

Appropriate Education Alters Perceptions of Forensic Science and Guides Career Selection

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Abstract: Television crime series, i.e. CSI: Crime Scene Investigation, affect public perceptions of forensic science. The unrealistic view of science portrayed by these types of television shows has led to misperceptions of the science in forensic science by many students enrolling in forensic science degree programs. This study used quantitative and qualitative data about an undergraduate forensic science class at the University of Central Florida to demonstrate how critical entry level courses are in dispelling students' misconceptions about forensic science and guide their career paths. This paper presents the activities that adjust perceptions of the field and how these changes manifest in changes in career interest, official changes in academic degrees, etc. After taking this course, the number of students that stated they were affected by the "CSI Effect" went from 28% to 50%. Additionally, nearly 10% of students changed their degrees from forensic science to another discipline within one year after taking this course, indicating the significance that early education in a collegiate setting can have on students' decision-making on their future careers.

Keywords: forensic science, perceptions of science, education, career paths, CSI Effect

Introduction

The TV series, "CSI: Crime Scene Investigation", has had a profound impact on STEM (Science, Technology, Engineering and Mathematics) education since its inception in 2000. The show has been described as portraying "the increasing use and capabilities of forensic science in actual criminal investigations... in an exaggerated and highly stylized manner" (1). This effect on the general population has been coined the "CSI Effect", which is defined as the "supposed impact of the popular CBS crime drama CSI: Crime Scene Investigation"(2, 3). It has also been described as "blurring the lines between fiction and reality, many crime dramas unfortunately contribute to misconceptions about how the criminal justice system works" (4-7). This TV show has created an impact in the following three areas: 1) creating unreasonable expectations and increasing the Prosecutions' burden, 2) jurors' expecting that the science is always correct and infallible, and thus blindly believing forensic evidence, and 3) significantly increasing interest in forensic science in the general population and future college students (2, 8, 9). There has been an explosion of students enrolling in forensic science degree programs since 2000 (8), even at the University of Central Florida (UCF) where the number of students enrolling in forensic science has significantly increased *pre-* and *post-*CSI (Figure 1). The unfortunate aspect of

this effect is in relation to the third impact area described above; that many students are unaware of the scientific and mathematical requirements of the forensic career field and the necessary path to prepare for this career. Most researchers who study the effects of CSI typically and primarily focus on a select group of people: in the courtroom (e.g. jurors, judges, people in the audience) (10-14) and the general public who may become jurors (1, 4, 11). Perception studies related to the "CSI Effect" have focused on the possible constructive nature of the information portrayed and the realities of the field, while concomitantly considering the potential destructive aspects of the information, whereby misconceptions related to forensic science were examined (4).

In 2007, the popularity of forensic science careers was associated with the "CSI Effect" (15). There are several explanations that have been associated with the "CSI Effect", including: 1) "growing expectation that the police labs can do everything TV labs can" (16-18), and 2) "the notion that crime show viewing influences jurors to have unrealistic expectations of forensic evidence, which then affects their trial decisions" (1, 11, 12).

However, the main focus of these authors' work were in regard to the jury and how the "CSI Effect" can affect their decision-making process. Few researchers have studied how the "CSI Effect" plays a part in the selection of a college degree and ultimate career choice. This is

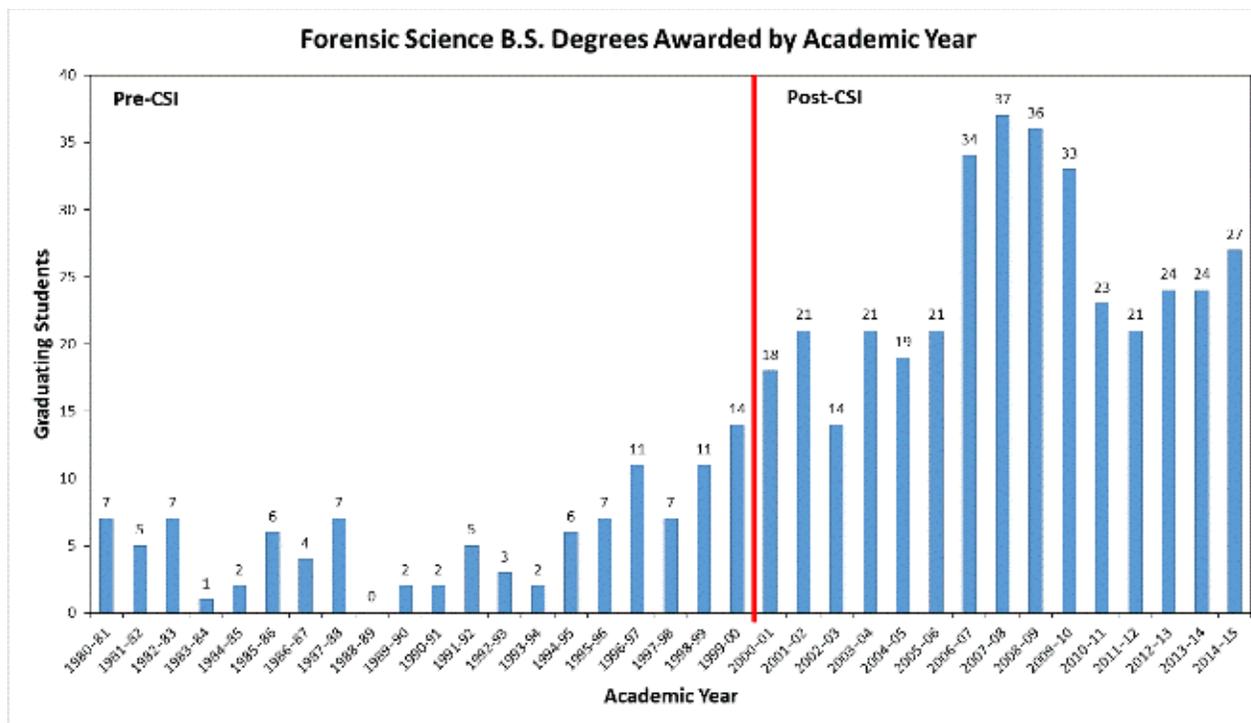


Figure 1 Forensic Science B.S. Degrees Awarded at UCF by Academic Year (1980 – 2015).

considering the relationship between the CSI TV series and shows on TV channel like Investigative Discovery with the increase in college applications of students pursuing forensic science programs and personal conversations with students when asked why they selected the academic program. However, the selection of the academic program is critical in ensuring that the criminal justice system remains strong and generates accurate investigative decisions based on the appropriate application of science to the investigation. This can potentially be hindered by students pursuing this career based off of misinformation and misconceptions of the field.

The “CSI” TV show introduced a significantly large audience to how science and other STEM fields can aid in criminal investigations and thus sparked a boom in the number of students pursuing a forensic science degree or one of the more traditional scientific fields (e.g., chemistry, biology, physics, and computer science) in an effort to obtain a forensic science position upon graduation. An unfortunate casualty of this boom, is that many students are unaware of the actual scientific requirement of a forensic science degree and/or career position (9). Many students are not aware that even a forensic discipline that is based on matching patterns, such as latent prints or firearms comparisons, still requires a chemistry or biology bachelor’s degree. Typically, these programs of study include courses such as general chemistry, general biology, organic chemistry, and

general physics. As a result, students enter college unprepared to pursue a college STEM degree, leading to first time in college (FTIC) dropout rates of up to 40% by graduation day, which was observed by Jackson in regards to Ohio University students (9). According to Jackson, the same was observed at other universities through personal conversations. However, more research in this aspect is necessary to understand how this dropout rate, potentially due to the “CSI Effect”, can be mitigated. Some universities require interviews prior to acceptance into the program. While other universities have instituted a 1- or 2-year degree declaration restriction before a student can declare a forensic science degree and by then the students will have taken some of the difficult courses, i.e., chemistry and biology. These courses are some of the primary reasons why students drop out of the forensic science program. Therefore, if students are not allowed to declare a forensic science degree until their third year, where they have made it through the difficult courses; the graduation rate is much higher. The question then becomes how does a survey course in forensic science affect the students’ decision to stay in a forensic science program, leave the program, or enter the program?

