
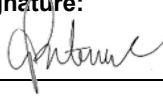




## Board/Authority Authorized Course: Aviation 12

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| <b>School District/Independent School Authority Name:</b><br>School District 27 Cariboo-Chilcotin | <b>School District/Independent School Authority Number:</b><br>SD No. 27   |
| <b>Developed by:</b><br>Ian Watson  | <b>Date Developed:</b><br>January 10, 2020   |
| <b>School Name:</b><br>Peter Skene Ogden Secondary School   | <b>Principal's Name:</b><br>Geoff Butcher  |
| <b>Superintendent Approval Date (for School Districts only):</b><br>April 26, 2022                | <b>Superintendent Signature (for School Districts only):</b><br>Chris van der Mark  |
| <b>Board/Authority Approval Date:</b><br>April 26, 2022   | <b>Board/Authority Chair Signature:</b><br>Ciel Patenaude                           |
| <b>Course Name:</b><br>Aviation 12  | <b>Grade Level of Course:</b><br>12  |
| <b>Number of Course Credits:</b><br>4   | <b>Number of Hours of Instruction:</b><br>120  |

**Board/Authority Prerequisite(s):**

none

**Special Training, Facilities or Equipment Required:**

Aviation background, knowledge and interest in the aviation/aerospace industry; a classroom or shop facility suitable for students to work on projects that involves the use small tools; navigation and meteorology charts, protractors, rulers, calculators, compasses; a class set of the textbook, *From the Ground Up*, wind tunnel and donated aircraft parts to support learning.

**Course Synopsis:**

The Aviation 12 course is designed to acquaint students with the large number of job and career opportunities offered in the aviation/aerospace industry. It is also designed to acquaint students with the knowledge, skills and attitudes relevant to the work place. Students will have the opportunity to research and explore the history of aviation, theory of flight, aircraft design, construction, and maintenance, aircraft operations, air law, meteorology, navigation and communication, airmanship and safety issues related to aircraft operations. The course is also designed to give students the knowledge, skills and tools necessary to plan their



## Board/Authority Authorized Course: Aviation 12

careers in an informed manner. Units and lessons will provide students with a varied learning experience; instructional strategies and course content will incorporate hands on learning, research, field trips, guest speakers, lab work and experimentation, individual and group projects, recommended readings, class discussions...etc. The course also serves to co-ordinate learning in mathematics, science, geography, metal, and drafting areas.

### **Goals and Rationale:**

The goals of the Aviation 12 course are to: 1) acquaint students with the growing number of occupations and career opportunities in the aviation/aerospace industry; 2) acquaint students with the knowledge, skills, and attitudes relevant to the work place and 3) give students the educational tools necessary to plan their careers in an informed manner.

### **Aboriginal Worldviews and Perspectives:**

Aviation 12 shares a variety of Aboriginal Worldviews and Perspectives:

- Learning is understanding identity and one's relationship with the external environment
- Learning requires exploration of one's own identity.
- Learning involves recognizing the consequences of one's actions.
- Learning involves generational roles and responsibilities.
- Learning involves the teacher as facilitator of a student-centered course
- Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors.
- Learning is holistic, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).
- Learning recognizes the role of indigenous knowledge.
- Learning is embedded in memory, history, and story.
- Learning involves patience and time.
- Learning involves recognizing that some knowledge is sacred and only shared with permission and/or in certain situations

# Board/Authority Authorized Course: Aviation 12

Course Name: Aviation 12

Grade:

## BIG IDEAS

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|--|--|---|---|--|--|
| <b>Career<br/>Exploration &amp;<br/>Planning</b> | <b>Aircraft<br/>Operations:</b><br><br>The Airplane,<br>Theory of flight &<br>Aero Engines | <b>Air Law:</b><br><br>Aerodromes &<br>Airspace,<br><br>Air Rules &<br>Procedures | <b>Meteorology:</b><br><br>Aviation Weather | <b>Navigation &amp;<br/>Communication:</b><br><br>Air Navigation,<br>Radio & Radio<br>Navigation | <b>General<br/>Airmanship:</b><br><br>Airmanship, Human<br>Factors & Air<br>Safety |
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## Learning Standards

