Board/Authority Authorized Course Framework Template

School District/Independent School Authority Name: Surrey School District	**School District/Independent School Authority Number (e.g. SD43, Authority #432):** SD36
Developed by: Adam Drake	**Date Developed:** Dec 11, 2024
School Name: Kwantlen Park	**Principal's Name:** Mike Kilpatrick
Superintendent Approval Date (for School Districts only):	**Superintendent Signature (for School Districts only):**
Board/Authority Approval Date: October 8, 2025	**Board/Authority Chair Signature:**
Course Name: RF (Radio Frequency) Communications	**Grade Level of Course:** 11
Number of Course Credits: 4	**Number of Hours of Instruction:** 120

Board/Authority Prerequisite(s): N/A

Special Training, Facilities or Equipment Required: N/A

Course Synopsis:

Radio Frequency (RF) Communications offers an introduction to, and a practical understanding of, modern radio frequency communications, encompassing Wi-Fi, Bluetooth, cellular and radio technologies. Students will explore the theory and practice around these methods of voice and data transmission, alongside the legal requirements to operate such equipment. They will consider practical use cases, including satellite communication, long range voice and data transmission, infrastructure design and emergency services communication.

Goals and Rationale:

This course will:

1) Give students a thorough understanding of modern radio frequency communications methods, and an introduction to further education and career opportunities in this exciting engineering field.

2) Connect students with industry and employment opportunities, as well as further post-secondary education pathways.

Aboriginal Worldviews and Perspectives: Declaration of First People's Principles of Learning:

- Learning is embedded in story and can enhance understanding of human's desire for communication.
- Interpersonal relations are essential within communication and are enhanced when personal connection and relationships are at the forefront of learning and teamwork.
- An understanding of weather and solar conditions combined with an engagement with nature allows for more successful RF signal propagation.
- Having a local focus and utilizing community members creates more meaningful understanding of the need to communicate, both locally and at long distance.
- Experiential, hands-on learning is essential to learning how to communicate using a variety of RF technologies.
- Declaration of Aboriginal Worldviews and Perspectives: The First People's Principles of Learning are inherent in the aspects included in all methods of communication. The RF Communications course is inseparable from connectedness and relationships; specifically:
    - The power of story
    - Connectedness and relationship
    - Engagement with the Land, Nature, the Outdoors
    - Local focus
    - Community involvement
    - Experiential learning
    - The role of the teacher

BIG IDEAS

The regulation of the electromagnetic spectrum ensures efficient use of radio frequencies, impacting technology and society by preventing interference and promoting reliable communication networks.	RF Communications connects communities and resources by enabling reliable and efficient wireless communication, which supports other technologies (cell phones, Wi-Fi, and emergency services).	RF tools and **technologies** can be adapted to meet specific needs, enabling diverse applications such as broadcasting, mobile communications, and emergency services.	Designing RF technologies with a **life cycle** perspective involves considering their social and **environmental impacts**, such as reducing electronic waste, improving energy efficiency, and ensuring equitable access to communication services.

Learning Standards

Curricular Competencies	Content
Students are expected to be able to do the following: **Applied Design** ***Understanding context*** • Engage in a period of **user-centred research** and **empathetic observation** ***Defining*** • Establish a point of view for a chosen design opportunity • Identify potential users, intended impacts, and possible unintended negative consequences • Make inferences about premises and **constraints** that define the design space, and identify criteria for success • Determine whether activity is collaborative or self-directed	*Students are expected to know the following:* The function and operation of different methods of RF communication, including: • Wi-Fi • Bluetooth • Cellular • **Radio** The rules and regulations around the safe and legal operation of RF equipment, including: • Establishing a station and communicating • Health and safety • Laws and industry regulations

Ideating • Generate ideas and add to others' ideas to create possibilities, and prioritize them for prototyping • Critically analyze how competing social, ethical, and sustainability considerations impact creation and development of solutions • Choose an idea to pursue based on success criteria and maintain an open mind about potentially viable ideas ***Prototyping*** • Choose a form for prototyping and develop a **plan** that includes key stages and resources • Analyze the design for the life cycle and evaluate its **impacts** • Visualize and construct prototypes, making changes to tools, materials, and procedures as needed • Record **iterations** of prototyping ***Testing*** • Identify and communicate with **sources of feedback** • Develop an **appropriate test** of the prototype, conduct the test, and collect and compile data • Apply information from critiques, testing results, and success criteria to make changes ***Making*** • Identify appropriate tools, technologies, materials, processes, cost implications, and time needed • Create design, incorporating feedback from self, others, and results from testing of the prototype • Use materials in ways that minimize waste ***Sharing*** • Determine how and with whom to **share** design and processes for feedback • Share the product with users to evaluate its success • Critically reflect on plans, products and processes, and identify new design goals • Analyze new possibilities for plans, products and processes, including how they or others might build on them **Applied Skills** • Apply safety procedures for themselves, co-workers, and users in both physical and digital environments	An understanding of electronic theory, components and equipment required for RF transmission and reception, including: • **Ohm's law** and **power** • Inductors and capacitors • Power supplies • **Waves** and bands • Propagation • Transmission lines • Antennas • Modulation and transmitters • Receivers • **RF interference** • Routine equipment operation

