RECORD OF ACADEMIC ACHIEVEMENT

The Evergreen State College - Olympia, Washington 98505

OFFICIAL TRANSCRIPT DOCUMENT

Heetderks, Alicia D — A00430459

Last, First Middle — Student ID

DEGREES CONFERRED:

Bachelor of Science — Awarded 16 Jun 2023

TRANSFER CREDIT:

Start	End	Credits	Title
03/2015	12/2020	90	**South Puget Sound Community College**

EVERGREEN UNDERGRADUATE CREDIT:

Start	End	Credits	Title
09/2021	03/2022	32	**Freshwater Ecology and Hydrology** **4 - Freshwater Ecology* **4 - Freshwater Hydrology* **3 - Aquatic Entomology* **3 - Aqueous Chemistry* **4 - Spatial Analysis: GIS* **4 - Applied Statistics: Statistics 1 and 2* **2 - Seminar* **8 - Research Project*
03/2022	06/2022	16	**Exploring Other Worlds: Astrobiology & Instrumentation** **6 - Astrobiology* **6 - Analytical Chemistry* **4 - Scientific Writing*
03/2022	06/2022	4	**Individual Learning Contract** *4 - Intermediate Geographic Information Systems (GIS)*
09/2022	03/2023	32	**Environmental Analysis** **8 - Analytical Chemistry* **4 - Aqueous Geochemistry* **6 - Analytical Chemistry and Geochemistry Laboratory* **4 - Geochemical Modeling Project* **4 - Biogeochemistry* **6 - Freshwater Analysis Project*
04/2023	06/2023	12	**Capstone Projects in Environmental Research** **12 - Capstone Research in Environmental Chemistry*

Cumulative

186 Total Undergraduate Credits Earned

Heetderks, Alicia D — A00430459
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"Life was born in ***water*** and is carrying on in ***water***. Water is life's matter and matrix, mother and medium. There is no life without water."

~Albert Szent-Gyorgyi

The quote above is the embodiment of what brought me to my academic emphasis. I worked for a small water treatment company for five years before my journey began at Evergreen but let's back up just a little to begin to understand how I got to where I am today. My education began in 2013 at South Puget Sound Community College where I studied such things as majors chemistry, biology, and calculus. I graduated in 2015 with my AS but was no closer to figuring out where I wanted to be. Once hired at the water treatment company I began to learn about boilers and cooling towers and water management plans among other things related to making water safe. I learned about what our water is used for and how we go about making it safe for everyone. I believe that everyone is entitled to clean and safe water, but we must be responsible with its use to leave this planet better off than when we arrived for all future generations to come. It is our job now to set up processes to better clean our water, develop new technologies and environmentally safe materials, and to reduce waste and pollution for those that come after us. If we continue to wait, then there will come a time when it will be too late. I knew I needed more education to make my dreams come true, so I decided to go back to school. I chose Evergreen because of their interdisciplinary philosophy and collaborative environment. After much thought I decided to pursue a BS with an emphasis on environmental science, analytical chemistry, and hydrology.

I learned so much about myself and what I am capable of while at Evergreen. I had the freedom to choose what path I would take and could change course if I found something else that I was interested in. I got to get hands on with the instrumentation. I got out in the field and collected my own samples, then took them back to the lab to analyze. I learned about alkalinity, total hardness, and silicate analysis. I trained for and obtained my operator's license for the ICP-MS for trace metal analysis for both semi-quantitative and quantitative modes. I learned how to use a YSI meter to measure for dissolved oxygen content, conductivity, and salinity. I learned how to utilize ArcGIS to take data and create maps. I also utilized statistics to determine whether two data sets are correlated or to determine how they differ. My last quarter was spent developing an important research question, designing an experiment to test for that question, and executing the experiment and analyzing all data on my own with little supervision. There is so much to learn about water quality, and I was absorbing it all like a sponge. One of my major accomplishments was that a paper I co-wrote was published in an issue of Metamorphosis.

I want to be a force for conservation and prevention of pollution of our precious waterways. I want to develop better processes for cleaning up pollution and help everyone reduce their waste, and to assist in implementing plans that will reduce pollution and groundwater contamination. I want to lead the charge to clean up our waterways to preserve our most precious resource, and therefore make sure that people and animals can coexist in a clean and healthy environment.

