

A New ERP Curriculum to Integrate Computer Technologies, Accounting, and Data Analytics

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Abstract

Luca Pacioli, a 15th Century mathematician, was the father of accounting double-entry journal debit/credit mathematics. Back in 2014, Warren Buffett described accounting as the "language of business, which has to be learned before you can understand it." Many legacy entry-level accounting curriculums continue to emphasize specialized collections of manual debit/credit journal entries and accounting rules, classified by business subsystems and types of accounting to prepare financial statements, to prepare business and accounting majors for professional careers, such as a CPA. Research into academic interdisciplinary accounting and computer technology curricula is lacking. A preliminary review of accounting course descriptions, outcomes, text books and tools, and these courses relationships with CIS majors and computer technology courses was conducted. This review analyzes the challenges facing siloed legacy accounting and CIS courses, and the potential benefits of new interdisciplinary Accounting and CIS courses. Enterprise Resource Planning (ERP) systems, such as Oracle NetSuite ERP, emphasizes easy-to-understand data entry, validation and error correction, automated journal transactions, and is available at no-cost, provides instructor training, course materials, and videos. ERP systems should be viewed as a collection of accounting systems, which also provides the integration of advanced computer and data analytic technologies. ERP systems provides KPI data analytics, AI decision making, integration of corporate web sites, credit card processing, databases, security, JSON/RESTful web service transactions, event triggers, system workflows, KPI, MapReduce data analytics, and integration of web applications. scripts. To take advantage of NetSuite ERP, five (5) new interdisciplinary ERP courses and course descriptions are presented in this paper.

Keywords: Computer Information Systems, Accounting Curriculum, ERP KPI Data Analytics, Data Center Cost Accounting, Oracle NetSuite ERP

1. LEGACY ACCOUNTING CURRICULUM VERSUS ERP TECHNOLOGIES

Luca Pacioli, a 15th Century mathematician, was the father of accounting double-entry journal debit/credit mathematics. Back in 2014, Warren Buffett described accounting as the "language of business, which has to be learned before you can understand it." Accounting apprenticeships, college and university education were introduced in the United States between the late 1700s and 1883 (Langenderfer, H., 1987).

The Accounting discipline is organized by a) types of accounting disciplines, b) ledgers, and c) journals. Examples of accounting disciplines and course designs include financial, managerial,

cost, and auditing. A ledger, or chart of accounts, contain records, similar to a computerized master file or table that contains descriptive or summary accounting information. Each ledger record or row contains multiple columns, such as Account Number (primary key), account name, type of account (asset, liability, owner equity, revenue, etc., balance. A ledger is where all journal entries are being summed up. The Chart of Accounts and database design are important to support accounting, business, and computer technology majors.

A journal is also similar to a computerized transaction file or table, records that stores multiple transaction entries for each logical accounting transaction. Journal database design

applies the principles of generalization-and-specialization, which organizes and provides a hierarchy structure COA ledgers and journals.

Manual debit/credit journal entries, based on generally accepted accounting principles, rules and methods, are organized into subsystems based on ledger and journals. Accounting curriculums start by introducing the major financial statements, such as the income statement, balance sheet, statements of equity, and cash flows to communicate financial and economic information. Most accounting courses designed to prepare accounting majors for professional careers, such as a CPA. (Kestenbaum, D., 1987).

In the 1960s major companies decided to change from traditional manual accounting systems to support the new IBM's System 360 computer technologies, online applications and large transaction volumes. Accounting professionals and faculty did not understand the functions of the new computers. Likewise, computer technology professionals or faculty did not understand accounting systems.

Over decades major companies replaced in-house batch processing accounting software systems with online and real time transaction processing. Managers, customers, vendors, employees, and other stakeholders were able to interact with the selected accounting systems using remote, web, and mobile interfaces. Over the years, legacy accounting statements, reports and analysis were supplemented by customized Excel templates. Small Business accounting software, such as QuickBooks, have provided opportunities to replace manual processes. The complexity of new computer technologies and security required accounting auditors, technology developers, and testers, who required interdisciplinary knowledge and skills.

Research into academic interdisciplinary accounting and computer technology curricula is lacking. (Hepner, M. & Dickson, W., 2013; Chen, K, et al. 2011) Many accounting curriculums often ignore the benefits of computer technologies beyond Excel or Small Business Accounting Software, or to recommend to students to register computer technology electives or minors. Likewise, most computer technology courses ignore principles of accounting, except for accounting electives or minors. interdisciplinary accounting, computer programming or technology skills are in demand (Kepczyk. R., 2022; Reis, P., 2021).

