

**Interagency Committee for Apprenticeship (IACA)**  
**Occupational Framework for Registered Apprenticeship**

March 5, 2021,

Dear Information Technology (IT) Colleagues,

Rapidly advancing technology, tremendous economic change, and COVID-19 pandemic response has moved workers online and increased the need for a prepared IT workforce. This is true across economic sectors with employers seeking to hire qualified and skilled employees.

Unfortunately workforce gaps remain in essential IT positions like data analyst, networks, and cybersecurity. Industry and technology-based occupations seek a match with skilled workforce; but significant challenges remain to finding and hiring qualified talent. One particular challenge is understanding currently needed high demand skills that would make a difference in providing talent pool of numerous prospective new employees for your organization. We request your feedback and insight as an IT subject matter expert to help us meet these challenges.

The California Interagency Advisory Committee on Apprenticeship (IACA) IT Subcommittee represents education, training providers, and industry. We focus on leveraging registered apprenticeships to support high demand IT talent workforce needs.

We have developed key Model Industry Training Competencies (MITCs) to better align education/training programs with labor market needs. Attached is a survey which includes MITCs for data analyst (big data) and cybersecurity analyst occupations found across California for your review. We seek your input on the skills and competencies you seek in prospective employees. What knowledge and abilities are valued by today's IT employer/industry?

Please complete the survey to share whether you agree or disagree with the skills and competencies identified. We encourage you to leave comments and suggestions. We anticipate the survey to take approximately 15 minutes of your time and remain open through May 5, 2021.

Thank you very much for your feedback and suggestions!

**Comments and Suggestions:** We seek IT industry feedback on the following questions:

**Question #1:** Do you agree/disagree with the skills and competencies identified on the MITCs below?

MITC	Strongly Agree	Agreed	Neutral	Disagree	Strongly Disagree
Data Analyst	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Cybersecurity Analyst	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

**Question #2:** Do you have any comments, suggestions, feedback to make regarding the MITC provided? Anything missing or require further clarification?

Click or tap here to enter text.

**Question #3:** Do you have any suggestions to make regarding additional competencies/skills to include that you fit your specific industry/employer needs?

Click or tap here to enter text.

**Question #4:** What is your sense of professional industry/employer support for these MITCs and the registered apprenticeship workforce development model?

Click or tap here to enter text.

Your input is deeply appreciated and thanks for your participation! Please return feedback to [kclement@mail.fresnostate.edu](mailto:kclement@mail.fresnostate.edu) and [TArefain@dir.ca.gov](mailto:TArefain@dir.ca.gov) by **May 5, 2021** so we can finish the proposed MITC templates and distribute across California industry and employers. If you have any additional questions, comments, or suggestions on these MITCs or ways to align and implement a registered apprenticeship solution at your place of business, feel free to reach out to us at the above e-mail addresses.

Thank you for your time and feedback.

Best regards,

- Dr. Keith Clement, Professor, Fresno State and IACA IT Subcommittee Chair
- Tsegay Arefaine, Strategic Business Advisor, Division of Apprenticeship (DAS)

**Data Analyst MITC Developed by:**

- Annie Tahitinen, Director of Technology Programs, JVS
- Michael Specchierla, Executive Director, SLOCOE, SLO Partners

**Cybersecurity Analyst MITC Developed by:**

- Olivia Herriford, Regional Director, Employer Engagement, ICT Digital Media Sector, Hosted by Diablo Valley College

DRAFT TEMPLATE v.6

Interagency Committee for Apprenticeship (IACA)  
Occupational Framework for Registered Apprenticeship

<b>Name of Subcommittee:</b>	Click or tap here to enter text.
Occupation	Data Analyst
Job titles	Data Analyst, Financial Analyst, Market Research Analyst, Business Analyst, Corporate Strategy Analyst, Compensation and Benefits Analyst, Budget Analyst, Insurance Underwriting Analyst, Sales Analyst, Actuary, Credit Analyst, Business Product Analyst, Social Media Data Analyst, Machine Learning Analyst
O*NET Codes (include for each job title)	15-1199.08
RAPIDS Codes	Click or tap here to enter text.
Created	Click or tap here to enter text.
Revision Timeline	Click or tap here to enter text.

