Bachelor of Innovation^{TM} Degree in Game Design and Development (GDD)

28 April 2009

Background

In the Fall 2005 semester an interdisciplinary group of faculty (the Game Design and Development Program Committee) joined together to develop a proposal for a Bachelor degree in Game Design and Development (GDD) at UCCS, with the degree program starting in Fall 2007. Faculty from the Colleges of Education, EAS, and LAS and representatives from the Teaching and Learning Center and Information Technology all participated in and contributed to the committee's efforts.

We recently decided to fold the GDD degree into a larger proposed family of degrees called the Bachelor of Innovation. A Bachelor of Innovation in GDD will provide students with the technical knowledge needed for success in this field while also addressing numerous business issues like intellectual property, marketing, and so on. This business knowledge should prove invaluable to our graduating students whether they pursue jobs at large game companies, decide to form their own companies instead, or pursue some other career path in this area.

The Colorado Regents officially approved this degree on November 2, 2006, and UCCS began offering this degree in Fall 2007.

Objectives

The Bachelor of Innovation™ in Game Design and Development (GDD) will provide students with a firm foundation in the basics of game design and development while also giving them the flexibility to pursue their special interests through concentration courses. In addition, students will learn the business and communication background required for working effectively in the interdisciplinary teams that are the norm in game design and development. The Bachelor of Innovation™ in Game Design and Development will therefore provide students with the technical, business, and communication background to work on innovative game design and development projects, including the ability to: (1) recognize the broader issues in GDD-related problems, (2) understand the technological, business, legal and societal constraints affecting this technology, and (3) have the ability to communicate the key issues, needs, potential options, and final solution to a GDD challenges. The program seeks to prepare students for successful careers and lifelong learning, whether they pursue traditional corporate employment or form their own companies.

Program Flexibility

One of the most exciting aspects of the degree program described here is the combination of a set of required (core) courses to ensure all students develop a firm foundation in the basics of game design and development and business and innovation issues while also giving them the opportunity to their special interests through GDD-related concentration courses.

Degree Requirements

The degree requirements for the Bachelor of Innovation™ degree in Game Design and Development requires completion of at least 120 credit hours and a minimum 2.0 grade point average in all computer science courses, GDD courses, and courses taken at the University of Colorado The courses for the degree are outlined as follows:

Innovation Core (27 credits)
The Innovation Core consists of courses geared toward innovation and entrepreneurship.

Innovation Elective: ID 101 or Innovation-related course approved by advisor	3
ENTP 100. Introduction to Entrepreneurship	3
INOV 101. The Innovation Process	3
INOV 201/202/301. Innovation Team, Reporting & Analysis (1 credit 3 terms) Meets with 302/401/402	3
INOV 302/401/402. Innovation Team, Design & Research (2 credits 3 terms).	6
INOV 210. Technical Writing, Proposals and Presentations	3
ENTP 450. Entrepreneurship and Strategy	3
BLAW 201. Business and Intellectual Property Law	3

Creative Communication Core, Business Core, or Globalization Core
Note: GDD students who select the Business Core or Globalization Core are required to take a 3 credit-hour art class and a 3 credit-hour music class as free electives.
The Business, Globalization, and Creative Communication Cores are designed to provide students with exposure to areas outside their chosen area of study. Students opting for the Business or Globalization cores will need to take a 3 credit-hour art class from the Creative Communication Core list and a 3 credit-hour music class. The courses in the various cores are as follows:

Creative Communication (15 credits):

Course Number	Credits	Course Title
COMM 344	3	Leadership Communication
Choose 1 MUS course	3	MUS course
Choose 1 course from the list on the right.	3	VA 101 Beginning Studio 2D VA 102 Beginning Studio 3D VA 104 Beginning Drawing VA 206 Two-Dimensional Topics VA 207 Three-Dimensional Topics VA 210 Digital Imaging VA 211 Introduction to Photography VA 215 Digital Photography
Choose 2 courses from the list on the right.	6	MGMT 390 Improving Personal and Team Creativity COMM 102 Interpersonal Communication COMM 201 Oral Communication in the Workplace COMM 328 Intercultural Communication COMM 422 Creative Communication ENGL 205 Introduction to Creative Writing – Fiction ENGL 312 Technical Editing and Style PSY 100 General Psychology PSY 315 Psychology of Motivation

Business (15 credits):

