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Welcome from the Director . . .

It is amazing to me that this year marks the tenth anniversary of the formation of the Forensic and Investigative Sciences (FIS) Program at IUPUI! This is also the year in which we will renew our accreditation with the Forensic Educational Programs Accreditation Commission (FEPAC) and remain the only FEPAC-accredited program in the State of Indiana. All in all, the FIS Program is solidly established, seeks constant improvement and cares deeply about educating and training the next generation of forensic scientists.

The mission of the Forensic and Investigative Sciences Program (FIS) at Indiana University Purdue University Indianapolis is to develop professional, ethical graduates with the highest quality education in the natural, physical and forensic sciences, law and criminal justice to successfully prepare students for advanced degrees, employment, and research in forensic science and related fields.
Message from the Director...

The past year can be summarized in one word: Growth. Here are just a few highlights:

- Dr. Susan Walsh has joined us as a new faculty member in forensic biology.
- We have expanded our course offerings, and we are teaching more students than ever before.
- Our teaching space in the new Science and Engineering Laboratory Building is fully operational and ready for use.
- We have re-vamped our graduate program and introduced a one-year non-thesis Master’s degree.

I am very excited to see what the coming year will bring for our program. I am especially grateful to our Board of Visitors and Internal Advisory Committee, who are listed below. This group of academics, practitioners, and professionals serve as an invaluable resource as the FIS Program continues to grow and develop.

Greg Smith
Senior Conservation Scientist
Indianapolis Museum of Art

Sonia J. Leerkamp
Independent Law Practice Professional
Attorney at Law

Ed Littlejohn
Director
Indiana State Department of Toxicology

Michael Medler
Director
Indianapolis Marion County Forensic Services Agency

Gay L. Bush
Technical Leader
Laboratory Director of Operations
Strand Analytical Laboratories

Carl Sobieralski
DNA Technical Leader
Indiana State Police
Indianapolis Regional Laboratory

Donna Roskowski
South Zone Drug Unit Supervisor
Indiana State Police
Indianapolis Regional Laboratory

Kenna Quinet
School of Public and Environmental Affairs

Simon Rhodes
Dean, School of Science

George Sandusky
School of Medicine

Judge Cale J. Bradford
Court of Appeals of Indiana

Major Steve Holland
Commander
Indiana State Police Laboratory Division

Kun Ma
Vice President, Science & Technology
AIT Laboratories

Frances Watson
School of Law

2013-14 FIS Annual Report 4
Message from the Director (cont.) . . .

TEACHING

My teaching duties were at the undergraduate level this past year. Together with Dr. Manicke, I taught FIS 40100: Forensic Chemistry I in Fall 2013. I then taught FIS 40400: Forensic Chemistry II in Spring 2014. As of Fall 2014, I am excited to begin teaching our new graduate students in FIS 50500: Current Issues in Forensic Science and FIS 51100: Chemical Analysis of Alcohol and Drugs. The latter class will also include students from the Chemistry M.S. and Ph.D. programs who take my class as an elective. I will return to teaching FIS 40400 in Spring 2015. I have been particularly pleased with how our students are performing in their practical laboratory exercises in Forensic Chemistry II Lab, including a mock trial exercise that I conduct at the end of every Spring term. This is the student’s biggest opportunity to take what they have learned and completed in the laboratory and communicate it within the context of a criminal trial, including cross examination!

RESEARCH

This past year saw the graduation of two FIS M.S. students (Megan Carrison and James Osbourne) as well as two Ph.D. students (Tina Rainey and Dee Ann Turner). Currently, my research group consists of two Chemistry Ph.D. students: Dana Bors (Explosive Devices) and Wil Kranz (Forensic Applications of Headspace Analysis). We have also been joined this year by Clinton Carroll, an undergraduate in the FIS Program as well as Darren Dixon, a high school student from the American Chemical Society Project SEED Program. We will be welcoming Jordan Ash, a new FIS M.S. student, this fall.

Our research continues to involve collaborations with outside agencies such as the Indiana State Police Bomb Squad. For example, with their help, we designed a “blast cage” whereby pipe bombs could be initiated inside and explosive residue collected on “witness plates” mounted around the device (see pictures below). Collaborations like these ensure that our work has maximum impact for practitioners in the law enforcement, public safety, and counter-terrorism communities.
Message from the Director (cont.) . . .

We have also begun projects with the National Hot Rod Association and the U.S. Auto Club. These projects involve testing of the tires, fuel, and other samples from racers to ensure that there is no “cheating” going on in the form of fuel additives, tire treatments, etc. This has allowed Wil Kranz, Dana Bors, and Clinton Carroll to perfect methods for detecting trace amounts of volatile compounds in these materials (as well as spurred a field trip to the Lucas Oil Raceway, pictured below).

This year also marked the beginning of a new collaboration between Dr. Christine Picard and myself. We have obtained funding from the National Institute of Justice to study how fly pupae (pictured below) that are recovered from scenes of death can be identified. Our methods have the potential of determining both the species and age of the insect by sampling the volatile compounds these insects emit and using advanced statistical procedures to differentiate them.

SERVICE

My service as the Director of the FIS Program, together with Amy Maidi, has covered a lot of ground this year. We have completed a self-study for our re-accreditation with FEPAC, established a one year accelerated M.S. program, and made several changes to our curriculum to help our students receive a higher quality education.