This paper analyzes the challenges facing siloed legacy accounting and CIS majors and the benefits of new interdisciplinary Accounting and CIS courses. Oracle NetSuite ERP was selected to propose five interdisciplinary courses since it was easy-to-use, provided state-of-art computer technologies at no-cost, and the availability of instructor training, course materials, and videos.

From an accounting perspective Enterprise Resource Planning (ERP) software have significantly changed how organizations implement accounting information systems. ERP systems emphasize easy-to-understand data entry, validation and error correction, automated journal transactions from internal and external system workflows. ERP accounting systems can support vertical and horizontal organizational structures, subsidiaries, Supply Chain Management and logistics (SCM), Customer Resource Management and customer retention (CRM), Human Resource Management (HRM), and Cost Accounting analysis (Russo, K. (2022).

Beyond accounting journal transactions, ERP systems emphasize integration of accounting and benefits of computer technologies, such as KPI data analytics, AI decision making, integration of corporate web sites, credit card processing, databases, security, JSON/RESTful web enterprise web service transactions, events, workflows, MapReduce data analytics, and organization web scripts (Reis, P. 2021).

2. APPROPRIATE MIS, CS, SE, AND CIS MAJORS FOR ERP

In 1974 Eller College of Management was the first attempt to create a business and computer technology major named Department of Management Information Systems (MIS). (Magoun, A., 1974; Nunamaker, J., 1974. Modern MIS outcomes require students to: 1) determine business requirements for specialized, information systems (business analysts), 2) analyze the effective use of business resources, and 3) problem-solving. (Eller School of MIS (n.d.); Maryville, n.d.). MIS was not designed to be a new accounting and computer technology interdisciplinary major.

Computer Science and Software Engineering majors often share core courses. The first Computer Science (CS) academic department was introduced by Purdue University and IBM's Fredrick Brooks in 1962. Computer Science is more abstract and theoretical, and is focused on the development of computer hardware, data coding, operating system, storage and network

systems, algorithms, programming languages, and security.

In 1979, the first undergraduate Software Engineering (SE) degree was Rochester Institute of Technology. The Software Engineering Institute (SEI) was a federally funded research and development program managed by Carnegie Mellon University. The focus of a Software Engineer is to determine software requirements, design, construction, testing, performance, maintenance of applications and systems. (Rochester Institute of Technology (n.d.); Indeed Tutorial Staff (2021); Maryville, (n.d.)

Computer Information Systems (CIS) degrees were designed to provide students and employers alternative computer technology approaches. CIS degrees are designed to integrate computer technologies, accounting and business courses that may provide synergistic skills that may better prepare CIS graduates for opportunities in IT managerial positions and future professional advancement. (Kohil, P., 2020).

Most CIS majors require one or more application program languages, core and elective computer infrastructure courses. CIS elective business courses may include financial and managerial accounting, finance, business law, marketing, management, or logistics courses. Many CIS courses are designed to be offered between academic departments.

Most CIS majors combine computer technology with accounting and business courses. However, the CIS major did not resolve challenges between computer technology and legacy accounting education. Accounting students still do not understand computer technologies that support accounting information systems. Likewise, computer technology students often do not understand double-entry, manual bookkeeping systems. CIS and ACCT interdisciplinary courses are rare. Yet, 50-70% major CPA revenues are derived from IT services. CPAs and accountants are recommended to learn more about critical IT technologies. (Drew. J. (2010), Kepczyk. R. (2022), CPA Practice Advisor (2021))

3. PRELIMINARY REVIEW OF ERP, ACCOUNTING, AND CIS COURSES

A convenience sample of eight different colleges or universities accounting and CIS major course descriptions, course outcomes, textbooks and applied technologies was conducted. The research was limited to undergraduate curriculums. No attempt was made to

differentiate between the academic departments that supported CIS, MIS, Accounting, or Business degrees. Appendixes A, B and C summarizes the findings of this review.