• Individually or collaboratively identify and assess skills needed for design interests • Demonstrate competency and proficiency in skills at various levels involving manual dexterity and circuitry techniques • Develop specific plans to learn or refine identified skills over time **Applied Technologies** • Explore existing, new, and emerging tools, technologies, and systems to evaluate suitability for design interests • Evaluate impacts, including unintended negative consequences, of choices made about technology use • Examine the role that advancing technologies play in electronics-related contexts	

Big Ideas – Elaborations

- **Technologies:** tools that extend human capabilities **life cycle:** takes into account economic costs, and social and environmental impacts of the product, from the extraction of raw materials to eventual reuse or recycling of component materials
- **Environmental impacts:** including manufacturing, packaging, disposal, and recycling considerations

Curricular Competencies – Elaborations

- **User-centred research:** research done directly with potential users to understand how they do things and why, their physical and emotional needs, how they think about the world, and what is meaningful to them
- **Empathetic observation:** aimed at understanding the values and beliefs of other cultures and the diverse motivations and needs of different people; may be informed by experiences of people involved; traditional cultural knowledge and approaches; First Peoples worldviews, perspectives, knowledge, and practices; places, including the land and its natural resources and analogous settings; experts and thought leaders
- **Constraints:** limiting factors, such as task or user requirements, materials, expense, environmental impact
- **Plan:** for example, pictorial drawings, sketches, flow charts
- **Impacts:** including social and environmental impacts of extraction and transportation of raw materials; manufacturing, packaging, and transportation to markets; servicing or providing replacement parts; expected usable lifetime; and reuse or recycling of component materials
- **Iterations:** repetitions of a process with the aim of approaching a desired result
- **Sources of feedback:** may include peers; users; First Nations, Métis, or Inuit community experts; other experts and professionals both online and offline
- **Appropriate test:** includes evaluating the degree of authenticity required for the setting of the test, deciding on an appropriate type and number of trials, and collecting and compiling data
- **Share:** may include showing to others or use by others, giving away, or marketing and selling

Content – Elaborations

- **Radio** – including HF, VHF, UHF and other frequency bands
- **Ohm's law** – including the relationship between voltage, current and resistance
- **Power** – including the relationship between voltage, current and power
- **Waves** – covering the electro-magnetic spectrum and its uses and band allocation
- **RF interference** – including causes, solutions and legal ramifications

Recommended Instructional Components:

Instructional Component:

1. Direct Instruction
2. Group Work
3. Independent Instruction
4. Self and Peer Evaluation
5. Project based
6. Simulation
7. Practical and Hands on Application

Recommended Assessment Components: Ensure alignment with the Principles of Quality Assessment

This BAA course is built on a foundation that focuses on the learning process and provides multiple opportunities for students to demonstrate their learning. It consists of both formative and summative assessment.

FORMATIVE ASSESSMENT

Students and teachers will engage in a process of gathering, interpreting and responding to evidence of learning.

STUDENTS WILL ANSWER THESE QUESTIONS ON AN ONGOING BASIS:

- What am I learning?
- Where am I in my learning?
- Is there anything hindering my learning?
- What goals have I set for my learning?
- How am I going to move forward in my learning?

THE TEACHER WILL:

- clarify Learning Intentions
- generate and provide clear success criteria in student-friendly language
- frame and solicit meaningful open-ended questions that lead to deeper understanding of the learning intentions
- provide ongoing descriptive feedback
- provide opportunities for ongoing Self and Peer Assessment

SUMMATIVE ASSESSMENT

Students will complete performance-based tasks connected to curricular competencies and content.

Evaluation of these tasks will be reserved for those occasions when a snapshot of student performance/ achievement is required or necessary.

The evidence gathered will be used to communicate student learning and provide evaluative feedback.

Learning Resources: N/A

Additional Information: N/A