

Brendan Connolly

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Education

University of Colorado Colorado Springs

August 2017 - December 2023

Bachelor of Innovation in Computer Science

Cross Discipline Core: Business

Minor: Game Programming + 3D, Mathematics

Innovation Core

ENTP 4500 Entrepreneurship and Strategy

Capstone course for the Bachelor of Innovation. Basic knowledge of finance and accounting, marketing, operations, and management is assumed. Topics include understanding the entrepreneurial process, assessing opportunities, selecting a start-up team, financing entrepreneurial ventures, writing and presenting business plans, and new venture and competitive strategy. Utilizes lectures and case studies as well as coaching teams in the creation of a business plan and public presentation for an innovative new business or nonprofit organization.

INOV 4010 Innovation Team: Design and Lead

Senior level continuation of the teams course sequence with emphasis on design and leading team projects. Teams are expected to meet outside of class hours, possibly with sponsor companies.

INOV 3010 Innovation Team: Research and Execute

Junior level continuation of the teams course sequence with advanced participation in team projects including research, design, and execution. Teams are expected to meet outside of class hours, possibly with sponsor companies.

INOV 2100 Technical Writing, Proposals, and Presentations

Technical writing course. Addresses five major types of technical writing: project reports, funding proposals, magazine and trade articles, technical reports, and journal articles.

BLAW 2010 Business and Intellectual Property Law

Examines the legal significance of ideas, innovations, and start-up organizations. A focus on the issues of intellectual property, including patents, copyrights, and brand protection. Coverage of essential contracts and agents.

INOV 2010 Innovation Team: Analyze and Report

Sophomore level course emphasizing team projects, research, analyzing data, and reporting. Teams are expected to meet outside of class hours, possibly with sponsor companies.

INOV 1010 The Innovation Process

Overviews the key components in the innovation process and examples of major innovations throughout history. Examines the interdisciplinary nature of innovation. Includes group exercises focused on improving team dynamics, brainstorming, conceptual-block busting and other creativity and problem solving activities.

ENTP 1000 Introduction to Entrepreneurship

Designed to provide an introduction to the process of turning an idea into a successful startup business. Covers basic aspects of a successful business and introduces the student to the processes for creating a potentially successful business plan. Students will also learn to assess opportunities for venture/value creation, to address/identify risk in the startup process and develop presentation skills to convince others of the potential success to implement the business entity.

Major

CS 4720 Design and Analysis of Algorithms

Design methodologies; divide-and-conquer, exhaustive search, dynamic programming. Time and space complexity measures, analysis of algorithms. Survey of important algorithms for searching, sorting, graph manipulation. Tractability: class P and NP, NP complete problems.

CS 4500 Operating Systems I

Introduces concepts, terminology, and algorithms of operating systems. Describes semaphores, processes, virtual mappings, interrupts, resource allocation and management, protection, synchronization, scheduling, queuing and communication as applied to operating system design and implementation.

CS 4420 Database Systems I

Course introduces general database concepts as well as database system technology. The course covers ER and R data models, R-algebra, SQL, data storage and indexing, query optimization, database design and security.

CS 4220 Computer Networks

Course focuses on the basic network and protocol concepts and principles with practical hands-on exercises on network management, network programming, and network planning through the use of industry simulators. Topics include: Internet protocols and routing, local area networks, basic TCP/IP programming, congestion control, packet switching and routing, quality-of-service, and network management.

CS 4200 Computer Architecture I

Course covers fundamentals of computer design, instruction set principles and examples, pipelining, advanced pipelining and instruction-level parallelism, memory-hierarchy design and survey of design issues in storage, interconnection network and multiprocessor systems.

CS 3300 Software Engineering

Students build a solid foundation for developing and maintaining sustainable codebases through modern practices. Version control, project management styles, coding best practices, cloud services, and web technologies used to create deployable products and maintain work.

CS 3160 Concepts of Programming Languages

Evolution of the central concepts of programming languages, describing syntax and semantics, data types, abstract data types, control structures, subprograms, concurrency and exception handling.

CS 3020 Advanced Object Technology Using C#/.NET

C# class construction principles, delegates, threads, event handling, GUI components, observer pattern, standard collections, generic parameters, enumerators, custom components, UML representation, abstract classes, interfaces, object persistence, remoting, and refactoring.

CS 3050 Social and Ethical Implications of Computing

This class will discuss selected topics in ethical, social, political, legal and economic aspects of the application of computers. Each student is expected to research one or more topics, actively participate in discussions, and give a presentation.