4. FINDINGS OF ACCOUNTING AND CIS COURSES, AND ERP BENEFITS

Financial Accounting Courses

An analysis was performed on financial accounting course descriptions, course outcomes, text books, and assignments focused manual double-entry, bookkeeping-oriented, journal transaction skills that were designed to prepare students for accounting careers and a common body of financial accounting knowledge. The accounting courses reviewed were normally taught by business faculty. The number of financial accounting courses varied between one or two courses, such as Fundamentals of Accounting or Principles I & II. Excel instructor's or text book templates, or other accounting simulators were not classified as computer technologies. Small Business Accounting Systems, such as QuickBooks, were reserved for advanced accounting courses. Reviewed financial accounting course content rarely mentioned any computer technologies.

ERP technology courses can create and interpret aging reports, financial ratio, standard and financial reports. LIFO, FIFO, and Average Costing are examples of alternative inventory cost flow rules. ERP forms will display check boxes to configure and automate alternate cost flow rules. Warehouse balancing, logistics, sales taxes and many other alternative decisions or rules can supplement other accounting or business alternatives using customized ERP scripts.

Managerial or Cost Accounting Courses

The objectives of managerial accounting courses are designed to identify, measure, analyze, and provide reports to management to measure performance of organization goals. Cost Accounting is a form of managerial accounting that collects and analyzes individual production costs or service costs.

CIS majors may not benefit from the examples of cost analysis of "hypothetical" widgets. However, computer professionals may value the computer technology costs that they pay for computer technologies, e.g., laptops, network connections, storage, performance, leasing or buying applications, and backups.

A student may access a Word application or game on the cloud on a subscription basis. Computer applications and infrastructure technologies are major, mission-critical cost centers. It is important for CIS students to understand IT technology cost centers, IT budgets, types of IT costs and behavior, IT cost allocation methods, make, buy or lease software decisions, and using transfer prices to allocate IT costs to operational department or subsidiaries (Srivastav, A. (n.d.).

The following analysis demonstrates the significance of IT cost and investment centers. As percentage of revenues, computer technology cost management varies by Industry and company size, e.g., Financial Services: 4.4% - 11.4%; Health Care: 3.0% - 5.9%; and Retail 1.2% - 3.0%. (Computer Economics. (n.d.) Examples of major computer technology budget costs are estimated to range between \$570 million dollars and \$1.5 billion dollars.

Challenges of Manual Journal Entries

Accounting majors will be the future professionals who may master the details of financial and managerial journal entries. Traditionally, accounting courses emphasize various collections of journal entries across business system using various manual or Excel template entry methods. Research indicates that a manual journal entry is slow and expensive, have a high error rates, e.g., entering the wrong account, transposing, entering data backwards, or takes time to debug and correct errors. (Tipalti, 2019; Yarab, A. 2011)

ERP journals may overcome these challenges by providing journal autocomplete services, templates, and autocorrect or diagnose journal entry errors. It is estimated that computer technologies have eliminated memorizing or entering 50-97% of accounting entries by using small business accounting software, legacy customized computer applications, automation, event triggered ERP journal entries, or customized workflow scripts, which substantially reduces the number and scope of manual journal transactions. AI scripts may be customized for external customers, vendors, supply chains, credit card partners (Visa, Master Card), or managing web sites and security. (Freshbooks, 2019; Tipalti, 2019; Yarab, A. 2011)

Value of ERP Financial Accounting Data and KPIs

The importance of accounting data, whether is it stored in a database, files, or stored as many generations, or decades of stored archive files is

VALUABLE. The availability and importance of accounting data is often unappreciated.

The largest diverse, retail database is Walmart's accounting databases. The reader maybe surprised and suggests that this recognition may belong to Amazon. In 1962, Sam Walton, the founder of Walmart was the first to purchase a retail mainframe that stored accounting data on magnetic storage devices. (Amazon was founded in 1994. In spite of the high cost of electronics, companies, like Walmart decided to store data beyond traditional accounting data. Perhaps the modern terminology "KPI data" may be better described by Sam's description of "non-accounting data". With the introduction of mainframes in 1960s, data analytics, and complex statistical analysis and mathematical tools were born.

Today, KPI data and accounting data is very important to predict marketing trends, make decisions, describe or diagnose system problems, or what organization should do in the future. Many companies collect and lease social network data, such as Google, YouTube, or Facebook. Federal and State government agencies, or other data KPIs sources are available for free research. Companies and higher education love free or low-cost data analytic "raw" research data. But, quality data analytic research data is not FREE. First, one, must design and collect the research data. Second, the research data must be maintained, searched and processed. And third and most important, the data must be "valuable" to provide insights for your organization.