In addition, I am a departmental representative on the School of Science Research Committee, which has involved reviewing internal research proposals as well as assisting in IUPUI’s effort to define its key research areas. I am also on the Graduate Curriculum Committee for the Department of Chemistry and Chemical Biology, with a particular focus on revising the department’s curriculum in analytical chemistry. This new curriculum will include several “core” classes in the major areas of chemistry (i.e., analytical, biochemistry, organic, and physical) as well as several advanced courses designed to add to a student’s specialization.
Touching Base with Christine Picard . . .

As I wrap up my third year in the FIS Program, I finally feel like things are going much more smoothly. This past year in particular has been an exciting and busy one. Research wise – my lab has been bustling with a Ph.D. student, three masters students, a visiting Ph.D. student from Egypt, and three undergraduates. This year saw a lot of travel for me, which included a two week trip to China in which I met with colleagues and presented my research to five different Chinese institutions. With regards to teaching, my courses (Forensic Biology I and II) are going well and are well established at this point. In particular with the lab, a laboratory manual has been developed with the help of a recent Forensic Science MS graduate, Kevin Smolar. Coming up this fall, my final MS student will be graduating, and my lab will be made up of three Ph.D. students and my visiting Ph.D. student who stays one more year.

Research

My research program continues to grow and mature. As I am currently a Co-PI on two National Institute of Justice grants, I have been busy mentoring students associated with each of those projects. One involves the genomic sequencing and subsequent analysis of carrion flies with experimentally derived developmental phenotypes, with the hope that we can isolate genetic markers that are predictive of a particular developmental rate (i.e. fast developer). This will aid in increasing our precision and accuracy when making postmortem interval estimates in death investigation cases. The second funded project is a collaborative effort with Dr. Goodpaster and his Ph.D. student in which we are looking at the effects of abiotic factors on VOC profiles associated with carrion fly pupae, to determine if we can use VOC profiles to ascertain the age of the pupa, again, with the hopes of validating a new method for the determination of the age of an insect for death investigation purposes.
Outside of my funded endeavors, I continue refining my research goals of developing genomic tools for forensic entomological purposes. I have a Ph.D. student who is currently refining the brand new genome of Phormia regina, the most commonly used insect in death investigations, so we may develop additional tools to refine our estimations. In addition to that genome, we have two other insect species’ genome analyses in progress.

And last but certainly not least, I have one Ph.D. student who has been busy validating current phenotypically predictive SNP loci for use in humans. We are interested in eye, hair, and skin color, as well as biogeographic ancestry and age SNP markers. Her Ph.D. will be the validation of these markers in North American populations, and the development of a one tube assay that will be useful to any and all forensic science laboratories using common equipment (i.e. not SNP array readers will be necessary). In addition, she will explore statistical methods for the analysis of this data based on population surveys of the phenotypes (i.e. how many individuals have dark skin, light hair, and blue eyes?).

Currently, I have one publication under review and an additional 3-4 to be submitted in the next few months.

Service
My service duties continue to be acting as the graduate program coordinator for our Forensic Science MS Program, assisting with the teaching of the Forensic Science Capstone class, and participating in School of Science and campus committees.

Teaching
My courses for the upcoming academic year include the Forensic Biology and Forensic Genetics courses.
A Year from the Desk of Gina Londino . . .

Throughout the past year I have been very involved in moving into the new Science and Engineering Laboratory Building (SELB), changing content in the new forensic science laboratory course, and performing service to the community through various guest lectures.

Course Development

I developed a new course, Investigating Forensic Science, FIS 10101, which is a laboratory course for non-forensic science majors first taught in the fall of 2012. This course was again offered in the fall 2013 and in the spring 2014 both with 24 students. In the fall of 2014 there are two sections which are both full at 20 student each. This course was originally developed as a stand-alone course, not to align with a lecture, to allow for students to have a hands-on experience without the expense of a true forensic science laboratory. After offering this course, I have decided that a weekly lecture is needed to prepare students with the material associated with the laboratory exercise. The plan is to have a one credit hour lecture that will precede the laboratory portion of the course. This will be a separate course, FIS 10100, that students can take as a stand-alone lecture or as a co-requisite with the laboratory course.

The online courses are still remaining extremely popular with 75 student in FIS 20500 Concepts in Forensic Science I during the first summer session and 24 students in FIS 20600 Concepts in Forensice Science II second summer session.

I am currently in the process of modifying the graduate microscopy course. In the past, graduate students were required to complete the forensic microscopy course that had very similar curriculum to the undergraduate microscopy course. I will be completely developing a new Advanced Forensic Microscopy course, FIS 50600, which all of our graduate students will take and will also be open for undergraduate students as an advanced science course. This course will focus on case situations where students will complete a portfolio and a mock case by the end of the course. Instrumentation microscopy will also be included in the course content.

