

Master of Science in Forensic Auditing Analytics: One University's Response to Skills Gap

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Worldwide, corporations and other institutions face substantial losses from fraud. In its 2022 Report to the Nations, the Association of Certified Fraud Examiners (ACFE) stated that based on its survey responses, organizations reported losing approximately five percent of their revenue annually to fraud. Extrapolating the reported fraud percentage, the amount lost globally to fraud exceeds \$4.7 trillion annually (ACFE, 2022). As commerce moves to a digital economy, the opportunities for electronic fraud will increase, and so will the need for analytical skills for fraud examiners (Kramer et al., 2017). The American Institute of Certified Public Accountants (AICPA), as well as accounting educators, cites the need for more training in forensic auditing skills to detect financial statement fraud (DiGabriele, 2011). Also, the CPA Evolution initiative addresses the need for technical skills for accountants. This paper discusses the merits of a Master of Science in Forensic Auditing Analytics degree at Texas A&M University-Commerce (TAMUC) offered through a blend of existing graduate courses in accounting and business analytics in meeting industry expectations.

Keywords: fraud, auditing, forensics, accounting education, CPA evolution

BACKGROUND

While accounting education has successfully prepared students to complete the Certified Public Accountant (CPA) exam and perform a financial statement audit using appropriate procedures, it does not specifically prepare students to find fraud. However, the evolution of accounting regulations and standards has been moving toward greater responsibility for auditors to detect fraud (Pearson & Singleton, 2008). Because of the prevalence of employee fraud, including embezzlement and other financial crimes, the need for forensic accounting skills for auditors is essential. These skills should be included separately in the curriculum rather than just assuming coverage in a regular auditing class. Both educators and practitioners agree that forensic skills must be integrated into the existing accounting curriculum or taught in a specialized graduate program (Kramer et al., 2017).

To some extent, accounting educators and forensic accounting practitioners differ in the skills needed for forensic auditing. Practitioners favor more instruction in computer internet schemes, corruption, forensic litigation, and report writing. At the same time, professors view elements of fraud, fraud risk factors, ethical issues, legal environment, and prevention as more critical (Daniels et al., 2013). Employers point out that forensic accountants need general accounting knowledge and skills such as data analysis, problem-solving, critical thinking, and interviewing. Personal characteristics, such as flexibility, persistence, skepticism, and people skills, are also important (Bartulovic & Filipovic, 2017).

Currently, most significant financial frauds involve computers either in the commission, concealment, detection, or investigation of fraud. Cybercrimes involve obtaining information without proper authorization, and investigation of these crimes requires specialized skills in data extraction, preservation, analysis, and documentation (Pearson & Singleton, 2008). Practitioners view cybersecurity and forensic skills as some of the most important to include in the accounting curriculum (Kramer et al., 2017). Regulatory bodies, such as the Public Company Accounting Oversight Board (PCAOB), which oversees accounting firms auditing public companies, also cite the need for data analytic skills to detect and reduce fraudulent transactions (Singh et al., 2019).

Organizations generate many terabytes of data in their organizational processes, and finding fraud in these massive amounts of data is difficult (Minder & Ramamoorti, 2017). Currently, large amounts of data pose problems for auditors. However, data analytics skills allow external auditors to filter large volumes of data and differentiate between financial and nonfinancial data. Also, in digital work processes, there are no paper documents in the audit trail, making the process challenging for auditors (Singh et al., 2019). Consequently, digital forensic skills have become a necessity in finding, preserving, and documenting digital evidence to ensure admissibility and undeniability in court (Lin et al., 2018).