While Sam Walton may not have been a data analytic expert, Sam did know the quality and value of his accounting data and customized KPIs, to make quality decisions, create one of the largest retail databases in the world. ERP accounting and KPI data is important and valuable.

Value of ERP Backups and Security

Memories of 9/11 reminds professionals of the importance of backup and security of accounting and KPI data. Standard backup plans always recommend proper backups stored at off-premise sites. On 9/11 179 corporations had stored their backups on the second World Trade Center tower. All accounting data was lost and these corporations could not ever recover from this 9/11 loss of data.

CIS Cybersecurity courses emphasize strategies to authenticate users, groups, or groups, or to

authorize access to files systems and security policies to manage and secure operating systems. However, ERP accounting security provides a more granular and applied ERP security design that authenticates accounting users, roles, and authorizes access and management of accounting subsystems and transactions.

To summarize, computer technology security managers focuses on operating system infrastructure, and accountants focuses on ERP security policies. This type of security design strategy that appropriately describes as the "Separation of Duties".

Routine accounting IT Audits are regularly conducted. IT auditors make recommendations to improve computer infrastructure and ERP security. However, IT auditors do not design, implement, or maintain computer infrastructure and ERP security. An interdisciplinary security approach will benefit both CIS and Accounting majors.

5. LACK OF ACCOUNTING AND COMPUTER TECHNOLOGY COLLABORATION

While specialized knowledge and skills are valued, interdisciplinary skills and collaboration among accounting, business, and computer technology professionals is the key to success. A preliminary review of existing accounting course descriptions, outcomes, and content confirms the lack of computer technology skills beyond Excel that are lacking in fundamental accounting courses. Please review Appendix C.

Many CIS majors, such as cybersecurity, may not require any fundamental accounting courses. Other CIS majors may be required or elect to enroll in legacy accounting courses. However, these accounting courses emphasis legacy accounting that ignores the role of computer technologies in AIS. Please review Appendix 3.

This lack interdisciplinary collaboration may be caused by different historical legacies, administration, or accreditation barriers. There may be departmental turf wars, varying complexity of content, lack of computer, technology awareness or differences in specialization of instructors. (Higgins, M. 2021; Hepner, M. & Dickson, W., 2013; Chen, K, et al, (2011))

6. COMPARING SMALL BUSINESS ACCOUNTING AND ERP SOFTWARE

Personal Finance and Small Business Accounting Software

Excel Workbook templates. Personal Finance Software (APPs), such as Quicken, Mint, and Personal Capital have provided limited educational benefit for accounting or finance courses. Small business accounting software, such as, QuickBooks, Xero, FreshBooks, and Wave, provide out-of-the-box accounting information systems that are limited to the number of users. Many small business accounting software companies may provide academic licensing and educational resources. (The Small Business - QuickBooks. 2022; QuickBooks VIP Training. 2022) Review Appendix 1 and 2

Microsoft Dynamics 365 is designed for small business systems. Microsoft Dynamics 365 is very easy to use, but lacks many common ERP features. (GeekTech, 2019). However, faculty and students, access free Microsoft Dynamics 365 training though the Microsoft Dynamic Learning Portal. Course materials and text books are available.

Small Business Accounting (SBA), such as QuickBooks, provides the best of bookkeeping and accounting functions that is low-cost, easy to install, learn, or use is designed for easy-to-install or uses a cloud solution. The limitations of Small Business Accounting systems include: 1) limited to approximately 25 accounting users, 2) limited real-time data, 3) may not be compliant with GAAP standards, tax law and regulations, 4) lacks robust industry-specific accounting, 5) poor inventory control management, 6) limited security, 7) limited performance, database storage, and data backups capabilities, and 8) lack of and customizable enterprise integration SCM, CRM, HRM, etc. Enterprise Resource Planning (ERP) software will be an excellent alternative. NetSuite ERP recommends 20+ accounting users. From the perspective education, many business and accounting majors require six or more course accounting credits before enrolling in a small business accounting software course. (OptiProERP Manufacturing. (n.d.); Blue Link. (n.d.))

Small business accounting software provides limited interdisciplinary value to CIS, MIS Cybersecurity, and Data Analytics majors. benefits of interdisciplinary accounting and computer technology specialists for large

SAP Enterprise Resource Planning (ERP)

"At its core, an ERP is an application that automates business processes, and provides insights and internal controls, drawing on a central database that collects inputs from departments including accounting, manufacturing, supply chain management, sales, marketing and human resources (HR)" (McCue, R. 2022). The bad news is that SAP ERP software may be expensive to maintain, converting legacy data and legacy accounting procedures is challenging. SAP ERP system design and training costs will offset reduction in legacy labor costs.

