Position Description Form (PDF)

College: **Sir Sandford Fleming**

Incumbent's Name: **Vacant**

Position Title: **Data Scientist (I/O)**   Payband: I

Position Code/Number (if applicable): S00654

Scheduled No. of Hours: **37.5**

Appointment Type: ___**X**___ 12 months   ___**___** less than 12 months

Supervisor's Name and Title: **Reza Moslemi, Industrial Research Chair for Colleges**

Completed by: **Reza Moslemi**   PDF Date: November 18, 2020
                                                Last Revision:

Signatures:

Incumbent: Date:
(Indicates the incumbent has read and understood the PDF)

Supervisor: Date:

Supervisor's Supervisor: Date:

Instructions for Completing the PDF

1. Read the form carefully before completing any of the sections.

2. Answer each section as completely as you can based on the typical activities or requirements for the position and not on exceptional or rare requirements.

3. If you have any questions, refer to the document entitled "A Guide on How to Write Support Staff Position Description Forms" or contact your Human Resources representation for clarification.

4. Ensure the PDF is legible.

5. Responses should be **straightforward and concise using simple factual statements.**

Position Summary

Provide a concise description of the overall purpose of the position.

The Data Scientist deploys advanced analysis tools to help further research on predictive analytics related to water network condition assessment and monitoring. They will use Geographical Information System (GIS) based spatial database and other related time series and employ advanced data analysis, artificial intelligence and machine learning techniques in order to develop predictive tools and models for water mains condition analysis and evaluation. They will also be involved in software development, investigating signal processing and machine learning algorithms, and developing new features through a combination of experimental/theoretical research.

Duties and Responsibilities

Indicate as clearly as possible the significant duties and responsibilities associated with the position. Indicate the approximate percentage of time for each duty. Describe duties rather than detailed work routines.

	Approximate % of time annually*
1. Data Analysis & Model Development • Deploying analysis tools to help further research on predictive analytics for water network • Analyzing pipe related data using statistical and machine learning methods • Investigating signal processing and algorithms • Developing new features through a combination of experimental/theoretical research • Working collaboratively with other teams to develop new data driven models, software and applications	40%
2. Research Development/Applied Research • Conducting literature review • Developing research proposals and plans • Assisting with establishing new partnership with industrial/academic collaborators	25%
3. Field Test and Experimentation • Designing and executing research experiments • Collecting and analyzing pipe related field data	10%
4. Procedural Documentation and Report Generation • Authoring knowledge base documents, presentation materials, publications and reports and providing documentation to support ongoing corporate initiatives	10%
5. Supervision/Training • Monitoring project progress as per defined timeline • Coordinating among team members and communicating with project partners on project status and progress. • Overseeing and training other research team members, as needed	10%
6. Other related duties as assigned	5%

*   To help you estimate approximate percentages:
½ hour a day is 7%   1 hour a day is 14%   1 hour a week is 3%
½ day a week is 10%   ½ day a month is 2%   1 day a month is 4%
1 week a year is 2%

1. Education

A. Check the box that best describes the **minimum** level of **formal** education that is required for the position and specify the field(s) of study. Do not include on-the-job training in this information.

☐ Up to High School ☐ 1 year certificate ☐ 2 year diploma

☐ Trade certification ☐ 3 year diploma / degree ☒ 4 year degree or 3 year diploma / degree plus professional certification

☐ Post graduate degree (e.g. Masters) or 4 years degree plus professional certification

☐ Doctoral degree

Field(s) of Study:

> Engineering, Computer Science, Natural Sciences

B. Check the box that best describes the requirement for specific course(s), certification, qualification, formal training or accreditation in addition to and not part of the education level noted above and in the space provided specify the additional requirement(s). Include only the requirement that would typically be included in the job posting and would be acquired prior to the commencement of the position. Do not include courses that are needed to maintain a professional designation.

☒ No additional requirements

☐ Additional requirements obtained by course(s) of a total of 100 hours or less

☐ Additional requirements obtained by course(s) of a total between 101 and 520 hours

☐ Additional requirements obtained by course(s) of a total of more than 520 hours

2. Experience

Experience refers to the minimum time required in prior position(s) to understand how to apply the techniques, methods and practices necessary to perform this job. This experience may be less than experience possessed by the incumbent, as it refers only to the minimum level required on the first day of work.