As part of the CPA Evolution project to update the Certified Public Accountant (CPA) exam in 2024, the American Institute of Certified Public Accountants (AICPA) and the National Association of State Boards of Accountancy (NASBA) surveyed 1200 schools on emerging technology areas that new graduates currently need. The findings were published in the Accounting Program Curriculum Gap Analysis report (AICPA & NASBA, 2020). The 317 respondents to the survey indicated that while approximately 64% of accounting programs are teaching IT audit and data analytics, fewer than half of accounting programs teach emerging topics that are of increasing importance, such as predictive analytics (40%), systems and organization controls (SOC) engagements (23%), digital understanding (23%), cybersecurity (40%), IT governance (41%), and IT risks and controls (43%). A recent article in the Journal of Accountancy stated that these gaps between what schools are teaching and what practice is demanding have resulted in accounting firms hiring 29% fewer accounting graduates (Vien, 2021). Because current accounting graduates often lack skills in IT audit, information security, cybersecurity, and other emerging technology areas, the firms indicated that they hired students with nonaccounting degrees. This degree seeks to provide the emerging skills accounting students need now and in the future.

The new CPA exam in 2024 will consist of traditional core areas of accounting, tax, and audit but also technology. Students will also have to pick one of three areas of specialization to test in to show more in-depth knowledge. The three specializations include tax compliance and planning, business analysis and reporting, and information systems and controls. In a survey of students, the AICPA and NASBA (2020) found that 22% chose tax compliance and planning, 54% business analysis and reporting, and 24% information systems and controls. Accounting faculty surveyed had similar projections of the number of students who would choose to test in each of the three specializations: 35% tax compliance and planning, 43% business analysis and reporting, and 22% information systems and controls. Based on this information, 22-24% of future CPA exam applicants will choose to test in the information systems and controls area that this degree will address with data analytics, database management, cybersecurity, IT audit, cyber forensics, and information security policy governance courses in the degree. Students in the AICPA and NASBA surveys indicating interest in the information systems and controls section of the new CPA exam were students with nonaccounting undergraduate degrees. Thus, these students would be additional rather than accounting students simply switching from a Master of Accountancy program to this program.

In response to the changing technology skills needed to detect and prevent fraud in a digital economy and the changes to the CPA exam, Texas A&M University-Commerce (TAMUC) crafted a new master's degree in forensic auditing analytics consisting of existing accounting and business analytics courses. The process began in Spring 2021 with research into student interest, potential job market, and similar existing programs and culminated in Summer 2022 with approval of the new degree from the Texas Higher Education Coordinating Board. This paper will present the research conducted for the degree and the courses that comprise it and discuss its merits.

STUDENT INTEREST

Students having an undergraduate accounting degree would be interested in the Master of Science in Forensic Auditing Analytics degree. Applicants would need an undergraduate or bachelor's degree with accounting courses through Intermediate Accounting II. However, students with a bachelor's degree in another area who do not have the required accounting background could take two prerequisite courses, ACCT 501, Accounting for Managers, and ACCT 502, Financial Accounting, in addition to the ten required classes for the master's degree.

Students pursuing this degree would have an interest in auditing, as well as forensic accounting and cybersecurity. This degree provides excellent preparation for public accounting, industry, or government positions. Students may also be interested if they wish to establish consulting firms offering investigation services and expert witness testimony. Forensic auditing analytics skills enable graduates to detect embezzlement, corruption, and other white-collar crimes utilizing data analytics and cybersecurity tools and techniques. Current accounting and business graduate students and alums from the TAMUC accounting and business analytics programs provided feedback on the proposal for the new degree. They indicated that the degree would be attractive to students. Comments from the students and alums are included below:

