutes includes: photochemical sciences, neuroscience, regional economic development, business analytics, entrepreneurship and innovation, supply chain management, family and demographic research, family and marriage research, and international democratic education.

Grant proposal development, institutional review and university approval of research proposals, proposal subcontracts, and research compliance reviews (human subjects protection, radiation/hazardous materials safety, animal care) are handled by the Office of Sponsored Projects and Research (OSPR).

Forensic science research will be administered according to all applicable state and Federal regulations, as administered by the Office of Sponsored Projects and Research.

For new tenure track faculty hired to teach in the forensic science programs and majors, laboratory and research start-up support is available through the Office of the Vice President for Research and Economic Development and the hiring college and department. The Office of

Sponsored Programs and Research also administers the internal Faculty Research Committee grant programs focused on building strength through promotion of early-phase activities leading to the submission of major external grant proposals; and support for activities in areas that do not require the support of large external grants.

More specifically oriented to forensic science, the collaboration between BGSU and the Bureau of Criminal Investigation (BCI) has already resulted in identification of 18 research areas/projects suggested by BCI laboratory staff focusing on DNA processing techniques, instrument validation, body fluid identification, sample storage parameters, processing of fired ammunition cartridges, techniques for analyzing digital or cybercrime data, and collection/extraction methods for use with super-absorbent materials. Furthermore, it is evident from recent research that laboratory collection and processing methods that can be adapted and validated for use in field situations involving investigation and evidence collection are a growing development in forensic science. These topics provide direction for current and future forensic science faculty and graduate student researchers.

Admission Criteria

The emphasis of the admissions process for the MSFS program is on building a strong cohort of students who have the academic ability and drive to successfully complete the degree requirements and contribute to the forensic science community. The admissions criteria reflect a desire to be inclusive of individuals who have recently finished their undergraduate studies and those who have been out of the educational mainstream for a period of time.

While couched within the same core curricular theme, the diversity of the subject matter in the different specializations requires that applicants to the program declare at the outset which of the specializations they are pursuing and to demonstrate appropriate preparation for the chosen specialization. Specific admission criteria include the following:

1) A minimum undergraduate GPA of 3.0 (on a 4.0 scale) is required for regular admission to the program. All Graduate College admissions policies pertaining to GPA requirements will be followed for this program.

2) Applicants must also submit two letters of recommendation addressed to the Graduate Coordinator. These letters should come from individuals with knowledge of the applicant's qualifications and ability to successfully complete graduate study. Examples of these individuals include past professors, supervisors, or colleagues holding a graduate degree.

3) A written statement of interest and expectations must be provided by all applicants. This should address the expectations and future goals of the applicant. Where appropriate, this statement should provide information on on-educational experiences, specialized training, or other matters which make the candidate suitable for admission.

4) Students whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL) as stated in the Graduate College English language policy.

5) FB/FC applicants must submit official scores on the Graduate Record Examination (GRE). FI applicants are not required to take the GRE (in line with national norms for criminal justice masters degrees and many criminal justice Ph.D. programs). Letters of recommendation, the personal written statement, and past experience are used as indicators of potential success in lieu of the GRE for FI applicants.

Credit hours for the Program

All three specializations (FB, FC and FI) require a minimum of 36 credit hours beyond the bachelor's degree, which includes either a thesis (Plan I) or experiential research project (Plan II). This corresponds to the guidelines promulgated by the Forensic Science Education Programs Accreditation Commission (*FEPAC*) and is consistent with other institutions nationwide that offer forensic science masters degrees.

Accreditation

The American Academy of Forensic Sciences maintains an accreditation program under the banner of the Forensic Science Education Programs Accreditation Commission (FEPAC). This is a voluntary accreditation. Students graduating from non-accredited programs are not impacted in their job search and placement. The Ohio BCI estimates that roughly half of their yearly hires are from non-accredited programs and that they do not select employees based on whether their educational background is from an accredited program or not. Consequently, the choice to pursue accreditation is completely voluntary.

Despite the above, the intent is to pursue FEPAC accreditation in the future. Such accreditation requires a program to have graduated at least two classes before an application for accreditation can be submitted. In the interim, the proposed curriculum has been built following FEPAC guidelines and BGSU has worked with an experienced consultant to assure that the curriculum meets the accreditation guidelines.

Field Experience

While the MSFS degree does not require a field experience, many students will take the opportunity to undertake such an experience during their studies. FB/FC students will typically undertake placements with the BCI or other forensic laboratories and use that time and experience as the cornerstone of their thesis or major research project. It is possible that some FB/FC students, particularly those who are currently employed in a forensic science laboratory, will forgo a field placement and complete their research under the direct tutelage of a faculty member on campus. Similarly, FI students may opt for a voluntary field experience, particularly those who choose to undertake a thesis.

NEED

Student Interest and Demand

On a practical level, several sources of information demonstrate the need for this program in Northwest Ohio.

- First, the Ohio Attorney General's Office and the Ohio BCI have indicated a need and desire to have forensic science training in Ohio.
- Second, a survey of current BGSU students and BCI staff revealed a strong interest in the proposed masters degree program. Of roughly 100 respondents, 66 indicated an interest in this proposed degree program and indicated that they were likely to enroll.
- Third, the Criminal Justice, Biological Science and Chemistry programs at BGSU receive approximately 50 inquiries each year from individuals interested in a forensic science degree.

Institutional Need

At the present time, there is no state supported Masters degree program in forensic science. The single program at a private institution (Tiffin University) is in forensic psychology and not in the areas addressed in this proposal. While there are various institutions that offer an undergraduate specialization or degree in forensic science, these programs do not provide the depth or breadth of coursework required of future forensic scientists that will be offered in the proposed masters degree program. Preliminary discussions with directors of forensic science laboratories, including the FBI Lab in Quantico, VA, indicate that the master's degree is the minimum qualification that they will consider for new employees. We recognize that other labs (including the Ohio BCI) and many private labs will hire those with a baccalaureate, but we aspire to place BGSU graduates in the top ranks of the discipline. Furthermore, the Superintendent of BCI and the Director of BCI laboratories both indicated that although they hire bachelors level forensic staff, they prefer to hire masters trained staff because of their additional science coursework, mentored research, and analytical experience in a laboratory setting. These are all qualities that are provided for in the proposed Masters degree in Forensic Science program at BGSU.

Societal Demand

It is well documented that the growth in the need for forensic scientists has been accelerating in recent years. One prime example of this involves work in the area of DNA testing and technology. In 2005, the Bureau of Justice Statistics reported a DNA case backlog of 24,000. This backlog jumped to almost 112,000 cases in 2010 and the level has not declined. The explosion of new technologies has resulted in the collection of more criminal evidence for testing. This evidence is causing state and private laboratories to hire additional staff to try to keep up with the demand for their services. The Bureau of Labor Statistics indicates there has been a 34% growth in forensic science jobs since 2004 and projects an additional 20% increase by 2020. he American Academy of Forensic Sciences indicates that the growth in forensic science will require more graduate prepared individuals. Likewise, the final report of the National Research Council's Committee on Identifying the Needs of the Forensic Sciences Community indicates that a continuing issue with forensic science education "is the degree requirements for positions in crime laboratories. A requirement for an entry-level position in

most crime laboratories is at least a bachelor's degree in a natural science or forensic science, and many laboratories require a year or two of experience, with a master's degree."[7]

Another trend that also influences the need for additional master's degree trained forensic scientists is the development of new technologies for law enforcement and investigative use. For example, recent media reports indicate that new systems for rapid analysis and identification of DNA are being tested with the support of three Federal departments (Defense, Justice, and Homeland Security).[8] Although these technologies are intended for field use, masters-trained scientists and investigators are likely to be needed not for evidence collection but for assuring the quality of the collected specimens so that they can be entered into national DNA databases or used reliably in legal proceedings. Field use of rapid DNA testing also expands the applications for which it can be used, for example, immigration, human trafficking, natural disasters, terrorism prevention. These uses require a more highly educated workforce not only for understanding the improved technology but also for understanding the legal implications and limits of the data's use.

Scope

As indicated above, there is no state supported masters degree program in forensic science. Private college programs focus on a single aspect of forensic science, psychology or digital, neither of which have the scientific bases of biology and chemistry that are required for working in forensic laboratories. That requires BCI to hire forensic scientists at the masters degree level from outside the State of Ohio. BCI has been successful in that regard, but we believe that forensic science needs in Ohio are better met by capitalizing on the keen interest that many young people have in forensic science (regardless of source). We intend and will ensure that the partnership between BCI (with its new forensic science facility at BGSU) and the university will provide community awareness and education about forensic science across the lifespan. The new BCI laboratory is being designed to facilitate public observation and education without compromising evidence security or personal identities. The university will become involved in these educational programs at all levels, thereby heightening interest in applied science at younger ages; developing an understanding of essential areas of knowledge in science for junior high youth; motivating more high school students to prepare a strong background science for admission to college; offering bachelor's and master's degree programs in forensic science at BGSU; and demonstrating to parents that forensic science careers are available in Ohio's 21 forensic science laboratories, not only BCI. Many of these educational experiences for children, youth, parents, (as well as students enrolled in forensic science at BGSU), will involve contact and interaction with laboratory and university staff on tours, Saturday science programs, and summer camps. In a single sentence, the educational and research partnership between BCI and BGSU will demonstrate to Ohioans and beyond the value of science education and its application in public service through the discoveries, applications, jobs, and societal benefits involved in forensic science.

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[7] National Research Council. (2009). *Strengthening Forensic Science in the United States: A Path Forward*. Washington, DC: National Academy of Sciences Press, p. 221 (emphasis added).

[8] R. Locker and K. Breitman. (2014). "Pentagon, scientists closing in on rapid DNA technology," USA Today, January 27, 2014. (Retrieved from the WWW on February 7, 2014 at http://www.usatoday.com/story/nation/2014/01/27/rapid-dna-scanning-technology/4828285/ .