**EEO CONSIDERATIONS**

*Include here considerations to expand access to the proposed apprenticeable occupation(s) for California's historically underrepresented and underutilized populations through strategic outreach, recruitment, selection, use of pre-apprentice linkage and/or other support. This may include:*

- 1. Description of key barriers to entry and/or advancement in this proposed apprenticeable occupation(s) for California's historically underrepresented and underutilized populations.*
- 2. Description of internal processes that ensure equity and inclusion in access and promotion for this proposed apprenticeable occupation(s) for California's historically underrepresented and underutilized populations.*
- 3. Identification of relevant pre-apprentice linkage agreements.*
- 4. Any relevant participant reporting showing inclusion rates of underrepresented and underutilized populations.*

*This statement should be reviewed by the EEOC and Pre-Apprenticeship Subcommittees before submission to IACA.*

**1. LENGTH OF TRAINING**

*Minimum length of program and hours of OJT*

Type	Hours
Classroom Training	Click or tap here to enter text.

On-the-job Training	Click or tap here to enter text.
Total Hours	Click or tap here to enter text.

## 2. PROGRAM TYPE

*Detail industry definition and criteria for “Competency-Based” and “Hybrid” programs for this occupation.*

☐ Competency-Based

☐ Hybrid

Comments: Click or tap here to enter text.

## 3. CERTIFICATIONS, LICENSURE, AND OTHER CREDENTIAL REQUIREMENTS

*List of credential details including Earned Before, During or After Apprenticeship. This should include identifying licensure requirements for occupations in information technology and other industries where there is DCA oversight.*

Certification Name	Type	Credentialing Agency(s)
Certificate/ Credential 1	Click or tap here to enter text.	Click or tap here to enter text.
Certificate/ Credential 2	Click or tap here to enter text.	Click or tap here to enter text.
Certificate/ Credential 3	Click or tap here to enter text.	Click or tap here to enter text.
License 1	Click or tap here to enter text.	Click or tap here to enter text.

4. **JOB FUNCTION 1: Interpret data, analyze results using statistical techniques and provide ongoing reports.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
Demonstrate knowledge of statistics and experience using statistical packages for analyzing datasets (Excel, SPSS, SAS etc.)		No	Yes	
Demonstrate knowledge of an experience with reporting packages (Business Objects etc.), database (SQL etc.), programming (XML, JavaScript, or ETL frameworks)		No	Yes	
Performing any mathematical or similar operations needed to get quantitative information ready for analysis.		No	Yes	
Demonstrate ability to translate word problems into mathematical expressions, manipulate algebraic expressions and solve equations, and graph different types of functions and understand the relationship between them.		No	Yes	
<p><b>Framing Structured Thinking - 25HRS</b></p> <p>Structured Thinking is the foundation of robust business analysis that can be used to identify the macro and micro value drivers of any business program, regardless of industry.</p> <p><b><u>Topics Covered:</u></b></p> <p>Structured thinking through case studies and problem statement worksheets</p> <p>Problem-solving frameworks and processes, such as the HDEIP Framework, 7-Step Problem Solving Framework, and others.</p> <p>Issue trees, hypothesis trees, and value driver trees</p>		Yes	No	

5. **JOB FUNCTION 2: Develop and implement databases, data collection systems, data analytics and other strategies that optimize statistical efficiency and quality.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
Maintain data systems and database; this includes fixing coding errors and other data-related problems		No	Yes	
Performing initial analysis for data quality checking (removing of corrupted data) and performing further analysis and interpretation to get meaning from the data		No	Yes	
Prepares for database expansion by studying plans and requirements, advising senior technical management, coordinating design and maintaining database performance by troubleshooting problems.		No	Yes	
Investigate data anomalies and other data-related problems.		No	Yes	
Demonstrate technical knowledge regarding data models, database design development, data mining and segmentation techniques		No	Yes	
Providing technical knowledge on data storage structures, data mining, and data cleansing		No	Yes	

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
<p>Analyzing Business Problems - <b>85HRS</b></p> <p>A key skill that analysts should have is the ability to structure their efforts around a central theme and present it to an executive with tangible business insight. In this module, students will be introduced to common financial concepts as well as the basics of economics.</p> <p>Students also review fundamental business statistics concepts, such as descriptive statistics, correlations, simple and multivariate regression, and confidence intervals. Students will apply your problem-solving and analytical skills to real-life data sets to derive business insights.</p> <p><b><u>Topics Covered:</u></b></p> <p>Using Excel to create a default evaluation model covering revenue and operational cost modelling.</p> <p>Financial concepts, including revenue, cost of goods sold, profit, balance sheets, cash flow statements, and EBITDA</p> <p>Economic concepts, including supply and demand curves, cost curves</p> <p>Statistical concepts, including descriptive statistics (mean, mode, standard deviation, correlations, etc.), simple and multivariate regression, confidence intervals.</p>		Yes	No	