- **Current graduate student in Master of Accountancy program** – “About the new degree proposal, I think it's a brilliant (sic) idea. It suits students who are interested in IT auditing or Forensic focus.”
- **Current graduate student in MS in Business Analytics program** – “I read your proposal and is very well written! I hope they approve, as I, for one, find the Major really interesting.”
- **Alumni from the Master of Accountancy program employed as an auditor for the Defense Contract Audit Agency**– “I think the proposed degree would be valuable to students. Something I think is essential is a course that involves applying data analytics (like a computer lab-style course) such as regression analysis and Benford's law. It could be this is already included, and I'm just not familiar with some of the courses on the list. Also, understanding metadata, I think, is essential, but this may be covered as well IT Auditing.”
- **Alumni from TAMUC employed as a CPA at a Dallas CPA firm** – “I read over your proposal today several times. It makes me want to go back to school and become a forensic accountant! I think a program like this could develop those skills - obviously for an end game for auditing and forensics - but it's just a good skill for any accounting job. We work with a lot of healthcare clients - and it's not beyond the scope of our accounting engagement to find evidence of fraud within a medical practice because an accountant was smart enough to notice discrepancies and irregularities in billing records. I think the added layer of forensics enhances an auditor's skill set. I like that the program as you've designed it is really all-encompassing - analytics, database understanding, accounting management, etc. I have several clients who have a niche in various fields providing litigation support. I think it's a growing industry and this degree would feed right into that. I would be excited to have the opportunity to consider someone with this degree for employment.”

JOB MARKET

As early as 1991, an executive with a national placement firm for accountants identified forensic accounting skills as one of the most desirable for graduates. Additionally, the Wall Street Journal and U.S. News & World Report predict that forensic auditors will experience rapid job growth in both the private and public sectors (Kramer et al., 2017). Based on a recent survey, over half of the employers believed that positions requiring forensic auditing and accounting skills would increase, while the rest believed that they would at least remain the same. These results aligned with global trends (Bartulovic & Filipovic, 2017). The Bureau of Labor Statistics (BLS) indicated in 2021 that job growth for accountants and auditors would be six percent over the next decade.

Partnerships with businesses and other organizations requiring forensic auditing skills can be valuable to the university and the organizations. These networks provide opportunities for students to obtain internships and jobs upon graduation and offer practitioners access to continuing professional education to update their skills. In addition, faculty could also provide consulting services to partner businesses, which allows for additional revenue opportunities for the university and adds to the program's visibility in the marketplace (Pearson & Singleton, 2008).

This degree provides skills required for accountants, auditors, and digital forensics and information security analysts. Information from the Bureau of Labor Statistics, BLS.gov, and the Occupation Information Net, O*Net Online, on projected job growth from 2020-2030 for these three career fields shows substantial employment increases in Texas and faster than average growth in the US. Accountant and auditors' positions are projected to grow by 20% in Texas and 4-7% in the US. Digital forensic analysts' positions are projected to grow by 20% in Texas and 8-10% in the US, and information security analysts' positions by 50% in Texas and 11% or higher in the US (National Center for O*NET Development, 2023)

Gap analysis information from the Texas Workforce Commission (2021) showed an annual shortage of accounting and auditing graduates in Texas of 7,201, with a significant proportion, 1,670, in the Dallas area near to Texas A&M University-Commerce. The 2020 Texas Workforce Commission report, *Texas Growth Occupations*, cited accountant and auditor positions as STEM high-wage careers that will experience high growth in the 2018 –2028 period in six key industries. The key industries and the percentage growth in accounting and auditing positions in the report included: educational services, 16%; transportation and wholesale, 17%; wholesale trade, 15.2%; finance and insurance, 18.5%; professional, scientific, and technical services, 27.8%; and accommodation and trade services, 19.4%.

Texas Growth Occupations (2020) indicated that an additional 15,603 annual accounting and auditing positions will be needed in 2028, increasing from 65,648 positions in 2018 to 81,251 positions in 2028, a 23.8% increase. *Texas Growth Occupations* (2020) also indicated that the most considerable growth in accounting and auditing positions, 11,795, will be in the professional, scientific, and technical services industry, which is shifting to require more education than in the past, creating training challenges. Information from the Texas Higher Education Coordinating Board (THECB) website indicated that in the period 2014–2020, 26,587 students graduated from bachelor's programs and 12,384 students from master's programs in accounting at public universities in Texas, increasing from 5,318 graduates in 2014 to 5,572 graduates in 2020, an increase of only 4.8% (THECB, 2021). Accounting students often seek a graduate degree after obtaining a bachelor's degree since 150 semester hours are required to apply for the Certified Public Accountant exam. Therefore, there is likely duplication in graduates with the same students completing both bachelor's and master's degrees, reducing the number of available graduates. Based on the graduation statistics, there will be a shortage of qualified graduates from Texas universities over the next decade to meet the increased demand in the accounting and auditing career field.