DIVERSITY

It is well known that "underrepresented minorities (blacks, Hispanics, and American Indians) in science and engineering programs are less likely than whites to attend college or to graduate."[9] What is not so well known is that according to information compiled by the National Science Foundation's National Center for Science and Engineering Statistics, minorities in science and engineering masters degree programs who do graduate have the same degree patterns as whites.[10] Of more importance is the finding that minority masters degree graduates in science and engineering programs have increased from about six percent in 1991 to about 16 percent in 2010.[11]

This new program will target prospective minority and female individuals for enrollment. A particular emphasis will be placed on recruiting underrepresented students. In order to try to enroll a diverse student population, the program will actively market this degree program to campuses, agencies and appropriate organizations in and around Ohio. As the program matures, we expect it to be competitive in national and international markets.

Bowling Green State University has a number of initiatives that seek to recruit and retain a diverse student body. The Project Search Program helps to identify, recruit, orient, matriculate, mentor, monitor, retain, graduate, and place multi- ethnic graduate students throughout their BGSU tenure. This program purposefully celebrates diversity, promotes civility, encourages inclusion, and embraces healthy interdependence among multi-ethnic graduate students, faculty, and administrators on-campus. The Winifred O. Stone Graduate Student Development Fund helps to support outstanding Project Search and industrious international graduate students. The Winifred O. Stone and Presidential Diversity Enhancement Fellowship is a non-service fellowship for incoming multi-ethnic graduate students. The Graduate Student Senate, Office of Multicultural Affairs and the Women's Center all offer programming and assistance to minority and female students and applicants to assist them throughout their career at BGSU and beyond. BGSU is also active in promoting STEM programming, particularly with women and minorities.

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[9] National Science Foundation. (2013). *Women, Minorities, and Persons with Disabilities in Science and Engineering*. NSF 13-304. Arlington, VA: National Center for Science and Engineering Statistics (NCSES), NSF (February). See http://www.nsf.gov/statistics/wmpd/2013/digest/theme2_2.cfm. Retrieved from the WWW on February 7, 2014.

[10] Ibid.

[11] Ibid.

APPENDIX A

FORENSIC INVESTIGATIONS COURSE DESCRIPTIONS

Course: FORI 5010 Elements of Forensic Science (3). Introduction to philosophical considerations and historic landmarks in the discipline; overview of major sub-disciplines in forensic science; examination of the role of expert witnesses and their importance. Course will focus on the various subdisciplines in the forensic sciences. Recent developments and changes in these subdisciplines will be discussed.

Student Learning Outcomes:

At the conclusion of the course, students will be able to:

- Discuss the philosophical and historic background to the forensic science as a discipline
- List and briefly explain a variety of forensic science topics
- Discuss the legal issues involved in working with crime scene evidence
- Write a basic report for entering into evidence
- Demonstrate techniques of effective courtroom testimony

Course Outline:

Week	Topic
1	Introduction
2	History and Philosophy of FS
3	Examining the Crime Scene
4	Death Investigation: Anthropology and Entomology
5	Bodily Fluids
6	DNA
7	Trace Evidence: Fingerprints
8	Trace Evidence: Tool and Other Markings
9	Questioned Documents
10	Digital Forensics
11	Cold Case Analysis
12	Behavioral Analysis
13	Legal Issues, Report Writing and Testimony
14	Presentations
15	Presentations

Required Reading:

James, S.H., J.J. Nordby and S. Bell (2014). *Forensic Science: An Introduction to Scientific and Investigative Techniques*, Fourth Edition
CRC Press

Other literature as assigned in class.

Course Assignments:

- Students must read assigned materials and come prepared to discuss in class
- Students will investigate the literature on at least two forensic science topics, prepare a presentation, and lead class discussion of the topic
- Students will be presented with mock forensic evidence, prepare an outline of issues related to its investigation and lead a class discussion on the issues
- Students will develop a term paper on the philosophy, history and advances as they relate to one area of forensic science

Course: FORI 5100 Criminalistics (3). This course will introduce the student to some of the various forms of evidence that traditionally constitute "trace" and/or comparative evidence, including fingerprints, ballistics, and questioned documents.

Student Learning Outcomes:

At the conclusion of the course, students will be able to:

- Apply the techniques for enhancement of latent prints in a manner appropriate to a particular substrate
- Articulate the distinctions between various categories of hairs and fibers
- Demonstrate knowledge on the recognition and investigation of questioned documents
- Discuss issues and analysis of paint, soil and glass evidence
- Recognize trace evidence at crime scenes
- Discuss and identify tool mark and other impressions
- Demonstrate an understanding of the science underpinning ballistics
- Describe the science behind bullet/case matching.
- Critically assess gunshot residue analysis.
- Describe the science behind the retrieval of defaced serial numbers.
- Articulate the scientific and legal requirements for trace evidence

Course Outline:

Week	Topic
1	Introduction
2	Latent Prints: Development
3	Latent Prints: Comparison
4	Hair and Fiber Evidence
5	Questioned Documents: Handwriting, Typewriting
6	Questioned Documents: Forgeries
7	Paint and Soil
8	Glass
9	Tool Marks and Impressions
10	Firearms: Residue Analysis
11	Firearms: Bullet and Case Matching
12	Blood Splatter
13	Physical Matches and *Daubert*
14	Presentations
15	Presentations

Required Reading:

Girard, J.E. (2015) Criminalistics: Forensic Science, Crime and Terrorism. Burlington, MA: Jones and Bartlett.

1. Ellen, D (1997) The scientific examination of Documents, Methods and techniques. 2nd ed., Taylor & Francis Ltd.
2. Morris (2000) Forensic Handwriting Identification (fundamental concepts and Principals)
3. Levinson, J (2000) Questioned Documents. Academic Press, Tokyo.
4. Kelly,J.S and Lindblom, B.S (2006) Scientific Examination of Questioned Documents. Taylor & Francis, New York.

Other literature as assigned in class.

Course Assignments:

- Students must read assigned materials and come prepared to discuss in class
- Students will investigate the literature on at least two forensic science topics, prepare a presentation, and lead class discussion of the topic
- Students will be presented with mock forensic evidence, prepare an outline of issues related to its investigation and lead a class discussion on the issues
- Students will develop a term paper on the philosophy, history and advances as they relate to one area of forensic science

Course: FORI 5400 – Law, Evidence & Procedure in Forensic Science (3 credits). This class provides an overview and examination of the legal aspects of physical evidence including rules of evidence, procedural rules, and the role of expert witnesses. The course also includes direct and cross-examination of students in a moot court setting.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Understand how forensic evidence is used in criminal prosecutions as established by case law and statutes;
- Apply the rules and law of evidence in the collection of evidence, examination of evidence, and preparation of scientific reports and testimony;
- Describe and demonstrate the kinds of evidence that require a scientific foundation for its admission;
- Interpret and implement standards of forensic practice as established by the rules of evidence; and,
- Apply knowledge of forensic science to case scenarios.
- Critically analyze current and past appellate court opinions in the area of forensic science and to discuss this knowledge orally in class and through written assignments.

Course Outline:

WEEK:	TOPICS:
1	Overview of the Criminal Courts m
2	Science, Forensic Science, and Evidence
3	Science and the Criminal Law
4	Hair Analysis
5	Fiber Analysis
6	Ballistics and Tool Marks
7	Soil, Glass, and Paint
8	MID-TERM EXAM
9	Footprints and Tire Impressions
10	Fingerprints
11	Blood Spatter Analysis
12	DNA Analysis
13	Forensic Anthropology and Entomology
14	Pretrial Proceedings
15	Trial Proceedings

Required Readings:

Faigman, D. L., Saks, M. J., Sanders, J., & Cheng, E. K. (2008). *Modern scientific evidence: Forensics*. Eagan, MN: Thomson/West.

Course Assignments:

- Two examinations
- Students will complete case briefs
- Participation in moot court exercises

Course: CRJU 6510 Seminar in Criminal Justice Ethics (3 credits). The course will discuss ethics, morality, and values and how they manifest themselves in the criminal justice system. The course will discuss a variety of dilemmas facing criminal justice agencies and practitioners. Students will be challenged to consider their own values vis-a-sis their roles as social control agents and members of a democratic society.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Understand and discuss the basic vocabulary of ethical analysis;
- Identify and analyze the major ethical systems;
- Identify and analyze the major ethical issues in the criminal justice system;
- Understand and discuss the sub-cultural barriers to ethical decision making and the importance of ethical leadership; and,
- Understand and discuss the significance of discretion and how it is utilized ethically and unethically.

Course Outline:

Topics

Introduction to Ethics and Ethical Systems
Ethics and the Criminal Justice System
Police and Ethics
Criminal Courts, Law and Ethics
Corrections and Ethics
Research Ethics

Required Reading:

Pollock, J. M. (2012). *Ethical dilemmas and decisions in criminal justice* (7th Ed.). Belmont, CA: Wadsworth/Cengage.

Course Assignments:

- Class Participation
- Article Review
- Production of 4 Writing/Discussion Papers

Course: CRJU 5150 Data and Statistical Analysis (3 credits). This course focuses on various methods of data and statistical analysis found in criminal justice research. Topics covered include methodology, measurement of variables, central tendency, probability, sampling distributions, correlation coefficients, and multiple regression. Offered main campus and web-based. Prerequisite: MSCJ major or consent of instructor.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Use SPSS.
- Organize and transform (i.e., "clean") data.
- Apply common statistical methods.
- Interpret and communicate the meaning of statistical findings.
- Identify and better appreciate good empirical research.

Course Outline:

Week	Topics
1	Introduction and overview of course
2-3	Entering, accessing, and manipulating data
4	Levels of measurement, displaying data, and descriptive statistics
5	Probability and sampling
6	Testing for mean differences between groups
7	Analysis of Variance
8	Nonparametric Tests of Significance
9	Correlation
10	Bivariate linear regression
11	Presentations and multiple linear regression
12	Presentations and review
13	Presentations and nonlinear regression
14	Presentations and regression diagnostics
15	Presentations and data analysis paper due

Required Reading:

Fox, James Alan, Jack Levin, and David R. Forde. (2009). *Elementary Statistics in Criminal Justice Research* (3rd edition). Boston, MA: Pearson Education.

Salkind, Neil J. (2014). Chapter 16: Predicting who'll win super bowl using linear regression. Pgs. 281-295 in *Statistics for people who think they hate statistics* (5th ed.). Sage.

DeMaris, Alfred. (1995). A tutorial in logistic regression. *Journal of Marriage and Family*, 57, 956-968.

Course Assignments:

- Class Participation
- Homework Assignments
- Midterm Exam
- Data Analysis Paper will analyze data in order to address a specific research question or hypothesis.
- Presentation dealing with the focus of your data analysis paper.

