

The Nuts and Bolts of Creating a Two-Year Data Science Program



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Prof. David Singletary

A.S in Data Science Technology (2019)

Mission/Purpose

The mission of the Data Science Technology Associate in Science program is to prepare students to enter or advance in the field of data science by combining traditional college education with hands-on training in areas of data acquisition, processing and transformation techniques applied to modeling, analysis and visualization.

The Program

The Data Science Technology program prepares students for a respected career as a data science technician. The field of data science involves the most cutting-edge sectors within information technology. Data science extends to multiple areas, including artificial intelligence, biotechnology, computer engineering, computer science, information technology, robotics and telecommunications.

The program curriculum includes activities that focus on the acquisition of data in both structured and unstructured formats, cleaning, modeling and analysis of acquired data, and the extraction of knowledge or insights using statistical processes and systems. Students also study the identification of data sources, retrieval issues and methodologies, data security and the use of informational tools.

Embedded Certificates

- Old

Embedded Certificate(s)

Two technical certificates are available within this degree program: [Data Science Technician I \(6985\)\(T.C.\)](#) and [Data Science Technician II \(6987\)\(T.C.\)](#). Students may pursue the A.S. degree and earn technical certificates while completing the requirements for the degree, or pursue one or more certificates to develop or upgrade their skills in a particular field. Contact an advisor to determine the career education path that is best for you.

- New (catalog description pending)
 - Data Science Technician
 - FinTech Technician

How Did We Get Here?

- Start with the A.S. in Computer Information Technology (2018)
- "Lay of the land" – the A.S. in Computer Information Technology program as we started designing the new program:

The Program

The Computer Information Technology program prepares you for a respected career as a developer, programmer, programmer-analyst, database developer, or web developer. You'll study program and systems design, computer communications, database development, web development, customer support, and software development in specific languages. Our relationship with Microsoft's Developer Network Academic Alliance allows you to download a free, licensed copy of the Microsoft server and developer applications, operating systems and integrated development environments for programming languages taught in your classes. A 50-hour internship is included in the program to provide valuable work experience.

The Computer Information Technology degree program allows you to focus in one of three career tracks:

- **Software Development Track:** The Software Development Track allows for specialization in software development using modern languages. Students may select 6 credits from C language, C++, C#, Java, J2EE, or Visual Basic.NET, ASP.NET, CAPM, Special Topics or Introduction to IT.
- **Web Track:** The Web Track allows for specialization in web development using modern web technologies. Students may select 6 credits from web design, web management, Special Topics or Introduction to IT.
- **Database Track:** The Database Track allows for specialization in database development using modern database technologies. Students may select 6 credits from Oracle SQL and PL/SQL, database administration, M.S. Access database, Special Topics or Introduction to IT.

Substantive Changes

- Substantive changes in Florida can result in extended time periods for approval of a new program

| Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) Assessment | | | | |
|---|--------------------------|-----|--------------------------|----|
| <p><i>In order to maintain the College's continued accreditation through the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC), all originators are required to complete this section to determine if reporting to SACSCOC is required. Please contact the Office of Institutional Effectiveness and Accreditation (OIEA) at oiea@fscj.edu at the beginning of the proposal process to discuss the specific requirements for your proposed change to minimize the possibility of implementation delay.</i></p> <p><i>If you answer YES to one or more of the questions below, complete the substantive change intake form found on the OIEA website. Timelines for the development and submission of reports to SACSCOC can also be found on the OIEA website.</i></p> <p><i>Based on the information provided within the proposal, please identify if the proposal involves any of the following actions related to substantive change.</i></p> | | | | |
| The development of a new degree or certificate program? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| A contract, MOU, grant or consortium for the development of all or part of a new program or course? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| The inactivation of a degree or certificate program? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| An increase or decrease in the total degree or certificate program hours by $\geq 25\%$? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Adding or modifying coursework that requires new faculty, course content, equipment, facilities, library or other resources? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| Changing the program from clock hours to credit hours or vice versa? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| The instruction of courses delivered by College faculty/instructors and/or employees at an off-campus location? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

