Isaac D. **Griffith**

Assistant Professor · Computer Science

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Professional Summary

- Twelve years of Software Engineering experience in a variety of positions: five years involving testing and maintenance, five years involving automation, seven years of product analysis, and three years in continuous integration and build engineering.
- Assisted companies and their engineers in understanding the value and evaluation of Software Product Quality both at the engineering and business levels.
- Eight years involved in research, focusing on Simulation, Parallel Processing, Domain Specific Languages, Game Theory, Genetic Algorithms, and Static Analysis techniques applied to Computation Ecology, Release Engineering, Technical Debt, Software Architecture, and Product Quality Analysis. Culminating in the completion of a Master's thesis and Doctoral dissertation (*expected*) along with eleven publications.

Experience

Idaho State University

Aug. 2018 - Present

Assistant Professor — *Pocatello, ID*

- Instructor for both Systems Analysis and Design and Introduction to Computer Programming, covering multiple sections including a graduate section comprising 95 students. My focus is to spread the joy of computer science while also aiming to show students the path towards becoming great software engineers.
- Director of a research lab focused on Empirical Software Engineering. Currently supervising two undergraduate students in the endeavor to construct new tools to analyse software systems to better understand quality, maintenance issues, and security issues.
- Currently redeveloping the entire curriculum for the Computer Science program, with the goal of improving overall student outcome. The main focus is to provide a better student experience, improve the robustness of the degree program, and to forge a greater connection for computer science students with Idaho State University.

Montana State University

Oct. 2011 - May. 2018

Instructor/Teaching Assistant — *Bozeman, MT*

- Teaching Assistant for Joy and Beauty of Data course in fall 2017, covering two labs consisting of 51 students. I focused on helping students to understand the implementation of python code along with the intricacies of using the python data science libraries: NumPy, Scikit-learn, pandas, and matplotlib.
- Instructor for Basic Data Structures and Algorithms Course over the summer of 2016, which included 12 students. Worked to improve student's critical thinking and problem solving skills using test driven assignments with clear goals while focusing on algorithm design and underlying concepts.
- Instructor for Introduction to Java I course over the summer of 2015, which included 11 students. Integrated both traditional lectures, pair programming in class assignments, and hands on laboratory assignments.

Montana State University – Software Engineering Laboratory

Oct. 2011 – Present

Software Engineering Research Assistant — *Bozeman, MT*

- Utilized data science methods to evaluate and compare quality models resulting in improved choice and understanding of software quality by clients as evidenced by the development of quality models based on industry and academic standards as well as a publication.
- Setup collaboration between Montana State University Software Engineering Laboratory and Mississippi State University Software Engineering Laboratory to study the relationship between software quality models and technical debt, resulting in a publication at the 6th International Workshop on Technical Debt.
- Implementation of an experimental pipeline to evaluate the effects of different coding and architectural issues on software product quality attributes as realized in multiple tools and research publications.

TechLink Center

Oct. 2015 - Present

Software Quality Engineer — *Bozeman, MT*

- Point of contact between CERL/DLA, DoD Contractors and TechLink to spearhead the continuous build process and automated analysis resulting in the automated build of 4 DLA software projects.
- Initiated the Software Product Quality Control program using SonarQube as basis for a Quality Modelling framework resulting in 3 plugins composed of 10 modules.

Montana State University – Computational Ecology Research Group

Oct. 2009 - Oct. 2015

Lead Engineer / Research Assistant — *Bozeman, MT*

- Led the engineering team, consisting of 4 student engineers, in designing and developing the Network Exchange Objects modeling framework for ecosystem simulation resulting in a highly modular simulation environment with 85% test coverage and several publications.
- Developed a visual domain specific language for the construction of Network Exchange Objects model components resulting in the reduction in training and development time for novice and intermediate cross-discipline users.
- Automated the build and analysis of the framework using Jenkins CI and SonarQube™ which resulted in faster turn-around in the identification and remediation of technical debt and other quality issues.

RightNow Technologies, Inc.

Oct. 2010 - Oct. 2011

Software Engineering Intern — *Bozeman, MT*

- Developed a JavaScript unit testing framework for underlying Customer Portal API.
- Reduced company liability and improved API maintainability and reliability.