Heetderks, Alicia D — A00430459
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April 2023 - June 2023: Capstone Projects in Environmental Research

12 Credits

DESCRIPTION:
Faculty: Robin J. Bond, Ph.D.

In this program, students carried out a modest environmental research project from beginning to end. Each student came up with their own idea, created plans and wrote standard operating procedures, collected field samples, and ran analyses. Students created a presentation explaining their project to the general public. Students also wrote a scientific paper that demonstrated a knowledge of related peer-reviewed literature, explained methods and field sampling protocols, and presented results in context of existing scientific knowledge.

EVALUATION:
Written by: Robin J. Bond, Ph.D.

Alicia chose to do a project that examined water quality parameters (such as alkalinity, silicates, and metal concentrations) in the Elwha River and the adjacent groundwater.

Alicia wrote standard operating procedures (SOPs) for field sampling, filtration, alkalinity titrations, and quantitative analysis of metals on the inductively-coupled plasma-mass spectrometer (ICP-MS). In general, Alicia's SOPs were very well-organized. Alicia's field work was particularly ambitious, as it involved setting up a field lab for alkalinity titrations in an off-site location. Over the course of the quarter, Alicia was able to carry out most of the planned procedures, but had to substitute metal analysis by atomic absorption spectroscopy after the ICP-MS developed problems.

Alicia then presented this data in two ways. First, Alicia gave a presentation to an audience that included both scientists and non-scientists. Alicia's verbal presentation skills were very good, and were backed up by a Powerpoint containing excellent pictures. Alicia also wrote an very good final paper that was grounded in scientific literature, with the error analysis and future work paragraph being the strongest sections.

Throughout the course of the quarter, Alicia showcased many skills essential to an independent researcher. Alicia was generally quite organized and proactive about getting things done. Additionally, Alicia showed considerable flexibility in finding solutions when the field sampling trip did not go as planned.

Overall, Alicia's work this quarter demonstrated an excellent aptitude for independent research.

SUGGESTED COURSE EQUIVALENCIES (in quarter hours) TOTAL: 12

*12 - Capstone Research in Environmental Chemistry

* indicates upper-division science credit

Heetderks, Alicia D — A00430459
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September 2022 - March 2023: Environmental Analysis

32 Credits

DESCRIPTION:
Faculty: Robin J. Bond, Ph.D.

Environmental Analysis was designed as a multi-quarter interdisciplinary program that combined material in analytical chemistry, aqueous geochemistry, chemical and geochemical analysis, and interdisciplinary projects. In fall, the thematic focus was analyzing and modeling geochemical systems. In winter, the focus shifted to biogeochemistry and analysis of both soil and freshwater.

Analytical Chemistry with Laboratory: The program used the textbook *Analytical Chemistry 2.1* by David Harvey. Topics covered were chemistry of analytical methods, including chemical activity, chemical equilibrium, titrations, complexation, solubility, and acids/bases. Electrochemistry was also covered, with applications to using and developing electrochemical probes. Students also learned general principles of instrumentation such as sources of noise and signal processing. They then applied these principles to specific types of instrumentation such as UV-Vis, infrared, fluorescence, Raman, and spectroscopy; gas and liquid chromatography; and X-ray methods. Principles of quality assurance and control were covered in the classroom and also applied in the context of learning major instrumentation.

Laboratory: The laboratory portion included experiments relating to water quality, such as alkalinity by acid/base titrations, analysis of total dissolved solids, colorimetric analysis of silica, water hardness by complexation titrations, gravimetric analysis of sulfates, and analysis of both total and dissolved metals. Special attention was given to processing samples for trace metal analysis, matrix matching, and identifying and removing interferences. Students also identified the dynamic range of an instrument for an analyte. Throughout the program, emphasis was placed on reading and following standard analysis procedures published by the EPA, USGS, and APHA. Students had the opportunity to become certified for theory and operation of the Inductively-Coupled Mass Spectrometry (ICP-MS) in both semi-quantitative and quantitative modes.

Aqueous Geochemistry: The program used *The Geochemistry of Natural Waters: Surface and Groundwater Environments*, 3rd ed., by Drever. Topics covered in the program included equilibrium thermodynamics and activity, the carbonate system, hydrologic cycle and evaporating systems, the redox equilibria and redox in natural waters, and finally isotope analysis. Students read and discussed papers from the primary literature that linked topics covered in class to current research in geochemistry.

