



## **Appendix A6**

**WORK PROCESS SCHEDULE**

**AND**

**RELATED INSTRUCTION OUTLINE**

**FOR THE OCCUPATION OF:**

**COMPUTER PROGRAMMER**

**O\*NET-SOC CODE: 15-1251.00 RAPIDS CODE: 0811CB**



## Appendix A6

### **WORK PROCESS SCHEDULE COMPUTER PROGRAMMER O\*NET-SOC CODE: 15-1251.00 RAPIDS CODE: 0811CB**

This schedule is attached to and a part of these Standards for the above identified occupation.

#### **1. APPRENTICESHIP APPROACH**

Time-based                       Competency-based                       Hybrid

#### **2. TERM OF APPRENTICESHIP**

The term of the occupation shall be defined by the attainment of all competencies of the position, which would be reasonably expected to occur within 2 to 3 years of OJL, supplemented by 305 hours of related instruction during the apprenticeship. The sponsor may recognize prior-learning achievements or demonstration of competencies to account for related instruction or OJL hours.

#### **3. RATIO OF APPRENTICES TO JOURNEYWORKERS**

The apprentice to journeyworker ratio is: 1 Apprentice to 1 Journeyworker per worksite.

#### **4. APPRENTICE WAGE SCHEDULE**

Apprentices shall be paid a progressively increasing schedule of wages. Apprentices' starting wage should be a minimum of \$14.77 per hour. The journeyworker wage is \$16.83 per hour, which is to be paid to the apprentice after completion of the apprenticeship. The starting wage and journeyworker wage may be adjusted to accommodate each employer and shall be uploaded into the Rapids database. This wage scale is specifically for Denver, CO, and may vary based on minimum wage laws in different geographic locations, which will be indicated on Appendix D.

**Term:**

1 <sup>st</sup> Period	Starting Wage (0-18 months)	\$14.77/hr
2 <sup>nd</sup> Period	On level (18-36 months)	\$15.87/hr
Completion	Full Competency	\$16.83/hr

#### **5. PROBATIONARY PERIOD**

Every apprentice selected for apprenticeship will serve a probationary period of 500 hours.

#### **6. SELECTION PROCEDURES**

Please see page 14.



**WORK PROCESS SCHEDULE  
COMPUTER PROGRAMMER  
O\*NET-SOC CODE: 15-1251.00 RAPIDS CODE: 0811CB**

**Description:** Computer Programmers create, modify, and test the code, forms, and script that allow computer applications to run. Work from specifications drawn up by software developers or other individuals. May assist software developers by analyzing user needs and designing software solutions. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

**On-The-Job Training:** Apprentices will receive training in the various work experiences listed below. The order in which this training is given will be determined by the flow of work on the job and will not necessarily be in the order listed.

Ratings are:

- (4) Exceeds Expectations (Advanced)
- (3) Meets Expectations (Proficient)
- (2) Meets Some Expectations (Emerging)
- (1) Does Not Yet Meet Expectations (Novice)
- (0) Not applicable (No Skill)

4. Exceeds Expectations (Advanced): Consistently exceeds performance standard established for the time in position. Achieves results above and beyond what is required. Extends themselves in their roles to exceed personally and as a team to achieve exceptional results.

3. Meets Expectations (Proficient): Employee meets all expectations in a fully satisfactory way and is proficient in the outlined competencies.

2. Meets Some Expectations (Emerging): Meets the performance standards established for time in position. Handles routine tasks & some unexpected situations with the usual amount of supervision. Can continue to develop with coaching, training or more experience to gain proficiency.

1. Does Not Yet Meet Expectations (Novice): Occasionally meets some of the objectives related to this goal but does not meet others in a fully satisfactory way. This performance level generally indicates the need for additional coaching, training or other plan for performance improvements.

0. Not Applicable (No Skill): Training in this competency has not yet begun.

Apprentices need to receive a “3” or better in each competency in order to complete the apprenticeship.