Research Statement

The research objective was to determine if the UCF’s Introduction to Forensic Science course impacted the career choice of students who took the course. This

study investigated how the course influenced students to continue their pursuit in the field or change academic degrees. The expectation was that students pursuing a degree in forensic science were affected by the “CSI Effect” and therefore, with proper education and exposure to the STEM-based sciences that these effects could be mitigated. According to the National Academies of Science report Strengthening Forensic Science in the United States: A Path Forward, formal education at the university level is the best opportunity to correct misconceptions of the field (19). This formal education should be based on established scientific knowledge and practices accepted in the community.

It was expected that the students who took this course would reflect on their personal abilities to pursue a STEM-based degree and operate in a STEM-based career. This course should provide enough scientific/mathematic information to encourage students who could do well in these STEM-based courses to continue their pursuit of a forensic science degree, while also helping those who struggle in STEM courses to realize that there are other disciplines that they could pursue outside of the traditional STEM-based forensic science disciplines, i.e., DNA/serology, drugs, trace evidence, digital evidence, etc. Therefore, students do not remain subject to the “CSI Effect” and can make appropriate decisions for their future career path in a timely fashion.

Research Methods

It was expected that students would utilize information that they learned from forensic science professionals, who work in the field, and what they learned from the Introduction to Forensic Science course to reflect on their own ability to do well in their academic pursuits toward this career field.

Sample Populations

UCF’s Introduction to Forensic Science course is required for all forensic science majors and science education majors but is open to students from other majors. A summary of the academic standings of students are presented in Figure 2a, along with the percentage of STEM majors and Forensic Science (FS) majors in Figure 2b. Figure 2a illustrates the academic standing of students in the class, where the designation “other” represents non-degree seeking and 2nd degree students who took the course. This figure illustrates that this course had a mixture of students with different standings, in which most of the students, from year to year, had freshmen or junior academic standing. The students’ degrees were summarized into three categories: forensic science major, other STEM major, and other majors (refer to Figure 2b). Most of the students (> 50%) declared forensic science as their major when they registered for the class.

Surprisingly, there were approximately 20% of students that were not pursuing a science-based major registered for this course. A complete list of student’s standings and degrees is presented in Supplemental TABLE S1.

Course Set-Up

This course was designed to provide an overview of the scientific foundation of most of the specialty areas in a traditional forensic crime laboratory by bringing in forensic professionals who work in a variety of disciplines to speak with the students. The course itself had an inquiry-based pedagogical approach where the faculty member posed questions to students to see how much scientific knowledge was learned and retained as well as students’ ability to integrate these lessons into a scientific discussion. Since the invited speakers tended to have a more direct-instruction pedagogical approach (20), the course instructor facilitated the discussion between the students and the speakers to ensure that students understood the scientific underpinnings of the forensic topic. The students were required to read a chapter on a forensic discipline in the text book prior to class. Therefore, the students could incorporate the text information in the presentation and discussion with the speaker to reinforce the topic.

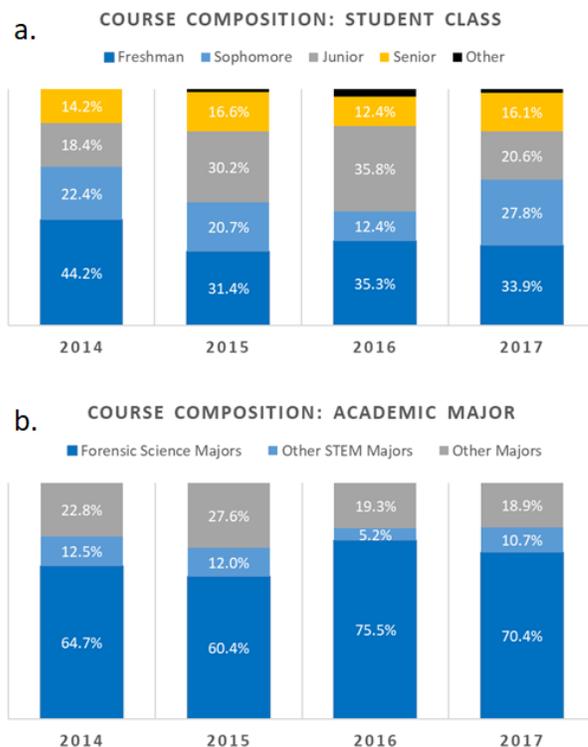


Figure 2 The initial class composition during 2014 and 2017: A) the classification of students and B) the academic majors.

The speakers who were invited to speak to the class were from the law enforcement community. They were current or retired detectives, forensic scientists, and medical personnel who all had firsthand knowledge of their individual forensic discipline. The invited speakers had a more direct-instruction pedagogical philosophy (21) and lectured to the students. The course instructor would interject in an effort to engage the students into the discussion. These professionals discussed the actualities of the profession, as well as their educational background and career preparation. These interactions with professionals from the field provided students with a clear understanding of the amount of science and college-level math that is necessary to adequately perform these jobs.

This course laid the foundation for the students' remaining time at UCF prior to graduation, which could range from 1 to 5 years. This course discussed how science is applied in criminal investigations and various forensic science analyses and the underlying scientific (i.e., STEM-based) concepts.

Pre- and Post-Course Surveys

To quantify this course's effect on students' decisions to continue pursuing forensic science, a 10-question survey was given to the students after the first class of the semester. Additionally, a 10-question post-course survey was given to the students at the end of the last class, before the final exam. Students were told that if they chose to answer or not answer a question on either survey, they would get a point. Effectively, each student received 10 free points out of 15 total points, whether they chose to answer the questions or not. The surveys asked questions related to the following:

- Self-reflection on how the "CSI Effect" has impacted their career choice
- How the course has affected their career and academic degree decision
- To what extent students change their interest in a forensic specialty or the discipline as a whole throughout the semester
- Self confidence in performing forensic task
- Joining or retaining STEM majors
- Joining or retaining forensic majors
- Perception of what classroom activities, if any, affect student career choice

The first iteration of the survey tool in 2015 was subsequently revised in 2016 to ensure that the responses given by the students were more streamlined and easier to compile. However, the content in the surveys did not change and thus the data collected from the 3 years could be compiled to generate the results herein. Many of the questions were multiple choice and a few were open-ended, essay questions to allow the students to provide their personal thoughts and feedback. The comments provided to the open-ended questions were reviewed by

the authors to identify the core idea of the student's answer. The comments were compiled based on these core ideas (refer to Supplemental TABLES S2-S5).

External Surveys

In the third year of the study, additional external surveys were conducted to obtain in-depth information from discussions with students surrounding how this course helped them determine if they would continue in forensic science or not. In an effort to increase the chances that the students shared honest responses, the course instructor did not participate in this portion of the data collection. Researchers who had no connection to the course facilitated these discussions and collected this data. The course instructor only saw aggregated versions of the data. Student participation in these additional, external surveys was optional. The students who completed these surveys were given extra credit points.

The first part of the external survey required that students participate in a class discussion about the course. The discussion began as students in small groups discussed a set of questions provided by the researchers. Each group provided notes about the answers given in the small-group discussions. The whole-class discussion was recorded and transcribed. The class discussions focused on a typical day in the Introduction to Forensic Science course, what advice the students would give to other students who decided to take the class, and how the Introduction to Forensic Science course compared to other science courses. Students were also given the option to complete additional questions online through Qualtrics. The open-ended questions solicited information specific to the individual students, such as: why did the student enroll in the course and what aspects of the course would the student keep the same versus change? The survey also solicited information about forensic science shows the student has watched and what aspects of the shows were validated or rejected during the forensic science course. Additionally, students were asked how the forensic science course influenced overall feelings about forensic science and their career decisions. Refer to Supplemental Sections 5 and 6 for the discussion and online survey questions.