Geochemical Modeling Project: Students read articles from the geochemical literature related to endorheic basins. Students learned the geochemical modeling program PhreeqC (from USGS), trying it first on a model system and then applying it to datasets found in literature related to endorheic basins. Students presented their models through a group presentation as well as in an individual written document.

Biogeochemistry: This portion was based on *Biogeochemistry: An Analysis of Global Change*, 4th ed., by Schlesinger. Topics covered included atmospheric processes, lithospheric processes, primary productivity, cycling of important nutrients (e.g. carbon, nitrogen, phosphorus, potassium, sulfur), wetland processes, and the effects of climate change on biogeochemical cycles.

Winter Freshwater Analysis Project: Working in groups, students identified a body of water and located appropriate sampling locations within it. Students sampled at these sites both before and during a rain event and ran multiple analyses on those samples—pH, dissolved oxygen, salinity, total dissolved solids, alkalinity, water hardness, silica, and both major and trace metal concentrations. Students ran statistical

analyses to determine the effects of rain on their freshwater system, then presented their results in a group presentation as well as an individual research paper. For much of this portion of the program, students were working independently, without faculty present.

EVALUATION:
Written by: Robin J. Bond, Ph.D.

Alicia's work in this program was generally excellent. Alicia was a highly engaged student who worked diligently to master all of the learning objectives for the program.

In Analytical Chemistry, Alicia's homework usually showed excellent understanding of the material in both fall and winter, especially related to mathematical concepts such as the systematic treatment of equilibrium and statistical tests. On the fall final exam, Alicia demonstrated very good comprehension of the material, especially on the problem relating to activity. On the winter final exam, Alicia exhibited good understanding of the material, with the best work done on the problem relating to quality control. Overall, Alicia showed mastery of most learning objectives, but may want to spend additional time studying complexation.

In Aqueous Geochemistry, Alicia's homework showed excellent understanding of the material; best work was done on redox systems. On the final exam, Alicia demonstrated excellent comprehension of the material, especially on the problem identifying saturated ionic compounds in an aquifer. Overall, Alicia showed mastery of all learning objectives.

In lab, Alicia had very good attendance and worked excellently in both individual and group settings. Alicia's lab technique and results demonstrate excellent precision. Alicia successfully obtained an operator's license for the ICP-MS in both semi-quantitative and quantitative modes. The instrument aide said Alicia "clearly has a thorough understanding of the theory and can comfortably operate the instrument."

For the fall project, Alicia wrote very good annotated bibliographies of scientific literature on endorheic basins. Alicia successfully modeled several geochemical systems using PhreeqC and used the results to create very good comparative figures which were used in reporting. Alicia was part of a group which focused on modeling Pilot Valley, Utah, as well as Lake Bonney in Antarctica. Alicia's group gave an oral presentation that featured slides that had excellent figures but sometimes too much text; Alicia's portion of the presentation was quite good. Alicia also created a fairly good brochure explaining the geologic and geochemical differences between the two endorheic basins to the general public.

In biogeochemistry, Alicia's homework showed very good understanding of the subject and showed particular mastery of carbon cycling. On the final exam, Alicia exhibited very good comprehension of the material, with best work being done on the problem relating to nitrogen cycling. Alicia showed mastery of most learning objectives and competency in the rest.

For the winter freshwater analysis project, Alicia's group studied the effect of rain on the chemistry of Long's Pond. Alicia worked collaboratively with teammates, taking a leadership role when necessary. Alicia's results show very good precision. Alicia was able to use data from lab analyses to show no significant difference in water chemistry between rainy and dry days. Alicia's portion of the group presentation was clearly presented. Alicia's final paper was fairly well written; however, there were some sections that would have benefitted from extra details.

SUGGESTED COURSE EQUIVALENCIES (in quarter hours) TOTAL: 32

*8 - Analytical Chemistry

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*4 - Aqueous Geochemistry
*6 - Analytical Chemistry and Geochemistry Laboratory
*4 - Geochemical Modeling Project
*4 - Biogeochemistry
*6 - Freshwater Analysis Project

* indicates upper-division science credit

Heetderks, Alicia D — A00430459

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March 2022 - June 2022: Individual Learning Contract

4 Credits

DESCRIPTION:
Faculty: Dr. Ken Tabbutt

Alicia completed this individual learning contract to build on the foundational ArcGIS Pro skills and knowledge that she gained in fall and winter quarter, and to prepare for ESRI's ArcGIS Desktop Professional certification exam. Alicia completed 61 on-line courses in preparation for the certification exam; these exercises spanned understanding ArcGIS fundamentals and map visualization, data and editing, R Studio-ArcGIS Bridge, ArcGIS API for Python, and geoprocessing in ArcGIS.