Course: FORI 6000 Crime Scene Techniques (3 credits). The course provides consideration of the different "crime scene" dimensions, needs, and techniques for investigating different crime types. An overview of traditional crime scene work precedes individual inquiries into specific criminal activities that pose special problems, and demand more specific techniques.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- articulate and demonstrate proper techniques for documenting physical crime scenes
- articulate and demonstrate proper techniques for collecting and preserving physical evidence
- articulate and demonstrate proper techniques for interviewing victims, witnesses, and suspects
- articulate and demonstrate proper techniques for interrogating suspects
- understand the specific needs of crime scenes involving digital evidence
- understand the various hazards attending physical crime scenes, and the techniques used to minimize risks to law enforcement personnel
- articulate the evidentiary requirements of sexual abuse cases
- articulate the special needs of non-physical "crime scenes" involving multiple forms of monetary fraud
- articulate the special needs of non-physical "crime scenes" involving long-term investigation of enterprise crime, organized criminal networks, and terrorist groups
- apply the above skills to operational scenarios

Course Schedule:

Week	Topic
1	Introduction and Overview
2	Safety and Security
	Determination of hazards
	Determination of crime scene dimensions
	Probability of secondary scene dimensions
	Security needs vs. available resources
3	Search Protocols and Documentation
	Photography, Sketching, Logs
	Outdoor scenes
	Advanced techniques: CAD, 3-D
	Forensic Preservations ("bagging and tagging")
	Chain of Custody
6	Physical Intrusion
	Tool marks
	Physical destruction evidence
	Approaches

7	Digital Intrusion	
		Hacktivism: an introduction
		Preservation of digital evidence
		Techniques of digital forensics
8	Arson and Chemical Attacks	
		Physical evidence and safety
		Financial records
		Improvised Explosive Devices
		Inventory chains
9	Fraud	
		Elder Abuse
		Ponzi schemes
10	Laboratory Analysis	
		"Forensics-in-a-Box"
		Emerging scientific techniques
		Decline of the guild techniques: pseudo-science
11	Sexual Assaults	
		Adults
		Vulnerable adults
		Children
		Infants
12	Network Crime	
		Enterprise crime / RICO
		Terror Networks
		The "scene" before the crime
13	Embezzlement and Intellectual Property Crimes	
14	Operational Scenario #1	
15	Operational Scenario #2	

Required Readings:

Maloney, M. S., and D. G. Housman (2014). Crime Scene Investigation: Procedural Guide. Boca Raton, FL: Taylor and Francis, CRC Press.

Additional .pdf resources and readings as posted to Canvas

Course Requirements:

1. Two exams
2. Students are expected to participate in the analysis of mock operational situations

Course: FORI 6050 Forensic Science and the Law (3 credits). An exploration of case law and legal standards pertaining to emerging issues and topics in forensic investigations and forensic science. Topics include expert evidence rules, statistical inference, DNA evidence, expert testimony, forensic science, medical causation, and ethical issues.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Understand the application of the scientific method to the criminal legal process;
- Apply the rules and law of evidence to statistical inference, the preparation of scientific reports, and expert testimony;
- Describe the legal issues associated with various scientific principles for different types of forensic evidence;
- Interpret, implement, and apply standards of forensic science practice to the law, rules of evidence, and rules of court.

Course Outline:

Week	Topics
1	Introduction to Science and the Law
2	Expert Evidence Rules and Cases
3	Statistical Inference
4	DNA Evidence
5	Expert Testimony Part I
6	Expert Testimony Moot Court #1
7	Expert Testimony Moot Court #2
8	MID-TERM EXAM
9	Forensic Science Standards
10	Medical Causation
11	Expert Testimony Part II
12	Crime Scene and Accident Reconstruction
13	Ethics, Discovery, and Procedure
14	Expert Testimony Moot Court #3
15	Expert Testimony Moot Court #4

Required Reading:

Conley, J. M., Moriarty, J. C., & Strong, R. R. (2011). *Scientific and expert evidence* (2nd ed.). New York, NY: Wolters Kluwer.

Federal Judicial Center (2011) *Reference manual on scientific evidence* (3rd ed.). Washington, DC: National Academies Press.

Committee on Identifying the Needs of the Forensic Sciences Community, National Research Council (2009). *Strengthening forensic science in the United States: A path forward*. Washington, DC: National Academies Press.

Course Assignments:

- Class Participation
- Mid-Term and Final Exam
- Moot Court Exercises
- Research Paper

Course: FORI 6100. Death Investigation (3 credits). This course examines the realm of medical-legal death investigation, including study of crime scene and autopsy phases of a case and the relationship between the medical examiner and other participants in the overall investigative process.

Student Learning Outcomes:

- Demonstrate knowledge of forensic death investigation
- Discuss the medical-legal investigative systems at the national and state levels
- Demonstrate knowledge of the difference between death due to homicide, suicide, accidents and natural causes
- Discuss the relationship be forensic death investigation to the legal system
- List and discuss major aspects of technical medial aspects of death investigations

Course Outline:

Week	Topic
1	History and Development of Forensic Medicine and Pathology
2	Understanding the Crime Scene
3	Assessing the Time of Death and Changes after Death
4	Methods for Identifying Human Remains
5	Sudden and Unexpected Death from Natural Causes in Adults
6	Investigating Deaths in Childhood
7	Trauma and Disease
8	Blunt Force Injury
9	Sharp Force Injury
10	Injury by Gunfire
11	Asphyxia
12	Other Forms of Injuries (Thermal, Electrical, etc.)
13	Investigation of Mass Disasters
14	Investigation of Deaths from Drug Abuse and Alcohol
15	The Medicolegal Autopsy Report

Required Reading:

Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation (4th Edition)
By Werner U. Spitz

Death Investigation: A Guide for the Scene Investigator. Technical Update
National Institute of Justice

Course Assignments:

- Students must read assigned materials and come prepared to discuss in class
- There will be two essay examinations
- Students will develop a term paper and present it in class for discussion

Course: FORI 6150 Organized Crime and Criminal Networks (3 credits). Organized crime and criminal networks involve local, national, or transnational groups of centralized criminal enterprises. This course explores criminal organizations with an emphasis on historical and contemporary syndicates within the United States and abroad.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

1. Define organized crime and identify the various classifications of organized crime;
2. Understand and interpret laws relating to organized crime;
3. Explain theories of organized crime causation and understand historical perspectives of organized crime;
4. Distinguish organized crime from other forms of criminality;
5. Formulate and evaluate a plan for organized crime prevention, law enforcement strategies, and forensic investigation or organized crime.

Course Schedule:

Week 1: History of Organized Crime
Week 2: History of Law Enforcement Response to Organized Crime
Week 3: The Business of Organized Crime
Week 4: Domestic Criminal Syndicates
Week 5: Transnational Crime
Week 6: Legal Strategies
Week 7: Terrorism as Organized Crime
Week 8: Crime Scene Investigation and Physical Evidence in Organized Crime Cases
Week 9: Interrogation and Interview Techniques in Organized Crime Investigations
Week 10: Prosecution Considerations for Organized Crime Cases
Weeks 11-15: Group Projects and In-Class Presentations

Required Textbooks:

Abadinsky, H. (2012) *Organized Crime* (10th edition). Belmont, CA: Wadsworth/Cengage.

Course Requirements:

1. Students are expected to complete all assigned readings prior to class.
2. There will be two essay exams (a mid-term exam and a final exam).
3. There will be four assigned practical group assignments relating to forensic investigation of organized crime and criminal networks.
4. Students will draft and submit a 10-page term paper.

Course: FORI 6200 Sex Trafficking and Pornography (3 credits). This course focuses forensic investigation and prosecution of sex trafficking and pornography cases. It includes an overview of historical, policy, legal matters, forensic investigation, physical evidence, interviewing, interrogation, and testifying in criminal cases.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

1. Understand and recognize domestic and international sex trade and trafficking;
2. Discuss common misconceptions about sex trafficking and its victims;
3. Identify known risk factors that make an individual vulnerable to commercial sexual exploitation;
4. Describe societal conditions that shape trafficking and pornography markets, including economics, globalization, organized crime, culture, and technology;
5. Appreciate and discuss recent laws and funding initiatives to address sex trafficking; and,
6. Apply course material to the practice of forensic sex trafficking and pornography investigations.

Course Schedule:

Week 1: Global Context of Human Trafficking
Week 2: Introduction to Sex Trafficking in the United States
Week 3: Legal Aspects of Sex Trafficking in the United States
Week 4: Prostitution versus Sex Trafficking
Week 5: Domestic Sex Trafficking of American Children
Week 6: Sex Trafficking of Foreign Women and Children into the United States
Week 7: The "John" Factor in Sex Trafficking
Week 8: Child Sex Tourism and the American Male
Week 9: Interrogation of Sex-Trafficking Suspects
Week 10: Crime Scene Examination and Physical Evidence in Sex-Trafficking Cases
Week 11: Interviewing Victims of Sex Trafficking
Week 12: Direct and Cross-Examination of Defendant and Victim Witnesses
Week 13: Direct and Cross-Examination of Other Witnesses

Required Textbooks:

Institute of Medicine and National Research Council (2013). *Confronting commercial exploitation and sex trafficking of minors in the United States*. Washington, DC: The National Academies Press.

Territo, L. & Glover, N. (2013). *Criminal investigation of sex trafficking in America*. Boca Raton, FL: CRC Press.

Optional Textbooks:

AMBER Alert Training and Technical Assistance Program Team & Fox Valley Technical College (2012). *Trafficking in persons symposium report*. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.

Bales, K. & Soodalter, R. (2010). *The Slave next door: Human trafficking and slavery in America today*. Los Angeles: University of California Press.

Shelley, L. (2010). *Human trafficking: A global perspective*. New York: Cambridge University Press.

Course Assignments:

1. Students are expected to complete all assigned readings prior to class.
2. There will be two essay exams (a mid-term exam and a final exam).
3. There will be four assigned practical group assignments (interviewing, interrogating, testifying in court).
4. Students will draft and submit a 10 page term paper.

Course: FORI 6250 Exploitation Crime (3 credits). This course examines financial exploitation and fraud and provides an overview of different forms and perpetrators, law enforcement responses, and considerations for forensic investigation and prosecution.