Professional Development

I have been getting more involved with forensic science and chemical education organizations this past year. I am currently the treasurer for the Council of Forensic Science Educators (COFSE) and am involved with the local Indiana section of the American Chemical Society (ACS). COFSE is a group of academics and K-12 educators that directly teach forensic science. This is a great way to communicate with other professors on their course content and laboratory ideas for students as well as share activities for the K-12 community. I have also been serving of a committee with the Indiana section of ACS which will be hosting an event for underrepresented college students in the STEM fields. I am also still working with Taylor and Francis to have the laboratory exercises developed for FIS 10101 to be published in the form of a Laboratory Manual by 2015.
Outreach Activities

My outreach involvement has remained steady with the Forensic Science Club. The students have been involved with National Chemistry Week, Science Olympiad, and the Murder Mystery Dinner for IUPUI students. The club was awarded a total of $2500 this past year to host the murder mystery dinner.

I have been invited to local high schools, libraries, and museums, including the Indiana Medical History Museum, to give lectures on forensic science, which I enjoyed very much. With the new laboratory space, I have also been able to plan events for a wide range of school age children to have hands on experience in forensic science. We hosted a Girl Scout badge in February with over 40 girl scouts to obtain their detective badge. We are planning another event for this October.

SELB Laboratories

We were fortunate to move into the new Science and Engineering Laboratory Building earlier than expected. I moved my office in November 2013 and most of the chemical and laboratory supplies by the end of 2013. By May 2014 all the instrumentation used in forensic teaching was moved into the forensic chemistry laboratory. We currently occupy three of the five labs in SELB. There is a pre- and post-PCR laboratory for the forensic biology courses, a separate microscopy lab, and forensic chemistry lab with all our instrumentation. Investigating forensic science, forensic microscopy and forensic biology lab courses were taught in the new space in the spring of 2013. We will extend our teaching in the new building this fall by offering two sections of investigating forensic science and forensic chemistry.
Touching Base with Nick Manicke...

My first year as part of the FIS Program at IUPUI is now drawing to a close. It has been an exciting year, and one that I enjoyed enormously, particularly starting my lab, teaching for the first time, and getting to know my colleagues in the FIS program and the School of Science. The next year looks to be another exciting one – I will be welcoming two graduate students, a postdoc, and at least two undergraduates into my lab and teaching FIS 51100 for the first time.

Research

My research program focuses on bioanalytical and forensic chemistry, with a particular focus on the development of novel mass spectrometry related technologies. After some delays in completing lab renovations, my instrumentation was up and running in May. My research group currently consists of Rachel Potter, a forensic chemistry MS student, Brandon Bills, a chemistry Ph.D. student, and Chengsen Zhang, a postdoctoral researcher, all of whom started this summer/fall. Over the last year, I have also supervised three undergraduates in my research lab (one forensic chemistry major and two chemistry majors). I presented three conference oral presentations since coming to IUPUI last August, highlighted by a research talk at the annual American Society for Mass Spectrometry Conference on a new method for urine drug screening.

Several projects that I participated in before I came to IUPUI were published or submitted last year. This included two papers in Analytical Chemistry on drug analysis with my former PI, Graham Cooks. I have two other papers in the works with a clinical focus in which I am corresponding author: one paper is on therapeutic drug monitoring of the immunosuppressive drug tacrolimus (submitted in July) and the other is a pharmacokinetic study of the cancer drug pazopanib (in preparation).

Service

Last year, I was a member of two faculty search committees: a computational chemist faculty position and the forensic biology faculty search committee which resulted in the hiring of Susan Walsh. Next year, I will be on another search committee, this time for a bioanalytical faculty position in the Chemistry and Chemical Biology department. I will also serve on the technical facilities committee.

Teaching

I co-taught FIS 40100 and 40101 (Forensic Chemistry I and lab) with John Goodpaster in the fall. I did not teach in the spring (first year teaching relief). Next year, I will teach FIS 40100/40101 in the fall and FIS 52200, the second semester graduate course in forensic chemistry, in the spring.
An Update from Amy Maidi . . .

This has been an exciting year in the FIS Program! I’ve spent the year searching for ways to improve the experience for students. Building upon the goals I set out last year, I have been working on the following things:

- **An FIS Virtual Community**: A new Oncourse site was set up for all current FIS students and students who intended to be FIS majors. This is been an excellent forum for faculty staff and students to get the latest information, job listings, internships, academic check sheets, and other important information. All faculty were added to the site and able to provide announcements to the students thus creating our own virtual community.

- **Build Student-Faculty Relationships**: One of the goals from last year was to create more meaningful contact between the students and faculty. This was achieved by having faculty participate in every new student orientation this year as well as all faculty participating in Forensic Science Club events. Students express interest in doing research with our faculty. Creating opportunities for students to meet and interact with the faculty is an essential component to achieving strong undergraduate participation in research and professional mentorship for the future.

- **Where are our graduates?** An important goal was to engage our alumni more meaningfully. To this end we have created a LinkedIn group exclusively for FIS students and alumni. All students who graduated this year were invited to join the group. We now have the 21 members and growing. This should provide a wonderful resource to connect, post job listings, find out what students are doing as well as share information about what is going on in the program.

- **Finding the Most Effective Curriculum**: An ongoing review of curriculum has been being done this year to evaluate student preparedness, student success, and encumbrances to graduation. As a result of this ongoing, open dialogue many curricular changes have been addressed including changes to both the biology and chemistry concentration.