Course Number	Credits	Course Title
ECON 101	3	Introduction to Microeconomics
ACCT 201	3	Introduction to Financial Accounting
MGMT 330	3	Introduction to Management & Organization
Choose at least two of:		
OPTM 300	3	Fundamentals of Operations Management
MKTG 300	3	Marketing
FNCE 305	3	Finance for Innovation OR Basic Finance

Globalization (15 credits):

Course	Credits	
Foreign Language	6	This requirement is fulfilled by taking and passing the 211 and 212 courses for any spoken foreign language. Students may need to take additional foreign language courses for placement into the 211 and 212 courses and may need to exceed the 120 credit hours required to graduate. This requirement may be satisfied by passing a proficiency test. If a student successfully passes the proficiency test then the 6 credits must be substituted from the list below.

| Choose 3 courses from the list on the right. | 9 | COMM 328 Intercultural Communication
ECON 328 International Political Economy
ECON 431 International Economics
FCS 318 German and Austrian Civilization and Culture
FCS 322 Japanese Culture and Civilization
FCS 339 Internships in Foreign Cultures
FNCE 440 International Financial Management
INTB 360 International Business
INTB 461 Regional Business Environment Europe
INTB 480 International Management
INTB 496 Internship in International Business | MKTG 490 International Marketing
PSC 101 Introduction to Global Politics
PSC 322 Eastern Political System
PSC 413 Latin-American Political System
PSC 421 International Politics
PSC 425 International Law
PHIL 309 Philosophies of Asia
PHIL 416 Business and Management Ethics
SOC 222 Communities in a Global Environment
SOC 438 Globalization and Development |

Mathematics (7 credits):

MATH 135. Calculus I	4
MATH 313. Introduction to Linear Algebra	3

Science (10 credits):

Physics: PES 111, 116	5
5 more credit hours from Biology, Chemistry, Geography and Environmental Studies, Geology, and Physics and Energy Science	5

English:

Eng 131. Writing and Rhetoric	3

GDD Core (30 credits):

The core major's courses that all GDD students are required to take. The courses in the GDD core are as follows:

GDD 110. Problem Solving through Game Creation	3
GDD 120. Introductory Programming for Game Developers	3
GDD 210. Game Design for Diverse Populations	3
GDD 220. Data Structures for Game Developers	3
GDD 410. Advanced Game Design Concepts	3
CS 302. Advanced OO Techniques using C#/.NET OR CS 306. Object-Oriented Programming in C++	3

CS 335. Introduction to Game Design and Development	3
CS 478. Advanced 3D Games and Digital Content Creation	3
CS 480. Computer Graphics	3
VA 101, 102, 104, 206, 207, 210, 211, or 215	3

GDD Concentration Requirements (15 credits):

Students select 15 hours of concentration courses related to game design and development from the table below. We believe that there will be a significant number of students interested in opportunities for even deeper exploration of GDD topics than undergraduate courses provide. The table below also includes a variety of graduate-level courses that are regularly taken by undergraduates at UCCS.

CS 422. Computer Networks	3
GDD 330. Modeling and Simulation for Games	3
GDD 340. Artificial Intelligence for Games	3
GDD 360. Developing Serious Games	3
GDD 450. Online Game Development	3
GDD 499. Independent Study	3
CS 575. Computational Geometry	3
CS 576. Geometric Modeling	3
CS 577. Animation and Visualization	3
CS 579. Wearable Computing and Complex Systems	3
CS 581. Advanced Graphics	3
CS 677. Virtual Reality/HCI	3

Free Electives (13 credits):

Free Electives	13

The Bachelor of Innovation™ students are required to participate in research/innovation projects. Most of these will be industry-sponsored projects. Students employed full-time who wish to pursue a degree in this program will be required to sign IP agreements and have such agreements executed by their employer, or arrange for their employer to be one of the industry-sponsored projects.

Employment Opportunities

In 2004, Halo 2 had over $125M in sales on the first day it was available. A search on Gamasutra's job site (http://www.gamasutra.com/php-bin/jobs_display.php) yielded 365 game-related job opportunities posted in November 2005 alone. Employment at

Electronic Arts, the No. 1 game maker, has almost doubled since 2000, with the number of employees actually creating games almost tripling in the same time period. Electronic Arts has also started sponsoring academic programs in game design and development programs because "… the students are starting to come out of school immediately able to contribute to real projects, which is what we need … there is still not as much talent as there is opportunity."(NY Times)

We also note that the Colorado Game Developers Association lists 31 companies in Colorado that engage in game development activities (http://www.coloradogamedev.org/companies.php). Even those GDD graduates who choose to stay in Colorado will have an opportunity to join an existing local game developer or, in some cases, form their own game development company.