Learning Outcomes:

Students who successfully complete this course should be able to:

1. Understand and discuss different types of exploitation crime;
2. Recognize and describe warning signs of financial exploitation;
3. Develop understanding of the criminal laws relating to financial exploitation crimes; and,
4. Apply course materials to the practice of forensic investigations of exploitation crime.

Course Schedule:

Week 1: Fraud Committed by Strangers
Week 2: Financial Exploitation by Relatives and Caregivers
Week 3: Exploitation Crime Victim Vulnerabilities
Week 4: Victim Facilitation in Exploitation Crime
Week 5: Exploitation Crime Revictimization
Week 6: Exploitation Crime Offender Characteristics
Week 7: Interpersonal Violence and Special/Vulnerable Populations
Week 8: Interrogation of Suspects in Exploitation Crime Cases
Week 9: Forensic Evidence in Exploitation Crime Cases
Week 10: Interviewing Victims of Exploitation Crime
Week 12: Direct and Cross-Examination of Defendant and Exploitation Victim Witnesses
Week 13: Direct and Cross-Examination of Other Witnesses in Exploitation Crime Cases

Required Textbooks:

Bonnie, R.J., & Wallace, R. (Eds.). (2003). *Elder mistreatment: Abuse, neglect, and exploitation in an aging America*. Washington, DC: National Academies Press.

Course Requirements:

3. Students are expected to complete all assigned readings prior to class.
4. There will be two essay exams (a mid-term exam and a final exam).
5. There will be four assigned practical group assignments (interviewing, interrogating, testifying in court).
6. Students will draft and submit a 10-page term paper.

Course: FORI 6300 Cold Case Investigation (3 credits). Examination of the investigative process and techniques for solving previously closed cases or those cases awaiting the development of new evidence. Topics include the identification of promising cold cases for examination, the use of data bases for uncovering new leads, and other methods for solving the cases.

Student Learning Outcomes:

At the conclusion of the course, students will be able to:

- Explain what is a cold case and identify different types of cold cases
- Explain how a cold case investigation is conducted
- Identify and demonstrate proper investigative techniques
- Identify and explain the use of appropriate sources of data/information used in cold cases
- List and define different follow-up investigative strategies

Course Outline:

Week	Topic
1	Introduction to Cold Cases
2	The Cold Case Evaluation Model
3	Sources of Data/Information for Cold Cases
4	Case File Analysis
5	Applying Science to Cold Cases- Forensic Applications: DNA, Fingerprints, Etc.
6	Databases- People Searches
7	Interviews and Interrogation Techniques/Issues
8	Preparing Reports
9	Cold Case Review Teams
10	Case Studies
11	Legal and Ethical Issues in Cold Cases
12	Other Forms of Injuries (Thermal, Electrical, etc.)
13-15	Case Presentations

Required Reading:

Pettem, S. (2013). *Cold Case Research Resources of Unidentified, Missing and Cold Homicide Cases.* CRC Press.

Adcock, J.M. (2010) *Cold Cases: An Evaluation Model with Follow-up Strategies for Investigators.* CRC Press.

Course Assignments:

- Students must read assigned materials and come prepared to discuss in class
- There will be a final essay examination

- Students will investigate a past cold case and make a presentation to the class on what steps would be taken, what data would be needed, and identify the legal and ethical issues involved in undertaking the investigation

Course: FORI 6400 Cybercrime and Digital Forensics (3 credits). This course covers the basic concepts of cybercrime and digital forensics including computer forensic examination, the techniques required for conducting a forensic analysis on computer systems and data, and legal considerations in recovering/restoring data for litigation and various fraud-based investigations.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Identify and define emerging cybercrime and digital crime
- Discuss legal issues in combatting cybercrime
- Outline and explain the process used to preserve the verifiable integrity of digital evidence
- Identify common storage media and how computer storage systems operate
- Outline a basic universal procedure for examining removable storage media
- Analyze relevant data found in special and typically inaccessible areas of a disk
- Prepare a forensic report of the subject computer system and a listing of all relevant files and discovered file data

Course Outline:

Week	Topic
1	Computer forensics and investigation as a profession
2	Computer investigations and legal implications
3	Contemporary computer crime (Cybercrime)
4	Prosecution and government efforts
5	Legal Issues in investigation and prosecution
6	Processing crime and incident scenes
7	Digital forensics: terminology and requirements
8	Searching and seizing digital related evidence
9	Digital evidence controls
10	Data acquisition
11	Computer forensic analysis
12	Recovering image files
13	Network forensics
14	E-mail investigations
15	The work of an expert witness and results reporting

Required Reading:

Britz, MT (2013). *Computer Forensics and Cyber Crime: An Introduction* (3rd Ed.) Prentice Hall.

Course Assignments:

- Read assigned materials and participate in class discussions
- Complete two essay examinations
- Complete two student projects designed to apply the techniques described in the text to perform a computer forensics investigation
- Attend any lectures given by guest speakers and professionals in the field and complete a summary which includes the following:
    - What are the 5 main points of this presentation?
    - What methods/techniques are used in this field?
    - What legal considerations are there in using the information in court?
- What ethical issues might face a forensic scientist in this field?
- Complete two sample "expert witness" reports based on the materials and forensic investigatory findings provided in class

Course: FORI 6500 Criminal Profiling and Behavioral Analysis (3 credits). This course examines the foundations and limits of the behavioral analysis exercise known as "criminal profiling."

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- demonstrate an understanding of the origins of "criminal profiling"
- articulate the scientific underpinnings of Forensic Psychology and Psychiatry
- understand and articulate the relationship of physical evidence at crime scenes to behavioral patterns
- understand and articulate the role the profiling plays in linking crimes across time and space
- understand the limits of the profiling craft
- understand the potential for misinterpreting "signs" across cultural differences
- articulate the distortions prompted by for-profit media portrayals of "criminal profilers" on television and elsewhere
- describe the problematic aspects of blinders, particularly in high-profile cases
- articulate the ethical dilemmas and aspects of profiling
- demonstrate proper demeanor for courtroom presentation of profiling evidence

Course Schedule:

Week	Topic
1	Introduction and Overview
2	History: The Development of Criminal Profiling
3	Forensic Psychology, Forensic Psychiatry, and Profiling
4	Behavioral Analysis at Crime Scenes
5	Psychopathy and Sadism
6	Linking Behavioral Evidence Across Space and Time
	Case Study: (serial killers)
7	Criminal Behavior on the Internet
	Case Study:
8	Inferring Offender Characteristics
9	Investigating Pattern Crimes
10	Cross-cultural Behavioral Analysis (immigrant communities)
11	Error and Misinterpretation
	Case Study: The Beltway Snipers
	Case Study: Racial Profiling
	Critique: "Faith-based profiling"
12	Debunking the TV mythology
13	Alternative Methods of Criminal Profiling
14	Profiling and Ethics
15	Profiling in the Courtroom
	Admissibility of Profiling Evidence
	"Dueling Experts" in testimony

Required Readings:

Turvey, B., Editor (2011) *Criminal Profiling: An Introduction to Behavioral Evidence Analysis.* Academic Press.

Additional .pdf resources and readings as posted to Canvas

Course Requirements:

1. Final examination
2. Students are expected to read materials prior to class and come prepared for discussion
3. Prepare case studies for presentation to class
4. Produce a final paper dealing with the application of profiling to a case scenario
5. Testify in a mock court setting

Course: FORI 6600 Intelligence and Homeland Security (3 credits). This class introduces the student to the wide array of predictive and investigative techniques employed to detect, identify, and defeat or deflect criminal enterprise or terroristic threats. International and domestic applications are part of the course content, supplemented with introductions to private security techniques for loss prevention.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Define and illustrate techniques in modern intelligence gathering
- Compare the effectiveness, challenges, and limits of international intelligence work with domestic intelligence work
- Compare and contrast the merits and weaknesses of past and present technologies, and articulate their relationship and contributions to modern intelligence collection
- Identify developing trends that will affect future intelligence development
- Develop a rationale and philosophy to guide domestic intelligence programs
- Understand the scope and sequence of investigations

Course Schedule:

Week	Topic
1	Introduction and Overview of Intelligence Services
2	HUMINT – Developing Human Information Sources
3	SIGINT – Interpreting Signal Intelligence
4	Open Source 1: News Media and Other Open Sources
5	Open Source 2: Assessment of Social Media
6	Coordination of Private Security Resources
7	Hacktivism: Black Hats, Grey Hats, and White Hats
8	Covert Action
9	Deception and counter-deception in the field
10	International Surveillance and National Surveillance
11	Counterintelligence Analysis
12	Case Study: The 9/11 Attacks
13	Case Studies: Jonathan Pollard, and the Walker Spy Ring
14	Case Studies: Robert Hanssen and Aldrich Ames
15	Wrap-up: Limits, Limitations, and Future Possibilities

Required Readings:

The 9/11 Commission Report
Worldwide Threat Assessment of the US Intelligence Community (2014)

George, R.Z. and J.B.. Bruce (2008). Analyzing Intelligence: Origins, Obstacles and Innovations. Georgetown University Press.

Additional .pdf readings as posted

Course Requirements:

7. Students are expected to complete all assigned readings prior to class.
8. There will be a final essay exam

Course: FORI 6700 Forensic Casework Practicum (3 credits). Students will manage mock cases involving multiple types of evidence. They will collect, analyze and interpret the evidence. Written reports on the case will be submitted to evaluation during a mock court trail.

Student Learning Outcomes:

At the conclusion of the course, students will be able to:

- Demonstrate their ability to identify appropriate data/evidence to be used in a case
- Explain the steps and process to be used in investigations
- Identify and demonstrate proper investigative techniques
- Write comprehensive reports on the investigation and the evidence for submission to the prosecution and the court

Course Outline:

Varies based on the type and number of mock cases chosen for examination.

Course Assignments*:*

- Students analyze assigned mock cases
- Class participation and discussion of cases as they develop through the term
- Prepare a comprehensive written report on the assigned case, including a discussion of the evidence and any legal issues related to pursing the case in court
- Students will present their investigation to the class in a mock court setting for discussion

Course: FORI 6900 Topics in Forensic Investigation (3 credits). The systematic study of selected topics in forensic investigation. May be repeated.