| Curricular Competencies  | Content   |
|--|---|
| <ul style="list-style-type: none"> <li>• Students are expected to do the following:</li> <li>• Research, explore and obtain exposure to the various aviation related careers (airplane pilot, aircraft mechanic, air traffic control, electronic technician, meteorologist, flight instructor, flight dispatcher, station manager, schedule coordinator, food services, customer service, reservations, flight attendant, regional control centers, federal aviation administration, airport director, public relations, customs...etc.).</li> <li>• Research and explore career trends and opportunities.</li> <li>• Explore basic career responsibilities and expectations.</li> <li>• Research and explore educational requirements.</li> <li>• Examine the nature of the various careers: wages, salary, employment benefits, advancement, working conditions, mobility...etc.</li> <li>• Gather and interpret the information required to make informed educational, career, and personal decisions.</li> </ul> | <p><i>Students are expected to know the following:</i></p> <p>The Airplane</p> <ul style="list-style-type: none"> <li>• Aircraft Components {Parts of an airplane}.</li> <li>• Control Systems and Materials {Control Systems, Cabin Pressurization, Construction Materials, Loads and Load Factors, Logbooks, and Inspections}.</li> <li>• Aircraft Classes and Categories {Normal, Utility, Aerobatics, Commuter, Transport, and Additional Categories}.</li> </ul> <p>Theory of Flight</p> |

## Board/Authority Authorized Course: Aviation 12

- Use information to implement their educational, career, and personal plans.
- Build networks of resources to support their educational, career, and personal goals.
- Relate their strengths, interests, attributes, and values to their educational, career, and personal goals.
- Access, use, and evaluate services, resources, and advice related to their educational, career, and personal goals.
- Demonstrate competent use of computer technology to support their educational, career, and personal goals.
- Apply appropriate computer research tools to build resources to support their educational, career, and personal goals
- Demonstrate an understanding and appreciation for information technologies as it relates to educational, career, and personal plans.
- Use information technologies to develop their educational, career, and personal portfolios.
- Gather, interpret, and assess the historical information as it applied to the present aviation/aerospace industry.
- Apply and incorporate the historical information into their projects and experiments.
- Apply correct scientific methods and principles to their projects and experiments.
- Identify and describe Canada's contributions to the aviation/aerospace industry.
- Identify and clarify problems, issues, and influences pertaining to the development of today's aviation/aerospace industry.
- Explain the development, importance and influence of the aviation/aerospace industry on today's economy.
- Gather and interpret the information required to make informed educational, career, and personal decisions.
- Analyze internal and external factors to inform personal career-life choices for post-graduation planning
- Elaborations: may include consideration of passions, preferences, strengths, education/work opportunities, well-being
- Assess personal transferable skills, and identify strengths and those skills that require further refinement
- Explore and evaluate personal strategies, including social, physical, and financial, to maintain well-being
- Collaborate with a mentor to inform career-life development and exploration.

- Theoretical Applications {Forces Acting on an Airplane in Flight, Wing Design, Airplane Axes, Stability, Performance Factors, Airspeed Limitations...etc}.
- Flight Instruments {Pitot Static Instruments, Radar Altimeter, Gyro Instruments, Angle of Attack Indicators, Mach Indicators}.

### Aero Engines

- Definitions and Configurations {Power, Types of Combustion Engines, Parts of Reciprocating Engines, Two and Four-Stroke Cycles, Diesel Engines, Turbocharging, Supercharging, Engine Timing, Cooling and Lubrication}.
- Fuel Systems {Types of Fuel Systems, Tanks, Selector Valves, Lines and Filters, Gauges, Fuel types, and Fuel Related Problems}.
- Carburetor and Fuel Injection Systems {How Carburetors Work, Mixture Control, Carburetor Icing, Fuel Injection}.
- Exhaust Systems
- Ignition Systems {Magnet Polarity, Magnetos, Dual Ignition, Shielding, Ignition Timing}
- FADEC Systems
- Electrical Systems
- Propellers {Pitch, Types of Propellers, Feathering, Prop Reversing, Propeller Care}
- Engine Instruments {Oil Pressure and Temperature Gauges, Cylinder Head and Carburetor Temperature Gauges, Tachometer, Manifold Pressure Gauge}.
- Engine Operation
- Jet Propulsion {Ram, Turbojet, Turboshift, Turboprop, By-Pass, Turbofan Engines, Thrust Reversal}.