EVALUATION:
Written by: Dr. Ken Tabbutt

Alicia demonstrated the ability to work independently and manage her time to complete all of the goals of the contract. She completed the entire sequence of ESRI courses to prepare for the ArcGIS Desktop Professional certification exam. This length sequence of on-line tutorials allowed Alicia to gain a strong understanding of the functionality of ArcGIS Pro. Alicia now has the knowledge and skills to do more advanced work in GIS.

SUGGESTED COURSE EQUIVALENCIES (in quarter hours) TOTAL: 4

4 - Intermediate Geographic Information Systems (GIS)

Heetderks, Alicia D — A00430459
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March 2022 - June 2022: Exploring Other Worlds: Astrobiology & Instrumentation

16 Credits

DESCRIPTION:
Faculty: Robin J. Bond, Ph.D.

This program focused primarily on analytical chemistry (especially instrumental analysis) and astrobiology. For each of these topics, students watched lecture videos, read from the textbooks (Harvey; Horneck & Rettberg), and answered reading questions before participating in class discussions; then they did homework problems to strengthen their comprehension of concepts. Students had two exams which integrated aspects of both subjects.

The astrobiology portion of the program focused on physical and chemical properties of planets that affect whether life might exist on a world, and—if so—how those properties determine what sort of life might be present. Students also participated in a seminar on peer-reviewed articles related to astrobiology.

In analytical chemistry, students learned about spectroscopic instrumentation as well as quality control protocols. Students had in-person instrumentation instruction that provided experience with UV-Vis spectrophotometry, atomic absorption (AA) spectroscopy, and infrared spectroscopy. Training on the inductively-coupled plasma-mass spectrometer (ICP-MS) provided the possibility of becoming certified to operate the instrument without faculty oversight.

Students also received instruction in technical writing. Students wrote standard operating procedures (SOPs) for their own laboratory exercises and also learned to create SOPs from standard methods. Students also participated in exercises that helped them learn to write all four sections of a scientific paper.

Several activities allowed students to integrate many aspects of the program. Both midterm and final exams had problems which combined principles of instrumental analysis and astrobiology. Students participated in a three-day field trip which helped them apply principles of chemical analysis (quality control, sample collection) and astrobiology (looking for principles underlying how life can grow and thrive in “barren” sites). The final research project allowed students to integrate all aspects of the program; each student created a mission proposal that used instrumentation to seek out life and/or biosignatures on a body in the solar system. Students gave a presentation on their mission to their classmates and also submitted a final paper.

EVALUATION:
Written by: Robin J. Bond, Ph.D.

Alicia was a diligent student, engaged well in group activities, and was a strong contributor to group work. Although Alicia's best work was not showcased by exams, other assignments showed Alicia's very good understanding of the material.

In astrobiology, Alicia completed all of the reading questions. Alicia’s answers to homework questions were thorough and thoughtful. In seminar, Alicia demonstrated a strong understanding of the paper being discussed. Alicia’s strongest area of understanding seemed to be the interaction of solvents with life.

In analytical chemistry, Alicia completed all of the reading questions in a timely fashion. Alicia’s answers to homework questions were thorough and thoughtful. Alicia’s strongest area of understanding seemed to be in theory of how instrumentation works. Alicia’s lab results showed evidence of very good lab technique. Alicia’s lab notebook was neat, complete, and thorough, and included all procedural details

and calculations. Alicia's lab write-ups were thorough and showed evidence of strong critical thinking skills.

Alicia received an operator's license for the ICP-MS. The lab aide wrote, "Alicia showed a very strong understanding of the correct and safe operation of the ICP-MS, and comfortably described the roles and mechanisms of each component in the ICP-MS."

In the writing portion of the program, Alicia showed considerable improvement over the course of the quarter. By the end, Alicia's standard operating procedures were very good in quality.

Alicia's performance on the midterm exam was acceptable and the final exam showed evidence of good comprehension of the material.