Course Outline:

This course will explore different emerging topics in the field of forensic investigations. It is intended to allow students and faculty to address topics as they emerge.

Course: FORI 6910 Directed Individual Study in Forensic Investigation (1-3 credits). Readings or research on a topic or problem approved by the supervising instructor. May be repeated.

Course Outline:

This course will allow individual students to explore different topics in cooperation with a single faculty member.

Course: FORI 6990 Thesis Research (1-3 credits). Credit is for thesis research. Thesis proposal must be submitted to the graduate director for approval prior to submission to the graduate college. May be repeated.

APPENDIX B

FORENSIC BIOLOGY AND FORENSIC CHEMISTRY COURSE DESCRIPTIONS

Course: FORI 5010 Elements of Forensic Science (3). Introduction to philosophical considerations and historic landmarks in the discipline; overview of major sub-disciplines in forensic science; examination of the role of expert witnesses and their importance. Course will focus on the various subdisciplines in the forensic sciences. Recent developments and changes in these subdisciplines will be discussed.

Student Learning Outcomes:

At the conclusion of the course, students will be able to:

- Discuss the philosophical and historic background to the forensic science as a discipline
- List and briefly explain a variety of forensic science topics
- Discuss the legal issues involved in working with crime scene evidence
- Write a basic report for entering into evidence
- Demonstrate techniques of effective courtroom testimony

Course Outline:

Week	Topic
1	Introduction
2	History and Philosophy of FS
3	Examining the Crime Scene
4	Death Investigation: Anthropology and Entomology
5	Bodily Fluids
6	DNA
7	Trace Evidence: Fingerprints
8	Trace Evidence: Tool and Other Markings
9	Questioned Documents
10	Digital Forensics
11	Cold Case Analysis
12	Behavioral Analysis
13	Legal Issues, Report Writing and Testimony
14	Presentations
15	Presentations

Required Reading:

James, S.H., J.J. Nordby and S. Bell (2014). *Forensic Science: An Introduction to Scientific and Investigative Techniques*, Fourth Edition
CRC Press

Other literature as assigned in class.

Course Assignments:

- Students must read assigned materials and come prepared to discuss in class
- Students will investigate the literature on at least two forensic science topics, prepare a presentation, and lead class discussion of the topic
- Students will be presented with mock forensic evidence, prepare an outline of issues related to its investigation and lead a class discussion on the issues
- Students will develop a term paper on the philosophy, history and advances as they relate to one area of forensic science

Course: FORI 5100 Criminalistics (3). This course will introduce the student to some of the various forms of evidence that traditionally constitute "trace" and/or comparative evidence, including fingerprints, ballistics, and questioned documents.

Student Learning Outcomes:

At the conclusion of the course, students will be able to:

- Apply the techniques for enhancement of latent prints in a manner appropriate to a particular substrate
- Articulate the distinctions between various categories of hairs and fibers
- Demonstrate knowledge on the recognition and investigation of questioned documents
- Discuss issues and analysis of paint, soil and glass evidence
- Recognize trace evidence at crime scenes
- Discuss and identify tool mark and other impressions
- Demonstrate an understanding of the science underpinning ballistics
- Describe the science behind bullet/case matching.
- Critically assess gunshot residue analysis.
- Describe the science behind the retrieval of defaced serial numbers.
- Articulate the scientific and legal requirements for trace evidence

Course Outline:

Week	Topic
1	Introduction
2	Latent Prints: Development
3	Latent Prints: Comparison
4	Hair and Fiber Evidence
5	Questioned Documents: Handwriting, Typewriting
6	Questioned Documents: Forgeries
7	Paint and Soil
8	Glass
9	Tool Marks and Impressions
10	Firearms: Residue Analysis
11	Firearms: Bullet and Case Matching
12	Blood Splatter
13	Physical Matches and *Daubert*
14	Presentations
15	Presentations

Required Reading:

Girard, J.E. (2015) Criminalistics: Forensic Science, Crime and Terrorism. Burlington, MA: Jones and Bartlett.

1. Ellen, D (1997) The scientific examination of Documents, Methods and techniques. 2nd ed., Taylor & Francis Ltd.
2. Morris (2000) Forensic Handwriting Identification (fundamental concepts and Principals)
3. Levinson, J (2000) Questioned Documents. Academic Press, Tokyo.
4. Kelly,J.S and Lindblom, B.S (2006) Scientific Examination of Questioned Documents. Taylor & Francis, New York.

Other literature as assigned in class.

Course Assignments:

- Students must read assigned materials and come prepared to discuss in class
- Students will investigate the literature on at least two forensic science topics, prepare a presentation, and lead class discussion of the topic
- Students will be presented with mock forensic evidence, prepare an outline of issues related to its investigation and lead a class discussion on the issues
- Students will develop a term paper on the philosophy, history and advances as they relate to one area of forensic science

Course: FORI 5400 – Law, Evidence & Procedure in Forensic Science (3 credits). This class provides an overview and examination of the legal aspects of physical evidence including rules of evidence, procedural rules, and the role of expert witnesses. The course also includes direct and cross-examination of students in a moot court setting.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Understand how forensic evidence is used in criminal prosecutions as established by case law and statutes;
- Apply the rules and law of evidence in the collection of evidence, examination of evidence, and preparation of scientific reports and testimony;
- Describe and demonstrate the kinds of evidence that require a scientific foundation for its admission;
- Interpret and implement standards of forensic practice as established by the rules of evidence; and,
- Apply knowledge of forensic science to case scenarios.
- Critically analyze current and past appellate court opinions in the area of forensic science and to discuss this knowledge orally in class and through written assignments.

Course Outline:

WEEK:	TOPICS:
1	Overview of the Criminal Courts m
2	Science, Forensic Science, and Evidence
3	Science and the Criminal Law
4	Hair Analysis
5	Fiber Analysis
6	Ballistics and Tool Marks
7	Soil, Glass, and Paint
8	MID-TERM EXAM
9	Footprints and Tire Impressions
10	Fingerprints
11	Blood Spatter Analysis
12	DNA Analysis
13	Forensic Anthropology and Entomology
14	Pretrial Proceedings
15	Trial Proceedings

Required Readings:

Faigman, D. L., Saks, M. J., Sanders, J., & Cheng, E. K. (2008). *Modern scientific evidence: Forensics*. Eagan, MN: Thomson/West.

Course Assignments:

- Two examinations
- Students will complete case briefs
- Participation in moot court exercises

Course: CRJU 6510 Seminar in Criminal Justice Ethics (3 credits). The course will discuss ethics, morality, and values and how they manifest themselves in the criminal justice system. The course will discuss a variety of dilemmas facing criminal justice agencies and practitioners. Students will be challenged to consider their own values vis-a-sis their roles as social control agents and members of a democratic society.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Understand and discuss the basic vocabulary of ethical analysis;
- Identify and analyze the major ethical systems;
- Identify and analyze the major ethical issues in the criminal justice system;
- Understand and discuss the sub-cultural barriers to ethical decision making and the importance of ethical leadership; and,
- Understand and discuss the significance of discretion and how it is utilized ethically and unethically.

Course Outline:

Topics

Introduction to Ethics and Ethical Systems
Ethics and the Criminal Justice System
Police and Ethics
Criminal Courts, Law and Ethics
Corrections and Ethics
Research Ethics

Required Reading:

Pollock, J. M. (2012). *Ethical dilemmas and decisions in criminal justice* (7th Ed.). Belmont, CA: Wadsworth/Cengage.

Course Assignments:

- Class Participation
- Article Review
- Production of 4 Writing/Discussion Papers

Course: BIOL 5030 Plant Taxonomy and Forensic Applications (3) The biochemistry, genetics, and molecular biology of cellular structures and processes in selected prokaryotes.

Text:

Brenda A. Wilson, Abigail A. Salyers, Dixie D. Whitt, and Malcolm E. Winkler. (2011) Bacterial Pathogenesis: a Molecular Approach, 3rd Edition.

Learning Outcomes:

Upon successful completion of this course, students will:

1. Learn to critically think about microbiology.
2. Learn techniques and molecular methods used to study pathogens and virulence genes.
3. Demonstrate knowledge of the basic bacterial mechanisms that cause disease.
4. Understand host-pathogen specificity.
5. Apply knowledge of pathogenic concepts to current topics in microbiology including forensics, medicine, and microbial ecology.

Key Topics:

1. Introduction to Pathogenic Microbiology and Assessment Tests
2. Koch's Postulates
3. The Immune System
4. Natural bacterial flora and disease
5. Mechanisms of Genetic Exchange
6. Measuring virulence
7. Molecular approaches for virulence factors
8. Molecular Approaches for host factors
9. Evading host immunity
10. Virulence factors
11. Delivery of virulence factors
12. Virulence regulation
13. Antimicrobial compounds
14. Bacterial resistance
15. Biosecurity and Forensics

Course: BIOL 5320 Plant Taxonomy and Forensic Applications (3 credits). This course examines the use of botanical material to identify illicit plants or to ascertain possible links between a suspect, victim and a crime scene, including locating crime scenes, determining the time of events, and establishing evidence.

Text:

Simpson, M.G. (2006) Plant Systematics.

Learning Outcomes:

Upon successful completion of this course, students will:

1. Be able to relate the diagnostic characters for more than 50 angiosperm families
2. Be able to demonstrate techniques for collection and preservation of plants for construction and the use of identification keys
3. Be able to compare various methods of classification
4. Demonstrate an understanding of traditional and molecular approaches to the study of plant phylogeny
5. Be able to discuss the evolutionary processes in plants including pollination biology, plant speciation, and apomixes.

Key Topics:

1. Introduction and Plant Systematics
2. Evolution of flowering plants
3. Plant identification
4. Plant morphology
5. Angiosperm diversity: Basil angiosperms, magnoliids, monocots
6. Angiosperm diversity: Eudicots
7. Nominclature: Plant names
8. Plant collecting and documentation
9. Herbaria and data information systems
10. Phylogenetic systematics: History and methods
11. Plant reproductive biology
12. Plant molecular systematics

Course: BIOL 5460 Light and Electron Microscopy (3). Theory and practice of scanning electron microscopy applicable to structural/compositional research. Critical point drying, sample coating techniques, backscattered electron detection, energy dispersive x-ray microanalysis, and computational analysis of data.