It's also important to note that companies that build games designed for entertainment aren't the only employment possibility for graduating GDD students who decide to work in the game industry. Serious games – those that are designed to teach as well as entertain, like simulation and training games, educational games, games for healthcare, and so on – are also a fast-growing game-related domain. Employment in this area of game development is also a possibility for graduating GDD students.

Finally, the Bachelor of Innovation™ in Game Design and Development (and other BI majors) is designed to teach students about entrepreneurship and innovation. Casual Games – games that are generally played for short periods of time, often on the web or mobile devices – are experiencing significant growth as a game domain. Because these games can be built with fewer people in less time for less cost than larger games, they represent a great opportunity for startup game development companies. We expect that many of our students will start their own companies in this field.

Game design and development is clearly a viable career choice, and the demand for effective game developers is likely to continue experiencing significant growth for the foreseeable future. Even for those students who decide to pursue career options outside of the game industry, the critical thinking and information management and manipulation skills that they learn in this program will also serve them well in other careers (NY Times).

Sample Schedules

Two sample schedules are provided below. The "Calculus Early" schedule is for students who enter the program ready to take Calculus I and the "Calculus Later" schedule is for those students who need some more math background before tackling calculus.

Contact Information

For more information about the BI in GDD, please contact Dr. Tim Chamillard, Computer Science, chamillard@cs.uccs.edu, (719) 262-3150.

GAME DESIGN AND DEVELOPMENT SAMPLE PROGRAM (Calculus Early)

The following document is intended for student use only. It represents the suggested order and semesters in which students should take courses to graduate within 4 years. Since each student starts at a different level of mathematical ability this listing should only be considered a guide. Specific questions about the sample program should be directed to the Engineering Advisor at (719) 255-3427. *Please refer to the BI GDD Checklist for elective options and course prerequisites and co-requisites.*

Courses marked with an * are often available in the summer. Courses marked with ** are <u>ONLY</u> offered in that semester. Please check with the Engineering Advisor if you would like to take some of these courses during the summer. <u>Note that the default Cross Discipline Core for GDD students is the Creative Communication Core. If a GDD student wants to take the Business or Globalization cores instead, they can, but they're still required to take the VA course and the MUS course from the Creative Communication Core.</u>

FRESHMAN YEAR

FALL SEMESTER (16 credit hours)	SPRING SEMESTER (14 credit hours)
**GDD 110 Problem Solving Through Game Creation – 3 **ENTP 100 Intro. to Entrepreneurship – 3 *ENGL 131 Rhetoric & Writing I – 3 *MATH 135 Calculus I – 4 Innovation Elective: ID101 COB/EAS Freshman Seminar (Millionaire, ItechKnow, Mindstorms) OR Innovation related course approved by advisor - 3	**GDD 120 Intro. Programming for Game Developers - 3 **INOV 101 The Innovation Process – 3 *PES 111 General Physics I – 4 *PES 116 Advanced Physics Lab I – 1 Cross Discipline Core Course – 3

SOPHOMORE YEAR

FALL SEMESTER (16 credit hours)	SPRING SEMESTER (16 credit hours)
**GDD 220 Data Structures for Game Developers – 3 **INOV 201 Innovation Team, Reporting & Analysis – 1 **BLAW 201 Business and Intellectual Property Law – 3 *VA 101, 102, 104, 206, 207, 210, 211, or 215 – 3 Cross Discipline Core Course – 3 *Free Elective – 3	**GDD 210 Game Design for Diverse Populations – 3 **INOV 210 Tech. Writing, Proposals and Presentations – 3 CS 302 Adv Object Tech Using C#/.NET.C# **OR** CS 306 Object-Oriented Programming in C++ – 3 **INOV 202 Innovation Team, Reporting & Analysis – 1 Cross Discipline Core Course – 3 Natural Science Elective - 3

JUNIOR YEAR

FALL SEMESTER (16 credit hours)	SPRING SEMESTER (15 credit hours)
**CS 335 Intro. to Game Design and Development – 3 **INOV 301 Innovation Team, Reporting & Analysis – 1 *MATH 313 Intro. to Linear Algebra – 3 GDD Concentration Course – 3 Cross Discipline Core Course – 3 *Free Elective – 3	**INOV 302 Innovation Team, Design & Research – 2 GDD Concentration Courses – 6 Cross Discipline Core Course – 3 Natural Science Elective – 2 *Free Elective – 2