CS 2300 Computational Linear Algebra

Covers mathematical as well as computational aspects of Linear Algebra. The class will apply/explore these concepts: Vectors, Matrices, 2D, 3D, and ND Transforms and Graphics, Systems of Linear Equations, Eigenvalues/ Eigenvectors, Numerical Stability, and Linear Filters/Predictors.

CS 2160 Computer Organization and Assembly Language Programming

Provides an introduction to the concepts of computer architecture, functional logic, design and computer arithmetic. It presents material on the mechanics of information transfer and control within a computer system. Also included are: symbolic programming techniques, implementing high level control structures, addressing modes and their relation to arrays, subprograms, parameters, linkage to high level languages and the assembly process.

CS 2080 Programming with UNIX

An introduction to the UNIX operating system with an emphasis on the development of C and command shell programs.

CS 2060 Programming with C

A first course in the C programming language for those who are proficient in some other high level language.

CS 1450 Data Structures and Algorithms

Concepts of data type, data abstraction, and data structure. Internal representations of fundamental data types. Linear data structures: stack, queue. Linked data structures and dynamic data types. Search table data abstraction, linear search in arrays and lists, binary search in arrays and trees. Binary trees, non-binary trees, binary search trees.

CS 1150 Principles of Computer Science

Introduction to programming with emphasis on computer science concepts. Develops methods for computer problem solving. Develops proficiency for programming in a modern programming language, and introduces the concepts of abstraction in problem solving. Includes basic concepts of computer systems and environments including debuggers, editors, and file systems.

Cross Discipline Core

MKTG 3000 Principles of Marketing

Analytical survey of issues involved with the development and exchange of goods and services. Takes a marketing management approach in attacking problems related to product planning, channels of distribution, pricing and promotion. Emphasizes the role of marketing in responding to changing environmental conditions.

MGMT 3300 Introduction to Management

An introductory study of management fundamentals and organizational behavior. How individuals adapt to organizations; how managers motivate and lead in work situations; how organizations are designed and managed.

ACCT 2010 Introduction to Financial Accounting

Provides knowledge of core business concepts in financial accounting following generally accepted accounting principles. Emphasis on understanding the primary objectives, principles, and users of financial accounting, analyzing basic business transactions and understanding their impact on financial statements, and defining and identifying the basic elements and content on each financial statement.

ECON 2020 Introduction to Macroeconomics

This course provides an examination of the forces that determine national income, unemployment, and inflation; the efforts of the government and the central bank to manage the state of the macroeconomy; and, the influence of the global economy on domestic macroeconomic functioning.

ECON 1010 Introduction to Microeconomics

An analysis of the market system and its role in allocating goods and services; problems of market failure (e.g., monopoly, environmental pollution, and public goods), and alternative government responses to such problems.

Math Minor**MATH 3410** Introduction to Analysis

An introduction to proofs in analysis. Topics include completeness of the real numbers, sequences and limits, infinite series, and continuous functions.

MATH 3130 Introduction to Linear Algebra

Systems of linear equations, matrices, vector spaces, linear independence, basis, dimension, determinants, linear transformations and matrices, eigenvalues and eigenvectors.

MATH 3810 Probability and Statistics

The axioms of probability and conditional probability will be studied as well as the development, applications and simulation of discrete and continuous probability distributions. Also, expectation, variance, correlation, sum and joint distributions of random variables will be studied. The Law of Large Numbers and the Central Limit Theorem will be developed. Applications to statistics will include regression, confidence intervals, and hypothesis testing.

MATH 2350 Calculus III

Continuation of MATH 1360. Parametric curves, vector functions, partial differentiation, multiple integrals, Green's Theorem and Stoke's Theorem.

MATH 2150 Discrete Mathematics

Introduction to mathematical proofs. Topics include logic, set theory, number theory, induction, and recursion.

MATH 1360 Calculus II

Continuation of MATH 1350. Transcendental functions, techniques and applications of integration, Taylor's theorem, improper integrals, infinite series, analytic geometry, polar coordinates.

MATH 1350 Calculus I

Selected topics in analytical geometry and calculus. Rates of change of functions, limits, derivatives of algebraic and transcendental functions, applications of derivatives, and integration.