Institutional Knowledge Management Data

Demographic information (i.e., ethnicity, gender) was collected from UCF's Institutional Knowledge Management (IKM) Office for every year that demographic information was available in the IKM database (i.e., 2011 – 2017). Additional information requested includes which semester students took this course, which semester they graduated, when they changed their major the first time after taking this course, what was the new major, and which degree was awarded

to the student upon graduation. Additional information gathered is listed below.

- Academic year (i.e. cohort or year)
- Gender
- Declared academic degree (STEM vs Non-STEM)
- Declaring major before and after the course
- Graduating degree
- Forensic Science Graduation rate pre- and post-CSI TV show
- Current enrollment status
 - First time in college (FTIC): Students who came to UCF as a true freshman directly from high school.
 - Florida college student (FCS): Students who have transferred to UCF from another Florida College that has a formal relationship with UCF (i.e. UCF Direct Connect Program).
 - Other Undergraduate Transfer (OUT): Students who have transferred to UCF from another college/university that does not have a formal relationship with UCF.

Research Findings

The Composition of the Student Population in the Introduction Course

Demographic information could be acquired from IKM for several years prior to the commencement of this research study. During the academic years (AY), 2011 – 2017, there were approximately 1,304 students that enrolled into this course over the eight (8) times the class was offered. Throughout this 6-year period, 26.6% of this student population was men and 73.4% were women. However, this research study was only conducted during 2015-2017, and it was a concern that the limited population of the students who answered the survey would not be representative of the larger population of students. Upon evaluating the data, the male/female ratio was approximately the same as the larger population, approximately 27.8% were men and 72.2% were women (refer to Figure 3). Additionally, the ethnic breakdown, for men and women, were approximately the same between the larger and smaller populations. The largest group of students that take this course is white women, followed by Hispanic women and white men, in that order.

Changes in Majors and Degree Conferred (2011-2017)

The information gathered from IKM, provided information about changes in majors and the degree

conferred upon graduation, which provided some insight into how this course may have affected academic decisions, and by extension career decisions, of the students who took the course. Students were found to have initially changed their major at various times after taking this course. Some students changed majors 1 semester after taking the course; whereas, other students waited to change their major up to 14 semesters (4.66 years) after taking this course. The longer it took for the student to decide to change their major, the less likely it was that this course had a direct impact on that decision. There could be a plethora of reasons why the student changed majors, including the length of time to reach graduation in this major, daily life changes/impacts, or the difficulty in passing upper-level courses. However, this was not a focus and the authors cannot comment specifically to reasons for the changes in majors that occurred since more the one year after the course. Therefore, to mitigate the increased likelihood of other reasons for these changes, this study's authors focused on official changed of majors that occurred in the first semester and first year after taking the course. The total number of students that changed majors between taking the course and graduating was also presented to provide a summary of official changes. Several students made more than one change to their major, however, we focused on the first change of their major that occurred more than one year after the course. Therefore, to mitigate the increased likelihood of other reasons for these changes, this study's authors focused on official changes of majors that occurred in the first semester and first year after taking the course. The total number of students that changed majors between taking the course and graduating was also presented to provide a comprehensive summary of official changes. Several students made more than one change to their major, however, we focused on the first change of their major that occurred within the first year after taking the class. There could have been additional factors affecting the second change in the student's major which were not recorded in this study.

Comprehensively, there were approximately 1,299 students who took this course from 2011 to 2017. This is an approximate number of students because there were students who may have started the course and dropped early in the semester and those who started late in the semester. It was this ebb and flow that was difficult to monitor each semester. Additionally, many students took the course more than once and each time the student took the course, they were considered a new student in the course for the study. The data was collected for the three different classes of students (i.e. FTIC, FCS, and OUT) at UCF to determine if one type of student changed their degree more than the other types. Approximately, 13.8% of the students graduated in the same non-forensic science major as when they started at the university (TABLE 2). Of the students who declared forensic science as their

major when they entered UCF, only 9.7% graduated with a forensic science degree. Of the nearly 1,300 students who took this course in 7 years, no information was provided by IKM for 61.8% of the students. These students either left UCF without a degree, were still active students, or had not changed their major when this data was collected. The remainder of the student population (14.7%) changed their major at least once during their academic career. These official changes in their major occurred either 1 semester up to 14 semesters after taking the course.

In the first semester after taking the course, 2.9% (38/1299) of the total student population changed their major (TABLE 1). Of this group of students, 89.5% (34 students) changed from forensic science to another academic discipline. Most of the students transferred from forensic science to another science-based discipline, with nearly half choosing to pursue a criminal justice degree. It was determined from the surveys provided during the class, that this change could be directly impacted by the misinformation in the media about what forensic science is and that by taking this course, they realized where their interests really lie. This change to criminal justice was largely found in the first time in college (FTIC) students. The subsequent degrees to which students moved to after criminal justice were health science and health services (11.8%), biology (5.9%), interdisciplinary studies (5.9%), and biomedical studies (5.9%) (refer to supplemental section 6, TABLE S6). To a lesser extent, 5.3% (2/38 students) of the students who changed majors immediately after taking the course changed their majors from non-forensic science degrees to other non-science degrees, i.e. biology to interdisciplinary or from psychology to anthropology. What was very interesting was that 5.9% of the students (2/38) changed their major to forensic science from anthropology and from journalism.

Within the first year (3 semesters) after taking the course, 10.1% of the total student population (131/1299) officially changed their major (TABLE 1). This is a significant increase in the numbers of students who changed their major after taking this course. What was most interesting was that most of the students who

changed, 38.9% (51/131), took the course in the spring semester and changed in the fall semester, which was considered a change after two semesters despite the fact that many students take the summer off from school. In the first year after taking the course, 84.7% (111/131) of the students changed their major from forensic science to a non-forensic science major. Most of these students changed from forensic science to criminal justice (35.1% (39/131)), subsequently followed by changed to biology (11.7%), health science/health services (9.0%), psychology (5.4%), anthropology (5.4%), interdisciplinary (4.5%) and biomolecular sciences (4.5%). Five students of the 131 students who changed their major (3.8%) went from a non-science to a non-science degree, 9.2% (12/131) changed from a science to another science-based degree, with most of the students moving from chemistry to health sciences or health service degrees (refer to TABLE S6). In addition to the two students who changed to a forensic science degree immediately after the course, one more student changed their major from chemistry to forensic science within the first year after taking the course.

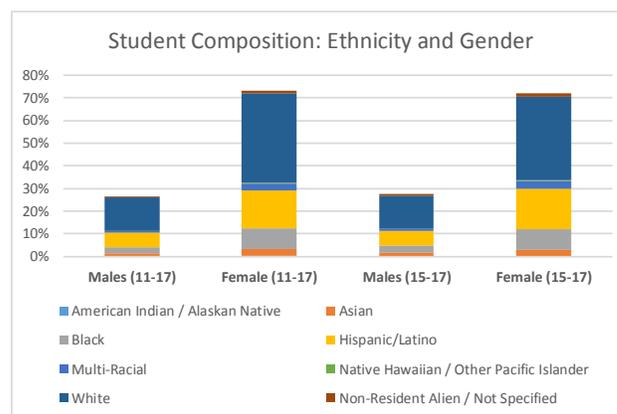


Figure 3 The percentage of students who took this course based on self-identified gender and ethnicity during the larger population (2011-2017) and the limited population of students who took the course surveys (2015-2017).

TABLE 1 Number of students who changed academic degree after taking this course. This data is presented for First Time in College (FTIC) students, Florida College Student (FCS) and Other Undergraduate Transfer (OUT) Students.