Substantive Changes

- To avoid the "substantive change" categorization for our new program, we examined the department's curriculum landscape to see where we could lay the groundwork for a "non-substantive" design by integrating data science outcomes into existing courses and including them in a temporary track in an existing program.
- New learning outcomes were added to the following courses:
 - Introduction to Information Technology
 - Programming in Python
 - Computer Networks and Telecommunications

A.S. Computer Information Technology 2018

- Additional Learning Outcomes:
 - Introduction to Information Technology
 - "Use data science terminology to describe concepts, programming languages, and tools used for data acquisition and data analysis."
 - Programming in Python
 - "Describe the Data Life Cycle and how it is implemented in Python"
 - "Write Python applications which use Numpy and Pandas to manipulate and analyze data"
 - "Write Python applications which use Matplotlib to visualize data"
 - Computer Networks and Telecommunications
 - "Describe the concepts of network virtualization and cloud computing"

A.S. Computer Information Technology 2019/2020

- In 2019 the Data Science track was added to the CIT program to help the modified courses and impending program to get some traction

The Program

The Computer Information Technology program prepares you for a respected career as a developer, programmer, programmer-analyst, database developer, or web developer. You'll study program and systems design, computer communications, database development, web development, customer support, and software development in specific languages. Our relationship with Microsoft's Developer Network Academic Alliance allows you to download a free, licensed copy of the Microsoft server and developer applications, operating systems, and integrated development environments for programming languages taught in your classes. A 50-hour internship is included in the program to provide valuable work experience.

The Computer Information Technology degree program allows you to focus in one of four career tracks:

- [Software Development Track](#): The Software Development Track allows for specialization in software development using modern languages. Students may select 9 credits from C language, C++, C#, Java, Java EE or Visual Basic.NET, ASP.NET, CAPM, Special Topics, or Introduction to IT.
Note: *Students who select COP 2073C or CTS 2910C to satisfy elective coursework options are required to take STA 2023 as a prerequisite for enrollment into each course.*
- [Web Track](#): The Web Track allows for specialization in web development using modern web technologies. Students may select 9 credits from web design, web management, Special Topics, or Introduction to IT.
- [Database Track](#): The Database Track allows for specialization in database development using modern database technologies. Students may select 9 credits from Oracle SQL and PL/SQL, database administration, M.S. Access database, Special Topics, or Introduction to IT.
- [Data Science Track](#): The Data Science Track allows for specialization in data science. Students may select 9 credits from programming in Python, SAS, R and data analytics, big data and data warehousing.

Data Science Track

- Added to the CIT program in 2018
- 9 Credit Hours, 3 Courses Minimum (prerequisites not listed)
 - **CIS 2349C - Introduction to Big Data Using Hadoop (New)**
 - **COP 2034C - Programming in Python**
 - **COP 2551C - Introduction to Object-Oriented Programming with Java**
 - **COP 2073C - Introduction to Statistical Programming with R (New)**
 - Note: Students must complete STA 2023 prior to enrollment in this course.
 - **CAP 2787C - Data Warehousing (derived from 4000-level BI course)**
 - **CTS 2456C - Introduction to SAS Programming (New)**
- In 2021 the track was removed since the A.S. in Data Science Technology program implementation was complete

NSF/ATE Grant

- DataTEC (Data Science Technician Education & Careers)

"Meeting Industry Needs Through a Two-Year Data Science Technician Education Program"

NSF grant #1902524

DataTEC Grant Timeline – Years 1 & 2

| Year One: 2019-2020 | |
|----------------------------|---|
| Fall 2019 | <ul style="list-style-type: none">• Host grant orientation meeting• Meet with BILT for curriculum design and certification skill needs• External Evaluator develops evaluation logic model, provides measurement process• Faculty work with industry experts on curriculum content/modifications and develop online and lab components for courses |
| Spring 2020 | <ul style="list-style-type: none">• Develop underrepresented student recruitment plan• Submit new program request form for credit program to FL Dept. of Ed |
| Summer 2020 | <ul style="list-style-type: none">• Host Data Science Working Connections for faculty• Curricular modifications reviewed/approved by FSCJ Curriculum Committee• Year One evaluation report is completed and submitted |
| Year Two: 2020-2021 | |
| Fall 2020 to Summer 2021 | <ul style="list-style-type: none">• Once framework is approved by FL Dept. of Ed, create curriculum proposal for submission to FSCJ's Curriculum Committee for Provost approval• Work with SACSCOC for any implications with accreditation• Deploy recruitment plan for underrepresented students• Host Data Science Working Connections for faculty• Year Two evaluation report is completed and submitted |