Learning Outcomes:

Upon successful completion of this course, students will:

1. Be able to evaluate data including limitations to conclusions
2. Be able to demonstrate laboratory techniques
3. Be able to identify values underlying science
4. Demonstrate objective v. subjective reasoning
5. Be able to apply knowledge and skills to design solutions.

Key Topics:

16. How SEM works
17. Zone of interaction and scattering
18. Imaging modes
19. Beam generation
20. Vacuum systems
21. Fixation of biological samples
22. Freezing/cryofracture
23. Viewing and interpretation
24. Digital image formation
25. X-ray spectrometry
26. Convergent beam diffraction
27. Acronym microscopes

Course: BIOL 5490. Epidemiology (3 credits). Distribution and determinants of health and disease in humans. Methods of studying those factors that influence change in the determinants of disease.

Required Textbooks:
Epidemiology Foundations
1st Edition, by Peter J. Fos ISBN: 780-470-40289

Learning Outcomes:

Upon successful completion of this course, students will:
1. explain and practice some key techniques in epidemiology;
2. understand some routine methods of epidemiological data analysis.

Key Topics:
1. Why Epidemiology; definition
2. History of Epidemiology
3. Health and Disease
4. Describing Health and Disease
5. Measuring Health and Disease
6. Epidemiology Study Designs: Observational and Experimental Studies
7. Uses of Epidemiological Studies
8. Epidemics
9. Epidemiology and Society
10. Screening for Disease
11. Community Public Health
12. Epidemiology Today

Course: BIOL 5690 Medical Entomology (3 credits). Biology and identification of disease-carrying, toxic, and parasitic arthropods.

Required Textbooks:

Service, Mike. 2012. Medical Entomology for Students. 5th edition. Cambridge University Press. Cambridge, UK.

Gennard, Dorothy. 2012. Forensic Entomology: An Introduction. 2nd edition. Wiley-Blackwell. West Sussex, UK

Learning Outcomes:

Upon successful completion of this course, students will:

6. Learn to think critically about issues and values in the fields of medical entomology and forensic entomology through investigation and problem solving.
7. Become proficient in assessing information about medically important arthropods and their impacts on humans and other organisms, and become knowledgeable about the essential use of insects in forensic science.
8. Develop skill in integrating current knowledge about medically important arthropods, forensically important insects, and with new research directions in the fields of medical entomology and forensic entomology.

Key Topics:

28. Biology of the Arthropods
29. Introduction to Mosquitoes; Anopheline Mosquitoes; Culicine Mosquitoes
30. Black Flies and Phlebotomine Sand Flies
31. Biting Midges and Horse Flies
32. Tsetse Flies, House Flies, Stable Flies, and Latrine Flies, and Myiasis
33. Fleas, Sucking Lice, Bedbugs
34. Triatomine Bugs, and Cockroaches
35. Mites
36. Introduction to Forensic Entomology
37. Molecular Techniques and Entomotoxicology
38. Insects and the Decomposition Process; Forensically Important Flies and Beetles
39. Ecology of Flies and Beetles Important in Forensic Situation
40. Sampling at the Crime Scene; Rearing Forensically Relevant Insects; Calculating the Post Mortem Interval
41. Investigations in Aquatic Environments; Forensic Entomology in the Courtroom

Course: BIOL 6030 Advanced Biostatistics (3). Principles of experimental design and methods of univariate/multivariate statistical analysis of biological data.

Learning Outcomes:

Upon successful completion of this course, students will:

3. Be able to identify the appropriate statistical technique to use with different data
4. Be able to explain what different statistics mean and tell us
5. Be able to generate appropriate statistics with existing data

Key Topics:

13. Descriptive Statistics
14. Correlations
15. ANOVA
16. Parametric Models
17. Regression Techniques
18. Variance/Covariance Matrices
19. Factor Analysis
20. Multivariate Descriptive Statistics
21. Cluster Analysis
22. MANOVA
23. Canonical Correlations
24. Discriminant Analysis
25. Repeated Measure Designs
26. Time Series, Survival Analysis, Failure Analysis
27. Sequential Analysis, Temporal Autocorrelation, Analysis of Sound Data
28. Power Analysis

Course: BIOL 6210 Molecular Genetics I (3). Fundamental principles of molecular biology, focusing on mechanisms of gene regulation and methods in molecular genetic analysis. Both prokaryotic and eukaryotic systems are presented.

Learning Outcomes:

Upon successful completion of this course, students will:

9. Have a fundamental understanding of transcription, translation and replication.
10. Demonstrate knowledge on gene regulation
11. Be able to compare and contrast these events in prokaryotes versus eukaryotes.

Key Topics:

42. Kinds of cells
43. Gene expression
44. The circadian clock in cancer development and therapy
45. The cell membrane
46. Protein localization
47. Bacterial transcription regulation
48. Regulation of gene expression
49. DNA replication
50. Bacteriophage lambda and T4 replication
51. Transcription in prokaryotes *versus* eukaryotes
52. DNA replication in prokaryotes *versus* eukaryotes
53. Gene regulation differences between prokaryotes and eukaroytes

Course: CHEM 5450 General Biochemistry (3 credits). Structure, function, chemical, and physical properties of biomolecules with an emphasis on biomacromolecules.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Communicate ideas effectively
- Synthesize and succinctly communicate key points from course material
- work collaboratively to exploit effective group learning
- Interpret and communicate the meaning of statistical findings.
- Identify and better appreciate good empirical research.

Course Outline:

	Topics
1	Concepts of Organic Chemistry
2	Amino Acids
3	Peptides
4	Protein biochemistry
5	Enzymes
6	Nucleotides
7	DNA/RNA structure and function
8	Nucleotide biotechnology
9	Carbohydrate linkage, structure and forms
10	Lipid structure and forms

Required Reading:

Lehninger, Principles of Biochemistry 5th edition by M. Cox, D. L. Nelson and A. L. Lehninger

Required Material: HGS Maruzen Biochemistry Molecular Model kit

Course Assignments:

- Short written in-class assignments
- Group assignments
- Homework Assignments
- Quizzes
- Four exams

Course: CHEM 5540 Instrumental Methods of Analysis (3 credits). Theory of instrumental methods of analysis including electroanalytical, spectroscopic, and chromatographic methods.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Identify and discuss the main instrumental methods for the characterization of matter
- Discuss methods of atomic spectroscopy
- Explain molecular spectroscopy and different methods of MS
- List and define the key terms of electroanalytical chemistry
- Demonstrated different separation methods

Course Outline:

Week	Topics
1	Introduction- types, calibration and selection of instrumental methods
2	Measurement basics- Electrical components and circuits, operational amplifiers
3	Measurement basics- digital electronics and computers, signals and noise
4	Atomic Spectroscopy- introduction to spectroscopic methods
5	Atomic Spectroscopy- components of optical instruments, atomic absorption and emission spectroscopy
6	Atomic Spectroscopy- atomic mass spectroscopy and atomic X-ray spectroscopy
7	Molecular Spectroscopy- Introduction to UV/IS molecular absorption spectrometry, applications of UV/VIS molecular spectrometry
8	Molecular Spectroscopy- molecular luminescence spectrometry, molecular IR spectrometry
9	Molecular Spectroscopy- Raman spectrometry, NMR spectroscopy, molecular mass spectrometry
10	Molecular Spectroscopy- surface characterization by spectroscopy and microscopy
11	Electroanalytical Chemistry- potentiometry, coulometry, voltammetry
12	Separation Methods- gas chromatography, liquid chromatography
13	Separation Methods- supercritical fluid chromatography and extraction, capillary electrophoresis
14	Miscellaneous Methods- thermal methods, radiochemical methods
15	Miscellaneous Methods- automated methods and particle size determination

Required Reading:

Principles of Instrumental Analysis by Douglas A. Skoog, F. James Holler and Stanley R. Crouch, 6th edition

Course Assignments:

- In class presentations
- Homework Assignments
- Four exams

Course: CHEM 5660. Spectrographic Methods in Organic Chemistry (3). Organic structure determination by spectroscopic techniques, with emphasis on infrared, ultraviolet, and nuclear magnetic resonance spectroscopy, and mass spectrometry. Also includes a brief introduction to related spectroscopic methods.

Text:

E. Pretsch, P. Buhlmann, M. Badertscher (2009) *Structure Determination of Organic Compounds: Tables of Spectral Data*. Springer

Student Learning Outcomes:

Students who successfully complete this course should be able to:

1) Use modern NMR, IR, UV-vis and MS techniques to
   - Determine the structure and purity of complex organic compounds
   - Assign spectral signals
2) Understand and interpret modern multidimensional NMR techniques
3) Critically evaluate molecular characterization and spectral interpretation in the literature

Course Outline:

Topics

Nuclear Magnetic Resonance Spectroscopy (NMR)

- Basic Instrumentation principles
- The chemical shift and prediction (1H and 13C NMR)
- Chemical and magnetic equivalence (topicity)
- Spin-spin coupling and spin systems
- Advanced multi-pulse and multidimensional (2D) NMR techniques

Mass Spectroscopy (MS)

- Basic Instrumentation: Ionization Methods and Mass Analyzers
- Isotope patterns
- Typical Fragmentation and Rearrangement patterns of common functional groups

Infrared Spectroscopy (IR)

- Basic Instrumentation: FTIR and ATIR
- Hooke's Law and molecular vibrations
- Vibrational Modes and coupling
- Characteristic frequencies of functional groups

Ultraviolet / Visible Spectroscopy (UV/vis)

- Basic Instrumentation:
- Beer-Lambert Law
- Forbidden and allowed transitions
- Prediction rules and solvent effects

Course Assignments:

- Class presentation
- Homework/Problem Sets
- Quizzes
- Midterm and Final exams

Course: CHEM 5770. Forensic Chemistry (4). Three one-hour lectures and one three-hour lab per week. Qualitative, quantitative, and comparative analysis of forensic samples. Topics include drugs, toxicology, arson, explosives, firearms, colorants, polymers, glass, fingerprint development, and documents. Prerequisites: 5540. Extra fee.

Learning Outcomes:

Upon successful completion of this course, students will:

6. Have a fundamental knowledge of the chemistry involved in forensic investigations of drugs, poisons, arson, explosives, firearms, colorants, polymers.
7. Be able to accurately describe the methods and instrumentation used by chemists in crime labs (preparation for courtroom testimony).
8. Properly apply the methods described to analysis of evidence.