For the final project, Alicia developed a thoughtful plan for an orbital probe to Callisto. Alicia's oral presentation skills were excellent, though the slides were a bit wordy. The project paper was very well-written and demonstrated a strong understanding of fundamental principles and familiarity with scientific literature.

SUGGESTED COURSE EQUIVALENCIES (in quarter hours) TOTAL: 16

*6 - Astrobiology
*6 - Analytical Chemistry
*4 - Scientific Writing

* indicates upper-division science credit

Heetderks, Alicia D — A00430459
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September 2021 - March 2022: Freshwater Ecology and Hydrology

32 Credits

DESCRIPTION:
Faculty: Kenneth Tabbutt, Ph.D. and Carri J. LeRoy, Ph.D.

Rivers and streams rank as some of the most imperiled ecosystems on Earth. They are heavily influenced by transportation, agricultural and forest practices, energy production, waste disposal, and recreation. Due to both high extinction rates of freshwater species and projected influences of climate change on the hydrologic cycle, it is crucial to understand both how freshwater ecosystems function and how stream ecosystems can be restored. This program covered freshwater ecology, hydrology, aquatic chemistry and aquatic entomology concepts to understand rivers from a landscape perspective and to understand how streams, lakes, wetlands and groundwater interact with terrestrial ecosystems. We investigated the influences of local geology, land-use practices, and terrestrial disturbances on water quantity and quality. Students learned to use quantitative methods for both spatial analysis and statistical analysis to understand variation across landscapes and complete group research projects.

This program covered freshwater ecology in streams, rivers, lakes and wetlands using the text, *Freshwater Ecology* (Dodds and Whiles). A major focus was on research methods in both the field and the lab. Topics covered included: water chemistry, ecosystem processes, trophic dynamics, ecological interactions, organic matter and nutrient dynamics, and current threats to freshwater ecosystems. The course focused on current research in ecosystem ecology, community ecology, and terrestrial-aquatic interactions.

This program focused on hydrology concepts using the text, *Hydrology and the Management of Watersheds* (Brooks, Ffolliott and Magner). The course material covered components of the hydrologic cycle, including precipitation, evaporation and transpiration, infiltration, runoff, the role of groundwater, and stream flow. Stream channel morphology and sediment-size distribution were also examined. These topics were considered through the lens of environmental change and the direct relationship between hydrology and freshwater ecology.

Aspects of aqueous chemistry were covered in the second quarter; this included chemical weathering, redox, carbonate chemistry, sorption and ion exchange. Students read the primary literature and conducted field and lab work that linked theory to practice. Field instruments were used to measure water quality parameters such as conductivity, pH, DO, turbidity and temperature. In the lab, students learned to filter samples, prepare internal standards, perform total alkalinity titrations, and prepare samples for sorption experiments.

Content in aquatic entomology was covered in the second quarter using the text, *Aquatic Entomology* (Lancaster and Downes). Topics included: evolution and systematics, biomechanics, locomotion in and on water, feeding devices, foraging strategies, gas exchange, reproduction and mating, and insect development. Students spent time every week working with dissecting microscopy to learn the major aquatic insect orders, taxonomy and vocabulary, and to identify insects and non-insect invertebrates to the lowest taxonomic level possible.

Statistical and spatial data analysis were also emphasized. Students were expected to collect and analyze data associated with weekly field and lab assignments as well as group research projects. Students learned how to calculate descriptive statistics, understand probability and probability distribution functions, perform parametric statistics (Student's t-tests, Chi-square tests, analysis of variance (ANOVA), simple linear regression, multi-way ANOVAs, ANCOVA), permutative statistics (permutative ANOVA), multivariate statistics (permutative MANOVA, NMS ordination), and meta-analysis using various statistical software packages (R, JMP-in, JASP, PAST, OpenMEE, Excel). Geographic

Information Systems (GIS) was used to analyze and display spatial data. Students used ArcGIS Pro to import raster and vector data, reclassify, delineate watersheds, reproject, select, create new shapefiles, import XY data, create true and false-color images, create layouts, display 3D data, and other data manipulations. They also learned the theory behind GIS, GPS, coordinate systems and remote sensing.

Seminar readings focused on human-freshwater interactions and regionally important freshwater topics in the Pacific Northwest. Students read *Eager: The Surprising, Secret Life of Beavers and Why They Matter* (Golfarb) and *Where the Salmon Run: The Life and Legacy of Bill Frank Jr.* (Heffernen) as well as papers from the scientific literature.