6. **JOB FUNCTION 3: Acquire data from primary or secondary data sources and maintain databases/data systems.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
Reorganize data in a format that can be easily read by either human or machine		No	Yes	
Ability to assist in establishing the key required internal and external data sources as well as data availability and accessibility		No	Yes	
Utilize knowledge of data sources including how they are collected, where and how they are stored, within and external to the organization, to verify relevance of potential data sources.		No	Yes	
Ability to conduct data acquisition from relational database and flat files.		No	Yes	
Ability to hack/wrangle low complexity data selecting appropriate techniques such as parsing, or an algorithm, to create a data structure relevant to the problem.		No	Yes	

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
<p><b>Communicating Your Analysis - 60HRS</b></p> <p>Data analysts also need to be adept at presenting the results of their analysis to the appropriate stakeholders. This is a key, high-demand skill that separates effective business-oriented data analysts from the rest. You'll learn the different forms of presentation, and how to best prepare your presentations based on your audience and goal. More importantly, you'll learn to convert your analysis into a tangible or strategic insight that the business you're working for can capitalize on. This module covers best practices for presenting to both technical and non-technical audiences, ranging from front-line employees to executives. When you master the art of effective storytelling through visuals, executives won't just adopt your analysis—they'll promote adoption and grow the business based on those key insights.</p> <p><b><u>Topics Covered:</u></b></p> <p>Visualization tools such as Power Bland Tableau</p> <p>Creating presentations with PowerPoint, etc.</p> <p>Effective communication strategies, formats, and templates</p> <p>Presentations to technical and non- technical stakeholders, including C- suite executives, through case studies</p> <p>Presentation practice across different forms</p>		Yes	No	

**7. JOB FUNCTION 4: Identify, analyze, and interpret trends or patterns in complex data sets.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
Generating reports from single or multiple systems		No	Yes	
Knowledge of basic data audit techniques and approaches.		No	Yes	
Ability to assist the team with data quality assessment using experience of relevant tools and programming languages.		No	Yes	
Demonstrate knowledge of understanding of the data, potential issues such as missing values, duplicate data, and implications of data quality for the data analytics process.		No	Yes	
Ability to conduct data quality assessment.		No	Yes	
Translates data analytics outputs into clear and actionable insights and supports for decision making utilizing general understanding of the organizational context, meaning of the data and knowledge of the practical application of data analytics outputs.		No	Yes	

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
<p>Capstone Project 1 - <b>30HRS</b></p> <p>The capstone project brings together all the skills that you have learned up to now into a project based on a data set of your choosing. You'll work with your mentor to choose a data set from a diverse set of options across different industries; you'll also have the opportunity to use a data set outside the options we will provide. You'll conduct an end-to-end analysis of this data set, which will involve structuring relevant and valuable problems, stating a hypothesis, analyzing the information to prove or disprove the hypothesis, synthesizing insights, and creating a slide deck that you will present. The capstone will focus on and sharpen your ability to show executives how your analysis will help shape the organization's strategic or financial drivers. The capstone project will be a central piece of your portfolio and will provide you with an opportunity to showcase your skills during your job search.</p> <p><b><u>Topics Covered:</u></b></p> <p>Analytical frameworks Statistics using Excel Data visualization Executive presentation skills using PowerPoint</p>		Yes	No	

**8. JOB FUNCTION 5: Filter and “clean” data by reviewing computer reports, printouts, and performance indicators to locate and correct code problems.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
Knowledge of some basic data cleaning techniques and approaches such as data wrangling, batch processing, data mining, data enhancement, data harmonization and data standardization.		No	Yes	
Ability to assist the team with data cleaning of noisy and incomplete data using relevant tools and programming languages.		No	Yes	
Develops understanding of why data requires cleaning, including the organizational context, and the implications of this for data analysis processes.		No	Yes	
Utilize knowledge of how the interaction of multiple data issues, such as missing data, outliers, multiple values and meaning of data, impacts analysis and identifies an appropriate cleaning approach.		No	Yes	
Ability to identify and resolve established data issues.		No	Yes	

