Elective Course Description

Course Name

Introduction to Geographic Information Systems (GIS)

Course Number

TBD after Board approval

Length of Course

One Semester

Grade Level

7-8, 9-12

Credit Type

0.5 Elective Per Semester (for students in grades 9-12)

Grading Scale

A-F

Course Prerequisite

None

Course Summary

The focus of the course is to deepen each student's understanding of how we gather and use spatial data to recognize, represent, and communicate information about real-world issues. In addition, students are challenged to discuss solutions to these problems in a logical and creative way. Students will learn to use ArcGIS software on their computers. After taking this class, each student will have a better understanding of how GIS relates to their everyday lives, as well as the “where” and “what” of applied geography in the form of maps and spatial information.

Primary Materials

Lessons and materials will be accessed primarily through the Environmental Systems Research Institute (ESRI) site. We will use ArcGIS software, developed by ESRI.

Standards

Alaska Computer Digital Literacy Standards

- Empowered Learning
    - 6-12.EL.4 Students are able to navigate a variety of technologies and transfer their knowledge and skills to learn how to use new technologies.
- Knowledge Construction
    - 6-12.KC.1 Students demonstrate and practice the ability to effectively utilize research strategies to locate appropriate digital resources in support of their learning.
    - 6-12.KC.2 Students practice and demonstrate the ability to evaluate resources for accuracy, perspective, credibility and relevance.
    - 6-12.KC.3 Students locate and collect resources from a variety of sources and organize assets into collections for a wide range of projects and purposes.
    - 6-12.KC.4 Students explore real-world issues and problems and actively pursue an understanding of them and solutions for them.
- Computational Thinking
    - 6-12.CT.1 Students practice defining problems to solve by computing for data analysis, modeling or algorithmic thinking.
    - 6-12.CT.2 Students find or organize data and use technology to analyze and represent it to solve problems and make decisions.
- Creative Communication
    - 6-12.CC.2 Students create original works or responsibly repurpose other digital resources into new creative works.
    - 6-12.CC.3 Students communicate complex ideas clearly using various digital tools to convey the concepts textually, visually, graphically, etc.
- Global Collaboration
    - 6-12.GC.1 Students use digital tools to interact with others to develop a richer understanding of different perspectives and cultures.
    - 6-12.GC.2 Students use collaborative technologies to connect with others, including peers, experts and community members, to learn about issues and problems or to gain broader perspective.
    - 6-12.GC.3 Students determine their role on a team to meet goals, based

on their knowledge of technology and content, as well as personal preference.
    - 6-12.GC.4 Students select collaborative technologies and use them to work with others to investigate and develop solutions related to local and global issues.

Alaska Computer Science Standards for High School

- Data Analysis
    - Collection, Visualization and Transformation
        - L1.DA.CVT.01 Use tools and techniques to locate, collect and create visualizations of small and large-scale data sets (e.g., paper surveys, online data sets, etc.).
- Community, Global and Ethical Impacts
    - Culture
        - L1.CGEI.C.02 Demonstrates how a given algorithm applies to problems across disciplines.
    - Social Interactions
        - L1.CGEI.SI.01 Demonstrates how computing increases connectivity to people in various cultures.
- Safety, Law and Ethics
    - L1.CGEI.SLE.4 Describe the beneficial and intrusive aspects of advancing and emerging technologies (e.g., artificial intelligent agents, IoT, robotics).
    - L1.CGEI.SLE.5 Discuss diverse careers that are influenced by computer science and its availability to all regardless of background.

Assessment

Assessments (30%), skill demonstrations (35%), projects (35%)

Activities

Week 1

What is GIS? A brief introduction on what it is, the history of GIS, how it is used, and the software we'll be learning (ArcGIS). Will also introduce data models and coordinate systems.

Week 2

Maps and Data in ArcGIS Online. Introduction to the different types of virtual maps.

Week 3
3D Maps in ArcGIS Online - moving between 2D and 3D to see the world in a new perspective.
Introduction to GeoInquiries for World History, American Literature, and Earth Science.

Week 4
Data Collection in ArcGIS Online - how to create a data collection form, publish and share your survey, and analyze fieldwork data.
Relevant GeoInquiries lessons related to other course content (ongoing).

Week 5
Storytellng in ArcGIS Online - how to communicate information in meaningful ways.
Relevant GeoInquiries lessons related to other course content (ongoing).

Week 6
Exploring Tectonic Hazards - the spatial relationship between volcanoes, earthquakes, plate boundaries and major cities. GIS skills will be used throughout this lesson.

Week 7
Student-led projects using data collection and basic GIS skills related to course content (can relate to any current course), class projects, and/or place-based issues of interest to the student(s). Students will obtain approval for their project and then work with the teacher to outline a plan for data collection, map creation, and project presentation. This is ongoing.

Week 8
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 9
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 10
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 11
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 12
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 13
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 14
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 15
Relevant GeoInquiries lessons related to other course content (ongoing).
Student-led projects (ongoing).

Week 16
Final discussions and thoughts about GeoInquiries lessons.
Final presentations of student-led projects.