

Data Science Certificate

General Information About Completion

Updated 12/8/17

Introduction

This guide is designed to help you form expectations about the program you are beginning as well as point you in the direction of resources that will help you be successful as an online learner. This guide is designed to complement resources that are available on the Institute for Academic Outreach website at <http://institute.truman.edu/graduate> and well as those on Truman's website for online learning support at <http://online.truman.edu>. Most of these resources are available in digital form to allow you quick and easy access to important information about your program. If you have questions that cannot be answered by these resources, the staff of the Institute for Academic Outreach is available from 8 AM – 5 PM Central Time at 660-785-5384 to help point you in the right direction. After hours, please leave a message, or e-mail us at institute@truman.edu and we'll do what we can to promptly route assistance your way!

Learning Objectives of the Program

Participants in this certificate program will be able to:

- understand how the techniques of data science are used to solve real-world problems in an applied area
- use data mining tools and algorithms to solve real-world problems
- use machine learning tools and algorithms to solve real-world problems
- use data visualization tools and algorithms to find and present patterns hidden in real-world datasets
- create coherent, unified, usable datasets from disparate, incomplete, dirty, and massive data sources

Additionally, each course offered as part of the program will offer specific objectives unique to that subject matter. These objectives are described, in part, in course descriptions located on the program website at <http://institute.truman.edu/dataapply/>. Instructors will also include specific course objectives in their course syllabi.

Course Requirements and Program Structure

- **PDAT 610G – Introduction to Data Science**
- **PDAT 611G – Big Data Management**
- **PDAT 613G – Data Mining**
- **PDAT 615G – Machine Learning**
- **PDAT 620G – Capstone**

Course Descriptions

PDAT 610G Introduction to Data Science [3 credit hours]

A study of what data science is, how it works, and its impact on our world, and the tools used in its practices.

Prerequisites: Students entering the program must have completed CS 170 or CS 180 (or their equivalent from another University) and STAT 190 (or the equivalent from another University). These courses are offered online during Truman's summer session for students needing to complete these prerequisites.

PDAT 611G Big Data Management [3 credit hours]

(Prerequisite – PDAT 610G) Exploration of data analysis of very large data sets. Problems of scalability, network failure, and ill-suited data sets. Examination of the capabilities and limitations of available tools.

PDAT 613G Data Mining [3 credit hours]

(Prerequisite – PDAT 610G) An exploration of techniques used to find patterns in very large data sets, with an emphasis on the statistical structure of the approaches and practical uses of key tools.

PDAT 615G Machine Learning [3 credit hours]

(Prerequisite – PDAT 610G) This course introduces the theory and practice of machine learning. Statistical learning techniques such as regression, regularization, and principal component analysis are covered. Programming in a popular machine learning language such as R or Python is reviewed. Approaches such as neural networks, support vector machines, unsupervised learning, and reinforcement learning are covered.

PDAT 620G Capstone [3 credit hours]

(Prerequisite – PDAT 610G) This course serves as the culmination of the data science certificate program. Students, working alone or in a pre-approved group, complete a data science project within their given discipline. The deliverables for this project include a technical paper (written in R Markdown) that details the project and the steps taken, and an online presentation of the results.

Technology Required to Complete the Program

(Updated July 31, 2016)

Students participating in the certificate program will take their courses entirely online. Students access course content and submit assignments by the Blackboard system (<http://blackboard.truman.edu>). Students using Blackboard will need a broadband Internet connection, a computer with sufficient processing speed, and a compatible web browser. For most operating systems (Windows XP or later; Mac OSX) updated browsers (Internet Explorer, Safari, Firefox, Chrome), with recent updates, work with Blackboard. For a complete list of compatibility tests and certifications for different operating systems and browsers, visit:

http://learningtechnologies.truman.edu/blackboard/blackboard_browser_setup.asp

For most students, having regular and personal access to a compatible computer is desirable. While it may be possible to complete the program using someone else's computer, or a computer in a public location, students should understand that they are expected to complete required activities in a timely fashion. Therefore, having provisions for regular and unfettered access to both a computer and the Internet is essential to completing this program.