Advanced Acoustic Concepts *Bozeman, MT*

Software Engineering Intern *Oct. 2008–Oct. 2010*

- Implemented a webapp using google web toolkit using a reflection based algorithm to handle multiple xml formats for shipboard maintenance data.
- Provided basic statistical data analysis and charts to help sailors understand the effects of their maintenance programs and to help collect data and improve the overall maintenance program.

State of Montana – Department of Livestock *Bozeman, MT*

Software Engineering Intern *Sep. 2006 - Sep. 2007*

- Worked on a Laboratory Information Management System for the Animal Sciences Lab.
- Developed tests to validate system operation leading to identification of issues and discrepancies between the test and production databases.

Education

Ph.D. Computer Science *Bozeman, MT*

Montana State University *August 2019 (expected)*

Design Pattern Decay: An Extended Taxonomy and Empirical Study of Grime and its Impact on Software Product Quality and Technical Debt

M.S. Computer Science *Bozeman, MT*

Montana State University *December 2014*

Technical Debt Management in Release Planning – A Decision Support Framework

Graduate Certificate in Applied Statistics *Bozeman, MT*

Montana State University *December 2014*

B.S. Computer Science *Bozeman, MT*

Montana State University *May 2011*

B.A. Philosophy *Bozeman, MT*

Montana State University *May 2011*

Technical Skills

Data Science	Python, Scala, R, Apache Hadoop, Apache Spark, Statistical Analysis and Experimental Design
Software Engineering	UML, OCL, Agile/Lean, TDD/BDD, Architecture, Design Patterns, Microservices, Domain Specific Language Design, Continuous Integration, DevOps
Programming	Java, C#, Python, Groovy, JavaScript, Ruby, git, Hg, svn, cvs, Maven, Gradle

Awards

- IDoESE student travel award, September 2014.
- Undergraduate Scholars Program award recipient ($1500), Summer 2010.

Teaching Experience

Idaho State University *Spring 2019*

Assistant Professor CS 3321: Software Engineering *Pocatello, ID & Idaho Falls, ID*

- Charged with the instruction of undergraduate course in Software Engineering.
- This course focuses on the introduction of topics conceringin Software Engineering. Topics include Software Development lifecycles, requirements engineering, software design, software maintenance, software architecture, and software quality.
- The course is focused on the students using solid principles of design to design and construct a software system. The students work in teams and follow the Basic Unified Process which include weekly meetings with their instructor.

Idaho State University *Spring 2019*

Assistant Professor CS 3308: Data Structures and Programming *Pocatello, ID & Idaho Falls, ID*

- Charged with the instruction of undergraduate course in Data Structures and basic algorithms.
- This course focuses on basic data structures including: Lists, Stacks, Queues, Binary Trees, Maps, Sets, Graphs, and dynamic data structues. As well as, basic algorithmic techniques including: recursion, gready methods, backtracking, and graph/tree traversals.

Idaho State University *Fall 2018*

Assistant Professor CS/INFO 1181: Introduction to Computer Programming *Pocatello, ID*

- Charged with the instruction of a section of CS/INFO 1181 consisting of 35 undergraduate students (both majors and non-majors).
- Introductory course for both the Computer Science and Informatics programs at Idaho State University.
- Currently this course is taught in C# and covers the fundamentals of programming.

Idaho State University *Fall 2018, Spring 2019*
Assistant Professor INFO 3307/5307: Systems Analysis and Design *Pocatello, ID*
- Charged with the instruction of both the graduate and undergraduate sections of Systems Analysis and Design.
- This course focuses on the introduction of topics concerning Systems Analysis/Software Engineering. Topics include systems development life cycles, requirements gathering/analysis, software design, software maintenance, software architecture, and software quality.
- The course is focused on the students using solid principles of design to design a software system across the project. The students work in teams and follow Agile practices which include weekly scrum meetings with their instructor.

Montana State University *Fall 2017*
Teaching Assistant CSCI 127: Joy and Beauty of Data *Bozeman, MT*
- Managed and graded for two lab sections, including the Honors section. Lectured for several class periods.
- Course is currently the introductory course for Computer Science at Montana State University.
- Course covered the essentials of python and an introduction to SciPy libraries.

Montana State University *Summer 2016*
Instructor CSCI 132: Basic Data Structures and Algorithms *Bozeman, MT*
- Advanced Java including UI concepts and Swing. Introduction to basic data structures, their algorithms, and their application to problem solving. Data structures introduced include: lists, stacks and queues. Further development of algorithmic techniques by exploring searching, sorting, and recursion problems.