	FCS	FTIC	OUT	Total	% Change
No Change - Forensic Science Degree	33	83	10	123	9.70
No Change in Another Degree	85	84	10	179	13.78
Changed Degree 1 semester after	15	21	2	38	2.9%
Changed Degree 1 year after	46	82	3	131	10.08
Changed Degree 2 years after	17	31	3	51	3.93
Changed Degree 3 years after	3	5	1	9	0.69
No graduation information available	257	500	46	803	61.82

If focusing on the changes that occurred since the authors implemented the surveys into the course, similar changes were seen in the last three years (2015-2017). Within the first semester after taking the course, two students changed from forensic science to biology and criminal justice. Within the first year, there were four changes in the official major. Again, the changes were from forensic science to biology and criminal justice degrees. Of the remainder of the students, 7.6% of the students graduated with the same non-science degree in which they started, 0.7% of the students graduated with the forensic science degree, and the majority (90.9%) of the students did not have any information about graduation or official degree changes as recorded by IKM.

Comprehensive Surveys Results about Taking the Course

The pre- and post-course surveys were compared to determine if each student who answered both the pre- and post- questions had a change in their decisions about pursuing or not pursuing a career in forensic science. These surveys were only conducted for the courses offered from 2015 to 2017.

Most of the students that took this course stated that they were taking this course because they were interested in a career in forensic science (47.9%) and

that this course was required by their major (19.2%). The remainder of the students responded that they took this course because they were interested and wanted to learn more about forensic science (19.2%), it was an elective for their major (5.3%), or for another unnamed reason (1.3%). Most of the students (23.5%) said that they were interested in obtaining a basic understanding of what forensic science is and 23.1% of the students said that they were interested in learning about all the different areas of forensic science plus the different potential careers. Additional reasons for taking this course were to find a potential field to pursue in forensic science (8.8%), to determine if forensic science is a good career for them (8.1%), to find out what is done daily in a forensic science career (6.0%), and because they were interested in learning about one specific field (5.3%). Most of the answers were about using this course to identify a potential career in forensic science and what might be the best fit for them as well as looking to incorporate forensics into their career as an attorney or judge. At the end of the course, most of the students stated that they felt that they gained more information about all areas of forensic science (63.6%), their personal area of interest (11.4%) or another area that they initially had not considered (6.9%).

In the post-course survey, students were asked if they were interested in a forensic science career prior

to coming to the course and 74.2% said “yes”, while 6.8% said “no”, and the remainder did not answer. When asked if they were interested in pursuing a forensic science career after taking this course, 27.0% of the students stated “yes”, and 13.2% stated “no”. Most of the respondents (43.0%) stated that they were always interested in a forensic science career. Then they were asked if they had switched their interest in pursuing a forensic science degree after this course. Most of the students (31%) said “yes”; whereas, 29.8% said “no”. What was interesting, however, 4.8% were never interested in forensic science, 7.8% said that they chose not to pursue forensic science and would move towards another science degree, and 8.1% said that they would move towards a non-science degree. This is corroborated by the official changes in the majors of the students.

Potential Effect of the “CSI Effect”

To determine if students were possibly affected by the “CSI Effect”, students were asked if they often watched CSI and based on this, do they have a good idea of what real forensic scientists do on a daily basis. 29.7% of the respondents stated that they watch CSI type TV shows (forensic dramas) “very often”. Nearly half of the students (50%) watched these shows “often” or “occasionally”. Approximately, 16.8% stated that they “rarely” or “very rarely” watched these TV shows. Based on this, 6.3% stated that they definitely knew what forensic scientists do and 8.3% stated that they definitely did not know what happens in a forensic science career on a daily basis. The remainder of the respondents (83.7%) ranged in answers from “probably not” to “probably” indicating that there was some recognition by the students who took this course that they may not know all that is required of a forensic scientist.

In the post-course survey, the students were asked if they thought they were affected by the “CSI Effect” prior to taking the course and most of the students stated either “partially” or “yes”, totaling 54.6%. A large portion of the class (28.1%) stated that they were not affected by the “CSI Effect” and 17.2% did not respond. When asked what activities in the course may have removed the “CSI Effect” if they were previously affected by it, there were various answers provided by the class. Across the students surveyed over the three years, the one thing above all that reduced the “CSI Effect” was the

significant difference in the analytical and processing time observed on TV versus the actual time required in an operational forensic laboratory (26.8%). This statement also included the significant difference in the investigation time between the TV show and the real world. Approximately 9.7% of the students now understood that everything on TV was not true. The differences between what was observed on TV and in the “real-world” helped to dispel some of the “CSI Effect” for the students. The use of computers and databases that help the human forensic scientist also helped students understand how the “CSI Effect” may have affected them (4.0%). Additionally, responses that were common included “the amount of science necessary”, “how this was a team effort”, “there was a separation between the lab and the field and that lab personnel don’t go in the field”, and “how specialized the [forensic science] fields are”.

Another aspect that was studied under the “CSI Effect” header is how students interpret the use of science in various forensic science fields. Students were asked to rank the amount of science required in five different criminal investigation fields from 1 (no science needed) to 5 (a lot of science needed). They were asked to provide a ranking for a police detective, crime scene technician, latent print examiner, digital evidence examiner, and drug examiner. At the beginning of the course, many of the students (30.9%) stated that a police officer needed a moderate amount of science to be a good detective. At the end of the course, this ranking remained the same, where most of the students still stated that a detective needed a moderate amount of science. However, more students at the end of the semester stated that a detective needed “little to no science”. This percentage went from 4.0% at the beginning of the semester to 10.0% at the end of the semester. This change was most likely from a shift where students went from giving a detective a 5 to giving them a 1. At the beginning of the course, most students gave the remaining four disciplines a 5 (a lot of science needed), with greater than 59.3% of the students providing this ranking. While these results were approximately the same at the end of the semester for the drug examiner, there was a large decrease in the “5” ranking for the crime scene technician (-67.3%), latent print examiner (-9.3%) and digital evidence examiner (-14.5%). The students shifted these responses from a “5” to a “4”. This is an indication of how the “CSI Effect” has influenced the perception that students have of science being in

forensics. The authors hypothesized that, prior to this course, students did not recognize how much science was needed in the criminal justice process and were surprised by the initial amount of science students attributed to each one of these careers. Toward the end of the semester, the students' perceptions were more in line with reality.

The Change in Forensic Science Interests

In the pre-course survey, students were asked to identify the top three forensic science disciplines that they were interested in when they started the course. At the end of the course, they were asked the same question to see if the information provided in the course changed their perspective and/or interests in forensic science, now that they were equipped with more information about the high-points and the difficulties in different forensic disciplines.

Over the 3 years, on average, 9.0% of the students had the same three interests before and after the course; which is indicated by "3 – All three responses same" in Figure 4. These students primarily were the ones who knew they wanted to be in forensic science prior to taking the course. The majority of students, on average 64.6% of the students, changed 1 or 2 of the forensic interests by the end of the semester. There were several students who stated that they completely changed their top three interest areas (average 6.9%) and some students, 3.3%, stated that they were not interested in pursuing forensic science anymore and changed all three of their answers to "none". This indicated that they were not interested in pursuing a career in forensic science. Considering the significant number of students who changed interests, the change in the interest for a particular discipline is presented in TABLE 2. The highest negative changes, i.e. less students were interested at the end of the course, were observed with the crime scene technicians and medical examination, at -39.3% and -33.5%, respectively. Most of the students stated that they were not as comfortable as they thought they would be with dead bodies. One student stated, "... the Medical Examiner's presentation and seeming indifference to the bodies she was showing definitely turned me off from even considering going down that track." Conversely, entomology, drug examination, and latent print fields had more interested students at the end of the year. Another significant increase was the "none" category, which

increased by 1066% at the end of the semester. This was interesting because it demonstrated that education can change any preconceived misconceptions about forensic science disciplines.

Activities That Contributed to Interest or Disinterest in Forensic Science

In the 2016-2017 surveys, an additional question was asked to the students (n=371). They were asked which course activity helped them decide to pursue or not pursue a career in forensic science, the results of which are presented in TABLE 3. Several students stated that hands-on activities in the course influenced them the most, whether positively or negatively. Specifically, the testimony activity required students to be able to accurately explain information to a "jury" based on the questions asked by the "attorney". This activity demonstrated that students needed to be able to accurately define what they were seeing which was more difficult than most students expected. Similarly, the course midterm exam required students to take a scientific forensic science concept and explain it to either a jury or a forensic science branch chief accurately and, again, students found it difficult to explain scientific concepts appropriately. However, there was a student whose interest in pursuing forensic science and confidence of being able to do well testifying on the stand was increased by being forced to write concisely and explain a scientific concept.