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
<p><b>Connecting Data Using SQL - 30HRS</b></p> <p>You've been asked to analyze an extensive set of data so you can answer the burning question your executive has. However, in order to do this, you need data, and you'll have to source this yourself! Say hello to data connectivity. As a business-oriented data analyst, it is expected that you will pull data from databases yourself and write the structured queries to extract the information you need. SQL is the default language used to interact with a traditional Relational Management Database (RMDb). In this module, you'll develop a high-level understanding of what databases are, learn about the databases that you can use in your work, and learn how to communicate with databases. You'll be asked to consolidate what you learn in this module with the skills you've developed throughout the rest of the course to complete a mini-project that will focus on extracting data from a database via SQL, analyzing it, and creating a presentation of your business insights.</p>		Yes	No	

**Topics Covered:**

Introduction to SQL, best practices in writing queries (including common table expressions), and common DA/BA tools

Introduction to structured and unstructured databases

Introduction to set theory

Case studies and hands-on exercises in writing SQL with real data

Advanced supplementary material (i.e., Mode SQL)

**9. JOB FUNCTION 6: Work with management to prioritize business and information needs.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
Create appropriate documentation that allows stakeholders to understand the steps of the data analysis process and duplicate or replicate the analysis if necessary.		No	Yes	
Prepare reports for executive leadership that effectively communicate trends, patterns, and predictions using relevant data.		No	Yes	
Demonstrating the significance of their work in the context of local, national, and global trends that impact both their organization and industry.		No	Yes	
Utilize general knowledge of data analytics to identify when an issue may be amenable to a data-driven solution and to assist with setting data analytics goals and deliverables.		No	Yes	

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
<p>Visualizing Data Using Python - <b>40HRS</b></p> <p>Coding skills, especially the ability to do data analysis in Python, are an additional skill set that will set you apart from your peers in the job market. As the world places more importance on collecting and analyzing data to make decisions, data sets continue to grow in size and complexity. Previously learned tools, like Excel, are limited in their ability to deal with large data sets. In this module, you'll learn the basics of Python and key Python libraries, including Pandas, NumPy, Matplotlib, Seaborn, and more. You will learn how to import and wrangle data, as well as visualize it. You'll learn to use Git, GitHub and Jupyter Notebooks, including how to set them up, work in them, and share your code and projects. You'll practice all these skills through relevant mini-projects and hands-on exercises.</p>		Yes	No	

**Topics Covered:**

Basic Python syntax

Introduction to Jupyter and Jupyter Notebooks

Data cleaning

Visualizing data and trends with Seaborn and Matplotlib

**10. JOB FUNCTION 7: Locate and define new process improvement opportunities.**

Competencies	Core or Optional	RSI (classroom)	OJT (work-based)	Type of Test
<p><b>Capstone Project 2 - 50HRS</b></p> <p>By this point in the course, you'll have learned all the skills you need to become a business-oriented data analyst. You'll have mastered how to effectively structure your hypotheses and how to draw a data hierarchy map to connect exclusively to the data sources you need. Additionally, you'll have the ability to extract data from a relational database using SQL and clean the data using Python. Lastly, you'll have mastered the different presentation personas and will be able to present your analysis either via PowerPoint or Tableau to create a compelling narrative! As your final submission, you'll employ all of these skills to create a second capstone project.</p> <p>You'll work with your mentor to choose a data set to focus on for this final project. Each of the data sets provided will be reflective of a different industry. If none of the data sets match your interests, you'll be able to have a discussion with your mentor about using an alternative data set that you find on your own. If you choose to use an outside data set, it'll be important for it to be in a database format—if it's not, you'll need to create the necessary tables yourself so you can extract your data via SQL.</p>		Yes	No	

The premise of this project will again focus on providing recommendations to executives that will showcase your business analysis skills and help to shape the organization's strategic or financial drivers. You will need to clearly state your hypotheses to outline the value of your

analysis before proceeding to prove or disprove your associated hypotheses and then you'll package these into a structured presentation that you'll present to your mentor.

**LIST OF NAMES OF SUB-COMMITTEE MEMBERS**

*Must include industry representatives of employers and employees.*

Dr. Keith Clement  
Meredith Stowell  
Miriam Farnbauer  
Michael Speccheria  
Jennifer Prado  
Kenneth Anyanwu  
Annie Tahtinen  
Katherine Webster  
Oliva Herriford  
Keith Koo  
Tsegay Arefaine

Comments, Suggestions, and Feedback