### Apprentice Competency Evaluation

Core Competencies	Required for this employer (yes/no)	Rating	Supervisor Sign-off	Date
<p><b>Software Development Best Practices</b>  <i>Understands software assurance best practices and their use in software development.</i></p> <ul style="list-style-type: none"> <li>● Describes multiple vulnerabilities and how to prevent them when designing applications (e.g., encryption, SQL injection, captcha).</li> <li>● Uses version control.</li> <li>● Describes object-oriented principles such as encapsulation or polymorphism.</li> <li>● Describes the value of a design pattern.</li> <li>● Manages version control (e.g., branching, merging).</li> <li>● Participates in code reviews and implements techniques to prevent vulnerabilities (e.g., encryption, captcha).</li> </ul>				
<p><b>Core Coding Languages</b>  <i>Develops simple frontend, backend and/or mobile applications utilizing core coding languages (e.g., Java, C#, Objective C, JavaScript, Swift) on a development platform; integrates data storage (including SQL), libraries, methods, interfaces, and objects and uses code analysis and debugging techniques; web developers need to be able to integrate HTML, CSS, web services (including REST), and a web framework (such as Angular or Spring MVC) into applications.</i></p> <ul style="list-style-type: none"> <li>● Codes simple software tasks or routines in support of software development work. May create simple web pages</li> <li>● Develops prototypes that can be used by a supervisor/senior software developer.</li> <li>● Contributes to research and development processes.</li> <li>● Creates applications leveraging object-oriented techniques that can be reliably used by a customer in production. Integrates data storage (including SQL), libraries, methods, interfaces, and objects.</li> </ul>				
<p><b>Web Development</b>  <i>Understands commonly used web development languages such as AJAX, XML, HTML 5, and JavaScript.</i></p>				



<ul style="list-style-type: none"> <li>• Describes and uses the web development language of HTML.</li> <li>• Builds an application using HTML, JavaScript, and JSON/XML</li> <li>• Uses at least one common framework (e.g., Twitter Bootstrap, Angular, React.js, or Spring MVC, Vue.js.).</li> </ul>				
<p><b>General Database</b>  <i>Uses SQL basics (e.g., selecting, inserting, updating, deleting records), at least one database management software application, and database fundamentals such as normalization, schemas, and relationships.</i></p> <ul style="list-style-type: none"> <li>• Describes CRUD operations and at least one type of database (e.g. document, relational). Uses database concepts (e.g., tables, columns, rows, schema, relationships, indexes).</li> <li>• Designs document, relational, or other databases.</li> <li>• Performs SQL CRUD operations with at least one database management software application</li> </ul>				
<p><b>Software Development Tools</b>  <i>Utilizes an IDE (Integrated Development Environment) (e.g., Visual Studio) and a source control system such as TFS or GitLab.</i></p> <ul style="list-style-type: none"> <li>• Utilizes an IDE to write code, perform version control, and debug simple software issues.</li> <li>• Debugs more complex software issues.</li> <li>• Incorporates libraries and frameworks into base code solutions.</li> <li>• Utilizes available features inside IDE such as unit testing automation and environment management.</li> </ul>				
<p><b>Design and Implementation</b>  <i>Assists customers in the gathering of requirements, and designs, implements, and supports simple technology solutions to existing business problems.</i></p> <ul style="list-style-type: none"> <li>• Describes a software development life cycle (SDLC).</li> <li>• Assists customers to elicit and document customer requirements.</li> <li>• Translates customer requirements into a technology solution that meets the customer’s needs expressed through a project/product plan.</li> </ul>				



Optional Competencies (One of the first three following competencies are required; the others are optional.)	Required for this employer (yes/no)	Rating	Supervisor Sign-off	Date
<p><b>Software Development: Web Front End</b>  <i>Leverages user experience and responsive design, web mobility, communication tools (such as AJAX), web services (including REST), a web framework, version control, and a development life cycle methodology (such as Agile).</i></p> <ul style="list-style-type: none"> <li>• Demonstrates an understanding of a software development life cycle (SDLC) using a process such as Agile; understands user interface/user experience (UI/UX).</li> <li>• Uses web services such as REST and web frameworks (e.g. Twitter Bootstrap, Angular, React.js, and Spring MVC) to create prototypes for UI/UX.</li> <li>• Designs and builds UI/UX and creates responsive design systems (displaying on multiple device types).</li> </ul>				
<p><b>Software Development: Back End</b>  <i>Leverages object-oriented techniques, web mobility, backend processes, communication tools, application programming interfaces (APIs), web services (including REST), a web framework, version control, and a development life cycle methodology (such as Agile).</i></p> <ul style="list-style-type: none"> <li>• Describes an SDLC such as Agile, object-oriented techniques, and web services such as REST.</li> <li>• Designs and models application programming interfaces (APIs).</li> <li>• Leverages object-oriented techniques to create web services and APIs.</li> </ul>				
<p><b>Software Development: Mobile</b>  <i>Leverages object-oriented techniques, user experience, web mobility, backend processes, communication tools, web services (including REST), a web framework, version control, and a development life cycle methodology (such as Agile).</i></p> <ul style="list-style-type: none"> <li>• Describes a software development life cycle (SDLC) and UI/UX within a mobile framework.</li> <li>• Describes object-oriented techniques and web services such as REST primarily within</li> </ul>				