## Board/Authority Authorized Course: Aviation 12

|   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Define, recognize, explain, and demonstrate their understanding of the following topics as they apply to Aircraft Operations.</li> <li>• Define, recognize, explain, and demonstrate their understanding of the following topics as they apply to Air Law.</li> <li>• Define, recognize, explain, and demonstrate their understanding of the following topics as they apply to Meteorology.</li> <li>• Define, recognize, explain, and demonstrate their understanding of the following topics as they apply to Navigation and Communication.</li> <li>• Define, recognize, explain, and demonstrate their understanding of the following topics as they apply to General Airmanship.</li> </ul> | <p>Aerodromes and Airspace</p> <ul style="list-style-type: none"> <li>• Aerodromes {Runway Numbering, Markings, Taxiways, Guidance Signs, Wind Indicators, Lighting, Aerodrome Traffic Procedures...etc}.</li> <li>• The Canadian Airspace System {Domestic Airspace, Altimeter Regions, Identification Zones, Uncontrolled and Controlled Airspace, Classification of Canadian Airspace, Flight Information Region, Mountainous Regions...etc}.</li> <li>• The U.S. Airspace System {US Domestic Airspace, US Identification Zones, Classification of US Airspace}.</li> </ul> <p>Air Rules and Procedures</p> <ul style="list-style-type: none"> <li>• Rules of the Air {Airworthiness, Logs and Licenses, Rules and Right of Way, Fuel Requirements, Night Requirements, Over Water Flights, Aerobatics, Aircraft Occurrences, Explosives and Dangerous Goods...etc}.</li> <li>• Air Traffic Rules and Procedures {Air Traffic Services, Clearance and Instructions, Position Reports, Flight Rules, Flight Plans and Itineraries, Transborder Flights, Cruising Altitudes and Speeds, Weather Minima, Special VFR, Holding Patters, Identification Zones...etc}.</li> </ul> <p>Aviation Weather</p> <ul style="list-style-type: none"> <li>• The Atmosphere {Properties, Divisions, and Standard Atmosphere}.</li> <li>• Clouds {Cloud Formation, Classification, and Sky Condition}.</li> </ul> |
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## Board/Authority Authorized Course: Aviation 12

- Pressure {Atmospheric Pressure, Sea Level and Station Pressure, Pressure Systems, Pressure Changes, Pressure Gradients, Coriolis Force, Surface Friction, Centrifugal Force, Convergence and Divergence}.
- Winds {Hemispheric Prevailing Winds, Upper Level Winds, Surface Winds, Wind Speed and Direction, Wind Shear, The Jet Stream}.
- Humidity, Temperature and Stability
- Air Masses {Weather in an Air Mass. Modification of Air Masses}.
- Fronts {Polar Fronts, Types of Fronts, Frontal Weather}.
- Precipitation and Fog
- Thunderstorms {Thunderstorm Weather and Avoidance}.
- Icing {How Icing Affects the Airplane, Types of Icing, Icing in Clouds and in Precipitation, Protection from Icing, Icing Avoidance}.
- Turbulence
- High Level Weather
- Weather Signs
- Weather Information {Charts, Observing Systems, Reports, Forecasting, Information Sources}.

### Air Navigation

- Latitude and Longitude
- The Earth's Magnetism
- Units of Distance and Speed
- Aeronautical Charts
- Navigation Problems

### Radio

## Board/Authority Authorized Course: Aviation 12

- Radio
- Communication Equipment
- Radio Communication Facilities
- Radiotelephone Procedure

### Radio Navigation

- VHF Omnidirectional Range Navigation system
- Radio Beacons
- Instrument Landing Systems
- Microwave Landing Systems
- Automatic direction Finder
- Distance Measuring Equipment
- Flight Director
- Area Navigation
- Electronic Flight Instrument Systems
- Radar and Facilities
- Emergency Locator Transmitter

### Airmanship

- Care of the Airplane
- Weight and Balance
- Aircraft Performance
- Wake Turbulence
- Flight Preparations
- Emergency Procedures
- Bush Sense
- Ultralights
- Gliders

### Human Factors

## Board/Authority Authorized Course: Aviation 12

- Cockpit Organization
- Crew Co-ordination
- Fitness and Health
- Sensory Illusions
- Decision Making

### Air Safety

- The Proper State of Mind
- Checklists for Safe VFR Flights
- Important Rules
- Principles for Safe Take-Offs and Landings