Feedback from industry experts in auditing and forensics regarding the degree program indicated that there was a market for the skills the students would acquire in the program, as shown in the responses below:

- **Luke Verkeen, CPA, BVA, CFE, Shareholder in Sage Forensic Accounting, Salt Lake City, UT** – “I read through your proposal and thought that it was very well written and documented. There is a need for this type of program as many traditional accounting tracks do not teach enough about ways fraud is being committed and techniques that can be used to uncover them. Auditing procedures fall far short of what is typically required in most cases to uncover fraud. Keep me posted on whether your proposal gets approved.”
- **Jeff Dalrymple, CPA, Audit Director, Bland Garvey, Richardson, TX** – “This looks like a great opportunity for a separate specialized degree track! The basics of fraud are taught in most accounting programs, but I agree that there is an opportunity for more in-depth analysis in separate courses. Shoot, I'd sign up!”
- **Paul Bustos, CFE, CRME, Finance-Business Integrity Team, Southwest Airlines, Dallas, TX** – “Overall, I think this proposal is excellent! I do see a strong need for professionals with forensic analytical backgrounds. This degree program would be valuable to any entity that

conducts business online. My revenue protection team saves the company 10s of millions of dollars each year from chargebacks related to fraud and manual loyalty point adjustments.”

SIMILAR PROGRAMS

Although no similar program existed in Texas in 2021 at the proposal of the degree in Texas A&M Commerce's doctoral peer group, three programs in the emerging research peer group provided some or most of the courses to be offered in the new degree. The exception was that no other program at that time offered cybersecurity and cyber forensics, making the proposed program unique. The acceptance rates at the three universities offering similar degrees also indicated that there were substantial numbers of students who applied but were not accepted into the existing programs. A brief recap of the existing programs provides additional context.

Texas State University (TXST) offers a Master of Science in Accounting and Information Technology that prepares students to become auditors, IT auditors, business intelligence analysts, information security specialists, and information systems consultants. Graduates of the program have been hired by Big 4 accounting firms as IT auditors and consultants in designing and testing information technology controls and Service Organization Controls (SOC) audits (TXST, 2021). Texas State University enrollment for accounting master's degrees for the past five years (2015-2020) was 1,338, with 321 graduate degrees awarded (THECB, 2021). 95% of the students at Texas State University have jobs before they graduate. The acceptance rate into the graduate programs at Texas State University is considered moderately difficult (TXST, 2021).

The University of Texas at Dallas (UT Dallas) offers three tracks, professional accounting, risk assurance/internal auditing, and accounting analytics, within their Master of Science in Accounting that provide students with comprehensive training to develop future leaders in accounting (UT Dallas, 2021). These tracks include some or most of this degree's courses, except cybersecurity and cyber forensics. The enrollment in the accounting master's degree at UT Dallas for the past five years (2015-2020) was 8,855, with 2,008 graduate degrees awarded (THECB, 2021). Most accounting graduates from UT Dallas pursue careers in assurance, taxation, consulting, or forensic accounting. In addition, 90% of the graduates from UT Dallas have employment within three months of graduation, and the acceptance rate into graduate programs is considered very selective at 58.6% (UT Dallas, 2021).

The University of Houston (UH) offers within the Master of Accountancy degree a certificate in IT systems risk management that contains most courses except cybersecurity and cyber forensics. This specialization provides students with knowledge of IT systems development and acquisition, database design and operation, IT control frameworks and compliance, and risk management (UH, 2021). The enrollment in the accounting master's degree at the University of Houston for the past five years (2015-2020) was 4,512, with 1,021 degrees awarded (THECB, 2021). The University of Houston has many established partnerships with accounting firms and corporations in the Houston area, enabling them to place their graduates in the accountancy program quickly. The placement rate for 2019 graduates was 97%, and the acceptance rate at The University of Houston is considered moderately difficult at 60.9% (UH, 2021).