<p>one mobile framework (e.g., React Native PhoneGap).</p> <ul style="list-style-type: none"> <li>• Uses object-oriented techniques and UI/UX to create web services such as REST and a mobile application in primarily one mobile framework (e.g., React Native, PhoneGap).</li> </ul>				
<p><b>Scripting</b>  <i>Develops and uses common scripting languages, such as PERL, Python, or shell scripts.</i></p> <ul style="list-style-type: none"> <li>• Describes the value and uses of scripts.</li> <li>• Writes basic scripts using common scripting languages (e.g., PERL, Python, and shell scripts) for individual tasks (e.g., tasks that will help the individual do a job more efficiently).</li> <li>• Identifies a problem in a product or environment that needs a script and then designs, develops, and implements a script to solve that problem. Primarily uses one scripting language (e.g., PERL, Python, shell scripts).</li> </ul>				

### Apprenticeship Competencies – Career Readiness

In addition to mastering all the essential technical competencies outlined in the work processes, an apprentice must consistently demonstrate growth and proficiency in the following career readiness competencies to complete the apprenticeship.

Apprentices will be evaluated in these competencies semi-annually, and the supervisor will initial and date the accomplishment of the career ready competency at each review.

Ratings are:

- (4) Exceeds Expectations (Advanced)
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- (2) Meets Some Expectations (Emerging)
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- (0) Not applicable (No Skill)

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1. Does Not Yet Meet Expectations (Novice): Occasionally meets some of the objectives related to this goal but does not meet others in a fully satisfactory way. This performance level generally indicates the need for additional coaching, training or other plan for performance improvements.

0. Not Applicable (No Skill): Training in this competency has not yet begun.

Apprentices need to receive a “3” or better in each competency in order to complete the apprenticeship.

<b>ENTREPRENEURIAL SKILLS</b>	<b>Required for this employer (yes/no)</b>	<b>Rating</b>	<b>Supervisor Sign-off</b>	<b>Date</b>
<b>Critical Thinking/Problem Solving</b> <ul style="list-style-type: none"> <li>● Recognize that problems can be identified, and possible solutions can be generated</li> <li>● Define the problem using a variety of strategies</li> <li>● Make connections between information gathered and personal experiences to apply and/or test solutions</li> </ul>				
<b>Creativity / Innovation</b> <ul style="list-style-type: none"> <li>● Demonstrate curiosity, imagination and eagerness to learn more</li> <li>● Build on personal experience to specify a challenging problem to investigate</li> <li>● Engage in novel approaches, moves, directions, ideas and/or perspectives</li> </ul>				
<b>Inquiry</b> <ul style="list-style-type: none"> <li>● Recognize and describe cause-and-effect relationships and patterns in everyday experiences</li> <li>● Investigate to form hypotheses, make observations and draw conclusions</li> <li>● Test hypotheses/prototype with planned process for getting feedback</li> </ul>				
<b>Risk Taking</b> <ul style="list-style-type: none"> <li>● Demonstrate a willingness to try new things</li> <li>● Demonstrate flexibility, imagination and inventiveness in taking on tasks and activities</li> <li>● Innovate from failure, connect learning across domains and recognize new opportunities</li> </ul>				