Several students indicated that they were influenced by their other courses that they took outside of this course, however they did not indicate if they were positively or negatively influenced. Two (2) students said that their chemistry course was "too much", and they were not interested in pursuing forensic science anymore because of that.

All of the lectures had some influence on the students, whether negative or positive. However, there was one discipline that most negatively influenced students from pursuing that discipline, medical examination. While this may appear to be a loss, the authors feel that this is a plus because now students are made aware early in their academic career on what they can and cannot do and adjust their studies accordingly.

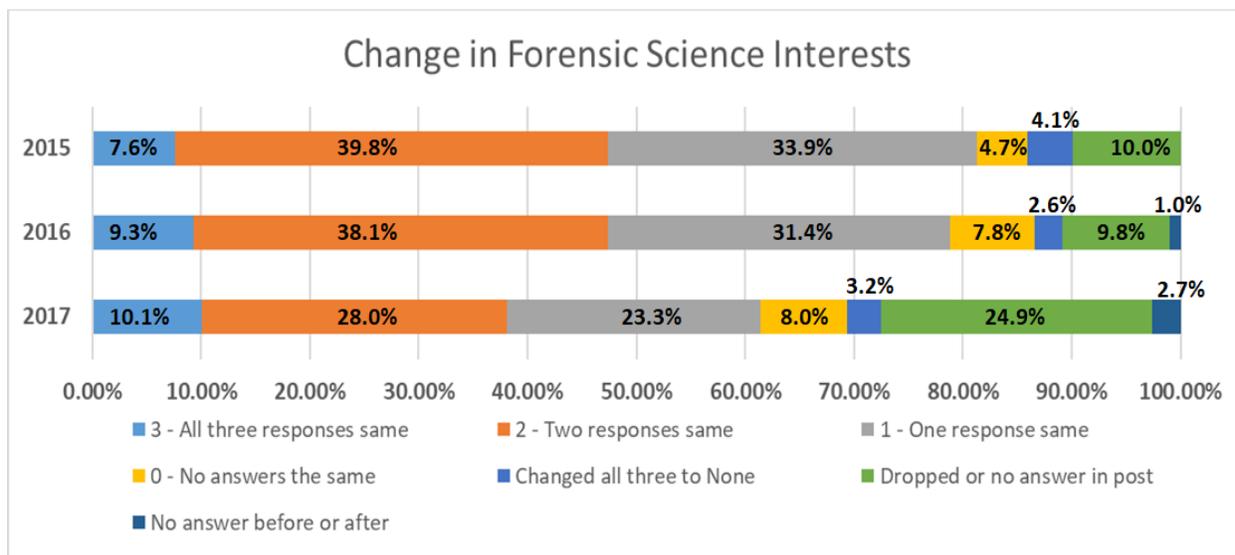


Figure 5 Number of changes in the top 3 interested forensic science disciplines at end of course.

TABLE 2 Number of students that identified each forensic discipline as one of their top three areas of interest both before and after the course.

FS Interest Identified	Before the Course	After the Course	# Change	% Change
Anthropology	89	48	-41	-46.1
Attorney/Judge	34	38	+4	11.8
Crime Scene Technician	397	241	-156	-39.3
Digital Evidence Examiner	55	39	-16	-29.1
DNA Examiner	191	124	-67	-35.1
Documents Examiner	26	19	-7	-26.9
Drug Examiner	81	134	+53	65.4
Entomologist	14	40	+26	185.7
Firearms Examiner	108	128	+20	18.5
Trace Evidence Examiner	70	49	-21	-30.0
Latent Prints Examiner	54	79	+25	46.3
Medical Examiner	173	115	-58	-33.5
Police Detective	151	127	-24	-15.9
Toxicologist	120	106	-14	-11.7
I Don't Know	26	18	-8	-30.8
None	6	70	+64	1066.7
Other	33	3	-30	-90.9

TABLE 3 Course activities that inspired students to pursue a degree in forensic science or deterred them from a forensic science career (n=371 students).

2016-2017	Inspired towards FS	Increase Interest Narrow discipline	Influenced, pos & neg	Deterred from FS
All Items in the course	3	1	4	3
Activity - Forgery (Document Examination)	4			
Activity - Latent Print matching			1	
Activity - Testimony (Attorney)	2		4	1
Activity - Midterm	1		7	1
Activity - CSI Video & Discussion	1			
External - Chemistry classes / too much			5	2
External - Biology class			11	
External - Math class			3	
External - Science class			2	
Lectures - All	31	14	52	13
Lecture - Crime Scene Investigation	7	3	17	2
Lecture - Digital Evidence	1		2	
Lecture - DNA	7	2	4	1
Lecture - Drug	2		5	
Lecture - Ethics in Forensic Science	1			1
Lecture - Firearms	2	3	2	
Lecture - Introduction to Course			1	1
Lecture - Legal	4		3	1
Lecture - Latent Print	3	1	4	1
Lecture - Medical Examination	13	3	9	10
Lecture - Police Detective/ Investigation	7	1	7	
Lecture - Toxicology	1		2	
Lecture - Trace Evidence	2		2	1
Presenters - speak with them			5	
Quiz – Firearms			1	
N/A - always interested			16	
N/A - always wanted to be ME			1	
N/A - Never interested			9	
Other - Middle school			1	
Other - Personal choice				1
Total	92	28	180	39

External Survey

The data from the external survey also showed that this course influenced students' decisions about pursuing a degree in forensic science. Most students who were already majoring in forensic science or a closely related field, shared that they would continue in their current major. One student stated that, "It has strengthened my desire to go into forensics and given me a better understanding of what to prepare for and expect in my future."

The external survey also provided more evidence that the lectures by the invited guest speakers were an aspect of the class that seemed to be very influential. Many students valued "seeing people in their actual careers and sharing their stories and [the] hands on experiences". "Through listening to the speakers, I have realized that I prefer one branch of forensic science a lot more than all the others and this class was the reason why I enjoy this subject a lot more now." Additionally, the students appreciated the "real-world" aspect of the speakers as one student stated:

Since the class did include speakers who actually work as forensic scientists, I was able to see what working as a forensic scientist is truly like. Each discipline varies in what they do. I got to see a glimpse into what it truly takes to become a forensic scientist in a specific discipline, and what the everyday work might involve. Although I can't say that I am 100% sure of which forensic science discipline I would like to pursue, this class allowed me to decide on disciplines that I definitely do not want to pursue.

There were some students who were not forensic science majors who determined during the class that they would continue their current degrees, yet still work in the field of forensic science. "It has shown me that a lot of different careers can potentially overlap with forensics." Several students who were chemistry majors expressed their interests. One expressed:

The lectures and classes are very interesting, I'm also surprised that a chemistry degree can qualify a person for some of these positions without a strong criminal justice background so I suppose I have been more convinced that going after jobs in

forensics may be a more possible goal than I initially believed.

These students wanted to pursue careers that were more science-related. However, some students were directed toward fields that were not science-related. "First thing I learned in this class was a forensic science degree was not needed to be in this certain field. For which has led me to change my major to criminal justice." There were also many students who shared that this course influenced them to remain in forensic science but made their decisions about their career paths more difficult because of the multitude of options to which they were exposed.

This class has allowed me to take a look at a wide variety of possibilities in the field of forensic science and while I have yet to make a definitive decision as to which discipline, I would like to go into, it has given me opportunities that I had not known about previously.

Hearing about the specific aspects of the speakers' careers also led students to choose career paths outside of forensic science. One student stated that the course "made me not want to major in forensic science anymore." However, it made her "consider just being a normal scientist." Another student shared that "This class has not influenced my original aspiration to become an engineer." This student felt "more clear that I wouldn't want to do forensics":

I was at first 90 percent sure I wanted to do forensic science, but now I'm 30 percent sure. This is because I have been given more information in determining that this career wouldn't suit me. It is still interesting to learn about though.