DataTEC Grant Timeline – Year 3 & Ongoing

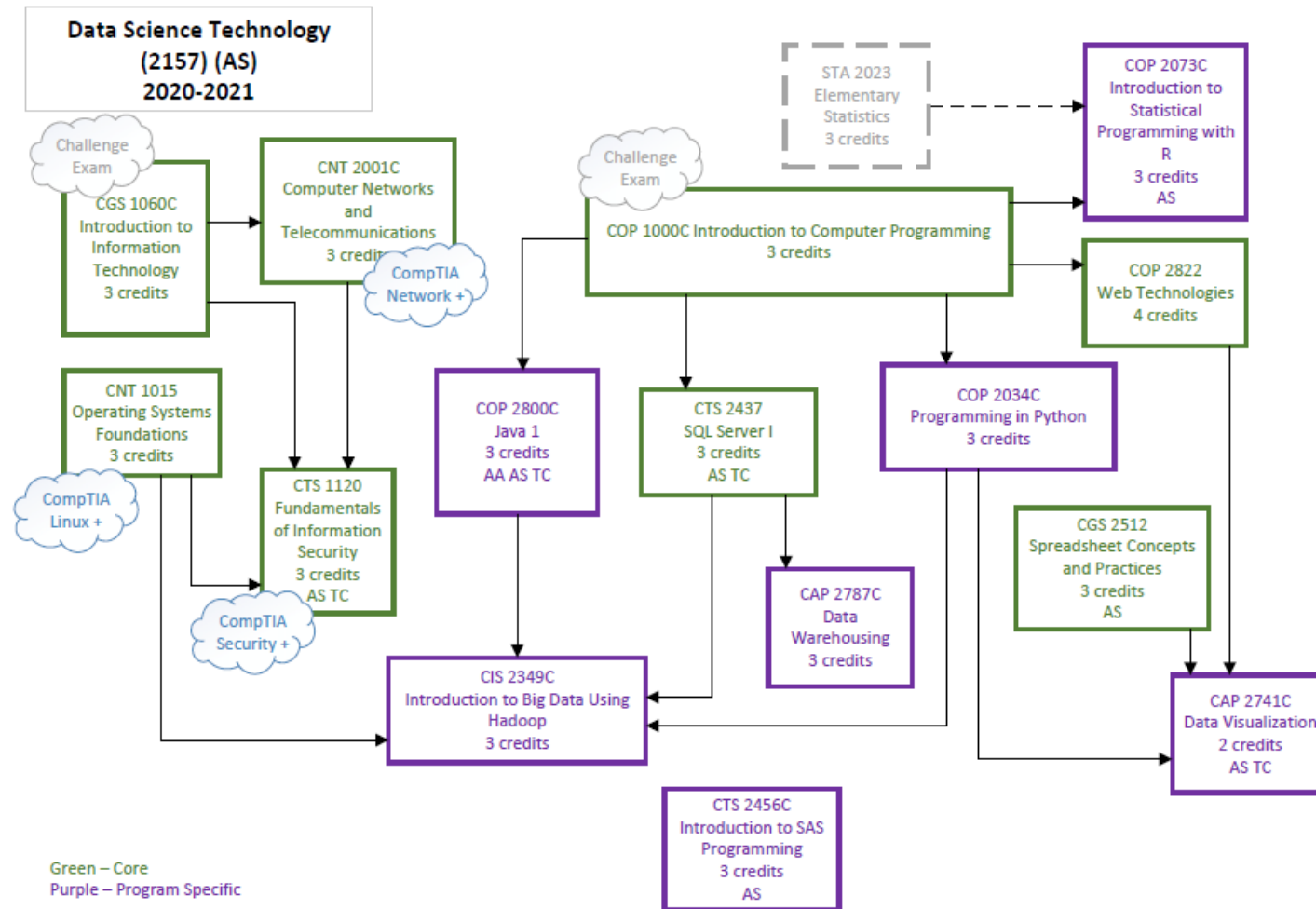
| Year Three: 2021-2022 | |
|--|---|
| Fall 2021 to Summer 2022 | <ul style="list-style-type: none">• Full implementation of program, students enrolling in Data Science program; new/modified courses launched with cohorts• FSCJ continues offering courses, students entering and completing programs• Students provide feedback on curricula activities, lab activities, evaluation and assessment activities and on their overall experience in the courses• Host Data Science Working Connections for faculty• Year 3 and cumulative evaluation report submitted; Dissemination of best practices |
| Ongoing Project Sustaining Activities | |
| Quarterly BILT meetings; Recruitment of underrepresented students; Collect formative evaluation data (shared with PI 1x times a year); Evaluator site visits in Oct/March each year; Project personnel attend STEM and Data Science conferences for dissemination and professional development | |