SAP ERP systems support the most comprehensive, industry-based add-ons. SAP is the #1 ERP system for many reasons. Originally built of a mainframe platform, Leveraging the scale of z System mainframes, SAP ERP systems are the most secure, scalable, and reliable ERP product. Historically, SAP have focused of large Global 1000 corporations, government agencies, and education. While other ERP are limited to the ability to customize the ERP features, SAP provides a very powerful ERP program language named ADAP code that permits unlimited customizable ERP features. Strategic initiatives for future releases include blockchain, quantum computing, machine learning, Internet of Things, and artificial intelligence. (Miller, 2019)

Since the 2000, many large universities and other academic institutions have relied of SAP for ERP academic administration services. It shouldn't be a surprise that most large universities have introduced SAP into the business, accounting and MIS curriculums. However, academic faculty and administrators have questioned the support costs, faculty training, and course preparation for SAP ERP. As a result, ERP courses are limited to advanced and graduate courses. (Wang, M. & Zhang, X. 2017)

The SAP University Alliances provides discounted costs to access to the SAP multitenant cloud version and access the SAP Learning Hub. SAP Text Books are available. SAP Learning Hub is available on a subscription basis and offers several flexible licensing options. (SAP University Alliances, n.d.; SAP Learning Hub. n.d.)

Since NetSuite ERP has appeared, SAP's market share has rapidly decreased. NetSuite was designed for small and intermediate size organizations, but is rapidly increasing performance to become a major SAP competitor. As repeated several times in this paper, NetSuite is very easy to configure, understand, and use.

NetSuite has increased over 28,000+ new worldwide customers. SAP is in the process of redesigning their ERP products to also very easy to configure, understand, and use. The complexity of SAP may be challenging to this redesign initiative.

Oracle NetSuite (ERP)

Oracle purchased NetSuite in 2017, which was originally designed for small and medium size companies. NetSuite was the most technologically advanced, easy-to-use, manage and maintainable ERP system. Oracle had previously supported a small business accounting system and cloud-based large-scale Oracle ERP software. As of 2022, NetSuite will be replacing previous Oracle ERP accounting software.

In 2020, SAP was the #1 ERP accounting software, which was originally designed for large-scale companies who normally provides and manages their computer technology platform. e. As of 2022, NetSuite is the #1 cloud-based, world-wide and provides the most modern and advanced ERP solution. NetSuite can be access from almost any internet connected device or web browser

Oracle Academy NetSuite will provide students free licenses to access NetSuite cloud-based ERP, CRM and SCM for 90-days, but cannot be extended. Faculty will provide free licenses to support a NetSuite academic course. Discounted licenses may be purchased after the 90-day period. Course materials and text books are available. (Oracle Academy Cloud, n.d.) See Appendix E for more details

5. CONCLUSION

Modern ERP accounting systems combines an easy-to-use accounting interface with power of advanced enterprise accounting knowledge and skills. Optional ERP modules can be integrated and applied to logistics, marketing, social media data, and other external data sources. However, ERP advanced tools, cloud infrastructure management and external enterprise skills, and security require computer technology skills integrated with accounting knowledge.

ERP skills, knowledge, and experience are in demand and provides a unique opportunity for accounting, CIS and business students. Students may prefer using ERP accounting software and systems approach than detailed manual journal entries. However, the biggest challenges to ERP curriculums may be academic departments and faculty to learn new computer technologies.

Due to the complexity of using SAP ERP accounting system, academic licensing, and infrastructure, this research study recommends NetSuite ERP to introduce one or more CIS/Accounting ERP Interdisciplinary courses. Based on the results of this research, five ERP courses and course descriptions are proposed: Introduction to Enterprise Resources Systems, Oracle NetSuite ERP, Supply Chain Management (SCM) Essentials, Customer Relationship Management (CRM) Essentials, Data Centers, Infrastructure, and Application Development Costs and Benefits Analysis, Advanced Data Analysis of ERP, SCM and CRM Technologies. Each ERP course may be offered as an academic three credit course or as professional training, continuing education credits, or digital badges. Please review Appendix D.