Another student simply stated, "It helped me realize I want to pursue a career outside of forensics." The data from the external survey supported and, in some cases, supplemented, the other sources of data.

Discussion

The "CSI Effect" is a common term used in the Forensic Science Education Community when discussing why the number of undergraduate applications for forensic science Bachelor of Science

(B.S.) programs is so high. Many educators are aware that it is necessary to ensure students are aware of the necessity of science and math in a forensic science career. The large number of students applying for BS forensic science programs are often due to the perception of forensic science, or forensic science careers, as portrayed in TV shows. It is necessary to determine the best intervention strategy to ensure students have the necessary information when deciding their academic degree to pursue their future careers. The earlier they are exposed to the educational requirements, career needs, and daily operational responsibilities; the better they are able to modify their academic pursuits accordingly, as requested by the NAS report. If a student is interested in forensic science and has a good idea of the scientific and mathematical requirements prior to taking this course, their interests in pursuing a forensic science career increased. However, the students who began this course with misconceptions about forensic science careers, were equipped through this course with clarifying information and were able to adjust their academic pursuits with a degree that is more aligned with their personal interests.

While many educators may view a change in academic degree path as a negative, especially since this may lead to less students in their program, the authors believe that this is a win:win situation for the student and the forensic science laboratories. If students recognize early in their academic programs that forensic science is not the best path for them; they save money on their education, they save aggravation and loss of self-confidence, and they increase the likelihood of graduating in a timely fashion. The forensic laboratory wins because the students who graduate from the program are more engaged in their careers and will want to conduct forensic science analysis. The goal of this study was to explore the perception of forensic science that is portrayed by TV to the average student pursuing a forensic science degree. The aim was to explore what impact this course had on the students' pursuits toward forensic science careers, the impact that "CSI Effect" had on students' perceptions of forensic science, and what course aspects helped remove or reduce the misconceptions of forensic science and/or a future career in forensic science.

The data collected in this study demonstrated that approximately 28% of the students said that they were not affected by misconceptions of forensic

science prior to taking this Introduction course. However, more than 50% of the students who finished this course proclaimed that they were affected by the "CSI Effect". After taking this course, more than 10% of the students officially changed their academic majors within the first year, with most of the students pursuing a degree in criminal justice or health sciences. The discussions and the presentations by actual forensic scientists were among the chief reasons that helped dispel some of the myths held by students and influenced their continued pursuits or changes in their degree paths.

While all of the course activities helped students make decisions about their careers, it is evident that actual real-world discussions and an actual scientist discussing why science and math is necessary may be more influential than reading the book. This was closely followed by the hands-on experiences.

In addition to exploring how this course intervened for students who would pursue or not pursue forensic science careers, the authors also explored how this course affects students who were consistent in their pursuit of forensic science throughout this course. Exposure of different forensic science fields was another influential aspect of this course. While 3% of the students indicated that they were not interested in pursuing any forensic science career at the end of the course; approximately 45% of the students did not change or had one change in the three forensic disciplines they were interested in at the beginning of the course, indicating that they had a pretty accurate idea of what the discipline required. What was the most interesting, was that nearly 35% of the students changed 2 or 3 forensic disciplines of interest which indicates that the students were exposed to more disciplines than they initially knew about, or the discussion of the scientific requirements shifted the students interested towards a new field.

Conclusion

It is evident that the perception of criminal/forensic science TV shows has a significant impact on the careers that students pursue in college. The Introduction to Forensic Science course at UCF provides the necessary information for students to make appropriate decisions about their future career in forensic science or another career field. Having real-world exposure and access to different fields to open up new opportunities, is a necessary aspect of education that should accompany more traditional

education coursework. This can be summed up by one student's comment, "A lot was rejected for me... it just makes you think how much it can crush someone's dreams when they learn that what's on tv isn't the same as reality".

IRB Information

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Supplemental Information

1. Academic Degree Summary

This is a summary of the academic degrees of the students who have taken this course since 2011. These degrees are the declared degrees of the students when they started the course.

TABLE S1: Percentage of degrees of the students who took the Introduction to Forensic Science class, per year. Where "S" designates the spring semester and "F" designates the fall semester.

Degree	2011 S	2012 S	2013 S	2013 F	2014 F	2015 F	2016 F	2017 F
Accounting / Pre-Accounting	0.7					1.2		
Adv/Public Relations						0.6		
Aerospace Engineering							0.5	
Anthropology	1.4	3.6	2	2.3		1.8		0.6
Applied Science					0.6			
Biology	2.1	1.8	2	3.8	2.9	0.6	1	1.7
Biomedical Science	0.7	4.8	1.3		2.4	2.4	1.6	1.1
Biotechnology		1.2		0.8				
Chemistry	1.4	1.8	2	4.5	2.4	3	1.6	6.1
Computer Science		0.6						
Criminal Justice	2.1	13.8	20.4	6.8	8.3	14.8	10.9	9.5
Electrical Engineering					0.6			
Elementary Education	0.7	0.6			1.2		0.5	
Emerging Media			0.7		1.2			
English						0.6	0.5	
Environmental Engineering			0.7					
Event Management					0.6			
Film							0.5	
Finance / Pre-Finance		0.6				0.6		
Forensic Science	82.4	59.9	60.5	73.7	64.7	60.4	75.5	70.4
Graduate Non-Degree		0.6			0.6			
Health Sci: Pre-Clinical	0.7	0.6	0.7	0.8		2.4	0.5	
Health Sciences BS								0.6
Health Services Adm BS				0.8				
History		0.6						
Hospitality Management					0.6			
Information Technology					0.6			
Interdisciplinary Studies	1.4	0.6	5.3	0.8	5.3	3.6	1.6	5
Int'l and Global Studies		0.6		0.8		0.6		
Journalism					0.6			
Legal Studies								
Liberal Studies		1.2						
Mathematics	0.7			1.5				
Management					0.6			
Marketing		0.6						
Medical Lab Sciences					1.2			
Mechanical Engineering								
Nursing	0.7	0.6	0.7	0.8	1.8			0.6
Philosophy						0.6		
Physics				0.8				
Political Science						0.6		
Psychology		1.8	1.3	1.5	1.8		1	
Real Estate								
Religion & Cultural Studies						0.6		

Science Education	4.9	2.4	1.3	0.8		2.4	2	0.6
Secondary Education								0.6
Social Science						0.6		
Spanish			0.7					
Sports & Exercise Science					0.6			
Theatre Studies							0.5	
UGRD SUS Transient							0.5	1.1
Undecided STEM							0.5	2.2
Undecided Health & Public Affair							0.5	
Undeclared		0.6	0.7		1.8	1.8		
STEM Majors	90.8	75.5	69.9	89.8	77.2	72.4	80.7	81.1
STEM Non-Majors	9.2	24.5	30.1	10.2	22.8	27.6	19.3	18.9
Forensic Majors	82.4	59.9	60.5	73.7	64.7	60.4	75.5	70.4
Forensic Non-Majors	17.6	40.1	39.5	26.3	35.3	39.6	24.5	29.6

2. Initial Set of In-Class Survey Questions (2015)

The first iteration of the pre- and post-course surveys that were conducted in 2015 is presented in Tables S2 and S3.