- Year 4 Extension Approved Spring 2022

A.S. Data Science Technology Curriculum

- CAP 2741C - Data Visualization
- CAP 2787C - Data Warehousing
- CGS 1060C - Introduction to Information Technology
- CGS 2512C - Spreadsheet Concepts and Practices
- CIS 2349C - Introduction to Big Data Using Hadoop
- CNT 1015 - Operating Systems Foundations
- CNT 2001C - Computer Networks and Telecommunications
- COP 1000C - Introduction to Computer Programming
- COP 2034C - Programming in Python
- COP 2073C - Introduction to Statistical Programming with R
- COP 2800C - Java 1
- COP 2822C - Web Technologies
- CTS 1120C - Fundamentals of Information Security
- CTS 2437C - SQL Server I - Fundamentals
- CTS 2456C - Introduction to SAS Programming


Course Sequence Flowchart











Recommended Course Sequence

| | |
|----------|--|
| Term I | ENC 1101 English Composition MAC 1105 College Algebra (or MGF1106 or MGF1107) CGS 1060C Introduction to Information Technology CNT 1015 Operating Systems Foundations |
| Term II | Humanities (Refer to General Education Requirements) COP 1000C Introduction to Computer Programming CNT 2001C Computer Networks and Telecommunications STA 2023 Elementary Statistics |
| Term III | CTS 1120C Fundamentals of Information Security CTS 2437C Introduction to SQL CGS 2512 Spreadsheet Concepts and Practices COP2800C Java 1 |
| Term IV | Social Science (Refer to General Education Requirements) COP2034C Programming in Python COP2822C Web Technologies CAP2787C Data Warehousing |
| Term V | COP2073C Introduction to Statistical Programming with R CIS2349C Big Data with Hadoop CTS2456C Introduction to SAS CAP2741C Data Visualization |

Free Textbooks for Most Courses







R for Data Science

★★★★★ 7 REVIEWS


by Garrett Golemund, Hadley Wickham

Publisher: O'Reilly Media, Inc.

Release Date: December 2016

ISBN: 9781491910399

Topic: R




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Book Description

Learn how to use R to turn raw data into insight, knowledge, and understanding. This book introduces you to R, RStudio, and the tidyverse, a collection of R packages designed to work together to make data science fast, fluent, and fun. Suitable for readers with no previous programming experience, R for Data Science is designed to get you doing data science as quickly as possible.



Industry Certification Exam Preparation

- Students will be prepared through their coursework to take exams which provide the following certifications:
 - CompTIA Network+ (CNT2001C)
 - CompTIA Security+ (CTS1120C)
 - Oracle Java OCA SE8 (COP2800C)
 - SAS Base Programming (CTS2450C)
 - Certified Associate in Python Programming (PCAP) (COP2034C)
 - Microsoft Office Specialist / Excel (CGS2512)
 - Tableau Desktop Specialist (CAP2741C)
- Exam Voucher Grant Funds Available

Useful Links

- Associate's Degree State Framework (Approved by Florida State DOE)
 - <http://www.fldoe.org/core/fileparse.php/18703/urlt/1511010100-1920.rtf>
- Florida State College at Jacksonville (FSCJ) Program Page
 - <https://www.fscj.edu/academics/areas-of-study/stem/2157>
- Grant Summary page
 - <https://www.fscj.edu/academics/workforce-education/grant-programs/datatec>



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