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APPENDIX A

Preliminary Analysis of Financial Accounting Courses, Text Books, and Computerized Tools												
Courses	# of Courses Reviewed	Text Book or Instructor Excel Templates or Applications	QuickBooks, Xero, Freshbooks, Wave, Microsoft Dynamics	Chart of Accounts	Journal Entries	Customer, Vendor, Emp. Receivables and Payables Entries, Purchase Order Invoicing, Payments	Current Assets, Cash, Checking Accounts, Reconciliation Inventories, FIFO/LIFO, Prepaid Expenses	Fixed Assets Land, Machinery, Vehicles, Computer Equipment, Buildings, Depreciation, Repairs, Buy/Sale, Exchange	Current & Long-Term Liabilities, Bonds, Pensions, Defer Comp, Expenses and Amortization	Revenues, Services Rent, Dividend, Interest and Expenses C/G/S, Operating, Financial, Accrued	Owners' Equity Paid in Capital, Retained Earnings, Dividends, Treasury Stock	Aging Reports, Trial Balance, Balance Sheet, Income, Stockholders Equity, Other
Introduction to Financial Accounting	6	6	N.A	Customized; Hier - 8 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 0
Principles of Financial Accounting	8	8	N.A	Customized; Hier - 8 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 0
Intermediate Accounting 1 or 2	4	4	N.A	Customized; Hier - 4 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 4 KPIs - 0 Applied CompTech - 2	Auto/Event/ Calculated - 0 Customized - 4 KPIs - 0 Applied CompTech - 2	Auto/Event/ Calculated - 0 Customized - 4 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 4 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 4 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 4 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 0
AIS or Small Business Accounting	2	2	2 QuickBooks	Customized; Hier - 2 KPIs - 2 Applied CompTech - 0	Automated - 2, Auto-validated - 2 AI-Generated - 0 Workflow - 2	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 0	Generated - 2 Customized - 2 KPIs Data Analysis - 2
ERP	2	2	2 SAP	Customized; Hier - 2 KPIs - 2 Applied CompTech - 2	Automated - 2, Auto-validated - 2 AI-Generated - 0 Workflow - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 0	Generated - 2 Customized - 2 KPIs Data Analysis - 2

APPENDIX B

Preliminary Analysis of Managerial and Cost Accounting Courses, Text Books and Tools												
Courses	# of Courses Reviewed	Text Book or Instructor Excel Templates or Applications	Job Order Costing, Manufacturing Services, Analyzing Costs Journal Entries	Process Costing, Equivalent Units, Transfer and Partial Units, Journal Entries, Weighted Average	Activity-Based Costing (ABC), Single or Multiple Overhead Rate Methods, Activity Rates, Allocating Costs, Selling and Administrative Expenses, Service Businesses	Budgeting: Sales, Production, Direct Materials, Labor, C/G/S, Sales and Administrative, and Income, Cost-Volume-Profit analysis,	Variance Analysis, Direct Materials, Overhead	Responsibility Cost, Profit, and Investment Centers, Transfer Pricing	Differential Analysis, Lease or Sell, Discontinue Segment or Product, Make, Buy or Replace, Cost-Plus, Setting Price	Capital Investment Analysis, Cash Payback, Average Rate or Return, NPV, IRR, Income Tax, Uncertainty and Capital Rationing	Financial Statement Analysis, Horizontal, and Vertical Analysis, Liquidity and Solvency Analysis	Demand Planning and Analysis+A2, Sales and Operation
Managerial Accounting	8	8	N.A	Customized; Hier - 8 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 8
Cost Accounting	8	8	N.A	Customized - 8 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 2	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 0
AIS or Small Business Accounting	2	2	2 QuickBooks	Customized; Hier - 2 KPIs - 2 Applied CompTech - 0	Automated - 2, Auto-validated - 2 AI-Generated - 0 Workflow - 2	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 1	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 0	Generated - 2 Customized - 2 KPIs Data Analysis - 2
ERP	2	2	2 SAP	Customized; Hier - 2 KPIs - 2 Applied CompTech - 2	Automated - 2, Auto-validated - 2 AI-Generated - 0 Workflow - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 2 Customized - 2 KPIs - 1 Applied CompTech - 2	Auto/Event/ Calculated - 0 Customized - 2 KPIs - 0 Applied CompTech - 0	Generated - 2 Customized - 2 KPIs Data Analysis - 2