Pre-Course Survey Questions (2015):

TABLE S2: Pre-course survey questions that were presented in 2015

Question	Answer Options	
Why did you sign up for this course?	I plan to major in forensic science I'm just interested and want to learn more about the subject It is a required course for my major It is an elective course in my major Other	
If you were to apply to a forensic-science based job today, which of the following areas interests you the MOST? (Choose ONLY ONE answer)	Anthropology Attorney/Judge Crime Scene Inv. Digital Forensics DNA/Blood Typing Document Examination Drugs Entomology	Firearms Fire Debris/Explosive/Fiber Latent Prints Medical Examination Police Detective Toxicology I don't know None, don't want to pursue FS
How important is it that a Police Detective has a strong background in scientific knowledge to perform his or her job?	1 = Unimportant 2 = Slightly Important 3 = Moderately Important 4 = Important 5 = Very Important	
How important is it that a Crime Scene Technician has a strong background in scientific knowledge to perform his or her job?	1 = Unimportant 2 = Slightly Important 3 = Moderately Important 4 = Important 5 = Very Important	
How important is it that a Forensic Digital Examiner has a strong background in scientific knowledge to perform his or her job?	1 = Unimportant 2 = Slightly Important 3 = Moderately Important 4 = Important 5 = Very Important	
How important is it that a Drugs Examiner has a strong background in scientific knowledge to perform his or her job?	1 = Unimportant 2 = Slightly Important 3 = Moderately Important 4 = Important 5 = Very Important	
How often do you watch crime dramas such as CSI, NCIS, etc. or other shows on TV which may have a forensic scientist character or use forensic science in the field?	Very Often Often Occasionally Rarely Very Rarely	
Think about what you have seen on TV about forensic science. Do you think you have a good idea of what forensic scientists actually do during criminal investigations?	Definitely Probably Maybe/Maybe Not Probably Not Definitely Not	
How strong do you think you are in math and science?	Very Strong Fairly Strong Average Fairly Weak Very Weak	
Generally speaking, what do you hope to learn in this class?	Open Answer Essay	

Post-Course Survey Questions (2015):

TABLE S3: Post-course survey questions that were presented in 2015

Question	Answer Options	
If you weren't interested in a forensic science discipline initially, are you interested in one now? (choose ONLY ONE answer)	Yes No Not applicable, I have always been interested in FS	
Based on what you learned in this course, did you switch your primary forensic interest (Choose ONLY ONE answer)	Yes No I have decided not to pursue a forensic science career Not applicable, I never wanted to pursue a career in FS	
If you were to apply to a forensic laboratory today, which ONE position would you apply for out of the following traditional areas? (Choose ONLY ONE answer)	Anthropology Attorney/Judge Crime Scene Inv. Digital Forensics DNA/Blood Typing Document Examination Drugs Entomology Firearms	Fire Debris/Explosive/Fiber Latent Prints Medical Examination Police Detective Toxicology Other (Dentistry, Engineering, Accounting, etc.) None, don't want to pursue FS
If you went into this forensic discipline, based on the information you learned in this course, how confident are you that you could examine a piece of evidence in your field of interest. (Choose ONLY ONE answer) <i>Example: If you were interested in Finger Print analysis, could you match a known fingerprint to a print from a crime scene?</i>	90 – 100% 80 – 90% 70 – 80% 60 – 70% Less than 60% I don't think I could examine evidence today Not applicable, I am not pursuing a FS career	
Thinking back to the beginning of this course and what you have learned in this course, do you think you were initially affected by the CSI effect?	Yes Partially No	
What did you learn in this class that has removed any "CSI Effect" that you might have had. If nothing has changed, please write "N/A" in the space.	Open Answer Essay	
Which of the following best represented what you have gained out of this course? (Choose ONLY ONE answer)	More information about my forensic interest More information about another area of forensic science More information about all areas of forensic science Nothing	
What was the activity in this course that most affected your decision about pursuing or not pursuing a career in forensic science? (Select ONLY ONE answer)	The assigned readings The presenters/presentations The mid-term The classroom discussions	

3. Second Set of In-Class Survey Questions (2016-2017)

To better compile the responses given by the students, the questions were streamlined and updated in 2016 and used again in 2017 (Tables S4 and S5).

Pre-course Survey Questions (2016-2017):

TABLE S4: Pre-course survey questions that was presented in 2016-2017

Question	Answer Options	
Why did you sign up for this course?	I am interested in a forensic science career I'm just interested and want to learn more about the subject It is a required course for my major It is an elective course in my major Other	
If you were to apply to a forensic-science based job today, which of the following areas interests you the MOST? (Choose your top three)	Anthropology Attorney/Judge Crime Scene Inv. Digital Forensics DNA/Blood Typing Document Examination Drugs Entomology	Firearms Fire Debris/Explosive/Fiber Latent Prints Medical Examination Police Detective Toxicology I don't know None, don't want to pursue FS
Based on a scale of 1 to 5, how important is it for a person to have a strong background in scientific knowledge to perform each of the following jobs? a. Police Detective: b. Crime Scene Technician: c. Latent Print Examiner: d. Digital Evidence Examiner: e. Drugs Examiner:	1 = Unimportant 2 = Slightly Important 3 = Moderately Important 4 = Important 5 = Very Important	
How often do you watch crime dramas such as CSI, NCIS, etc. or other shows on TV which may have a forensic scientist character or use forensic science in the field?	Very Often Often Occasionally Rarely Very Rarely	
Think about what you have seen on TV about forensic science. Do you think you have a good idea of what forensic scientists actually do during criminal investigations?	Definitely Probably Maybe/Maybe Not Probably Not Definitely Not	
How strong do you think you are in science?	Very Strong Fairly Strong Average Fairly Weak Very Weak	
How strong do you think you are in math?	Very Strong Fairly Strong Average Fairly Weak Very Weak	
Generally speaking, what do you hope to learn in this class?	Open Answer Essay	

Post-course Survey Questions (2016-2017):

TABLE S5: Pre-course survey questions that was presented in 2016-2017

Question	Answer Options		
Were you interested in a forensic science based job when you began this course?	Yes No		
Are you interested in a forensic science based career now?	Yes No Not applicable, I have always been interested in FS		
Based on what you learned in this course, have you switched your primary forensic interest?	Yes No I have decided not to pursue a forensic science career and pursue a fundamental science career (e.g. chemistry, biology, physics, math, etc.) I have decided not to pursue a forensic science career and pursue a non-scientific degree. Not applicable, I never wanted to pursue a career in FS		
If you were to apply to a forensic-science based job today, which of the following areas interests you the MOST? (Choose your top three)	<table border="1"> <tr> <td>Anthropology Attorney/Judge Crime Scene Inv. Digital Forensics DNA/Blood Typing Document Examination Drugs Entomology (Bugs) Firearms</td> <td>Fire Debris/Explosive/Fiber Latent Prints Medical Examination Police Detective Toxicology Other (Dentistry, Engineering, Accounting, etc.) I don't know None, don't want to pursue FS</td> </tr> </table>	Anthropology Attorney/Judge Crime Scene Inv. Digital Forensics DNA/Blood Typing Document Examination Drugs Entomology (Bugs) Firearms	Fire Debris/Explosive/Fiber Latent Prints Medical Examination Police Detective Toxicology Other (Dentistry, Engineering, Accounting, etc.) I don't know None, don't want to pursue FS
Anthropology Attorney/Judge Crime Scene Inv. Digital Forensics DNA/Blood Typing Document Examination Drugs Entomology (Bugs) Firearms	Fire Debris/Explosive/Fiber Latent Prints Medical Examination Police Detective Toxicology Other (Dentistry, Engineering, Accounting, etc.) I don't know None, don't want to pursue FS		
If you went into this forensic discipline, based on the information you learned in this course, how confident are you that you could examine a piece of evidence in your field of interest. (Choose ONLY ONE answer) <i>Example: If you were interested in Finger Print analysis, could you match a known fingerprint to a print from a crime scene?</i>	90 – 100% 80 – 90% 70 – 80% 60 – 70% Less than 60% I don't think I could examine evidence today Not applicable, I am not pursuing a FS career		
Based on a scale of 1 to 5, how important is it for a person to have a strong background in scientific knowledge to perform each of the following jobs? a. Police Detective: b. Crime Scene Technician: c. Latent Print Examiner: d. Digital Evidence Examiner: e. Drugs Examiner:	1 = Unimportant 2 = Slightly Important 3 = Moderately Important 4 = Important 5 = Very Important		
Thinking back to the beginning of this course and what you have learned in this course, do you think you were initially affected by the CSI effect?	Yes Partially No		
What did you learn in this class that has removed any "CSI Effect" that you might have had. If nothing has changed, please write "N/A" in the space.	Open Answer Essay		
Which of the following best represented what you have gained out of this course? (Choose ONLY ONE answer)	More information about my forensic interest More information about another area of forensic science More information about all areas of forensic science Nothing Other		
What course activity helped you decided to pursue or not pursue a career in forensic science?	Open Answer Essay		

4. External Reviewer's In-Class Survey Questions

These are the questions that were asked by the external reviewer to the class towards the end of the semester. The faculty member of the class was not provided the raw answers.