Check the box that best captures the typical number of years of experience, in addition to the necessary education level, required to perform the responsibilities of the position and, in the space provided, describe the type of experience. Include any experience that is part of a certification process, but only if the work experience or on-the-job training occurs after the conclusion of the educational course or program.

☐ Less than one (1) year	
☐ Minimum of one (1) year	
☐ Minimum of two (2) years	
☐ Minimum of three (3) years	

| ☒ Minimum of five (5) years | A minimum of 4-5 years of work/research experience in a data scientist or similarly inclined role including the following is required:

• Skilled in proposal and report writing, research design and methodology development
• Proficient in project management
• Good communication, interpersonal and collaborative relationship building skills
• Superior analytical and problem-solving skills
• Proficient in data analysis, machine learning techniques, database reporting tools, working with multiple systems and points of integration
• Experience in data mining and building data driven models to draw insights from data
• Expert-level knowledge of spreadsheets, databases and project planning tools, programming language (Python)
• Experience in signal processing using Matlab or Octave
• Advanced experience in programming and technical analysis in a GIS / Web Application Development environment
• Experience working independently in a customer-service focused team within a fast-paced business environment featuring critical deadlines, multiple projects and competing priorities
• Dealing with confidential / sensitive information
• Ability to understand advanced technical concepts
• Excellent communication skills for coordinating across multidisciplinary teams |
| ☐ Minimum of eight (8) years | |

3. Analysis and Problem Solving

This section relates to the application of analysis and judgement within the scope of the position.

The following charts help to define the level of complexity involved in the analysis or identification of situations, information or problems, the steps taken to develop options, solutions or other actions and the judgement required to do so.

Please provide up to three (3) examples of analysis and problem solving that are regular and recurring and, if present in the position, up to two (2) examples that occur occasionally:

#1 regular & recurring

Key issue or problem encountered.	An advanced research project is initiated which requires planning, design, analysis and development. Due to the novelty of the research project, it is likely that the proposed approach may require additional re-configuration and improvement during the execution and depending on the availability of the required database.
How is it identified?	The incumbent must engage in a process of repeated modification and improvement of the data analysis and model development process in order to identify a proper solution.
Is further investigation required to define the situation and/or problem? If so, describe.	Further investigation is required once additional sources of data is acquired which requires integration of the new features and information into the predictive algorithms and models. The incumbent will use analytical tools to investigate and analyze the necessary changes and modifications.
Explain the analysis used to determine a solution(s) for the situation and/or problem.	The performance and reliability of the existing methodologies and models will be examined and evaluated using the new set of data and information. Efforts will be taken to enhance and optimize the model. This may include optimizing and adjusting the underlying algorithms and model structure in order to obtain desirable accuracy and outcome.
What sources are available to assist the incumbent finding solution(s)? (e.g., past practices, established standards or guidelines).	The analysis frequently involves online searches of related research works as well as in-house knowledge base articles.

#2 Regular & Recurring

Key issue or problem encountered	Evaluating, structuring and prioritizing tasks and proposed research projects so that they are completed in line with respective deadlines and allocated resources.

How is it identified?	Research and development projects are very complex. Projects require careful definition. The incumbent must review the research question and determine the best way to address it in a way that is timely and efficient and resolves the presenting research challenge.
Is further investigation required to define the situation and/or problem? If so, describe.	The incumbent must use proper tools and investigation to define the scope of work and methodology by creating clear and testable solutions. Judgment must be used to define the problems in ways that both meets the needs of clients and also aligns with the resources and abilities of IRCC. After the project is completed, the incumbent must provide insight and recommendations based on the analysis and conclusion of the project. This requires expressing scientific information in a way that is useful and practical.
Explain the analysis used to determine a solution(s) for the situation and/or problem.	If the proposed solution appears to be feasible, the incumbent will prepare a functional environment comprised of data for further analysis.
What sources are available to assist the incumbent finding solution(s)? (e.g., past practices, established standards or guidelines).	The incumbent may use various sources of information including literature, best practice, consultation with experts and applicable standards to seek proper solution and approach to address the research problem.