<b>PERSONAL SKILLS</b>	<b>Required for this employer (yes/no)</b>	<b>Rating</b>	<b>Supervisor Sign-off</b>	<b>Date</b>
<b>Self-Management / Self Awareness</b> <ul style="list-style-type: none"> <li>• Accurately recognize one's own emotions, thoughts and values and how they influence behavior</li> <li>• Appropriately express one's own emotions, thoughts and values and identify how they influence behavior</li> <li>• Assess personal strengths and limitations, with a well-grounded sense of confidence, optimism and a 'growth mindset'</li> </ul>				
<b>Self-Direction</b> <ul style="list-style-type: none"> <li>• Recognize personal characteristics, preferences, thoughts and strengths</li> <li>• Pursue opportunities to engage and learn interests</li> <li>• Apply knowledge to set goals, make informed decisions and transfer to new contexts</li> </ul>				
<b>Adaptability / Flexibility</b> <ul style="list-style-type: none"> <li>• Recognize emotional response to ideas that differ from one's own</li> <li>• Regulate reactions to differing perspectives</li> <li>• Look for and value in different perspectives expressed by others</li> </ul>				
<b>Perseverance / Resilience</b> <ul style="list-style-type: none"> <li>• Resist distractions, maintain attention, and continue the task at hand through frustration or challenges</li> <li>• Set goals and develop strategies to remain focused on learning goals</li> <li>• Focus on learning goals by employing motivation and familiar strategies for engagement and evaluate progress, making necessary changes to stay the course</li> </ul>				

<b>CIVIC/INTERPERSONAL SKILLS</b>	<b>Required for this employer (yes/no)</b>	<b>Rating</b>	<b>Supervisor Sign-off</b>	<b>Date</b>
<b>Collaboration / Teamwork</b> <ul style="list-style-type: none"> <li>• Recognize how personal actions have had a positive or negative impact on others with feedback as needed</li> <li>• Recognize how members of a community rely on each other, considering personal contributions as applicable</li> </ul>				



<ul style="list-style-type: none"> <li>Follow a process identified by others to help generate ideas, negotiate roles and responsibilities, and respects consensus in decision making</li> </ul>				
<b>Communication</b> <ul style="list-style-type: none"> <li>Articulate personal strengths and challenges using different forms of communication to express oneself</li> <li>Consider purpose, formality of context and audience, and distinct cultural norms when planning content, mode, delivery and expression</li> <li>Establish goals for communication and plan out steps accordingly</li> </ul>				
<b>Global / Cultural Awareness</b> <ul style="list-style-type: none"> <li>Compare attitudes and beliefs as an individual to others</li> <li>Identify and explain multiple perspectives (cultural, global) when exploring events, ideas and issues</li> <li>Plan and evaluate complex solutions to global challenges that are appropriate to their contexts using multiple disciplinary perspectives (such as cultural, historical and scientific)</li> </ul>				
<b>Ethics</b> <ul style="list-style-type: none"> <li>Takes great care with organizational data</li> <li>Does not disclose any kind of personal or sensitive organizational information; understands that all data is confidential</li> <li>Demonstrates honesty and integrity in all interactions. If an error is made, prioritizes minimal impact to the organization over their own reputation</li> </ul>				

<b>PROFESSIONAL SKILLS</b>	<b>Required for this employer (yes/no)</b>	<b>Rating</b>	<b>Supervisor Sign-off</b>	<b>Date</b>
<b>Task/Time Management</b> <ul style="list-style-type: none"> <li>Articulate task requirements and identify deadlines</li> <li>Develop and utilize basic task and time-management strategies effectively</li> <li>Demonstrate task-management attributes associated with producing high-quality products including the abilities to: 1) Work positively and ethically 2) Manage time and projects effectively 3) Multi-task 4) Clearly communicate with others</li> </ul>				



<p><b>Self-Advocacy</b></p> <ul style="list-style-type: none"> <li>• Appropriately express a range of emotions to communicate personal ideas/needs</li> <li>• Ask questions to develop further personal understanding</li> <li>• Demonstrate confidence in sharing ideas/feelings</li> </ul>				
<p><b>Work Ethic</b></p> <ul style="list-style-type: none"> <li>• Complete tasks with ongoing support</li> <li>• Seek clarity on tasks and needs occasional support</li> <li>• Demonstrate skill in assigned tasks and completes with little or no support</li> </ul>				