SENIOR YEAR

FALL SEMESTER (13 credit hours)	SPRING SEMESTER (14 credit hours)
**CS 480 Computer Graphics – 3 **INOV 401 Innovation Team, Design & Research – 2 GDD Concentration Course – 3 *Free Elective – 3 *Free Elective - 2	**GDD 410 Advanced Game Design Concepts – 3 **CS 478 Adv. 3D Games and Digital Content Creation – 3 **INOV 402 Innovation Team, Design & Research – 2 **ENTP 450 Entrepreneurship and Strategy – 3 GDD Concentration Course – 3

GAME DESIGN AND DEVELOPMENT SAMPLE PROGRAM (Calculus Later)

The following document is intended for student use only. It represents the suggested order and semesters in which students should take courses to graduate within 4 years. Since each student starts at a different level of mathematical ability this listing should only be considered a guide. Specific questions about the sample program should be directed to the Engineering Advisor at (719) 255-3427. *Please refer to the BI GDD Checklist for elective options and course prerequisites and co-requisites.*

Courses marked with an * are often available in the summer. Courses marked with ** are <u>ONLY</u> offered in that semester. Please check with the Engineering Advisor if you would like to take some of these courses during the summer. <u>Note that the default Cross Discipline Core for GDD students is the Creative Communication Core. If a GDD student wants to take the Business or Globalization cores instead, they can, but they're still required to take the VA course and the MUS course from the Creative Communication Core.</u>

FRESHMAN YEAR

FALL SEMESTER (15 credit hours)	*SPRING SEMESTER (16 credit hours)*
**GDD 110 Problem Solving Through Game Creation – 3 **ENTP 100 Intro. to Entrepreneurship – 3 *ENGL 131 Rhetoric & Writing I – 3 # MATH 104 College Algebra – 3 Innovation Elective: ID101 COB/EAS Freshman Seminar (Millionaire, ItechKnow, Mindstorms) OR Innovation related course approved by advisor - 3	**GDD 120 Intro. Programming for Game Developers - 3 **INOV 101 The Innovation Process – 3 # MATH 105 Elementary Functions of Calculus – 4 Cross Discipline Core Course – 3 Natural Science Elective - 3

SOPHOMORE YEAR

FALL SEMESTER (17 credit hours)	*SPRING SEMESTER (15 credit hours)*
**GDD 220 Data Structures for Game Developers – 3 **INOV 201 Innovation Team, Reporting & Analysis – 1 **BLAW 201 Business and Intellectual Property Law – 3 *VA 101, 102, 104, 206, 207, 210, 211, or 215 – 3 *MATH 135 Calculus I – 4 Cross Discipline Core Course – 3	**GDD 210 Game Design for Diverse Populations – 3 **INOV 210 Tech. Writing, Proposals and Presentations – 3 CS 302 Adv Object Tech Using C#/.NET.C# **OR** CS 306 Object-Oriented Programming in C++ – 3 **INOV 202 Innovation Team, Reporting & Analysis – 1 *PES 111 General Physics I – 4 *PES 116 Advanced Physics Lab I – 1

JUNIOR YEAR

FALL SEMESTER (16 credit hours)	*SPRING SEMESTER (18 credit hours)*
**CS 335 Intro. to Game Design and Development – 3 **INOV 301 Innovation Team, Reporting & Analysis – 1 *MATH 313 Intro. to Linear Algebra – 3 GDD Concentration Course – 3 Cross Discipline Core Course – 3 *Free Elective – 3	**INOV 302 Innovation Team, Design & Research – 2 GDD Concentration Courses – 6 Cross Discipline Core Course – 3 Cross Discipline Core Course – 3 Natural Science Elective – 2 *Free Elective – 2

SENIOR YEAR

FALL SEMESTER (16 credit hours)	*SPRING SEMESTER (14 credit hours)*
**CS 480 Computer Graphics – 3 **INOV 401 Innovation Team, Design & Research – 2 GDD Concentration Course – 3 *Free Elective – 3 *Free Elective – 3 *Free Elective - 2	**GDD 410 Advanced Game Design Concepts – 3 **CS 478 Adv. 3D Games and Digital Content Creation – 3 **INOV 402 Innovation Team, Design & Research – 2 **ENTP 450 Entrepreneurship and Strategy – 3 GDD Concentration Course – 3