3. Analysis and Problem Solving

#3 regular & recurring

Key issue or problem encountered	
How is it identified?	
Is further investigation required to define the situation and/or problem? If so, describe.	
Explain the analysis used to determine a solution(s) for the situation and/or problem.	
What sources are available to assist the incumbent finding solution(s)? (e.g., past practices, established standards or guidelines).	

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Key issue or problem encountered	
How is it identified?	
Is further investigation required to define the situation and/or problem? If so, describe.	
Explain the analysis used to determine a solution(s) for the situation and/or problem.	
What sources are available to assist the incumbent finding solution(s)? (e.g., past practices, established standards or guidelines).	

4. Planning/Coordinating

Planning is a proactive activity as the incumbent must develop in advance a method of acting or proceeding, while coordinating can be more reactive in nature.

Using the following charts, provide up to three (3) examples of planning and/or coordinating that are regular and recurring and, if present in the position, up to two (2) examples that occur occasionally:

	#1 regular & recurring
List the project and the role of the incumbent in this activity.	Incumbent is required to coordinate daily tasks for other team members to ensure that assigned tasks and projects are on track and executed in a timely fashion.
What are the organizational and/or project management skills needed to bring together and integrate this activity?	The incumbent should demonstrate excellent organizational, communication and interpersonal skills. Knowledge of project management skills is required. Each project has a slightly different team of contributors. The incumbent will assist with scoping the project, communicating the scope and plan to other team members and managing the exceptions. Progress is tracked using various tools (simple spreadsheets to detailed Microsoft Projects) and communicated back to colleagues and partners. The incumbent must be cognizant of the deadlines established in the research plan so that deadlines are met and tasks must be prioritized accordingly.
List the types of resources required to complete this task, project or activity.	The incumbent would use product documentation, module documentation, and project management tools to create the project plan. They would use existing organizational structures (various leader's teams) and client meetings to ensure that the priorities continue to be represented.
How is/are deadline(s) determined?	Deadlines are established in conjunction with the industry partner and/or their clients. When drafting a project plan, the scheduling must take into account the influencing operational and external activities taking place in the client department in addition to the requirements of the project itself. Ultimately deadlines are negotiated directly with client departments and any external services being used to complete a project. Incumbent does not assign deadlines to individuals.

Who determines if changes to the project or activity are required? And who determines whether these changes have an impact on others? Please provide concrete examples.	Small changes (less than two weeks) can proceed with the approval of the manager. Larger changes will be decided by the manager in consultation with the industry partner. It may be required to change the priorities and deadlines given certain circumstances dictated by the partner's priorities and needs. The manager determines the impact on others trying to minimize the disruption to the succeeding milestones and activities.

4. Planning/Coordinating

#2 regular & recurring

List the project and the role of the incumbent in this activity.	The incumbent participates in various projects and research initiatives such as improving or developing signal processing algorithms, data driven models and interpreting and transforming data into useful information and insight. They are expected to monitor their own project progress and resolve issues as needed and collaborate with project team to meet project objectives.
What are the organizational and/or project management skills needed to bring together and integrate this activity?	Organizational, report writing, problem solving and communication skills are required to execute the tasks. They need to have the ability to work both independently and as a team contributor. The incumbent must have the ability to produces detailed technical reports and project documentation as required.
List the types of resources required to complete this task, project or activity.	The incumbent collects, consolidates and analyzes various sources of data and communicates with the data provider to seek advice and clarification in terms of complementary information and details required for conducting the analysis. The incumbent will use product documentation, module documentation, and project management tools to assist in the creation of a project plan.
How is/are deadline(s) determined?	Execution of various research projects is often influenced by the industry partner and the final due date is enforced by external funding agencies. The respective milestones and deadlines are established by the manager in consultation with the industry partner. The incumbent would assist in scheduling their own tasks working backward from the specified due dates in coordination with the client team.

Who determines if changes to the project or activity are required? And who determines whether these changes have an impact on others? Please provide concrete examples.	Deployment changes are often required by the manager or industry partner given the circumstances and interim goals and objectives. The scope of the change will determine how and if the change is completed as part of the initial project or deferred to a revisit (or phase II) of the project. The incumbent would determine the scope and therefore who needs to be consulted on in process change requests. If the incumbent can incorporate a change request into a project plan without risking a deadline, they will do so. Change requests that may impact deadlines are reviewed with the rest of the project team.

