BIA 678 Big Data Technologies

Stevens Institute of Technology
School of Business
Spring 2023

Instructor: Dr. Alkis Vazacopoulos
Course Schedule: Monday-Sunday
Contact Info: avazacop@stevens.edu
Virtual Office Hours: Monday 5:00 - 7:30 pm; Wednesday 5:00 - 6:30 pm
Virtual Live Sessions: Go to the “Zoom” tab on the left-hand navigation bar to access live virtual sessions for this course.
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Prerequisite(s): None
Corequisite(s): None
Cross-listed with: None
Credit hours:3

COURSE DESCRIPTION

The field of Big Data is emerging as one of the transformative business processes of recent times. It utilizes classic techniques from Business Intelligence & Analysis, along with new tools and processes to deal with the volume, velocity, and variety associated with big data. As students enter the workforce, a significant percentage of BIA students will be directly involved with big data either as technologists, managers, or users. This course will build on the understanding of the basic concepts of BI&A to provide students with the background to succeed in the evolving data centric world, not only from the point of view of the technologies required but in terms of management, governance, and organization. Tools will include Sparc, Python, Dataiku, and related software.

STUDENT LEARNING OUTCOMES

After successful completion of this course, students will be able to…

- **CO1: Determine** the characteristics of Big Data and their dimensions of scalability
- **CO2: Assess** opportunities for Big Data to construct a strategy and show its value to the enterprise
- **CO3: Develop** a Data Governance methodology to assess the risk of data strategies
- **CO4: Construct** actionable business decisions by combining Big Data with Business Intelligence, Data Science, Machine Learning, and Artificial Intelligence (AI) technologies
- **CO5: Develop** models by combining Big Data with text mining association rules and recommenders systems
- **CO5: Assess** opportunities for developing Big Data technologies using Sparc and other similar technologies
- **CO6: Assess** risk in the enterprise and the society by the ethical issues of AI and Big Data technologies
- **CO7: Assess** the speed of development of internet of things, robotic applications when combined with Big Data technologies.

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COURSE FORMAT AND STRUCTURE

This course is fully online. To access the course, please visit stevens.edu/canvas . For more information about course access or support, contact the Technology Resource and Assistance Center (TRAC) by calling 201-216-5500.

Course Logistics

- You are encouraged to "mentally enroll" in this course as if it occurred on Mondays [Or whatever day of the week you have chosen]. In other words, our weeks will run from Monday to Sunday. I will post information (online activities, discussion starters, etc.) for the upcoming week by Sunday evening so that when you log in on Monday, you can begin the new week.
- When assignments are due, they are due by 10:00 am EST on the due date listed in the course schedule.
- Deadlines are an unavoidable part of being a professional, and this course is no exception. Course requirements must be completed and posted or submitted on or before the specified due date and delivery time deadline. Due dates and delivery time deadlines are in Eastern Time (as used in Hoboken, NJ). Please note that students living in distant time zones or overseas must comply with this course time and due date deadline policy. Avoid any inclination to procrastinate. Due dates have been established for each assignment to encourage you to stay on schedule
- Assignments received 1-6 days late will have 20% of the total points deducted; assignments received more than one week late will receive 0 points. [this should align with what your late policy states]
- An assignment file should be appended by your username, such as "assignment1_kim53.doc". This makes it easier for me to manage assignment files you download to my computer.

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Instructor's Online Hours

I will be available via email and respond as soon as I am available (generally within 24-48). For the online discussions, I will check in at least three times per week. Keep in mind that it is not possible for me to respond to every single posting every week (nor is it pedagogically appropriate), but I will be sure to respond to various postings and students each week and attempt to assure equality in terms of responses to students. Furthermore, there is a specific discussion forum that you can use to ensure that you have my attention – to ask questions or to call my attention to a particular discussion you are engaged in that you would like me to take a look at. If you feel you are being neglected in any way, please contact me. When emailing me, please place in the subject line the course number/section and the topic of the email (i.e., XXX 240 – Assignment 2 Question). This will help me tremendously in locating your emails quicker when I scan the hundreds of emails that seem to make it into my box each day.*

Virtual Office Hours

Virtual Office Hours are a synchronous session (through Zoom or Blackboard Collaborate) to discuss questions related to weekly readings and/or assignments. Office hours will be held Monday evenings from 7:00-8:00 pm EST. To connect to the weekly session, go to the Canvas Zoom link.

Online Etiquette Guidelines

Your instructor and fellow students wish to foster a safe online learning environment. No matter how different or controversial they may be perceived, all opinions and experiences must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea, but you cannot attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambiance. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Allow other students to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language as it could lead to misinterpretation.
- Keep an "open-mind" and be willing to express even your minority opinion.
- Think and edit before you push the "Send" button.
- Do not hesitate to ask for feedback.