Game Design and Development Minor

CS 4800 Computer Graphics

Fundamental areas of modern raster computer graphics: hardware, software, data structures, mathematical modeling, user interface and manipulation of graphical objects. A subset of the two-dimensional GKS is examined and implemented with emphasis placed upon segmented display files and instance modeling. Basic to all graphic programs written are the ergonomic requirements of the user. Required programs are in the areas of animation, paint systems, polygon filling and clipping, and curve generation.

GDD 3400 AI for Games

The purpose of this course is to teach the Artificial Intelligence techniques that are most important in game development. Topics include Finite State Machines, pathfinding, emergent behavior, and other pertinent topics. The course also shows how these concepts apply to the most common game genres, as well as addressing the specific issues associated with each genre.

GDD 3200 Team-Based Game Testing and Deployment

Students continue working on an existing game. The course work includes Alpha testing by team members, Beta testing (open to a larger community than the development team), implementing changes to the game as required, and final deployment of the game.

CS 3350 Team-Based Game Production

Students continue working on an existing game, starting from the end of pre-production and continue to Alpha, a milestone that consists of delivery to internal employees (team members) for testing.

GDD 2150 Fundamental Game Design Concepts

Teaches fundamental game design concepts, including character development, storytelling, game balancing, and general level design principles. Also shows how these concepts apply to the most common game genres, as well as addressing the specific issues associated with each genre.

General Education

PORT 3000 Writing Portfolio Assessment

Writing Portfolio assessment required of all undergraduate students, prior to graduation, to demonstrate writing competency. Students must submit two to three papers to be scored by faculty raters.

PES 2160 Advanced Physics Lab II

Advanced calculus-based labs covering all of the major topics in electricity and magnetism ranging from electric fields to circuit analysis to AC circuits to magnetism.

PES 1120 General Physics II

Topics covered include electrostatics, the electric field, Gauss's law, electric potential, capacitors and dielectrics, current and resistance, the magnetic field, Ampere's law, Faraday's law, inductance, oscillations, and electromagnetic waves.

PES 1160 Advanced Physics Lab I - Calculus Based

Advanced calculus-based labs covering all of the major topics in mechanics ranging from projectile motion to Newton's Laws to Conservation of Energy to Rotational Motion.

PES 1110 General Physics I - Calculus Based

Rigorous calculus-level course in classical physics for science and engineering students. Includes measurements, vectors, motion in one dimension, motion in three dimensions, particle dynamics, work and energy, linear and angular momentum, rotation of rigid bodies, static equilibrium, oscillation, and gravity.

ENGL 1310 Rhetoric & Writing I

Focuses on academic reading and writing processes; critical reading, writing, and thinking; rhetorical analysis.

GPS 1010 Gateway Program Seminar

The Gateway Program Seminar is a unique, academic course designed for the interests and adjustment needs of UCCS first-year students. This required 3-credit course exposes students to in-depth analysis of an interdisciplinary topic or academic discipline while also preparing them for the academic, social, and psychological adjustments necessary for successful completion of the first year. Talented UCCS faculty and staff teach collaboratively to provide meaningful, enriching academic experiences. Topic groups break into sections of 15 students. Students must attend "Start Up Days," which are scheduled two days prior to the start of the fall semester.

Personal Statement

With the current pace of everyday life, as well as the constant barrage of overwhelming problems, many people undervalue taking time to enjoy life. So it may sound weird to admit, but I like playing video games. While many people believe that this is a waste of time or simply unnecessary, I believe that these activities provide so many opportunities to learn and grow as a person; to connect with other people and experience new emotions; to discover new ideas or perspectives.

I love learning. I was once asked in elementary school if I enjoyed school and, after pondering the question for a bit, I concluded that I did. I found school enjoyable for multiple reasons. I was able to learn new things, meet people, connect with friends, and share experiences with them. Some of the most important things that I did with my friends was make video games. When I was 12, two of my favorite games were released, Portal 2 and Minecraft. These games

test your brain and creativity in a variety of ways. Despite being completely different genres, these games were similar in that both were easily modifiable. One could, with a little bit of practice, create their own puzzles, mechanics, worlds, and stories. This endeavor forces the creator to try new things, to learn new skills in order to progress, and to build off of the ideas and works of others. Not only were these tools relatively simple to use, but it was also trivial to share your modifications with the world. The ability to see the works of others in the community allowed ideas to spread and be iterated on very quickly. Games like Minecraft rapidly became virtual engines unto themselves; the underlying framework which provided support for 1000s of games, stories, worlds, and shared spaces for communities.