- **Introducing . . . FIS 49600 Special Topics in Forensic Science**: One of the complaints that I hear from students on a regular basis is that they do not get to take as many FIS classes as they would like. There are times when they are simply working on prerequisite science courses and have semesters where they are not allowed to take any FIS classes. To respond to this request as well as address issues of students being as professionally prepared as possible, we established FIS 49600 Special Topics in Forensic Science. We have worked with incredible professionals in the field to help them develop three 1-credit hour workshops that students can take for the 1st time this fall.

  *Drugs of Abuse, Fingerprinting, and Basic Photography for Forensics* are all full and have waitlists!

  We think going forward this will be a wonderful way for our students to be more prepared to go into the workplace by having even more extensive exposure to forensic science topics.
• **DEA Internship:** I was very fortunate to be able to established a relationship with the Drug Enforcement Agency (DEA) North Central Laboratory in Chicago to cultivate a voluntary internship opportunity for our FIS Program students. Through collaboration with the lab manager, our students were allowed to apply for an internship at their lab. Learn more about the student who was selected and the work she did this summer on page 35.

• **Girl Scouts Explore Forensic Science:** Last year at a National Girls Collaborative Project meeting I met Jamie Hubbard, Program Development Manager for Girl Scouts of Central Indiana. We developed the idea of having a workshop in our new forensic science laboratories at IUPUI for Girl Scouts to work toward and earn the detective badge. As a former Girl Scout myself it was exciting to be part of planning and participating in this event. With our program and the forensic science field being so dominated by women, it was exciting to help engage young minds in the possibility of forensic science as a career. For more about this exciting event, see page 23.

• **FIS Capstone Class:** I thoroughly enjoyed my first time teaching the FIS Capstone in Fall 2013. It was gratifying to see how much the students learned about moving forward into the next phase of their lives as professionals. I even had one student comment, “This was the best class I have taken at IUPUI.”

• **Dreams, Goals, and a Self Study:** Finally, I have had the pleasure of working on my first FEPAC self study in anticipation of our site visit this fall. It was exciting to take a critical look at the program and draft goals for the future of the program. It will be great to highlight all the work we are doing and spend some time dreaming for the future with colleagues from other accredited programs.
Peer-Reviewed Publications


Book Chapters


Faculty Presentations


CJ Picard, “Importance of Understanding the Genetic Diversity of Stratiomyids,” Huazhong University, Wuhan, China June 2014.


Faculty Presentations


N. Manicke, Development of Ambient Ionization Mass Spectrometry and Its Application to Problems in the Biomedical and Forensic Sciences, Department of Chemistry and Physics, Indiana State University, Terre Haute, IN January 2014.


J.V. Goodpaster, “Fire Debris Evidence” for the Indianapolis Marion County Forensic Services Agency and the Indianapolis Fire Department (Fire Investigation Section), Indianapolis, IN April 2014.


Student Demographic Profile (Fall 2013)

- Undergraduate (111)
- Graduate (6)

- Part Time (16)

- Full Time (101)

- Male (22)
- Female (95)

- Under 18 (4)
- 18 to 20 (64)
- 21 to 22 (24)
- 23 to 24 (8)
- 25 to 32 (13)
- 33 to 59 (4)

- Senior (30)
- Junior (25)
- Sophomore (21)
- Freshman (35)
Student Demographic Profile (Fall 2013)

Where are the out of state students from?

- Hawaii
- Illinois
- Iowa
- Michigan
- Minnesota
- Ohio
- Texas
- Utah
- Washington
- Wisconsin
- Portugal
- United Arab Emirates

Total Students Pursuing FIS BS at IUPUI Fall 2013

- FIS Undergraduates (111)
- Pre-FIS Undergraduates in University College (53)
The FIS Program is well represented on:

- The School of Science (SOS) Dean’s Honor List which requires a minimum 3.5 term GPA
- The Science Scholar’s List which requires completion of at least 26 credits and 3.75 cumulative GPA

The FIS Program is proud to have academically exceptional students. We had thirteen of our incoming freshman this year admitted to the Honors Program.

Fall 2013 Term GPAs

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Spring 2014 Term GPAs

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FIS Trends

FIS Undergraduate Students

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<td>108</td>
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<td>2012</td>
<td>110</td>
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<tr>
<td>2013</td>
<td>111</td>
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University College Students Intending to Become FIS Majors

<table>
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<tr>
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<tbody>
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<td>2008</td>
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<tr>
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<td>72</td>
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<td>2011</td>
<td>79</td>
</tr>
<tr>
<td>2012</td>
<td>76</td>
</tr>
<tr>
<td>2013</td>
<td>53</td>
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FIS Students Admitted to the Honors College

<table>
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<tr>
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<td>2012</td>
<td>10</td>
</tr>
<tr>
<td>2013</td>
<td>13</td>
</tr>
<tr>
<td>2014</td>
<td>13</td>
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</table>
Where have FIS students gone after graduation?
Below is a sampling of places our undergraduate students are currently employed.