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TENTATIVE COURSE SCHEDULE

Module	Topic(s)	Readings	Graded Activities
Module 0	Course Introduction	Syllabus	N/A
Module 1	**Introductions** **Introduction to Big Data** **The four V's** **Examples of Big Data in different industries** **Case Study: Dow Chemical and Big Data**	Lee, I. (2017). Big data: dimensions, evolution, impacts, and challenges. *Business Horizons*, *60*(3), 293–303. https://doi.org/10.1016/j.bushor.2017.01.004 Cheikh-Ammar, M., Haggerty, N. R. D., Meister, D., & Chandrasekhar, R. (2017). Dow Chemical Co.: Big data in manufacturing. Ivey Publishing.	Interactive Video Quiz 1 Homework 1 Live Session Participation
Module 2	**What is data strategy** **What is Big data Strategy** **Developing Big Data Strategies**	Alharthi, A., Krotov, V., & Bowman, M. (2017). Addressing barriers to big data. *Business Horizons*, *60*(3), 285-292. https://doi.org/10.1016/j.bushor.2017.01.002 DalleMule, L., & Davenport, T. H. (2017). What's your data strategy? *Harvard Business Review 95*(3), 112–121. https://stevens.on.worldcat.org/oclc/7038901012 Hagiu, A., & Wright, J. (2020). When data creates competitive advantage...and when it doesn't. *Harvard Business Review*, *98*(1), 94–101. Wedell-Wedellsborg, Thomas. (2017). Are you solving the right problems? *Harvard Business Review*, *95*(1).	Interactive Video Quiz 2 Homework 2 Live Session Participation
Module 3	**What is Data Governance** **What is IT Governance** **Risks associated with data governance** **Case Study IT Governance at Oxford Industries**	Uppaluru, M. (2018). The U.S. Needs a New Paradigm for Data Governance. *Harvard Business Review Digital Articles*, 2–5.	Interactive Video Quiz 3 Homework 3 Live Session Participation

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		Selig, G. J. (2016). IT governance-an integrated framework and roadmap: how to plan, deploy and sustain for improved effectiveness. *Journal of International Technology and Information Management*, *25*(1), 55–76. Parent, M., & Reich, B. H. (2009). Governing information technology risk. *California Management Review*, *51*(3). 134–152. https://doi.org/10.2307/41166497 Khatri, V., & Brown, C. V. (2010). Designing data governance. *Communications of the ACM*, *53*(1), 148–152. https://doi.org/10.1145/1629175.1629210	
Module 4	**What is data mining** **Applications of Data MIning with Big Data** **Case study: Champo Carpets**	Davenport, T. H., & Patil, D. J. (2012). Data scientist: the sexiest job of the 21st century. *Harvard Business Review*, *90*(10), 70–76. Chapter 4 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited Chapter 1 White, T. (2015). Hadoop: the definitive guide (4th ed.). O'Reilly Media. Retrieved April 7, 2022, from https://stevens.on.worldcat.org/oclc/907477295	Interactive Video Quiz 4 Homework 4 Live Session Participation
Module 5	**What is Machine Learning** **Combining Machine Learning with Big Data** **ROI of Big Data** **Case Study: Belk: Towards exceptional scheduling**	Chapter 5 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited. Chapter 2 White, T. (2015). Hadoop: the definitive guide (4th ed.). O'Reilly Media. Retrieved April 7, 2022,	Interactive Video Quiz 5 Homework 5 Live Session Participation

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		https://stevens.on.worldcat.org/oclc/907477295	
Module 6	**What is deep learning** **Applications of Deep learning and Big Data** **Case Study: Vodafone**	Chapter 6 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited. Ajani, R., Chatterjee, A., Talwai. A., & Zhang, J. (2018). How a pharma company applied machine learning to patient data. *Harvard Business Review Digital Articles.*	Interactive Video Quiz 6 Homework 6 Live Session Participation
Module 7	**Text Analytics and Big Data Application** **Social Analytics and Big Data** **Case Study Evisort**	Chapter 7 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited.	Interactive Video Midterm Live Session Participation
Module 8	**Hadoop Mapreduce, Sparc** **Start the project** **Cloud computing**	Chapter 9 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited.	Interactive Video Quiz 8 Homework 8 Live Session Participation
Module 9	**Stream Analytics** **Case Study ShotSpotter**	Chapter 9 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited.	Interactive Video Quiz 9 Homework 9 Live Session Participation
Module 10	**Applications of Robots in Various industries** **Case study The YES**	Chapter 10 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited.	Interactive Video Homework 10 Live Session Participation

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Module 11	**Recommendations Systems & Big Data** **Case study: Bigbasket**	Chapter 12 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited.	Interactive Video Quiz 11 Homework 11 Live Session Participation
Module 12	**IOT and Big Data Case** **Study**	Chapter 13 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition,	Interactive Video Quiz 12 Homework 112 Live Session Participation

		Global). Pearson Education Limited.	
Module 13	**Ethical Implications of Big Data and AI** **Case studies and Applications**	Chapter 14 Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited.	Homework 13 Course Project Final Exam Live Session Participation

COURSE MATERIALS

The following items are required for the course.