Small-group research projects were a major component of this program and blended learning in hydrology, freshwater ecology, aquatic chemistry, aquatic entomology, statistics, and GIS. Students developed research proposals in the fall quarter and conducted the research, analyzed results, and shared their findings in winter quarter. These projects provided an opportunity for students to apply what they had learned in class to self-defined ecological questions. This research allowed students to explore a topic of interest in more depth than was covered in class. In addition, students developed skills in collaboration, time management, trouble-shooting, developing or adapting standard methods, critical thinking, and communicating through scientific writing and oral presentations.

EVALUATION:
Written by: Carri J. LeRoy, Ph.D. and Kenneth Tabbutt, Ph.D.

It was a pleasure having Alicia Heetderks in this program. Alicia entered the program with an interest in ecology and gained a strong understanding of all topics covered in the program. Alicia worked to complete both independent and group work of high quality. Alicia worked well with peers to learn during collaborative workshops and small group work in the field and the lab.

Freshwater Ecology

Learning in freshwater ecology was demonstrated through participation in class, workshop completion, demonstrated knowledge on quizzes and exams, and bi-weekly fieldwork reports. Alicia was able to complete all weekly workshops that allowed students to practice quantitative skills and apply knowledge of concepts to solving problems in freshwater ecology. This weekly practice solving problems was one method Alicia used to study for three quizzes and two exams in freshwater ecology. Other methods must have proved successful, because Alicia did strong work on all quizzes and exams. Alicia demonstrated mastery of the concepts in freshwater ecology on assessments this quarter. Finally, students were asked to complete field tasks each week and submit bi-weekly reports on their freshwater ecology field experiences. Alicia consistently submitted detailed, organized, and well-documented field reports that included all required components: title, date, names, location, map, coordinates, hydrological information, habitat information, climate/weather information, data collected, illustrations, photographs, and a written narrative of the experience. The field reports submitted by Alicia were of consistently excellent quality.

Freshwater Hydrology

Based on the results of workshops, quizzes, exams and field reports, it is evident that Alicia gained a very good understanding of the hydrology topics that were covered this quarter. The results of Alicia's quizzes and exams indicated a very strong understanding of concepts and ability to solve quantitative problems. Alicia's midterm exam score was perfect. Alicia worked very well with peers during workshop and in the field; all of the group assignments were completed in a timely manner and reflected an understanding of the hydrologic cycle, infiltration, stream discharge, grain-size distribution analysis, hyporheic flow and other concepts. Alicia's field and lab reports included all of the required components, but Alicia could have spent more effort on the data interpretation. It is clear that Alicia is very engaged

when in the field and applying theory to practice is a strength. Throughout the quarter, Alicia demonstrated the ability to think critically, use quantitative methods to evaluate data, and synthesize information.

Aquatic Chemistry

The results of Alicia's quizzes, workshops and lab reports indicate a good understanding of the aqueous chemistry topics that were covered. Although two lab reports were submitted late, Alicia's workshops indicated an understanding of chemical weathering, redox, the carbonate system and sorption as well as good quantitative reasoning skills. This level of understanding was also reflected in Alicia's quiz results. Alicia worked well with others in workshop, doing fieldwork, and in the lab. Alicia demonstrated careful lab technique when preparing standards for the ion chromatograph and Alicia's report was detailed and comprehensive.

Aquatic Entomology

Alicia learned a lot about aquatic insects and invertebrates this quarter. Weekly lectures on a variety of topics were distilled into three quizzes, and Alicia did consistently excellent work on all assessments. In addition to learning about concepts in aquatic entomology, Alicia also dove into learning about how to classify and identify aquatic invertebrates using dichotomous keys. Learning the vocabulary alone is an impressive feat, but Alicia learned to correctly identify most invertebrates to order, and often family. This work was recorded in an organized notebook including notes about the dichotomous key, and a final complete taxonomic identification. Alicia struggled to provide all required details for each specimen, but did consistent work throughout the quarter. Finally, the sum of the learning in aquatic entomology was applied to an extensive research project in winter quarter and it was evident that the research group was able to apply their knowledge and skills to this independent work.