### Big Ideas – Elaborations

#### Questioning and predicting

Demonstrate a sustained intellectual curiosity about an aviation/aerospace topic or problem of personal, local, or global interest  
Make observations aimed at identifying their own questions, including increasingly abstract ones, about the natural world  
Formulate multiple hypotheses and predict multiple outcomes

#### Planning and conducting

Collaboratively and individually plan, select, and use appropriate investigation methods, including field work and lab experiments, to collect reliable data (qualitative and quantitative)  
Assess risks and address ethical, cultural, and/or environmental issues associated with their proposed methods

#### Processing and analyzing data and information

Experience and interpret the local environment  
Apply First Peoples perspectives and knowledge, other ways of knowing, and local knowledge as sources of information  
Seek and analyze patterns, trends, and connections in data, including describing relationships between variables, performing calculations, and identifying inconsistencies  
Construct, analyze, and interpret graphs, models, and/or diagrams  
Use knowledge of aeronautical concepts to draw conclusions that are consistent with evidence  
Analyze cause-and-effect relationships

#### Evaluating

Evaluate their methods and experimental conditions, including identifying sources of error or uncertainty, confounding variables, and possible alternative explanations and conclusions  
Describe specific ways to improve their investigation methods and the quality of their data  
Evaluate the validity and limitations of a model or analogy in relation to the phenomenon modelled  
Demonstrate an awareness of assumptions, question information given, and identify bias in their own work and in primary and secondary sources  
Consider the changes in knowledge over time as tools and technologies have developed  
Connect scientific explorations to careers in aviation/aerospace  
Exercise a healthy, informed skepticism and use scientific knowledge and findings to form their own investigations to evaluate claims in primary and secondary sources  
Consider social, ethical, and environmental implications of the findings from their own and others' investigations  
Critically analyze the validity of information in primary and secondary sources and evaluate the approaches used to solve problems

## Board/Authority Authorized Course: Aviation 12

Assess risks in the context of personal safety and social responsibility

### **Applying and innovating**

Contribute to care for self, others, community, and world through individual or collaborative approaches

Co-operatively design projects with local and/or global connections and applications

Contribute to finding solutions to problems at a local and/or global level through inquiry

Implement multiple strategies to solve problems in real-life, applied, and conceptual situations

Consider the role of scientists in innovation

### **Communicating**

Formulate physical or mental theoretical models to describe a phenomenon

Communicate scientific ideas and information, and perhaps a suggested course of action, for a specific purpose and audience, constructing evidence-based arguments and using appropriate scientific language, conventions, and representations

Express and reflect on a variety of experiences, perspectives, and worldviews through place

### **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 include 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

## Board/Authority Authorized Course: Aviation 12

- **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

### Recommended Instructional Components:

Units and lessons will provide students with a varied learning experience, instructional strategies and course content will incorporate hands on learning, research, field trips, guest speakers, lab work and experimentation, individual and group projects, recommended readings, class discussions...etc. The course also serves to co-ordinate learning in mathematics, science, geography, metal, and drafting areas.

### Student Expectations:

- Ability to work with others.
- Ability to work with hands and small tools.
- High level of classroom maturity.
- All projects/tests reports/journals are to be completed at the highest personal standard
- For extended absence from school, other than serious illness it is the student's responsibility to obtain work and to complete all assignments when returning to class.
- If a student is absent for a test, the student will receive a "0" for that test until an excused absence is secured. If the absence is excused, the student will be given the opportunity to either write the test or make up the test in some other way as decided by the teacher. If more than one major test is missed the teacher may refer the problem to the administration when they feel it is appropriate. This is school policy.



## Board/Authority Authorized Course: Aviation 12

### Supplies

- Binder and loose-leaf.
- Protractors and rulers
- Scientific calculator
- Clothes suitable for working in a shop

### Assessment Component:

Assessment involves the wide variety of methods or tools that educators use to identify student learning needs, measure competency acquisition, and evaluate students' progress toward meeting learning standards. Assessment of all forms should support a flexible, personalized approach to learning and measure deeper, complex thinking.

In developing assessment strategies, it is important that the assessment is transparent and responsive to the learners. Knowing, doing, and understanding are the three key pillars that are traditionally assessed using a number of vehicles. Feedback in a timely manner that is specific and embedded in instruction is critical as well as involving students in their learning. Assessment over time that is clearly communicated to parents and students is key in supporting student learning.