4. Planning/Coordinating

#3 regular & recurring

List the project and the role of the incumbent in this activity.	
What are the organizational and/or project management skills needed to bring together and integrate this activity?	
List the types of resources required to complete this task, project or activity.	
How is/are deadline(s) determined?	
Who determines if changes to the project or activity are required? And who determines whether these changes have an impact on others? Please provide concrete examples.	

4. Planning/Coordinating

#1 occasional

List the project and the role of the incumbent in this activity.	The incumbent will assist in promoting the predictive analytics program and developing new initiatives and collaborations with utilities, water network owners and consulting firms. This includes setting up and attending meetings and discussions with the collaborators.
What are the organizational and/or project management skills needed to bring together and integrate this activity?	Good organizational and communication skills are required to successfully identify potential collaborators and establish and maintain business relationships with them.
List the types of resources required to complete this task, project or activity.	Relevant technical knowledge and understanding of industry's state-of-the art practice is required to perform the task.
How is/are deadline(s) determined?	This is an ongoing task and any specific deadlines will be determined by the manager.
Who determines if changes to the project or activity are required? And who determines whether these changes have an impact on others? Please provide concrete examples.	The manager will evaluate and determine if changes to the activity and the scope is required. If the scope of a collaborative project grows beyond the resources available, it must be forwarded to the Manager. The project scope is either modified or it is deferred until it can be properly scoped, resourced, and scheduled.

4. Planning/Coordinating

#2 occasional

List the project and the role of the incumbent in this activity.	
What are the organizational and/or project management skills needed to bring together and integrate this activity?	
List the types of resources required to complete this task, project or activity.	
How is/are deadline(s) determined?	

Who determines if changes to the project or activity are required? And who determines whether these changes have an impact on others? Please provide concrete examples.

5. Guiding/Advising Others

This section describes the **assigned responsibility** of the position to guide or advise others (e.g. other employees, students). Focus on the actions taken (rather than the communication skills) that directly assist others in the performance of their work or skill development.

Though Support Staff cannot formally "supervise" others, there may be a requirement to guide others using the incumbent's job expertise. This is beyond being helpful and providing ad hoc advice. It must be an assigned responsibility and must assist or enable others to be able to complete their own tasks.

Check the box(es) that best describe the level of responsibility assigned to the position and provide an example(s) to support the selection, including the positions that the incumbent guides or advises.

Regular & Recurring	Occasional	Level	Example
☐	☒	Minimal requirement to guide/advise others. The incumbent may be required to explain procedures to other employees or students.	Provides clarification regarding research process and methodologies to students, or other research team members. Explaining research plans and the scope of work to other team members and reviewing and evaluating interim research findings with the team members.
☒	☐	There is a need for the incumbent to demonstrate correct processes/ procedures to others so that they can complete specific tasks.	The incumbent is required to explain and demonstrate a course of action for the purpose of performing research and development activities. Also coordinates the efforts of the functional work group, monitoring tasks and ensuring project stays on schedule.
☐	☐	The incumbent recommends a course of action or makes decisions so that others can perform their day-to-day activities.	
☐	☐	The incumbent is an active participant and has ongoing involvement in the progress of others with whom he/she has the responsibility to demonstrate correct processes/procedures or provide direction.	
☐	☐	The incumbent is responsible for allocating tasks to others and recommending a course of action or making necessary decisions to ensure the tasks are completed.	

6. Independence of Action

Please illustrate the type of independence or autonomy exercised in the position. Consideration is to be given to the degree of freedom and constraints that define the parameters in which the incumbent works.

What are the instructions that are typically required or provided at the beginning of a work assignment?	
Regular and Recurring	Occasional (if none, please strike out this section)
Only specific goals & objectives and expected outcomes are communicated. Timelines established in keeping with key system processes and initiatives and as required to meet the deadlines established.	

What rules, procedures, past practices or guidelines are available to guide the incumbent?	
Regular and Recurring	Occasional (if none, please strike out this section)
Past practice, relevant policies & procedures, general systems and business knowledge, Collective Agreements, Scheduling Rules & Guidelines, Academic Schedule, Annual Planning Cycle, Industry trends and standards, technical manuals and articles, project management methodology, Higher Education Users Group.	Manager would provide minimal direction in multi-departmental projects.