Applied Statistics: Statistics I and II

Alicia was an active participant in the Applied Statistics I/II component of this program. To this end, Alicia was an exceedingly active participant in statistics lab each week. In particular, Alicia used the opportunity to work with other students in the lab to get questions answered and to problem-solve challenges. Alicia completed all weekly statistics assignments covering a variety of topics and the applications of statistics to real-world data. The work on statistics labs was consistently excellent. In addition, to expand the learning of statistics, Alicia completed all of the optional RStudio extensions, whereby additional learning in R language and coding to run statistics was the focus. Alicia should be commended on this additional work. Learning to code in R is challenging, but this will be an important skill moving forward. Based on four quizzes and two exams, Alicia demonstrated mastery of statistical concepts and the ability to think through statistical problems. Alicia was able to apply statistical concepts and methods to group research projects in winter quarter and now has the confidence and ability to collect and analyze real-world data.

Spatial Analysis: GIS

Alicia has an aptitude and genuine interest in GIS. Alicia demonstrated an outstanding understanding of the GIS tools in fall quarter but Alicia's work was not as consistent in the winter; one of the labs was not completed and one was submitted late. The results of Alicia's GIS quizzes and labs reflected a strong understanding of the theory. Alicia collaborated well with other students, often providing help when they encountered problems. Alicia was able to conceptualize and implement the steps needed to answer a question using GIS. Alicia contributed to creating a map for the research project. The final layout included a clear legend, research sites, and critical spatial data such as salmon and non-salmon bearing streams.

Readings, Seminar, and Research Proposal Writing

Alicia worked with four other students and completed a research project proposal, "Measuring the Effects of Fish Barrier Corrections on Freshwater Mollusk Species." The initial draft lacked some detail but was based on good research. The final proposal was significantly better; it was well organized, thorough, included the specific aims, background, the significance and details of the proposed work. The group's oral presentation was well organized and clearly outlined their proposed work. Alicia discussed how they planned to incorporate GIS in their project. Alicia's group is ready to start their investigation at the beginning of winter quarter. Alicia wrote some of the most extensive and thoughtful posts on the seminar readings; they reflected a strong understanding of central themes. Alicia consistently included pertinent quotes, communicated central themes, and wrote in a clear and well-organized manner.

Final Research Project

Alicia was a member of a collaborative research group that implemented the fall quarter project proposal with some modifications in winter quarter and expanded the ideas and research question into a full-blown research project. The culmination of the project was a final scientific research paper titled, "Measuring the Effects of Salmon Presence on Freshwater Macroinvertebrate Communities in Streams in Thurston County, WA." After several revisions, the final paper was well-written, well-organized, coherent, concise, and supported by the primary literature. The students co-wrote a complete paper following the format of a journal article, including title, keywords, abstract, introduction, methods, results, discussion, acknowledgements, references, tables, and figures. Each of these sections were exemplary, exceeded our expectations for the work, and as a whole, the scientific article is of high quality and represents a strong final draft. The students were able to apply key aspects of what they learned in GIS, statistics, freshwater ecology, aquatic chemistry, hydrology, and aquatic entomology to their final project, making the project cohesive and complete. We commend them on their excellent work.

Their oral presentation was exceptionally well done; it was well coordinated, organized, well-rehearsed, with smooth transitions between topics and speakers. They used well-designed PowerPoint slides to frame their talk. They managed the time very well; the presentation was comprehensive but focused on their research question and findings. They projected a very strong understanding of the topic and were able to answer questions clearly and thoughtfully.

Alicia's contribution to this project was inconsistent; she participated in some of the field and lab work but Alicia's presence was unreliable. When pressed, Alicia completed assigned work but being present during the scheduled work time was problematic and some of Alicia's responsibilities had to be picked up by other group members. Alicia's contribution to the paper was limited to the first draft of the methods section and the GIS map. Alicia presented the site locations and methods in the oral presentation. Alicia read from notes but made some eye contact. Alicia noted, "this project contributed to my academic pathway and career goals by teaching me the process and what is necessary for a successful scientific inquiry and research project of this nature."

SUGGESTED COURSE EQUIVALENCIES (in quarter hours) TOTAL: 32

*4 - Freshwater Ecology
*4 - Freshwater Hydrology
*3 - Aquatic Entomology
*3 - Aqueous Chemistry
*4 - Spatial Analysis: GIS
*4 - Applied Statistics: Statistics 1 and 2
*2 - Seminar
*8 - Research Project

Heetderks, Alicia D — A00430459

Last, First Middle — Student ID

* indicates upper-division science credit

EVERGREEN

The Evergreen State College • Olympia, WA 98505 • www.evergreen.edu

EVERGREEN TRANSCRIPT GUIDE

Accreditation: The Evergreen State College is fully accredited by the Northwest Commission on Colleges and Universities.