Montana State University *Spring 2015 – Spring 2016*
Guest Lecturer EIND 499R: Industrial Engineering Design Capstone *Bozeman, MT*
- Lecture concerning the Scrum Development process and other Agile development approaches.

Montana State University *Fall 2015*
Guest Lecturer CSCI 111: Introduction to Java I *Bozeman, MT*
- Lecture concerning conditionals, basic input/output, and arrays.

Montana State University *Summer 2015*
Instructor CSCI 111: Introduction to Java I *Bozeman, MT*
- Basic Java syntax, control structures, loops and iteration, recursion, input and output, and 2D graphics.

Montana State University *Fall 2013 – Fall 2015*
Guest Lecturer ESOF 322: Software Engineering I *Bozeman, MT*
- Discussion of design patterns, UML, and Agile and Lean development processes.

Research

Grants
- BigCZData: Connecting Surface and Subsurface Information to Quantify Resilience, Build Capacity, and Increase Participation in Critical Zone Science, Sponsored by University of Wyoming, External to Idaho State University, $5,763,893.00, Expected Date of Submission: January 25, 2019, November 30, 2018 - Present.

Research In Progress
- "Arc Framework", A tool and associated research for the visualization and evaluation of the quality of a software product. The goals of this is to develop the necessary methods to further investigate software quality both statically and dynamically., Uehline, B. (Idaho State University), Brady, K. (Idaho State University), On-Going, Scholarly.

- "Design Pattern Grime – A Study of Design Pattern Grime Evolution and its Impact on Quality and Technical Debt", Multiple experimental studies and case studies involving open source software systems. Specifically, we are investigating a phenomena known as design pattern grime and how it affects technical debt and software quality. Furthermore, we have developed an underlying method by which the results of experimentation and case studies can be reconciled to provide a deeper understanding of software related phenomena in general., Izurieta, C. (Montana State University), On-Going, Scholarly.

- "Dynamic Construction of Island Grammars", Development of the algorithms necessary to combine grammars for multiple programming languages into one or more combined grammars. The goal of this is to increase the capability in the realm of static and dynamic software analysis. Currently, we expect results of by Summer 2019., Roberts, R. F. (Idaho State University), On-Going, Scholarly.

- "Immersive Environments: Combining AR, MR, and VR", The development of techniques for the use of shared spatial computing. This includes the development and implementation of techniques to combine shared experiences of AR and MR environments across space, time, and into virtual environments via VR. The goal of the research is to provide a truly immersive experience for those together within the same time/space location along with those separated by space., Lasher, D. (Idaho State University), Planning, Scholarly.

Publications

Refereed Conferences
- Izurieta C., Reimanis D., Griffith I., Schanz T., "Structural and Behavioral Taxonomies of Design Pattern Grime Evolution". In Proceedings of the 12th Seminar on Advanced Techniques & Tools for Software Evolution, SATToSE 2019. Bolzano, Italy, July 8–10, 2019.
- Griffith I., Izurieta C., and Huvaere C., "An Industry Perspective to Comparing the SQALE and Quamoco Software Quality Models". In Proceedings of the 11th International Symposium on Empirical Software Engineering and Measurement, ESEM 2017. Toronto, Canada, November 9–10, 2017.