How is work reviewed or verified (e.g. feedback from others, work processes, Supervisor)?	
Regular and Recurring	Occasional (if none, please strike out this section)
Meetings with user groups and internal project groups. Supervisor reviews project progress and outcomes on a regular basis during the course of project. Projects delivered on-time, within budget.	

6. Independence of Action

Describe the type of decisions the incumbent will make in consultation with someone else other than the Supervisor?	
Regular and Recurring	Occasional (if none, please strike out this section)
The incumbent is required to utilize their specialized knowledge and expertise to determine and proceed with the appropriate course of action to solve complex problems and provide solutions to clients.	

Describe the type of decisions that would be decided in consultation with the Supervisor.	
Regular and Recurring	Occasional (if none, please strike out this section)
The incumbent is expected to be able to handle functional issues/problems, changes to project scope/budget/timelines, decisions related to appropriate business/audit controls.	

Describe the type of decisions that would be decided by the incumbent.	
Regular and Recurring	Occasional (if none, please strike out this section)
The incumbent trouble shoots and resolves a variety of challenges within each research project with little or no oversight by the manager. The incumbent must balance work load, solve problems, and ensure that project deliverables are met in a timely manner. Good judgment and analysis are required.	

7. Service Delivery

This section looks at the service relationship that is an assigned requirement of the position. It considers the required manner in which the position delivers service to customers. It is not intended to examine the incumbent's interpersonal relationship with those customers and the normal anticipation of what customers want and then supplying it efficiently. It considers how the request for service is received and the degree to which the position is required to design and fulfil the service requirement. A "customer" is defined in the broadest sense as a person or groups of people and can be internal or external to the College.

In the table below, list the key service(s) and its associated customers. Describe how the request for service is received by the incumbent, how the service is carried out and the frequency.

Information on the service		Customer	Frequency (D, W, M. I)*
How is it received?	How is it carried out?		
Request from the industry partner	Incumbent acquires data and information from the industry partners or other sources and analyzes data or develops predictive tools and algorithms. They need to regularly communicate and report the outcome of the analysis to the industry partner in the form of reports and presentations.	Industry partner or their clients	W
Request from Manager (this position's supervisor)	Incumbent must investigate and analyze options in order to determine a solution. Incumbent must use their expertise, experience and research skills to conduct the analysis and develop models and algorithms. Service is then delivered. Best practices, technical documentation and industry standards may be referenced.	Faculty, staff and students	W

*   D = Daily   W = Weekly   M = Monthly   I = Infrequently

8. Communication

In the table below indicate the type of communication skills required to deal effectively with others. Be sure to list both verbal (e.g. exchanging information, formal presentations) and written (e.g. initiate memos, reports, proposals) in the section(s) that best describes the method of communication.

Communication Skill/Method	Example	Audience	Frequency (D, W, M ,I)*

Exchanging routine information, extending common courtesy	Inquiries and correspondence related to industry partners resources and data. Networking at conferences or with product user-groups.	Industry partner or their clients Research community, clients, or users	D I
Explanation and interpretation of information or ideas	Sharing information, offering solutions, guidance, follow up and collaboration on projects Application data exchange, liaison, reporting techniques, and solution sharing	Client staff Co-workers and Colleagues	W M

Imparting technical information and advice	Discussions regarding specific functionality of the system. Discussions with end-users on possible changes to the system, procedural use of the system, and/or system trouble-shooting.	Other ITS; Departmental Leaders, Technical and Business Analysts; end-users	D
	Discussions regarding problems with systems or possible changes to systems, how to use system, troubleshooting.	Other ITS; Departmental Leaders, Technical and Business Analysts; end-users	W
	Support/Problem resolution and services. Imparting functional or procedural clarifications or facilitating informal learning opportunities.	Other ITS; Departmental Leaders, Technical and Business Analysts; end-users	W
	Implementation of new systems may involve changes to business process which must be explained to various stakeholders.	Other ITS; Technical and Business Analysts; end-users	I
	Software needs and requirements support/problem resolution and services	Technical and Business Analysts, Leaders in service departments	W
	Administering Support contracts	External vendors.	W
	Information System Changes, Service outages, updates.	All staff, faculty and students.	I
	Obtaining technical support and information	Application vendors (Oracle, ESRI, Microsoft)	W
	Training students and interns in terms of explaining the research plans and methodologies and providing instruction on how to conduct the required tasks.	Research team members	M
Instructing or training			