Degrees Awarded: The Evergreen State College awards the following degrees: Bachelor of Arts, Bachelor of Science, Master of Environmental Studies, Master of Public Administration and Master In Teaching. Degree awards are listed on the Record of Academic Achievement.

Educational Philosophy:

Our curriculum places high value on these modes of learning and teaching objectives:

- Interdisciplinary Learning
- Collaborative Learning
- Learning Across Significant Differences
- Personal Engagement
- Linking Theory with Practical Applications

Our expectations of Evergreen Graduates are that during their time at Evergreen they will:

- Articulate and assume responsibility for their own work
- Participate collaboratively and responsibly in our diverse society
- Communicate creatively and effectively
- Demonstrate integrative, independent, critical thinking
- Apply qualitative, quantitative and creative modes of inquiry appropriately to practical and theoretical problems across disciplines, and,
- As a culmination of their education, demonstrate depth, breadth and synthesis of learning and the ability to reflect on the personal and social significance of that learning.

Our students have the opportunity to participate in frequent, mutual evaluation of academic programs, faculty and students. In collaboration with faculty and advisors, students develop individual academic concentrations.

Academic Program

Modes of Learning: Evergreen's curriculum is primarily team-taught and interdisciplinary. Students may choose from among several modes of study:

- **Programs:** Faculty members from different disciplines work together with students on a unifying question or theme. Programs may be up to three quarters long.
- **Individual Learning Contract:** Working closely with a faculty member, a student may design a one-quarter-long, full-time or part-time research or creative project. The contract document outlines both the activities of the contract and the criteria for evaluation. Most students are at upper division standing.
- **Internship Learning Contract:** Internships provide opportunities for students to link theory and practice in areas related to their interests. These full- or part-time opportunities involve close supervision by a field supervisor and a faculty sponsor.
- **Courses:** Courses are 2-6 credit offerings centered on a specific theme or discipline.

The numerical and alpha characters listed as Course Reference Numbers designate modes of learning and are in a random order.

Evaluation and Credit Award:

Our transcript consists of narrative evaluations. Narrative evaluations tell a rich and detailed story of the multiple facets involved in a student's academic work. A close reading of the narratives and attention to the course equivalencies will provide extensive information about student's abilities and experiences. Students are not awarded credit for work considered not passing. Evergreen will not translate our narrative transcript into letter or numeric grades.

Transcript Structure and Contents: The Record of Academic Achievement summarizes credit awarded, expressed in quarter credit hours. Transcript materials are presented in inverse chronological order so that the most recent evaluation(s) appears first.

Credit is recorded by:

Quarter Credit Hours:	Fall 1979 to present
Evergreen Units:	1 Evergreen Unit (1971 through Summer 1973) equals 5 quarter credit hours
	1 Evergreen Unit (Fall 1973 through Summer 1979) equals 4 quarter credit hours

Each academic entry in the transcript is accompanied by (unless noted otherwise):

- The Program Description, Individual Contract or Internship Contract which explains learning objectives, activities and content of the program, course or contract.
- The Faculty Evaluation of Student Achievement provides information on specific work the student completed and about how well the student performed in the program or contract.
- The Student's Own Evaluation of Personal Achievement is a reflective document written by the student evaluating his or her learning experiences. Students are encouraged but not required to include these documents in their official transcript, unless specified by faculty.
- The Student's Summative Self Evaluation is an optional evaluation summarizing a student's education and may be included as a separate document or as a part of the student's final self- evaluation.

Transfer credit for Evergreen programs, courses and individual study should be awarded based upon a careful review of the transcript document including the course equivalencies which are designed to make it easier for others to clearly interpret our interdisciplinary curriculum. These course equivalencies can be found at the conclusion of each of the Faculty Evaluation of Student Achievement.

The college academic calendar consists of four-eleven week quarters. Refer to the college website (www.evergreen.edu) for specific dates.

This record is authentic and official when the Record of Academic Achievement page is marked and dated with the school seal.
All information contained herein is confidential and its release is governed by the Family Educational Rights and Privacy Act of 1974 as amended.
If, after a thorough review of this transcript, you still have questions, please contact Registration and Records: (360) 867-6180.