<b>ACADEMIC SKILLS</b>	<b>Required for this employer (yes/no)</b>	<b>Rating</b>	<b>Supervisor Sign-off</b>	<b>Date</b>
<p><b>Core Academic Foundation</b></p> <ul style="list-style-type: none"> <li>• Begins to use math and literacy skills to inform work</li> <li>• Uses math and literacy skills to perform job tasks with frequent checks by supervisor</li> <li>• Independently and consistently use math and literacy skills to perform tasks (with occasional checks for quality)</li> </ul>				



**RELATED INSTRUCTION OUTLINE  
COMPUTER PROGRAMMER  
O\*NET-SOC CODE: 15-1251.00 RAPIDS CODE: 0811CB**

**Related instruction** - The curriculum is defined as a variety of classes, around which the exams and projects are based. By defining the related instruction this way, all related instruction competencies required of the students are met through a combination of coursework and/or hands-on exercises. Employers will select relevant courses for related instruction in the topics outlined below, totaling **at least 144 hours** over the duration of the apprenticeship. Selection of required topics and associated training time may vary by employer and apprentice. Employer may add additional occupation specific courses as necessary over and above those specified below.

<b>RELATED INSTRUCTION</b>	<b>Approximate Hours</b>
Apprenticeship Orientation	15
Workplace Essentials	45
Employer Onboarding	10
Software Development Best Practices	30
Core Coding Languages	90
Web Development	45
General Database	45
Software Development Tools	15
Design and Implementation	10
<b>TOTAL RI HOURS</b>	<b>305</b>

**COURSE DESCRIPTIONS**

**Apprenticeship Orientation (15 hours)**

Introduction to career-readiness to prepare students for working in a professional environment: apprenticeship and workplace expectations with a focus on growth mindset.

**Workplace Essentials (45 hours)**

Skills in common computer applications, effective workplace communication, time management, and conflict resolution.

**Employer Onboarding (10 hours)**

Orientation training provided to new employees by the employer

**Software Development Best Practices (30 hours)**

Understands software assurance best practices and their use in software development.

**Core Coding Languages (90 hours)**

Develops simple frontend, backend, and/or mobile applications utilizing core coding languages (e.g. Java, C#, Objective C, JavaScript, Swift) on a development platform; integrates data storage (including SQL), libraries, methods, interfaces, and objects and uses code analysis and debugging techniques; web developers need to be able to integrate HTML, CSS, web services (including REST), and a web framework (such as Angular or Spring MVC) into applications.



**Web Development (45 hours)**

Understands commonly used web development languages such as AJAX, XML, HTML 5, and JavaScript.

**General Database (45 hours)**

Uses SQL basics (e.g., selecting, inserting, updating, deleting records), in at least one database management software application, and database fundamentals such as normalization, schemas, and relationships.

**Software Development Tools (15 hours)**

Utilizes an IDE (Integrated Development Environment) (e.g. Visual Studio) and a source control system such as TFS or GitLab.

**Design and Implementation (10 hours)**

Assists customers in the gathering of requirements, and designs, implements, and supports simple technology solutions to existing business problems.



## **SELECTION PROCEDURES**

1. Apprenticeship opportunities are shared with students enrolled in CareerWise and its affiliated programs.
  2. Interested applicants complete the application process outlined in the apprenticeship recruitment notice. All suitably qualified applicants can apply to the apprenticeship opportunity.
  3. All applicants that meet the minimum qualifications will be selected for an employer interview.
  4. At the time of interview, applicants will be asked the same set of questions to ensure each applicant is treated equally.
  5. Applicants shall be rated and ranked based on interview scores.
- If required by the employer, the top candidates may be invited for a second interview.
6. The applicants will be notified of the hiring decision in a timely manner and all applicants will be treated equally with regard to notifications.
  7. All records regarding the selection of apprentices will be forwarded to and maintained by the Sponsor (see Sponsor Requirements Guide).

### ***Direct Entry:***

The Sponsor may allow direct entry applicants that are part of an employer's incumbent workforce, a qualified pre-apprenticeship program, or Job Corps graduates whose training, similarly, qualifies them for the occupation.