- Rojas G., Izurieta C., and Griffith I., "Toward Technical Debt Aware Software Modelling". In Proceedings of IEEE-ACM Ibero-American Conference on Software Engineering, CibSE 2017. Buenos Aires, Argentina, May 22–23, 2017.
- Izurieta C., Rojas G., and Griffith I., "Preemptive Management of Model Driven Technical Debt for Improving Software Quality". In Proceedings of the 11th International ACM SigSoft Conference on the Quality of Software Architectures, QoSA 2015. Montreal, Canada, May 4–8, 2015.
- Griffith I., Izurieta C., Taffahi H., and Claudio D., "A Simulation Study of Practical Methods for Technical Debt Management in Agile Software Development". In Proceedings of the 2014 Winter Simulation Conference, WSC 2014. Savannah Georgia, December 7–10, 2014.
- Griffith I., Reimanis D., Izurieta C., Codabux Z., Deo A., and Williams B., "The Correspondence between Software Quality Models and Technical Debt Estimation Approaches". In Proceedings of the 6th International Workshop on Managing Technical Debt. Victoria, British Columbia, Canada, September 30, 2014.
- Griffith I. and Izurieta C., "Design Pattern Decay: The Case for Class Grime". In Proceedings of the 8th International Symposium on Empirical Software Engineering and Measurement. Torino, Italy, September 18–19, 2014.
- Griffith I. and Izurieta C., "Design Pattern Decay: An Extended Taxonomy and Empirical Study of Grime and its Impact on Design Pattern Evolution". The 11th International Doctoral Symposium on Empirical Software Engineering. Baltimore, Maryland, October 9, 2013.
- Izurieta C., Griffith I., Reimanis D., Luhr R., "On the Uncertainty of Technical Debt Measurements". In Proceedings of the IEEE ICISA 2013 International Conference on Information Science and Applications. Pattaya, Thailand, June 24–26, 2013.
- Izurieta C. Poole G., Payn R.A., Griffith I., Nix R., Helton A.M., Bernhardt E., and Burgin A.J., "Development and Application of a Simulation Environment (NEO) for Integrating Empirical and Computational Investigations of System-Level Complexity". In Proceedings of the IEEE ICISA 2012 International Conference on Information Science and Applications. Suwon, South Korea, May 23–25, 2012.
- Griffith I., Wahl S., and Izurieta C., "Evolution of Legacy System Comprehensibility through Automated Refactoring". In Proceedings of IEEE ACM MALETS 2011 International Workshop on Machine Learning Technologies in Software Engineering. In association with the 26th International Conference on Automated Software Engineering, ASE 2016. Lawrence, Kansas, November 7–12, 2011.
- Griffith I., Wahl S., and Izurieta C., "TrueRefactor: An Automated Refactoring Tool to Improve Legacy System and Application Comprehensibility". In Proceedings of ISCA 24th International Conference on Computer Applications in Industry and Engineering, CAINE '11. Honolulu, Hawaii, November 2011.

Abstracts

- Poole G.C., Helton A.M., Izurieta C., Payn R.A., Bernhardt E.S., Burgin A.J., Griffith I., Nix R., Ardon M., Stanford J.A., "Modeling Functional Heterogeneity of Multiple Interactive Ecological Currencies in Linked Channel, Floodplain, and Aquifer Systems". SFS 2012 Annual Meeting, Freshwater Stewardship: Challenges and Solutions. Louisville, Kentucky, May 20–24, 2012.
- Griffith I. and Levy S., "Libertarianism in the Face of Anarchy". NCUR 2010, 24th National Conference on Undergraduate Research. Missoula, MT, April 15–17, 2010.

Conferences Attended

11th IEEE-ACM International Symposium on Empirical Software Engineering and Measurement — *Toronto, Canada*
Author/Presenter — *November 8–10, 2017*

14th SEI Software Engineering Educator's Workshop — *Pittsburgh, Pennsylvania*
Attendee — *August 2–10, 2017*

32nd IEEE International Conference on Software Maintenance and Evolution — *Raleigh, North Carolina*
Attendee — *October 2–10, 2016*

8th IEEE International Workshop on Managing Technical Debt — *Raleigh, North Carolina*
Program Committee Member — *October 4, 2016*

8th ACM-IEEE International Symposium on Empirical Software Engineering and Measurement — *Torino, Italy*
Author/Presenter — *September, 2014*

11th International Doctoral Symposium on Empirical Software Engineering, IEEE ACM IDoESE — *Baltimore, Maryland*
Author/Presenter — *October 9, 2013*

ISCA 24th International Conference on Computer Applications in Industry and Engineering — *Honolulu, Hawaii*
Author/Presenter — *November 2011*

2011 International Workshop on Machine Learning Technologies in Software Engineering
Author/Presenter

Lawrence, Kansas
November 7–12, 2011

Affiliations

- Director of Idaho State University Immersive Environments Laboratory from 2019 to present.
- Director of Idaho State University Empirical Software Engineering Laboratory from 2018 to present.
- Professional Member of ACM since 2018
- Member of Montana State University Software Engineering Laboratory from 2012 to 2018.
- Member of Montana State University Computational Ecology Research Group from 2009 to 2014.
- Member of Golden Key International Honor Society since 2007.