Being that this framework was designed for other purposes, it had certain limitations. Many of the ideas I tried were simply too complex for these pre-existing games to handle. To progress further I began exploring consumer-grade game engines, such as Unity and Unreal. While these engines provided much more freedom in their design capabilities, they demanded more skills which I had not developed. As such, many of the projects which I attempted failed to materialize into cohesive playable experiences. I quickly learned that managing the scope of a project was going to be a difficult challenge and an important ability. Another way to facilitate development was to work in teams of people with diverse skill sets. Throughout high school, I worked on these projects with designers who specialized in everything from mechanics and character design, to story and world-building, to level and puzzle design. This teamwork offloaded certain tasks and greatly improved the rate at which progress was made. Working in teams was a skill that I would take into college and refine even more.

Majoring in computer science with minors in game design and mathematics, college granted me many opportunities to pursue these passions. I worked with dozens of teams on multiple game development projects, one of which was published. These projects also provided me with opportunities to take on different roles, including leadership. Serving as the lead programmer for a published game gave me a new perspective on the development process as a whole and changed the way that I look at team-based game development. Coordinating and assisting a team of programmers taught me how to maintain a codebase, and how to manage the architecture of a project at scale. It taught me how different people approach problems and implement solutions. Working in a larger team also helped expand my view of games as a whole.

As I spent less time and effort working on the technical aspects of games, I spent more time examining their content. By looking at how the characters behave, why the world is the way it is, how the mechanics complement the gameplay to perfect the overall experience of the game, I saw the much deeper, artistic meaning of the games I was both making and playing. As I started to notice these factors in games, I also began to notice them in all of the media I was consuming. In shows, movies, music, games are a form of art and, just like any other kind of art, games allow us to experience incredible, fantastical things. They can show us people whom we can empathize with, new perspectives which ask us to ponder impossible questions. They can tell us stories and provide countless new experiences. They can be reflections of ourselves, of humanity, of what we are, were, or what we hope to become. Even more importantly than that, games are fun. They

allow your mind to wander or explore, free of the worries and stresses of daily life. Games have made an incredible impact on my life and I want to share these experiences with as many people as I can, and by working in this field I hope to do just that.

Academic Experience

Rabid Troll Studios: Penguin Noir Colorado Springs, CO January 2022 - May 2023

Lead Programmer

- Published a commercial independent Unity game on Steam
- Coordinated a team of 7 developers through Github and Visual Studio
- Reviewed C# code submitted by all developers which ensured the codebase was maintainable
- Employed design patterns like Singletons and State Machines to improve code organization

Client Project: Wearbands Colorado Springs, CO August 2022 - December 2022

Researcher

- Researched multiple social media platforms to identify optimal places to advertise
- Produced 3 short form advertisements to be deployed across social media

Client Project: Operations Management Colorado Springs, CO August 2020 - December 2020

Programmer

- Developed 4 video game prototypes to facilitate the teaching of operations management concepts

Client Project: Memorial Hospital Colorado Springs, CO August 2019 - December 2019

Grant Writer

- Drafted a grant proposal for a new research project into the health effects of plant-based nutrition

Client Project: WordStackers Colorado Springs, CO August 2018 - December 2018

Programmer

- Developed a video game prototype in Unity with a group of 4
- Engineered game requirements based on client's design concepts

Skills

Programming experience

- | | |
|----------|--------|
| ● Java | ● Ruby |
| ● C# | ● x86 |
| ● Python | ● MIPS |
| ● C | ● lisp |
| ● C++ | ● HLSL |

Software Experience

- Unity
- GameMaker
- Visual Studio
- Eclipse
- Notepad++
- Word
- Excel
- Windows
- Unix
- Gimp
- Blender

Work Experience

University of Colorado Colorado Springs Colorado Springs, CO October 2019 - December 2020

IT Backend Developer

- Designed SQL database backend to facilitate data entry and retrieval
- Automated data entry systems to streamline information requirements

EcoMark Solar Colorado Springs, CO August 2019 - October 2019

Canvasser

- Interacted with 150 customers per day on company's behalf
- Found the best products for the customer based on their needs

AC DC Electric Greeley, CO May 2017 - August 2017

Electrician Apprentice

- Installed solar panels and security cameras on 7 buildings

Community Involvement

Weld County Food Bank Greeley, CO June 2020 - August 2021

Vehicle Loader Volunteer

- Loaded food into 100 vehicles per day, providing food to 100s of people per week.