APPENDIX C

Preliminary Review of Accounting Courses, Interdisciplinary CIS and Data Analytics												
Courses	# of Courses Reviewed	Text Book or Instructor Excel Templates or Applications	Role of Databases and Networks and Technology Accounting	Chart of Accounts Applied to Computer Technologies	Journal Concepts Applied to Computer Technologies	Cost or Financial Analysis Applied to Data Centers or Computer Technologies	Securing and Encrypting AIS	Accounting Audit Trails and AIS Backups	AIS KPI Data Analytics and Dashboards	AIS and ERP Cloud Management	External Web Service and Web Transactions	Role of AI in AIS
Introduction to Financial Accounting	6	6	N.A.	Customized; Hier - 8 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 0
Principles of Financial Accounting	8	8	N.A.	Customized; Hier - 8 KPIs - 0 Applied CompTech - 0	Automated - 0, Auto-validated - 0 AI-Generated - 0 Workflow - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Auto/Event/ Calculated - 0 Customized - 8 KPIs - 0 Applied CompTech - 0	Generated - 0 Customized - 8 KPIs Data Analysis - 0
Managerial Accounting	8	8	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Cost Accounting	8	8	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Intermediate Accounting 1 or 2	4	4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
AIS or Small Business Accounting	2	2	2 QuickBooks	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
ERP	2	2	2 SAP	N.A.	N.A.	N.A.	2 SAP	2 SAP	2 SAP	2 SAP	2 SAP	N.A.

APPENDIX D

Introduction to Enterprise Resource Planning

Course Description:

This interdisciplinary accounting course introduces hands-on Enterprise Resource Planning (ERP) accounting systems from the perspective of introductory financial accounting computer technologies, data analytics, security, and informatics. Hierarchical Charts of Accounts (ledgers), manual, form-based and automated journal entries of assets, liabilities, owner's equity, revenues and expenses of popular accounting subsystems applied from a financial accounting and computer technology perspective. Real-time financial statements, data analytics reports, and dashboards to support decision will be reviewed Important computer technologies used by ERP systems, such as, introductory database design, electronic automated payment systems, web-based sales or information sites, and integration of JSON and Restful APIs applications, and ERP Artificial Intelligence will be introduced. The integration of ERP accounting systems to support vertical and horizontal organizational structures, subsidiaries, Supply Chain Management (SCM), Customer Resource Management (CRM), Human Resource Management or Cost Accounting analysis will be introduced. Students will use Oracle cloud-based NetSuite ERP. **Prerequisites:** TBA

Supply Chain Management Essentials

Course Description: This course compares roles between ERP internal information systems and Supply Chain Management (SCM) information systems among external enterprises, subsidiaries, suppliers, or channel partners. Students will review the SCM key performance data and AI processes to automate supply chain workflows, products, logistics, and financial transactions to support Just-in-Time Inventory systems. Strategies to integrate, coordinate and secure SCM information and processes among internal enterprise customer ordering and systems, inventory fulfillment, warehouse management, external supply chain and logistic providers using cloud based-applications or customized RESTful APIs, will be discussed. Examples of descriptive, predictive, and cognitive data analytics will be introduced. Supply chain control towers to troubleshoot supply chain disruption and problems will be presented as time allows. **Prerequisites:** Introduction to Enterprise Resource Planning

Customer Relationship Management Essentials

This course reviews the functions and integration among Customer Relationship Management (CRM) systems, eCommerce or B2B platforms, and ERP systems. Students will be introduced Oracle NetSuite CRM skills and strategies to manage customer leads/prospects, active customers, marketing campaigns, sales pipelines, quotes, proposals, orders and sales quota system using hands-on or active learning. Examples of applied computer technologies to integrate CRM systems with ERP transactions, inventory, online sales, and shipping/logistics systems, and CRM relationships with e customers, sales sources, marketing campaigns and pipelines will be introduced. Using internal Key Performance Indicators (KPI), CRM data analytics forecast customer demand, optimal inventory levels and investment, new marketing channels and campaigns will be introduced. **Prerequisites:** Introduction to Enterprise Resource Planning

Data Centers, Infrastructure, and Application Development Costs and Benefits Analysis