- Eli Lilly and Company
- Wishard Health Services
- Mid America Clinical Laboratories
- Carrollton Police Department (Kentucky)
- Van Nuys Medical Science Center
- Anheuser Busch Brewery (Missouri)
- United Water
- Drug Enforcement Administration (DEA, Maryland)
- University of Miami Miller School of Medicine (Florida)
- Lancaster Laboratories
- Deaconess Health System
- Bismarck Crime Laboratory (North Dakota)
- Covance Laboratories
- Colorcon
- Sacramento County District Attorney’s Office (California)
- Strand Analytical Laboratories
- St. Charles County Sheriff’s Department (Missouri)
- Fort Wayne Police Department
- Miami Valley Regional Crime Laboratory (Ohio)
- Belize National Forensic Science Service (Belize)
- Raabe Company (Wisconsin)
- AIT Laboratories
- Florida Department of Law Enforcement (Florida)
- Indiana State Police Forensic Laboratory
- Dupage County Forensic Science Center (Illinois)
- Buchi Laboratory Equipment (North Carolina)
- Kelly Scientific Resources
- St. Vincent Health
- Agilent Technologies
- Lancaster Labs
- Southern Illinois University Edwardsville
- Sacramento County District Attorney’s Office
- Heritage Crystal Clean
- Roche Diagnostics
- Pepsico
- Quintiles Laboratories
- Indianapolis-Marion County Forensic Services Agency
- Hartland Bakeries
- Indiana State Department of Toxicology

Below is a sampling of places our undergraduate students have attended graduate school.

- University of Tennessee: Ph.D. in Chemistry
- IUPUI: MS in Forensic Science
- University of Central Florida: Ph.D. in Chemistry
- Indiana University: Law School
- Drexel University: Physician’s Assistant School
- Michigan State University
- Marion University School of Osteopathy
- Indiana University Medical School

Below is a sampling of places our graduate students are currently employed.

- AIT Laboratories
- ChemaTox Laboratory, Inc. (Colorado)
- Elmhurst College (Illinois)
- Butler University
- Microbac Laboratory Services
- Indiana State Police Forensic Laboratory
- Ideal Innovations, Inc. (Afghanistan)
- Indiana State Department of Health
- Eli Lilly and Company
- Denver State Police
- Sun King Brewery
- Texas Department of Public Safety
Community Involvement

Educating the public, future forensic scientists, and science teachers is part of the FIS mission.

This Spring the FIS Program hosted a Girl Scouting event in conjunction with Girls Scouts of Central Indiana. This daylong event filled up very quickly and even had a waitlist. We hosted more than 40 girls and 17 adults for a rotation of five different activities in the new FIS labs:

- Practice the Power of Observation
- Communicate in Code
- Fingerprint for Fun
- Try Out Detective Science
- Follow the Clues to Solve a Real Mystery

Each activity was lead by two volunteer FIS students who also talked to the girls about being in the FIS Program and studying in a science field.

Everyone had a great time—and all the girls completed their badges!
Community Involvement

Forensic Entomology: Crime Solving Bugs

Event Type: Adult Programs
Date: 7/9/2014
Start Time: 7:00 PM
End Time: 8:30 PM
Description: Christine Picard, Assistant Professor with the Department of Biology & Forensic & Investigative Sciences, will talk about what insects as crime scene evidence and how they can help solve the case.
Library: Fishers Library
Location: Fishers Center
Presenter: Christine Picard

The Forensic Microscope: Viewing Facts Behind the Evidence

Event Type: Adult Programs
Date: 7/16/2014
Start Time: 7:00 PM
End Time: 8:30 PM
Description: Gina Londino, Chemist and Senior Lecturer with the Forensic & Investigative Sciences Program of IUPUI, will present a talk on the theory of the microscope and its application in forensic science. Really close-up looks at hair, fibers, paint chips, etc. - essential clues to crime solving.
Library: Fishers Library
Location: Fishers Center
Presenter: Gina Londino

Sherlock Holmes and the Beginning of Modern Forensic Science

Event Type: Adult Programs
Date: 7/24/2014
Start Time: 7:00 PM
End Time: 8:30 PM
Description: David Zauner is a forensic scientist with the Indianapolis-Marion Co. Forensic Services Agency, and the current vice president of the Illustrious Clients of Indianapolis, the local Sherlock Holmes Society chapter. In this program, Mr. Zauner combines his expertise in the field of forensics and his interest in Arthur Conan Doyle's Great Detective to explore parallels between the methods in the Holmes stories and those actually used at the time. He compares Holmes cases to true crime cases at the turn of the 20th Century.
Library: Fishers Library
Location: Fishers Center
Presenter: David Zauner
Community Involvement

Project SEED is a locally administered program which allows students in the Indianapolis Public School (IPS) system to apply to attend an eight-week program as well as work in a research lab. Dr. Goodpaster hosted one high school student this summer in his lab.

Prof. Gina Londino assisted with Build It Day at IUPUI for the Indiana Science Olympiad

Dr. Christine Picard and Prof. Gina Londino both participated in the Health and Science Innovations Camps held on the IUPUI campus for high school students.

Prof. Londino challenged the students to determine the best mobile phase suitable for separating components in ink via Thin Layer Chromatography.

Dr. Picard had the students working with flies to determine which life cycle phase they were in which can lead to increased accuracy of time of death.
Community Involvement

Prof. Gina Londino presented to the Carmel High School Pre-Med Club on “ Decomposition, Death, and DNA”

Prof. Gina Londino has been very active with the School of Science Women in Science House (WISH). She served on a panel about career preparation as well as helping with other WISH community events.