In addition to the similar programs at universities in Texas, additional information compared similar offerings at universities in the United States to the new degree. East Tennessee State University (ETSU) offers the Master of Accountancy degree with an audit concentration that includes forensic and internal auditing but no database management, cybersecurity, information security, or cyber forensics (ETSU, 2021). Enrollment and graduation rates were unavailable. Eastern Michigan University (EMU) offers a BBA + MS in Accounting Information Systems, including internal auditing and fraud examination but no cybersecurity, information security, or cyber forensics. Enrollment and graduation statistics were unavailable for this program. Among other national universities (EMU, 2021), West Virginia University (WVU) offers a Master of Science in Forensic and Fraud Examination comprising ten courses, 30 SCH. Six courses are devoted exclusively to building forensic and fraud examination knowledge, skills, and abilities. WVU typically has more than 25 employers visit campus each year seeking qualified accounting

students, and 100s more seeking qualified business professionals from WVU's programmatic offerings, many of which also recruit students with forensic accounting credentials (WVU, 2021).

COURSE LIST

The following courses from the *Texas A&M University-Commerce (TAMUC) 2022 – 2023 Graduate Catalog* comprise the degree requirements for the Master of Science in Forensic Auditing Analytics. The degree consists of 10 existing courses, six in accounting and four in business analytics, for a total of 30 semester credit hours. There is also a comprehensive examination requiring at least an 80% or higher grade for graduation.

All Students Would Take the Following Five Accounting Courses

- *ACCT 527 - Auditing* Hours: 3 This course studies the professional auditing standards followed by public accountants in performing the attest function for financial statements and supporting data (TAMUC, 2022, p. 182).
- *ACCT 528 - Advanced Auditing* Hours: 3 The primary emphasis in this course will be on understanding and applying the concepts of, and approaches to, audits, investigations, and assurance services and on developing skills to apply the underlying concepts and approaches to professional services. This course will review changes in the audit environment and new approaches to auditing and examine the concepts related to auditing in computerized environments (TAMUC, 2022, p. 183).
- *ACCT 595 - Accounting Research and Communication* Hours: 3 This applied course challenges students to research, analyze and communicate topics in accounting and/or tax by using qualitative and/or quantitative research methodology. Students also learn various effective methods accountants must use to communicate (TAMUC, 2022, p. 185).
- *ACCT 562 - Forensic and Investigative Accounting* Hours: 3 This course covers essential topics associated with modern forensic accounting. Topics include fraud auditing, litigation support, valuation, cybercrime, and other key forensic topics (TAMUC, 2022, p. 184).
- *ACCT 563 - Advanced Forensic Accounting* Hours: 3 This course builds on topics covered in Forensic and Investigative Accounting. Topics include fraud auditing, litigation support, valuation, cybercrime, and other key forensic topics. The objectives include understanding the practices used by public accountants, internal auditors, prosecutors, special agents, investigators, and others to examine and prosecute civil and criminal financial violations (TAMUC, 2022, p. 184).

Students Would Choose From One of the Following Four Accounting Electives

- *ACCT 529 - Accounting Information Systems* Hours: 3 This course is designed to present an understanding of accounting information systems and their role in the accounting environment. Particular attention is paid to transaction cycles and internal control structure. Topics to be covered include the software development life cycle, contemporary technology and applications, control concepts and procedures, auditing of information systems, internet, intranets, electronic commerce, and the role of information systems in a business enterprise. This course will cover accounting information systems—both computerized and non-computerized—with particular emphasis on internal controls (TAMUC, 2022, p. 183)
- *ACCT 530 - Business Ethics for Accountants* Hours: 3 The course will provide a background in ethical reasoning, the ethical environment, the application of ethical rules and guidelines to case problems, and a framework for ethical decision-making. The focus will be on the ethical environment within which professional accountants and businesses operate. The objective is to provide the student with an educational background in what constitutes ethical conduct in businesses and accounting. Cross-listed with: ACCT 430 (TAMUC, 2022, p. 183).