Access and Purchase the Coursepack link: instructor to provide link

Textbook

Sharda, R., Delen, D., & Turban, E. (2021). Analytics, data science, & artificial intelligence: Systems for decision support (11th edition, Global). Pearson Education Limited

ISBN-13: 978-0135192016
ISBN-10: 0135192013

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COURSE REQUIREMENTS

As you move through the topics in each module, you will be asked to read, listen to, and watch a variety of media. You'll also be regularly prompted to actively evaluate your knowledge as you're building it. The components in each module are designed to be completed sequentially.

In addition to videos and readings, here are a few types of learning activities you'll encounter.

- **Practice Activities:** In each module, you will encounter discussion boards, examples, and solutions. These ungraded activities provide you with an opportunity to check your understanding of the module learning objectives.
- **Homework:** To help reinforce the material covered in the module, a homework exercise will be assigned to you each week. Homework will involve formulating and solving a small but practically relevant homework problem from the textbook.
- **Quizzes:** Each module will culminate in an auto-graded Canvas graded quiz. The quizzes help you determine the achievement of the module learning objectives. You will be given 2 attempts to complete the quiz.
- **Live Participation:** Live sessions are scheduled in each module. In some sessions, you will work collaboratively with your classmates to solve a problem. In others, you'll review module topics.
- **Midterm:** The midterm exam will assess your learning from Modules 1–7.
- **Final:** The final exam will assess your learning from Modules 8–13.
- **Project:**You will be required to read a case study and answer the questions using the principles learned throughout the course. The deliverables are a paper, an executive summary, and your files with the results.
- **Office Hours:** Use this time to ask your instructor about any concepts you are struggling with, difficulties with assignments, or simply share something relevant to the class you encountered this week.

TECHNOLOGY REQUIREMENTS

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

Technology skills necessary for this specific course

- Live web conferencing using Zoom
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video via Kaltura

Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Required Software

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

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GRADING PROCEDURES

Grades will be based on:

Assignment/Assessment	Competency & Behavior	Percentage of Final Grade
Homework	All COs	20%
Live Session	All COs	10%
Quizzes	All COs	10%
Interactive Video (PlayPosit)	All COs	5%
Midterm	All COs	15%
Project	All COs	20%
Final Exam	All COs	20%
	TOTAL:	100%

Grading Scale

The scale for grades is: A >92; A- 92~90; B+ 89~85; B 84~80; B- 79~75; C+ 74~70; C 69~65; C- 64~60; F<60

Late Policy

Late homework submissions or final project submissions will be subject to a 20% deduction.

Academic Integrity

Graduate Student Code of Academic Integrity

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside

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assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at www.stevens.edu/provost/graduate-academics.

Special Provisions for Undergraduate Students in 500-level Courses

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

EXAM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Conditions on the quiz or exam.

1. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.
2. Students are/are not allowed to work with or talk to other students during quizzes and/or exams.

Material	Permitted?	
	Yes	No
Handwritten Notes Conditions: i.e. size of note sheet	Yes	
Typed Notes Conditions: i.e. size of note sheet	Yes	
Textbooks Conditions: i.e. specific books	Yes	
Readings Conditions: i.e. specific documents	Yes	
Other (specify)	None	

Proctorio

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This course will use Proctorio, a remote proctoring solution designed to protect the integrity of this course's assessments. Proctorio is a trusted remote proctoring provider because of its commitment to student privacy. Proctorio uses Single Sign-On through our LMS and only approved institution individuals, including me as your instructor, will have access to your exam data. Proctorio only runs during your exam as a browser extension. Before getting started on your first exam, make sure to follow the instructions in Proctorio's Quick Start Test Taker Guide for how to install and use the extension. To verify your computer system meets the requirements and everything is installed correctly, take the practice quiz. This will ensure that everything will run smoothly on the day of the exam.

LEARNING ACCOMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit https://www.stevens.edu/office-disability-services. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at pgehman@stevens.edu or by phone 201-216-3748.

Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

INCLUSIVITY

Name and Pronoun Usage

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

Inclusion Statement

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a

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resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

MENTAL HEALTH RESOURCES

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments are can be made by phone (201-216-5177).

EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time sensitive, please email the CARE Team at care@stevens.edu. A member of the CARE Team will respond to your concern as soon as possible.

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