Obtaining cooperation or consent						
Negotiating						

*   D = Daily   W = Weekly   M = Monthly   I = Infrequently

9. Physical Effort

In the tables below, describe the type of physical activity that is required on a regular basis. Please indicate the activity as well as the frequency, the average duration of each activity and whether there is the ability to reduce any strain by changing positions or performing another activity.   Activities to be considered are sitting, standing, walking, climbing, crouching, lifting and/or carrying light, medium or heavy objects, pushing, pulling, working in an awkward position or maintaining one position for a long period.

Physical Activity	Frequency (D, W, M, I)*	Duration			Ability to reduce strain		
		< 1 hr at a time	1 - 2 hrs at a time	> 2 hrs at a time	Yes	No	N/A
Sitting at a desk / computer	D		X		X		
Walking, Standing	I	X			X		
Lifting	I	X			X		

*   D = Daily   W = Weekly   M = Monthly   I = Infrequently

If lifting is required, please indicate the weights below and provide examples.

☒ Light (up to 5 kg or 11 lbs)

☐   Medium (between 5 to 20 kg or 11 to 44 lbs)

☐   Heavy (over 20 kg or 44 lbs)

Manuals, printouts, equipment

10. Audio Visual Effort

Describe the degree of attention or focus required to perform tasks taking into consideration:
- the audio/visual effort and the focus or concentration needed to perform a task and the duration of the task, including breaks (e.g. up to 2 hours at one time including scheduled breaks)
- impact on attention or focus due to changes to deadlines or priorities
- the need for the incumbent to switch attention between tasks (e.g. multi-tasking where each task requires focus or concentration)
- whether the level of concentration can be maintained throughout the task or is broken due to the number of disruptions

Provide up to three (3) examples of activities that require a higher than usual need for focus and concentration.

Activity #1	Frequency (D, W, M, I)*	Average Duration		
		Short < 30 mins	Long up to 2 hrs	Extended > 2 hrs
Analysis and evaluation of sensitive data and drawing insight and conclusion from machine learning and model development processes	D		X	
Can concentration or focus be maintained throughout the duration of the activity? If not, why? ☒ Usually ☐ No				

Activity #2	Frequency (D, W, M, I)*	Average Duration		
		Short < 30 mins	Long up to 2 hrs	Extended > 2 hrs
Signal processing and algorithm development	M		X	
Can concentration or focus be maintained throughout the duration of the activity? If not, why? ☒ Usually ☐ No				

Activity #3	Frequency (D, W, M, I)*	Average Duration		
		Short < 30 mins	Long up to 2 hrs	Extended > 2 hrs
Writing reports, research plans and proposals	M		X	
Can concentration or focus be maintained throughout the duration of the activity? If not, why? ☒ Usually ☐ No				

Activity #4	Frequency	Average Duration

	(D, W, M, I)*	Short < 30 mins	Long up to 2 hrs	Extended > 2 hrs
Holding and attending meetings with clients, industry partners, etc.	M		X	

Can concentration or focus be maintained throughout the duration of the activity? If not, why?
☒ Usually
☐ No

*   D = Daily   W = Weekly   M = Monthly   I = Infrequently

11. Working Environment

Please check the appropriate box(es) that best describes the work environment and the corresponding frequency and provide an example of the condition.

Working Conditions	Examples	Frequency (D, W, M, I)*
☒ acceptable working conditions (minimal exposure to the conditions listed below)	Office environment and/or working from home office	D
☐ accessing crawl spaces/confined spaces		
☐ dealing with abusive people		
☐ dealing with abusive people who pose a threat of physical harm		
☐ difficult weather conditions		
☐ exposure to extreme weather conditions		
☐ exposure to very high or low temperatures (e.g. freezers)		
☐ handling hazardous substances		
☐ smelly, dirty or noisy environment		
☒ travel	Incumbent may be required to travel to the test facility or client sites for various functions of testing and data collection	I
☐ working in isolated or crowded situations		
☐ other (explain)		

* D = Daily   M = Monthly   W = Weekly   I = Infrequently