Required Text:

Bell, S. *Forensic Chemistry*, 2nd Ed, Pearson: Boston, 2013.

Key Topics:

13. Foundations of measurement
14. Quality assurance/quality control
15. Defensible uncertainties
16. Chemical fundamentals: Partitioning equilibria
17. Instrumentation
18. Drugs and drug analysis
19. Chemistry of combustion
20. Chemistry of explosives
21. Firearms and chemical evidence
22. Chemistry of colorants
23. Chemistry of polymers
24. Analysis of inks and paints

Laboratory Topics:

1. LIMS software
2. Calibration and validation of instrumentation
3. Thin-layer chromatography
4. Solid-phase extraction
5. Presumptive color tests for drugs
6. Infrared spectroscopy for drug analysis

7. Gas chromatography/mass spectrometry of drugs
8. Fiber analysis
9. Gunshot residue analysis

Course: CHEM 6250. Advanced Analytical Chemistry (3). Principles of chemical separations and chromatographic analysis. Mass spectrometry instrumentation and applications. Molecular spectroscopy theory and instrumentation.

Learning Outcomes:

Upon successful completion of this course, students will:

12. Have an understanding of the capabilities of chromatography, mass spectrometry, and molecular spectroscopy to identify and/or quantitate chemical components of interest.
13. Have a fundamental knowledge of the instrumentation associated with chromatographic, mass spectrometric, and molecular spectroscopic analyses.
14. Be able to evaluate the suitability of the different covered techniques to a particular analysis of interest.

Recommended Texts:

Strobel, H. A. *Chemical Instrumentation: A systematic Approach*, 3rd Ed, Wiley, 1989.

Watson, J. T. and Sparkman, O. D. *Introduction to Mass Spectrometry: Instrumentation, Applications, and Strategies for Data Interpretation*, 4th Ed, Wiley, 2007.

Key Topics:

54. Introduction to separation science
55. Principles of flow
56. Gas and liquid chromatography
57. Capillary electrophoresis
58. Microfluidic devices
59. Mass measurement accuracy and resolution
60. Vacuum systems and ion detectors
61. Ion activation and fragmentation
62. Ionization methods
63. Mass analyzers
64. Tandem mass spectrometry
65. Interaction of light with matter
66. Molecular electronic and vibrational transitions
67. Spontaneous Raman scattering
68. Linear and nonlinear response
69. Light sources, wavelength separation, and light detection

Course: FSCI 5200 Forensic and Molecular Biology (3 credits). Examination of biological evidence in crime laboratory, including identification of bloodstains and semen stains, and DNA typing of blood, bloodstains, and other body fluids.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

1. Develop skills in extracting nucleic acids (DNA and RNA), quantify nucleic acids, perform agarose gel electrophoresis, isolate DNA from agarose gels, digest DNA with enzymes, make competent bacteria, amplify DNA using PCR, clone DNA, perform Southern hybridization, produce cDNA from RNA, purify plasmid DNA, determine gene copy number, and purify various DNAs by CsCI density centrifugation.
2. Become proficient with the scientific literature related to uses of molecular techniques in scientific research and applications (including forensics).
3. Develop critical thinking skills through projects that require students to find solutions to technique limitations.
4. Complete a small project that uses learned techniques and present to class (develop writing and presentation skills)

Course Outline:

Week	Topics
1	Introduction; Collecting and Storing Biological Evidence
2	Presumptive and Confirmatory Testing for Blood
3	Presumptive and Confirmatory Testing for Semen and Other Biological Fluids
4	DNA Review and DNA Extraction
5	DNA Quantitation/PCR/Real Time PCR
6	Exam
7	PCR
8	Separation of STRs
9	Short Tandem Repeats
10	Mitochondrial DNA
11	Ethics and Issues in Forensic DNA Analysis
12	DNA Statistics
13	Review: Statistics and Species Identification
14	Mock Court
15	Open topic

Required Reading:

Butler, JM. *Forensic DNA Typing*. 2nd Edition. Academic Press

Course Assignments:

- Weekly written lab reports
- Homework Assignments
- Case reports on mock evidence samples
- Moot court testimony
- Two exams

Course: FSCI 5300. Pharmacology/Toxicology of Drug Addiction (3 credits). This course focuses on understanding why some drugs are addictive, how addiction can be treated, and the social and toxicologic consequences of drug addiction.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

1. Explain the principles of pharmacodynamics, pharmacokinetics and toxicology
2. Relate the chemistry (pharmacophore) to a drug's pharmacodynamics, pharmacokinetic and toxicologic effects
3. Discuss the social ramifications of drugs of abuse

Course Outline:

Week	Topics
1	Neuropharmacology of Drugs of Abuse
2	Drug Regulation and Law
3	General Principles of Pharmacodynamics and Pharmacokinetics
4	General Principles of Toxicology
5	Ephedrine/Amphetamine/Nicotine
6	Ephedrine/Amphetamine/Nicotine
7	Cocaine
8	MDMA/Hallucinogen/Synthetic Cathinones
9	MDMA/Hallucinogen/Synthetic Cathinones
10	Alcohol
11	Marijuana/Synthetic Cannabinoids
12	Marijuana/Synthetic Cannabinoids
13	Opiates
14	Prescription Drug Abuse
15	Case Studies

Required Reading:

Hanson, Venturelli, Fleckenstein (2014) Drugs and Society, 13th ed.

Examinations:

There will be two 100-point exams in the course. The exams will be of the essay and short answer type.

Student Case Report Presentations:

Students will be required to search the literature for a case-report involving toxicity associated with an agent of abuse. The case should be summarized to the class with a thorough critique of the pharmacological and toxicology as it pertains to the patient. The case report and one-page critique will need to be handed in on the day of the class presentation. The student will

have 10 minutes to summarize the case and present it to the class. The case-report is worth 100 points in the class.

Grading Scale out of 300 points

A	269-300 points
B	239-268 points
C	209-238 points
D	194-208 points
F	$\leq$ 194 points

Course: FSCI 6200 Advanced Forensic and Molecular Biology (3 credits). Expand upon the basics of Forensic Biology. Students will further explore methods discussed, but not practiced in FSCI 5200. There will be a lab component, providing students hands-on experience with techniques commonly used in a forensic biology laboratory.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

1. Perfect skills in extracting nucleic acids (DNA), quantify nucleic acids, perform agarose gel electrophoresis, isolate DNA from agarose gels, digest DNA with enzymes, amplify DNA using Realtime PCR, clone DNA, perform Southern hybridization, determine gene copy number, and evaluate purification techniques for DNAs.
2. Become proficient with the scientific literature related to uses of molecular techniques in forensic analyses and research applications.
3. Develop forensic case study projects that relate to learned skills and which require understanding of the limits of DNA analyses and the effects of environmental conditions on DNA degradation
4. Interact with Ohio Bureau of Criminal Investigations (BCI) DNA Lab personnel to better understand their problems and needs to improvements in DNA analysis.

Course Outline:

Week	Topics
16	Introduction
17	Presumptive Tests
18	Presumptive Tests- article discussion
19	Presumptive Tests- lab presentation
20	Plant Extraction
21	Plant Extraction- article discussion
22	Plant Extraction- lab presentation
23	Exam 1
24	Validation in DNA Laboratories
25	Validation in DNA Laboratories- article discussion
26	Validation in DNA Laboratories- lab presentation
27	Mock Case- Collection and Analysis
28	Mock Case- lab work
29	Mock Case- review and presentation
30	Review and Open Topic

Required Reading:

Butler, JM. *Forensic DNA Typing*. 2nd Edition. Academic Press

Course Assignments:

- Lab work and presentation
- Article reports
- Mock case preparation and presentation
- Two exams

Course: FSCI 6700 Forensic Laboratory Management (3 credits). This course covers theory, practical application and evaluation of forensic laboratory management principles, including issues of quality assurance, research and information systems.

Student Learning Outcomes:

Students who successfully complete this course should be able to:

- Identify components of laboratory management.
- Summarize the principles of laboratory management activities.
- Perform management activities, including critical evaluations of scientific literature, educational methodology, laboratory operations, writing laboratory procedures and safety.

Course Outline:

Week	Topics
1	Introduction
2	Leadership
3	Identifying Challenges
4	Performance Models
5	Costs and Efficiencies
6	Manager Job Requirements
7	Staff Education and Training
8	Resource Management
9	Strategic Management
10	Project Management
11	Quality Assurance
12	ISO Accreditation
13	Writing Policies and Procedures
14	Legal and Political Issues
15	Ethics

Required Reading:

Dale, W.M. and W.S. Becker (2014) *Forensic Laboratory Management: Applying Business Principles*
CRC Press

Course: FSCI 6900. Topics in Laboratory Forensics (3 credits). The systematic study of selected topics in laboratory forensics. May be repeated.

Course Outline:

This course will explore different emerging topics in the field of laboratory forensics. It is intended to allow students and faculty to address topics as they emerge.

Course: FSCI 6910. Directed Individual Study in Laboratory Forensics (1-3 credits). Readings or research on a topic or problem approved by the supervising instructor. May be repeated.

Course Outline:

This course will allow individual students to explore different topics in cooperation with a single faculty member.

Course: FSCI 6990. Thesis Research (1-3 credits). Credit is for thesis research. Thesis proposal must be submitted to the graduate director for approval prior to submission to the graduate college. May be repeated.