A recent version of Windows will be required for PDAT 610, with modest requirements for CPU, RAM, and disk space. Any recent Windows computer should work for the purposes of this program. At present the packages designed for this course will not work for Mac and Linux. All the software is free and open source, but no package or instructions will be available for non-Windows platforms at the present time.

Prerequisite Knowledge for Completing the Program

The Data Science Certificate is as an opportunity for computer science graduates - and professionals with significant practical experience but without formal computer science degrees - to earn advanced experience that meets a growing need for data science understanding in the workplace. The program offers an alternative to an advanced degree in computer science, while allowing students the requisite skill development to make a greater contribution to their jobs and to advance in their careers. This program is designed for students who have a Bachelor's degree in computer science, or industry or government professionals with experience in information technology, including a knowledge of operating systems, networking, and networking applications.

Estimated Costs Associated with Completing the Program

As of January 1, 2018, one credit of graduate tuition for this program was \$359.50. Students also pay a \$30 fee for online course support and a \$75 fee for adaptive learning software support. All courses in the program are 3-credit courses. Students are required to complete five courses (15 credits) to receive this certificate.

The total cost of tuition and fees for a student will be \$5,917.50 at current tuition rates, or \$1183.50 per course. There is no distinction between in-state and out-of-state fees in this program. The application fee for graduate students is waived.

Students taking at least 6 credit hours in a term (2 courses) will be required to pay an additional \$139 in student services fees.

Costs for textbooks will vary from course to course and may be purchased through the Truman State University Bookstore (an outlet of Follette) or online through providers such as Amazon.com. The use of textbooks in this program is minimal.

Tuition and fee rates are subject to change with notice.

Timeframe and Options for Timely Completion of Coursework

Courses in the Data Science Certificate are scheduled in six eight-week sessions. Students may start the program at the beginning of any of these six terms. The program is designed for students to complete one course at a time. Students ready to enter the program directly, without taking pre-requisites, can complete the program in just under one year. However, students whose schedules permit can take more than one course at a time after completing PDAT 610. PDAT 620 should not be started prior to completion of the other four courses in the program.

Library and Learning Support Services

Most critical services of Pickler Memorial Library on the Truman State University campus are accessible to online students. Regularly enrolled Truman students may access the library database, complete with hundreds of fully online journals, using their Truman ID and password. These resources must be accessed using a Virtual Private Network. Instructions for downloading the necessary software can be located at <https://secure.truman.edu/its-s/vpn/>.

Instructors in your online courses will make every effort to confine readings and critical assignments to materials that can be obtained online, via the library's electronic databases, or via Blackboard.

Truman students are also eligible to request materials via Interlibrary Loan and the various libraries of the MOBIUS consortium. However, students must be physically present to retrieve and return books.

Important Campus Offices and Contact Information

During your time as a Truman State you may wish to use the services of a variety of different offices on campus. While you may not be physically located on campus, you are welcome to avail yourself of these services.

| Office | E-Mail | Phone | FAX |
|--------------------------------------------------|------------------------------------------------------------|--------------|--------------|
| Business Office-Student Accounts | staccts@truman.edu | 660-785-4074 | 660-785-7420 |
| Career Center | pollym@truman.edu | 660-785-4353 | 660-785-4366 |
| Disability Services | ds@truman.edu | 660-785-4478 | 660-785-4011 |

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| Financial Aid | finaid@truman.edu | 660-785-4130 | 660-785-7389 |
| Graduate Office | gradinfo@truman.edu | 660-785-4109 | 660-785-7460 |
| IT Help Desk | Customer Web Interface | 660-785-4544 | NA |
| Library, Pickler Memorial | Ask A Librarian | 660-785-4038 | 660-785-7415 |
| Multicultural Affairs | pmoore@truman.edu | 660-785-4142 | 660-785-7524 |
| Registrar | registrar@truman.edu | 660-785-4143 | 660-785-7396 |
| Truman Bookstore | truman@bkstr.com | 660-785-4212 | 660-665-3202 |
| Institute for Academic Outreach | institute@truman.edu | 660-785-5384 | 660-785-7202 |
| University Counseling Services | ucs@truman.edu | 660-785-4014 | 660-785-7444 |
| Veterans Representative (see Registrar) | registrar@truman.edu | 660-785-4143 | NA |
| Women's Resource Center | wrc@truman.edu | 660-785-7224 | NA |
| Writing Center | write@truman.edu | 660-785-4484 | 660-785-7486 |