Dr. Christine Picard mentored a high school student this year for a science fair project. The student then went on the national competition in San Diego for the Student Science Program through the Society for Science & Public Life.
FIS Club

Since 2007, IUPUI’s Forensic Science Club has been a well-recognized organization engaging in activities, which enrich students’ minds and provide vast opportunities. Through this academic year students engaged in various activities around the IUPUI campus and Indianapolis. Guest lectures in distinct fields of the forensic community provided insight to spark the minds of students and faculty. Multiple lab tours were conducted to observe and hear personal testimonies from forensic scientists themselves. This year we went to the Marion County Forensics Services Agency and the American Institute Toxicology Lab. The club has also done their work in giving back to the community by adopting a family during Christmas where we provided presents for a less fortunate family.

On campus students conducted their annual Murder Mystery Dinner, which includes a formal dinner with the entertainment of a mystery to be solved. This year’s theme was based on the board game Clue.
FIS Club

Along with obtaining knowledge from forensic scientists, students have been able to interact with children in the community.

Celebrate Science at the Indianapolis Motor Speedway

National Chemistry Week
at the Indianapolis Children’s Museum
FIS Club

This year the students were awarded a grant to travel to the Midwestern Association of Forensic Scientists (MAFS), our students presented their work, networked, and have a great time.

Students presenting at MAFS

Ready for the conference 1950’s dance.
Celebrating Our Students

IUPUI Top 100

The FIS Program was so proud to have TWO students selected for the prestigious IUPUI Top 100 Students award. Chelsea Dodge and Jessica Bosse were both very deserving recipients with so much service to the FIS Club, research, and academic excellence.

Honors and Awards

FIS Academic Achievement Award: Ashley Riley
Chuck Gould Memorial Scholarship: Megan Carrison
FIS Leadership Award: Jason Olson
FIS Undergraduate Research Award: Alyssa Badgley
School of Science John D. Barnwell Memorial Scholarship: Sarah Tolbert
Celebrating Our Students

2014 Graduation

We are so proud to have 17 undergraduate and four graduate students graduating this year! This year’s graduation ceremony was extraordinarily special due to the fact the Jon Carnahan, pictured here, was the student speaker for the School of Science ceremony. He will be starting medical school in the Fall.
### Undergraduate Student Research

Below is a sampling of research experiences undergraduate FIS students engaged in this year.

<table>
<thead>
<tr>
<th>Student</th>
<th>Mentor or Institution</th>
<th>Research Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinton Carroll</td>
<td>Dr. John Goodpaster</td>
<td>Solid-Phase Microextraction in the Analysis of Blowfly Pupae</td>
</tr>
<tr>
<td>Jessica Espino</td>
<td>Dr. Lisa Jones</td>
<td>Expression of GCamP2 for In Cell FPOP</td>
</tr>
<tr>
<td>Hannah Caito</td>
<td>Drs. Michael McLeish, Horia Petrache, and Bruce Ray</td>
<td>Exploring the Conformational Changes Associated with Substrate/Inhibitor Binding of the Adrenaline Synthesizing Enzyme, PNMT</td>
</tr>
<tr>
<td>Jon Carnahan</td>
<td>Dr. Marty O’Donnell</td>
<td>Distributed Drug Discovery</td>
</tr>
<tr>
<td>Shannon Cook</td>
<td>Dr. George Sandusky</td>
<td>DNA/RNA Degradation Rate in Long Term Fixed Museum Specimens</td>
</tr>
<tr>
<td>Chelsea Dodge</td>
<td>Dr. George Sandusky</td>
<td>DNA/RNA Degradation Rate in Long Term Fixed Museum Specimens</td>
</tr>
<tr>
<td>Jared Brewington</td>
<td>Dr. Nick Manicke</td>
<td>Oxidation of Squalene in Latent Fingerprints</td>
</tr>
<tr>
<td>Whitney Reed</td>
<td>Dr. Christine Picard</td>
<td>Determining the Genetic Differentiation in <em>Calliphora</em></td>
</tr>
<tr>
<td>Saad Kluzinski</td>
<td>Prof. Gina Londino</td>
<td>FIS 10101 Summary Analysis</td>
</tr>
</tbody>
</table>
Graduate Student Research
A full listing of the research FIS thesis graduate students engaged in this academic year.

<table>
<thead>
<tr>
<th>Student</th>
<th>Mentor or Institution</th>
<th>Thesis Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kevin Smolar</td>
<td>Dr. Christine Picard</td>
<td>Forensic Analysis of Low Template and Environmentally Affected DNA Samples</td>
</tr>
<tr>
<td>Megan Carrison</td>
<td>Dr. John Goodpaster/Greg Smith (IMA)</td>
<td>The Room Temperature Evaporation Behavior of Purported Azeotropes Used as Cleaning Solutions in Art Conservation</td>
</tr>
<tr>
<td>James Osbourne</td>
<td>Dr. John Goodpaster</td>
<td>Spectroscopic and Chemometric Analysis of Automotive Clear Coat Paints by Micro Fourier Transform</td>
</tr>
<tr>
<td>Lisa Beach</td>
<td>Dr. Christine Picard</td>
<td>Evaluation of Storage Conditions on DNA Used For Forensic STR Analysis</td>
</tr>
</tbody>
</table>
Raeanne Adams
Marion County Coroner’s Office

“I am interning with the Marion County Coroner’s Office. I answer phones, file, assist with walk-ins, help with whatever the deputies need, accompany them on runs, and pick up medical records when needed. We also do mini investigations, called Greensheets, when doctors won't sign death certificates, and staff the MCCO tables at community outreach events such as the Indy Black Expo. The experience is fun. I enjoy the other interns I get to work with and the office staff. I was surprised at the process it takes to get an Electronic Death Certificate signed.”