Course Description: This course will introduce categories and specific infrastructure, application development, and data centers costs and benefits to manage, budget, or analyze the Total Cost of Ownership (TCO) of computer technologies. Factors, such as fixed and variable costs, measuring tangible and intangible costs and benefits, differential cost and benefits, licensing strategies, sunk costs, opportunity costs, and constraints of computer technologies that may affect decision making will be presented. Students will be introduced to Key Performance Indicators (KPI) to analyze cost and benefit concepts applied to Data Center and Hardware Infrastructure (IaaS), Cloud Computing, Operating System and Middleware Administration (PaaS), Application Development (SaaS), and Accounting and Financial services (BPO). Cost/Benefit comparisons to build in-house, or buy outsourced, customized or canned/automated applications and management services alternatives will be presented. Decisions to "Keep or Replace" projects under "conditions of constraints" will be discussed. Enterprise technology responsibility centers, transfer pricing, and cost analysis will be introduced as time permits. **Prerequisites:** Introduction to Enterprise Resource Planning, Operating System, Program Language, Network Management, and System Analysis

Advanced Data Analysis of ERP, SCM and CRM Technologies

Course Description: This course emphasizes data analysis of ERP, SCM and CRM key performance indicators beyond traditional financial and accounting reports and analysis. ERP analytics applies analytic and predictive tools, reports, pivot tables, charts and dashboards to provide summary and detailed insights not only of what has happened, but what will happen in the future and how they can stay ahead using customized or artificial intelligence analysis. Enterprise Analytics enables a "single source of truth" across all business functions and may be analyzed in real-time or historical trends. Using Oracle NetSuite students will analyze popular enterprise Key Performance Indicators (KPIs). ERP KPIs analysis includes summary and detailed analysis of cost, revenue, investment, and performance metrics. SCC KPIs analysis include Supply chain error rates, cash conversion cycle (C2C), Supply Chain Cycle Time), Perfect Order rates, Days Sales Outstanding (DSO), inventory turnover Gross Margin Return on Investment (DMROI), Warehousing, and transportation costs. CRM success metrics, such as, traffic-to-lead conversion, customer activity, conversion time, sales cycle duration, adoption rates, logon, net revenue, marketing ROI, retention cost and Customer Lifetime Value (CLV) metrics. **Prerequisites:** Introduction to Enterprise Resource Planning, Introduction to Data Analytics, Supply Chain Management Essentials, Customer Relationship Management

APPENDIX E

Oracle Academy Cloud Program

To provide free access for faculty and students to Oracle NetSuite, an academic institution membership must be registered, before a faculty member may be registered for the Oracle Academy Program. Oracle Academy Institutional membership is free and offers institutions and educators access to world-class technology and software, expert curriculum, teaching and learning materials, professional development, Membership is free.

Oracle Academy Cloud and NetSuite Registration

Join Oracle Academy - <https://academy.oracle.com/en/membership-join-oracle-academy.html>

NetSuite - <https://academy.oracle.com/en/solutions-cloud-netsuite.html>

Types of Oracle NetSuite Accounts

NetSuite ERP - Allows students to learn full enterprise resource planning, including supply chain management, accounting, and financial management processes.

NetSuite SCM - Students get hands-on experience in strategically planning for and managing the most streamlined and cost-effective supply chain flows.

NetSuite CRM - Introduces students to sales and customer lifecycle management, from marketing and opportunity management, to order management, upsell, cross-sell, renewal, and customer service.

SuiteCommerce - Enables students to learn an eCommerce platform, which includes point-of-sale, merchandising and order management, and integrates with back-office operations.

NetSuite Pre-populated and Blank Accounts

Pre-populated accounts are recommended for teachers with any level of configuration experience. The account setup resembles a wholesale distribution company, pre-populated to include transactions, products, vendors, customers, and more.

Blank accounts are available for teachers with advanced system configuration experience. The account setup resembles that of a new company without existing data. Students have the opportunity to set up their own company.

NetSuite Free educator professional development (Online learning)

Not available for students

NetSuite Faculty Academic Course	Recommended NetSuite Product	Recommend NetSuite Training Course
Accounting	ERP	NetSuite: Financial Management Admin Fundamentals
eCommerce	eCommerce	eCommerce Fundamentals
Sales	CRM	SFA Fundamentals
Supply Chain	ERP + SCM	Wholesale / Distribution: Fundamentals

Hundreds of YouTube NetSuite Tutorials and PDFs are available.

Introduction to ERP and NetSuite

PDF - NetSuite Basics

https://docs.oracle.com/cloud/latest/netsuitecs_gs/NSBSC/NSBSC.pdf

Video - NETSUITE Tutorial by True Cloud | Accounting

<https://www.youtube.com/watch?v=xYXRnYMbQxI>

Video - Oracle NetSuite Introduction and getting started

https://www.youtube.com/watch?v=993cveKuR_I9