Interacting with Faculty and Fellow Students Online

Each of your professors will be available to you online and over the phone. At the beginning of the course, professors will provide you with a syllabus for the course, indicating their e-mail address, an office phone number, and optimal times for reaching them with questions. Because the courses in this program are asynchronous and partially self-paced, e-mail may often be the best option for getting in touch with your professor quickly. It helps to make the purpose of your e-mail very clear in the subject line, such as “Concurrent Programming Class – Questions About Assignment” or “Machine Learning Class – Clarification of Due Dates.” Remember that professors in online courses might get lots of different communications from students during the course of the day, and if you do the bulk of your work on a class at night, you may not get a response to your question immediately.

Many online courses will utilize discussion boards or other interactive tools to get you talking with your classmates and professors on a regular basis. While some courses will require a certain level of interaction on these discussion boards, others may make that interaction optional. Where they exist, **we strongly encourage you to interact regularly in these forums regardless of the grade attached to that interaction.** Interacting with your classmates is critical to the learning process, but such interaction will also enable you to make personal connections that will provide you support throughout the experience. Additionally, Blackboard allows you to e-mail fellow students directly from the class page. This function maintains the privacy of student e-mail addresses, but allows you the full flexibility to ask questions of, and collaborate with, your fellow students and instructor.

Each of the courses in this program also feature real-time video “meet-ups” and virtual offices hours with your professor. It is highly recommended that you participate in these activities.

Interaction is at the very core of an online course. Do not fear engaging with one another!

Helpful Tips for Learning Online

Learning online is very different than learning in a traditional classroom. While there are a number of ways in which online learning can be superior to the classroom experience, it does take a certain degree of discipline to stay on top of your work online. We have assembled some online resources to help you perform to the best of your ability in these courses. This material can be accessed at <http://online.truman.edu>. We would encourage you to read some of the instruction materials at this site as well as view the video panel of online instructors made available there (as well as on many of our online course sites).

In the meantime, consider these useful tips:

- (1) **Log on to your class every day.** Even if you have completed the assigned material for a particular time span or module, it is important to remain engaged. Check for updates on class projects for assignments. View and contribute to discussion boards. Engage with your classmates.
- (2) **Check your e-mail regularly and make sure you set your junk mail filters to allow for incoming e-mail from the truman.edu domain.** It might be helpful to check your junkbox for the first few days of the course to make sure e-mails related to the class don't accidentally go there. If you use an e-mail address other than that assigned to you by Truman, be sure to make sure your Truman e-mail address is set to forward to your personal e-mail. Blackboard, as well as Truview, will default sent e-mails to your Truman account.
- (3) **Don't put off until tomorrow what you can do today!** This advice about procrastination is no more important than it is when dealing with an online course. The temptation with asynchronous coursework is to "let work go" for a week or two when life gets busy. Unfortunately, you will find it is hard to catch up on a course when you don't stay with it. Additionally, you'll find it particularly hard to find your interactions with peers, and on discussion boards, meaningful. Eight week courses will go by FAST! This can be energizing and motivating, but you cannot treat this experience like you might have a full semester on-campus class when you were in college.
- (4) **Make engaging with your online class part of your daily routine.** We are creatures of habit. If at all possible, plan to interact with your online course at about the same time each day. The more routine the interaction is, the more likely you are to keep up with it.
- (5) **Ask for help if you need it.** Your professor, the staff of the Institute for Academic Outreach, and the staff working in the various support office on campus are here to help you. We understand that getting used to an online course might take some time. Feel free to ask questions as often as you need to succeed.

Additional Questions?

Need help with something not covered in this packet? Contact the Institute for Academic Outreach and we'll help you with your problem. Call us at 660-785-5384 or email us at institute@truman.edu.