APPENDIX C

PROJECTED BUDGET

Estimated Budget for MSFS Degree

	Year 1	Year 2	Year 3	Year 4
Projected Enrollment				
Head-count full time[a]	15	23	28	28
Head-count part time	5	5	5	5
Full Time Equivalent (FTE) enrollment	17.5	25.5	30.5	30.5
Projected Program Income				
Tuition (paid by student or sponsor)[b]	209,880	478,272	548,232	548,232
Externally funded stipends, as applicable	0	0	0	0
Expected state subsidy[c]	40,600	59,161	70,760	70,760
Other income (if applicable, describe in narrative section below)[d]	2,700	7,200	9,000	9,000
TOTAL PROJECTED PROGRAM INCOME:	253,180	544,632	627,992	627,992
Program Expenses				
New Personnel Salaries @ $65K ea.	195,000	198,900	202,878	206,936
• Faculty (e.g. tenure-track, clinical, professional) Fringe Benefits @35%	68,250	69,615	71,007	72,428
Full _3___				
Part Time _3___ Part time funds @ $3K/class	9,000	9,000	9,000	9,000
• Non-instruction (indicate role(s) in narrative section below)				
Full ____				
Part time ____				
New facilities/building/space renovation[e] (if applicable, describe in narrative section below)	0	0	0	0
Tuition Scholarship Support (if applicable, describe in narrative section below)	0	0	0	0
Stipend Support (if applicable, describe in narrative section below)	0	0	0	0
Additional library resources (if applicable, describe in narrative section below)	0	0	0	0
Additional technology or equipment needs[f] (if applicable, describe in narrative section below)	1,175,000	0	0	0
Other expenses (e.g., waived tuition and fees, travel, office supplies, accreditation costs)[g] (if applicable, describe in narrative section below)	32,000	32,000	32,000	32,000
TOTAL PROJECTED EXPENSE:,	1,479,250	309,515	314,885	320,364
NET	(1,226,070)	253,117	313,107	307,628

Budget Narrative: *(Use narrative to provide additional information as needed based on responses above.)*
[a] The enrollment figures encompass two groups of MSFS students—those in Laboratory Forensics (LF) (Chemistry/Biology) and those in Forensic Investigations (FI). Due to the heavy laboratory component of the LF track, a maximum of 10 new students in any given year is targeted. The Headcounts are computed in the following fashion:

Year 1—6 LF students; 9 full-time FI students; 5 part-time FI students
Year 2—14 LF students (6 in their second year and 8 new); 15 full-time FI students; 5 part-time FI students
Year 3 and beyond—16 LF students (8 in their second year and 8 new); 20 full-time FI students; 5 part-time FI students

[b]Tuition figures are based on full-time LF students enrolled only during fall and spring terms (18 credit hours/student) and full-time FI students enrolled for fall, spring and summer (36 credit hours/student)

[c] State subsidy was calculated based on program categorization and vast majority of disciplines of courses as categorized as level BES 5 ($20,853); actual reimbursement = 2,320. These are conservative estimates based on projected graduation rates.) As a result of the estimated enrollment numbers and projected years of graduation (based on full time vs. part time and student classification), the following graduation rates are projected:

Year 1: 9 full-time FI students (only take courses AY)
Year 2: 6 second year LF students will graduate + 15 FI students (12 month plan) + 2.5 part-time students. This totals 23.5 students.
Year 3: 8 second year LF students will graduate + 20 FI students (12 month plan) + 2.5 part-time students. This totals 30.5 students.
Year 4: 8 second year LF students will graduate + 20 FI students (12 month plan) + 2.5 part-time students. This totals 30.5 students. (same calculation as year 3 and should continue this pattern subsequent years)

[d] Laboratory fees

[e] It is assumed that the University will re-task existing laboratory space for the use of Forensic Science from that vacated by Chemistry and Biological Sciences once Mosely renovations are complete and current lab space is vacated by those departments. In the absence of this, the University will need to build at least one new lab with at least 10 benches, as well as a storage room and a preparation room for Forensic Science. This category does not include equipment.

[f] Initial expenditures for laboratory equipment will be needed, including a GC/MS, FTIR, comparison microscopes, and a Capillary Electrophoresis instrument, as well as general set ups for a new teaching laboratory ($500K). Total cost will vary based on whether new or used instruments are obtained. Approximate dollar figure assumes new instruments. The purchase of new instruments typically includes a service contract. There are also start-up packages for the 3 new faculty. The forensic biologist and the forensic chemist will need $325K each and the forensic investigation faculty member will need $25K ($675K total start-ups).

[g] Other expenses include the following:

Laboratory Supplies-- $16,000
Office expenses (based on current department budget, including phones, copying, travel, etc.)-- $6,000
Instrument repair- $10,000 per year (if there are no service contracts)

h. This projected budget does NOT include state of Ohio contributions to the BCI facility, its equipment and staff who will also be influential in the MS program.

APPENDIX D

LETTERS OF SUPPORT

See Added Attachment with the following letters of support:

1. Mike DeWine, Ohio Attorney General
2. Jon E. Sprague, Director of The Ohio Attorney General's Center for the Future of Forensic Science
3. Steve Lab, Chair Human Services
4. Jeffrey Miner, Chair Department of Biological Sciences
5. John Cable, Chair Department of Chemistry

APPENDIX E

RESPONSES TO COMMENTS ON PDP

RESPONSES TO QUESTIONS/ISSUES RAISED BY REVIEWERS OF THE PROGRAM DEVELOPMENT PLAN

We appreciate the suggestions that we received from several universities on our plan for a Master of Science in Forensic Science degree. We believe that we have addressed all of the suggestions/concerns that were raised. The following outlines specific responses to those suggestions/concerns:

1) Two reviewers (Miami and OSU) requested more information related to admission requirements to the degree. (See pages 7-8 for a more detailed explanation of admissions requirements than found in the PDP). Individuals admitted into the degree program for the Laboratory Forensics specialization will be required to hold an undergraduate degree in biology, chemistry, or other closely related field. Additional requirements will include a minimum undergraduate GPA of 3.00 (on a 4.00 scale) and a satisfactory score on the Graduate Record Examination. Individuals admitted into the degree program for the Forensic Investigations specialization will be required to hold an undergraduate degree in criminal justice or other closely related field. Additional requirements will include a minimum undergraduate GPA of 3.00 (on a 4.00 scale).

2) Two reviews (Miami and OSU) raise concerns over the preparation of graduates for report writing and witness preparation, particularly in terms of the legal context of forensics. This activity occurs in many of the courses. An inspection of the brief syllabi attached to this proposal will show that these topics appear in the following courses: FORI 5400, 5450, 6100, 6200, 6300, and 6400 and FSCI 5010, 5200, 6200 and 6900, as well as others.

3) One review (OSU) questions where crime scene evidence collection will be addressed, especially in terms of identification of human remains. It is important to note that crime scene evidence involves a great deal of diverse materials beyond simply human remains, indeed human remains are relatively rare given the number of other crimes that occur (there were 495 homicides in Ohio in 2012 and 1,450 suicides in 2011). Most deaths do not raise issues of identification of remains (Source- Correspondence with BCI staff) and there are very few instances of finding and having to exhume and identify human remains in any given year (estimated at less than 10 a year by BCI staff) out of over 160,000 pieces of evidence processed every year by the Ohio BCI. Training in evidence collection, therefore, is more useful and applied in other crimes. Evidence collection and identification appears in most courses (particularly in the Forensic Investigation specialization), specifically FORI 5110 Crime Scene Investigation, FORI 6100 Death Investigation, FORI 6300 Cold Case Investigations, FORI Sex Trafficking and Pornography, FORI 6200 Questioned Documents, and FORI 6400 Cybercrime and Digital Forensics, and identification is the cornerstone of all Laboratory Forensics courses.

4) Related to item #3 was a comment about needing forensic anthropologists for recovery and identification of human remains (OSU review). While the value of these individuals

for identifying human remains cannot be disputed, this is an area of forensics for future exploration at BGSU and not one being targeted at this time.

5) The issue of faculty expertise is noted in the OSU review. One item to note at the outset is that not all of the listed faculty would be teaching in the Laboratory Forensics specialization and therefore would not be expected to have those credentials. Rather, those individuals are in the Investigations area and have experience and/or training in this area. Of those individuals listed who would be teaching laboratory courses, all currently teach courses that are considered key components of laboratory forensic training/degree programs and/or teach/research forensic science topics. None of the existing faculty are members of the American Academy of Forensic Sciences (not unusual given the fact that BGSU has not had a forensics program in the past).

   Given the above, the university has added two new faculty positions (one in Biological Science and one in Chemistry) and will search for 1 additional faculty member in Criminal Justice in support of the MSFS during the 2015-16 AY. In addition, the program will be utilizing the expertise of BCI staff for teaching some of the specialized courses/topics. This approach to covering courses is a typical method to cover the breadth of forensic topics and is used at many leading institutions/programs, including Alabama-Birmingham, Michigan State and Virginia Commonwealth, and fits FEPAC standards outlining "Faculty members with working experience in a forensic science laboratory are preferred" and that "Forensic science faculty includes any faculty or instructional staff member who teaches a forensic science course or a support course." It is not required that faculty hold "membership/diplomate status in the American Academy of Forensic Science".

6) The issue of assuring that courses and training will be truly forensic and that students will deal with actual crime scene evidence was raised in one review (OSU). The courses are all geared to analyzing and investigating crime scene evidence. It is vital to note that, except for students who may intern/work in the BCI laboratory or with crime scene investigators, evidentiary requirements greatly limit the ability of students to deal with actual evidence or remains while a case is still open. At the close of a case (i.e. after all possible appeals have been completed), it would be possible for students to handle actual case evidence. It is more likely (and expected) that students will work on representative evidence that is not involved in active cases. This will give them the same training but without threat to active cases.

7) A request was made for a list of specific courses for the program (OSU). This list, along with abbreviated syllabi, is included in the proposal.

8) One review (Cleveland State) inquires about the possibility for on-line courses. While there has been some discussion of the potential for eventual on-line offerings, at the present time all courses are being developed for face-to-face delivery.

9) Two reviews (Miami and Cleveland State) raise the issue of possible collaboration across universities/disciplines. Such collaboration is certainly possible and will be explored once the program is up and running.

10) A question was raised about whether the forensic laboratory would serve as a practicum site for forensic nursing students (Cleveland State). While we do not see a reason why this could not be possible, this is something that has to be raised with the Ohio BCI since they have sole authority to make any commitments in this area.

11) A request was made to see a more detailed budget (Cleveland State). A detailed budget projection for the first four years is included with this proposal.

12) Finally, many of the comments (implicitly or explicitly) point out areas/topics for expansion of the program. Indeed, there are many other forensic science areas that could be explored and added. Among these are digital forensics, forensic entomology, forensic accounting, forensic anthropology, forensic psychology, and forensic pathology. Each of these (and others) has value. At the present time BGSU is focusing on basic forensic science and forensic investigation and will explore the addition of other substantive areas as the program grows.

APPENDIX F

FACULTY VITA
(See Added Attachment due to length)