### Assessment Components:

Journaling

Peer Assessment

Self-Assessment

Performance Assessment

Oral Presentations

Quizzes and Exams

All the projects, worksheets, reports, journals, exams, and quizzes are equally weighted. The amount awarded to each is dependent on the total marks awarded for the course.

### Learning Resources:

### Aircraft and Flight Theory

## Board/Authority Authorized Course: Aviation 12

MacDonald, A. (2019). From the ground up. Ottawa, Ontario: Aviation Publishers Co. Limited.

### Aviation History

Dwiggins, D. (1969). Bailout: The story of parachuting and skydiving. New York, N.Y.: Macmillan Publishing Co, Inc.

Dwiggig, D. (1973). Riders of the wind: The story of ballooning. New York: Hawthorn Books, Inc.

Editors of Time-Life Books. (1980). The aeronauts. Alexandria, Virginia: Time-Life Books, Inc.

Editors of Time-Life Books. (1980). The giant airships. Alexandria, Virginia: Time-Life Books, Inc.

Editors of Time-Life Books. (1980). The road to Kitty Hawk. Alexandria, Virginia: Time-Life Books, Inc.

Editors of Time-Life Books. (1980). The first aviators. Alexandria, Virginia: Time-Life Books, Inc.

Editors of Time-Life Books. (1980). The pathfinders. Alexandria, Virginia: Time-Life Books, Inc.

Finnigan, C. (2001). Microlighting: Affordable aviation. Ramsbury, Marlborough: Crowood Press Ltd.

George, W. (1978). Kites for all seasons: The history, the lore, the art, the science and a practical guide for building and flying kites. Chicago, Illinois: Contemporary Books, Inc.

Lausanne, E. (1971). The romance of ballooning: The story of the early aeronauts. New York, N.Y.: Viking Press.

Lopez, D. (1995). Smithsonian guides: Aviation. New York, N.Y.: A Simon and Schuster Macmillan Company.

Molson, K. (1988). Canada's national aviation museum: Its history and collections. Ottawa, Ontario: D.W. Friesen Printers.

Mrazek, J. (1976). Hang gliding and soaring: A complete introduction to the newest way to fly. New York, N.Y.: St. Martin's Press, Inc.

Zuuring, P. (2001). Arrow countdown. Kingston, Ontario: Friesens.

## Board/Authority Authorized Course: Aviation 12

Zuuring, P. (2001). The arrow scrapbook. Kingston, Ontario: Friesens.

### **Aviation Resource**

The History Channel. (2000). History's mysteries: The Wright brothers controversy. New York, N.Y.: A & E Television Networks.

The History Channel. (1999). Modern marvels: Balloons. New York, N.Y.: A & E Television Networks.

The History Channel. (1998). Modern marvels: Airships. New York, N.Y.: A & E Television Networks.

Biography. (1994). Wilbur & Orville Wright: Dreams of flying. New York, N.Y.: A & E Television Networks.

The History Channel. (1999). Suicide mission: Silent wing warriors. New York, N.Y.: A & E Television Networks.

The History Channel. (1996). Mach one: The times, the team, the sound barrier. New York, N.Y.: A & E Television Networks.

The History Channel. (1999). In to the wild blue: The world's best flight teams. New York, N.Y.: A & E Television Networks.

The History Channel. (1999). Modern marvels: Helicopters. New York, N.Y.: A & E Television Networks.

The History Channel. (2000). Investigative reports: Air traffic jams, bumped, delayed and grounded. New York, N.Y.: A & E Television Networks.

### **Aviation Educational Resources**

British Columbia Institute of Technology (Aviation Maintenance). <http://www.htp.bcit.ca>

Canadian Forces. <http://www.dnd.ca>

Coastal Pacific aviation (Pilots). <http://www.coastalpacific.com/cpa/index.htm/>



## Board/Authority Authorized Course: Aviation 12

Industry Training and Apprenticeship Commission. <http://www.labour.gov.bc.ca/itac/itachome.htm>

Northern Lights College (Aircraft Maintenance Engineering). <http://www.nlc.bc.ca>

Selkirk College (Aviation two-year diploma). <http://www.selkirk.bc.ca>

Trinity Western (Aviation Studies). <http://www.twu.ca>