1. Tell me about a typical day in your Introduction to Forensic Science course?
2. What advice would you give to other students who decided to take this class?
3. How would you compare this forensic science course to other science courses?

5. External Reviewer’s Extra Credit Assignment

Below are the questions that were in the online assignment for the students as provided by the external reviewer to the class towards the end of the semester. The faculty member of the class was not provided the raw answers.

Forensic Science Extra Credit Questions

You are invited to share your thoughts about your Introduction to Forensic Science class. By answering the following questions, you are providing your participation consent. You will earn the maximum number of extra credit points if you provide quality answers for all of the questions.

Please share your first and last names so that you can be given credit for completing this assignment. (So that your answers can be anonymous, your name will not be included in the downloaded data.)

Question	Answer Options (if given)
What is your gender?	Female Male
What is your current age?	
What is your current classification?	Freshman Sophomore Junior Senior Graduate Other
What is your current major?	
What is your race?	American Indian/Alaska Native Asian Black/African American Hispanic/Latino Multi-racial Native Hawaiian/Other Pacific Islander White Other
Why did you take the Introduction to Forensic Science course?	
Have you ever watched any of the CSI television shows or shows based on forensic science?	
What aspects of the CSI shows (or other shows based on forensic science) were validated or rejected after taking this course?	
What aspects of this class would you change or remove?	
What aspects of this class would you keep the same?	
How has this class influenced your career decision in terms of pursuing forensic science as a career?	
How has this class influenced your career decision in terms of pursuing a career outside of forensic science?	
Overall, what are your feelings about forensic science after taking this class?	
Are there any final thoughts or topics we did not cover that you can share?	

6. Raw Data of the Change in Degrees

Below is a snapshot of the changes in degrees that occurred in the first semester and the first year after taking the course. The four changes observed were: 1) from a forensic science degree to another degree, 2) from another degree to forensic science, 3) from one science degree to another science degree (other to other) and 4) no effect observed since the changes were not made between science courses. Changes in red represented the largest changes observed. The percent change per line indicates the percentage of change within that group. The bolded number and percentage beneath each of the four groups represent the number of students that changed in the entire population of students who took the class (N = 1,299).

TABLE S6: Pre-course survey questions that were presented in 2016-2017

1st Semester After Course						1st Year After Course					
For Sci to NEW Degree	FCS	FTIC	OUT	Total	Percent	For Sci to NEW Degree	FCS	FTIC	OUT	Total	Percent
FS to Nursing	0	2		2	5.88	FS to Nursing	1	2		3	2.70
FS to Psychology	1	0		1	2.94	FS to Psychology	2	4		6	5.41
FS to Biology	1	1	0	2	5.88	FS to Biology	7	6	0	13	11.71
FS to Biotechnology	0	0		0	0.00	FS to Biotechnology	1	1		2	1.80
FS to Anthropology	0	0	1	1	2.94	FS to Anthropology	2	3	1	6	5.41
FS to Criminal Justice (CJ)	5	9	1	15	44.12	FS to Criminal Justice (CJ)	13	25	1	39	35.14
FS to Chemistry	0	1		1	2.94	FS to Chemistry	2	2		4	3.60
FS to Political Science	0	0		0	0.00	FS to Political Science	1	0		1	0.90
FS to Engineering		1		1	2.94	FS to Engineering		3		3	2.70
FS to Sociology	0	0		0	0.00	FS to Sociology	0	1		1	0.90
FS to Finance/Accounting	0	0		0	0.00	FS to Finance/Accounting	0	1		1	0.90
FS to Social Work	1			1	2.94	FS to Social Work	1			1	0.90
FS to Health Science/Service/Infomatics	2	2		4	11.76	FS to Health Science/Service/Infomatics	3	7		10	9.01
FS to Interdisciplinary	2	0		2	5.88	FS to Interdisciplinary	4	1		5	4.50
FS to Biomolecular Science (BMS)	2	0		2	5.88	FS to Biomolecular Science (BMS)	4	1		5	4.50
FS to Hospitality/Event Mgmt	0	1		1	2.94	FS to Hospitality/Event Mgmt	1	2		3	2.70
FS to Marketing		0		0	0.00	FS to Marketing		2		2	1.80
FS to Restaurant/Food		0		0	0.00	FS to Restaurant/Food		1		1	0.90
FS to Undecided		0		0	0.00	FS to Undecided		1		1	0.90
FS to Science Education		0		0	0.00	FS to Science Education		1		1	0.90
FS to Sports Exercise	0	0		0	0.00	FS to Sports Exercise	0	1		1	0.90
FS to Other Degree		1		1	2.94	FS to Other Degree		2		2	1.80
FS to Math		0		0	0.00	FS to Math		0		0	0.00
				34	89.47					111	84.73
Other Degree to For Sci	FCS	FTIC	OUT	Total	Percent	Other Degree to For Sci	FCS	FTIC	OUT	Total	Percent
Chemistry to FS		0		0	0.00	Chemistry to FS		1		1	33.33
Anthropology to FS		1		1	50.00	Anthropology to FS		1		1	33.33
Journalism to FS		1		1	50.00	Journalism to FS		1		1	33.33
				2	5.26					3	2.29
Other to Other	FCS	FTIC	OUT	Total	Percent	Other to Other	FCS	FTIC	OUT	Total	Percent
Chemistry to Biology	0			0	0.00	Chemistry to Biology	0			0	0.00
Biology to Interdisciplinary	1			1	50.00	Biology to Interdisciplinary	1			1	8.33
Biology to Legal Studies	0			0	0.00	Biology to Legal Studies	1			1	8.33
Science Education to Chemistry	0			0	0.00	Science Education to Chemistry	0			0	0.00
Chemistry to Health Science		0		0	0.00	Chemistry to Health Science		3		3	25.00
BMS to Biology		0		0	0.00	BMS to Biology		0		0	0.00
BMS to Physics		0		0	0.00	BMS to Physics		0		0	0.00
Psychology to Anthropology		1		1	50.00	Psychology to Anthropology		1		1	8.33
Biology to Public Relations		0		0	0.00	Biology to Public Relations		1		1	8.33
BMS to Health Science		0		0	0.00	BMS to Health Science		1		1	8.33
CJ to Social Science Education		0		0	0.00	CJ to Social Science Education		1		1	8.33
CJ to Sports Exercise		0		0	0.00	CJ to Sports Exercise		1		1	8.33
Undeclared to Anthropology		0		0	0.00	Undeclared to Anthropology		1		1	8.33
Biology to BMS		0		0	0.00	Biology to BMS		1		1	8.33
				2	5.26					12	9.16
No Effect on Degree	FCS	FTIC	OUT	Total	Percent	No Effect on Degree	FCS	FTIC	OUT	Total	Percent
Accounting to Business			0	0	0.00	Accounting to Business			1	1	20.00
Science Education to Interdiscip.	0			0	0.00	Science Education to Interdiscip.	1			1	20.00
Math to Health Service	0			0	0.00	Math to Health Service	1			1	20.00
Double Major	0	0	0	0	0.00	Double Major	0	0	0	0	0.00
Emerging Media to Art		0		0	0.00	Emerging Media to Art		0		0	0.00
Nursing to Sports Exercise		0		0	0.00	Nursing to Sports Exercise		0		0	0.00
Undeclared to Acctg/Finance		0		0	0.00	Undeclared to Acctg/Finance		1		1	20.00
Science Education to Hosp Mgmt		0		0	0.00	Science Education to Hosp Mgmt		1		1	20.00
				0	0.00					5	3.82