Kristin Richards
Marion County Prosecutor's Office

"Being involved in my internship at the Marion County Prosecutor's Office has been a fantastic experience for me, because it has given me the opportunity to learn more about the criminal justice system, as well as to see it in action. It has also helped further my knowledge of all the different aspects that are in the field, some of which I was unaware of before participating in this internship. The knowledge I have gained has helped reinforce my decision to want to be involved in the criminal justice field with forensic science. I have enjoyed learning as much as I can about all the sides of criminal justice before I specifically become involved with just the forensic science field."
Student Internship Experiences

Jessica Bosse  
Drug Enforcement Administration North Central Laboratory

“My main project involved the verification of drug standards. After analyzing each standard by GCMS and ATR FT-IR, I compared my data with previous verification data to make sure the drug has not been contaminated or become degraded in some way. Another smaller project I worked on involves making standard solutions that analysts will later use when examining high purity methamphetamine.

Interning with the DEA has been a great learning experience. As students, we gain a lot of knowledge in the classroom, but it is not quite the same as putting it into practice. I have been able to gain a lot of hands on experience working with different instrumentation in the lab. It was such a good feeling the first time I was able to prepare and run my samples on the instruments essentially on my own! Additionally, I have been able to get insight into the career of a forensic chemist. I have come to realize more fully that patience is a necessity in this job! It has also been great to meet and see the other analysts working on casework. And, of course, getting to go inside the drug vault was definitely a highlight of the experience!”

Chelsea Voegerl

“I spent the summer interning for the Dubois County Sheriff Department. I had the opportunity to see how crimes and arrest were handled and investigated in the field rather than in a lab. The project that I was apart of was called “Operation Big Brother” and involved removing 16 major drug dealers from the streets. This investigation began last July and continued a full year until enough evidence was collected to put these major drug dealers away for a long time, and show the community that it was not going to be tolerated. The arrest happened this July, after undercover state police and informants were sold approximately $6,000 worth of various drugs from the 16 people combined. Along with this project I had the opportunity to work alongside the detective, narcotics officer, patrol officer, and jailers. It was a great experience for me since I am interest in crime scene investigating. It gave me an opportunity to see what the field was like before committing to a job.”
"My summer internship began in Pikesville, Maryland at the Maryland State Police Crime Lab. I did not have a specific project but was assigned many tasks within the CODIS unit. A typical day for an intern would consist of any combination of the following tasks depending on what was needed to be done that day: data entry of CO and arrestee cards (that arrive with the individual’s DNA sample) into an online tracking system, filing CO and arrestee information cards, assembling expungement packets (paperwork that notifies the individual and his/her lawyer that his/her DNA sample has been destroyed) that need to be scanned into the tracking system, scanning and reviewing expungement packets, pulling samples that are ready to be analyzed and uploaded into CODIS, transferring data from an old log book into an Excel document, and combining and stapling FTA cards with their matching buccal swabs based on their unique database numbers.

While my job consisted of many administrative duties, I was able to watch analysts process evidence. I observed serological techniques, the use of DNA extraction and detection instruments, and the analysis of the results. The times I was able to observe, I recognized the methods and techniques that were performed on the evidence were based on what I had learned in class. It was exciting to see that what was taught in IUPUI forensic courses could be applied in a real forensic laboratory setting during my internship.”
Shannon Cook  
Forensic Anthropology Center, University of Tennessee Knoxville

Affectionately known to many as the "Body Farm," the Forensic Anthropology Center at the University of Tennessee Knoxville is a research facility studying human decomposition. Research subjects are obtained through donation and then placed in various conditions, both mock and experimental. Investigation agencies may consult with the Forensic Anthropology Center on difficult cases; research subjects may be placed in similar environments and situations as decedents found in real-life crime scenes. The rate at which research subjects decompose at the Forensic Anthropology Center enables investigators to better gauge likely time since death estimations. Research subjects may also be utilized in ground-breaking research studies orchestrated by students at the University of Tennessee studying forensic anthropology.

The Forensic Anthropology Research facility also offers courses to investigative agencies and students alike. During the summer the anthropology department at University of Tennessee offers many short courses ranging from osteology studies to forensic investigations. The class I partook in was a four day course covering forensic anthropology field methods. The first day was spent in the classroom learning methods and techniques we would utilize in the field the next few days during the course. Our three days in the field were spent recovering two research subjects; the first was a surface recovery and the second was a burial recovery.