- *ACCT 575 - Financial Statement Analysis* Hours: 3 This course presents a framework for business analysis and valuation using financial statements. Topics include accounting analysis, valuation theory and concepts, forecasting, equity security, and credit analysis (TAMUC, 2022, p. 184).
- *ACCT 580 - Internship in Accounting* Hours: 0-4 The goal of this course is to gain relevant accounting knowledge equal to or greater than the knowledge gained in a traditional accounting classroom setting. The student will gain work experience in the student's field of study by developing specific work-related skills to improve marketability upon graduation. The student will also build a network of professional contacts. Prerequisites: 12 hours of upper-level accounting must be completed and departmental approval (TAMUC, 2022, p. 184).

All Students Would Take the Following Four Business Analytics Courses

- *BUSA 511 - Business Analytics for Managers* Hours: 3. This course allows students to understand the underlying framework of business analytics, the role of big data in today's dynamic organizational environment, and using analytical models in business operations and decision making. Through a combination of lectures and business case studies (using SAP®), graduate students will learn how big data can support manager's decision-making and how business analytics can be leveraged by organizations to gain a competitive advantage. The case studies explored will illustrate how companies take advantage of different sources of data with different analytical techniques to improve performance, gain an understanding of optimizing results for better decisions, and employ analytical methods to translate data into key insights (TAMUC, 2022, p.198).
- *BUSA 526 - Database Management* Hours: 3 This course provides a foundation for the design, implementation, and management of database systems. Students will study both design and implementation issues with an emphasis on database management issues (TAMUC, 2022, p. 198).
- *BUSA 533 - Cyber Security and IT Auditing* Hours: 3 An examination of the technical and managerial aspects of the Cyber Security and IT Auditing nature of the course. An IT audit is the examination and evaluation of an organization's information technology infrastructure, policies, and operations, which is critical to understanding cybersecurity and assurance. This course provides the foundation for understanding the key issues associated with protecting information assets, identifying threats to information assets, and planning responses to threats. Addresses the use of analytics tools and techniques to enhance the ability of quality management approaches to improve information and security processes (TAMUC, 2022, p. 198).
- *BUSA 539 - Cyber Forensics and Information Security Policy Governance* Hours: 3 This course provides a foundation for the use of cyber forensic tools and procedures necessary to collect and analyze digital information that might be used in administrative, civil, or criminal cases. Special emphasis will be placed upon ensuring that organizational information security policies meet all applicable laws and regulatory requirements. (TAMUC, 2022, p. 199).

DISCUSSION

We live in a digital environment that allows perpetrators to conceal fraud easily. Because the techniques used by fraudsters are widely available and not necessarily complicated, the prevalence of cybercrime will undoubtedly increase. The ability of auditors to detect and prevent these crimes involves skills not commonly covered in the accounting curriculum. Offering a Master of Science in Forensic Auditing Analytics would provide students with valuable cutting-edge skills in many accounting areas, including internal and external auditing, law enforcement, litigation support, and consulting. These skills will only become more valuable as the amount of data organizations generate increases exponentially. Sorting through and continuously monitoring massive amounts of data to find fraud can be overwhelming without data analytics.

This degree will be one that both students and current practitioners will seek to acquire valuable skills. It has the advantage that program faculty could generate additional revenue streams for the university

through consulting projects, which could also provide students with internship opportunities. Developing relationships with practitioners strengthen the professional community and the university by allowing for synergy and innovation to combat the ever-increasing problems of digital fraud and cybersecurity. It also gives students the necessary background to take the information systems and controls discipline section of the new CPA exam format in January 2024. It provides technical skills applicable to the core sections.

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