Courses vary from summer to summer; some courses also have professional career stipulations for participation in certain short courses. For more information visit http://fac.utk.edu/courses.html
Life Health Sciences Internship (LHSI)

The FIS Program was proud to have four students selected for Life Health Sciences Internships. LHSI connects IUPUI life and health sciences undergraduates with research and professional experience internships on and near the IUPUI campus. Participants are encouraged to explore career and academic goals and future career pathways while gaining valuable professional connections with faculty and staff in our graduate and professional programs. Internship spots are extremely competitive and run from the end of August to the beginning of May.

**Jason Olson**

**Mentor:** George Sandusky, Department of Pathology and Lab Medicine  
**Research:** Observing Trends in Prescription Drug Abuse within Marion County

**Ellie Weber**

**Mentor:** George Sandusky, Pathology  
**Research:** Plastination of Human Tissues: A Cleaner and Biologically Safer Method of Gross Tissue Preservation

**Megan Welch**

**Mentor:** Alexander Obukhov, Cellular and Integrative Physiology  
**Research:** Diabetic Environment Down-Regulates TRPV1 Activity in DRG Neurons

**Dana Yenko**

**Mentor:** Shoji Ichikawa, Endocrinology  
**Research:** Effect of Parathyroid-Specific Klotho Deletion in a Murine Model of CKD
The FIS Program received more than $646,000 in financial support this academic year!
New Labs and FIS Instrumentation

The Forensic and Investigative Sciences Program is now occupying brand new space in the Science and Engineering Laboratory Building (SELB). This is the first time the program has had separate laboratory space dedicated to teaching laboratory in forensic science. We have three laboratories, Forensic Microscopy, Forensic Chemistry, and a Pre and Post PCR Forensic Biology laboratories.

EL 127: Forensic Microscopy

This room is roughly 800 square feet dedicated to teaching light microscopy and the instrument’s uses in a forensic laboratory. The courses taught in this room are FIS 30600 and FIS 50600; both forensic microscopy. There are four round tables which seat up to 16 students all with individual space to work independently on their microscope. There are also two teaching microscopes which are connected to the projector so the instructor can display magnified images seen under the microscope. This helps students with correctly identifying images as they work individually. The lab also is equipped with storage for all the student microscopes and has space for specialized microscopy on side bench space. See the following list with all the types of microscopes available for our students.

- Polarizing light comparison microscope, Leica DM750P
- Phase contrast compound light microscope, Leica DM2500M
- Polarizing light microscope, Olympus BX51
- Polarizing light microscope, Leica DM500P (11)
- Polarizing light microscope, Leica DMEP (5)
- Compound light microscope, Leica DM500 (7)
- Compound light microscope, Olympus CX21 (3)
- Stereomicroscope, Nikon SMZ800
- Stereomicroscope, Olympus SZ51 (3)
- Stereomicroscope, Olympus SZ61 (2)
- Stereomicroscope, Leica EZ4 (9)
- Digital Camera, Leica DFC290 (2)
- Boom Stand, Diagnostic Instruments (3)
New Labs and FIS Instrumentation

EL 135: Forensic Chemistry

This laboratory is about 1500 square feet and contains all of our teaching instrumentation required for forensic chemistry. The courses taught in this room include both Forensic Chemistry courses (FIS 40101 and FIS 40401) and the new Investigating Forensic Science laboratory (FIS 10101). The center of the room has two large bench tops which can have up to 12 students. There is also bench space surrounding the room where all the instruments are located. The room is also equipped with a fume hood and plenty of storage space for equipment and chemicals. The large room is much improved for teaching forensic chemistry laboratory exercises. Student will be able to prepare and analysis their samples in the same space. A list of all our teaching instrumentation is below.

- Microspectrophotometer, CRAIC, UV-Vis-NIR with fluorescence
- Micro Raman, Foster and Freemen (CRAIC), 786nm LASER
- Fourier Transform Infrared, Perkin Elmer, ATR capabilities
- Spectrophotometer, Thermo Scientific, UV-Vis
- Gas Chromatograph Mass Spectrometer, Shimadzu, autosampler
- Gas Chromatograph Mass Spectrometer, Agilent, autosampler
- Gas Chromatograph FID, Shimadzu, pyrolysis
- Video Spectral Comparator, Foster and Freeman
New Labs and FIS Instrumentation

EL 123/125: Forensic Biology

The Forensic Biology laboratory is separated into two lab rooms, a pre-PCR lab which is about 900 square feet and a post-PCR lab about 450 square feet. The DNA analysis laboratory has one large bench in the center of the room which can hold up to 12 students. The DNA extraction lab is equipped with multiple genetic analyzers for students to complete DNA laboratory work. A list of the equipment in the forensic biology labs is below.

- Air Clean Portable Hood, Air Clean
- Real Time PCR, Applied Biosystems
- Genetic Analyzer, Applied Biosystems, 310
- Genetic Analyzer, Life Technologies, 3500
- Mini Crimescope, Jobin Yvon, Inc, forensic light source system
- Centrifuge, Eppendorff, refrigerated
- Thermal Cycler, Fisher Scientific, 96-well block
New Labs and FIS Instrumentation

EL 121: Preparatory Laboratory

We also have laboratory preparatory space in SELB. The Forensic Science program has dedicated laboratory bench and shelf storage for commonly used consumable materials and chemicals. These materials are shared between all 7 undergraduate laboratory courses offered within our program. This space is also used by teaching assistants to prepare laboratory chemicals and samples.