THE UNIVERSITY OF ARIZONA

UNDERGRADUATE CERTIFICATE – ADDITIONAL INFORMATION FORM

Note: Certificate programs offered at the University of Arizona, at the undergraduate or graduate level, are not approved as eligible programs for federal student financial aid. Although students enrolled in certificate programs are not eligible for any federal student aid programs, students may be eligible for private loans, outside scholarships, and University of Arizona department funding. For more information, please see Federal Student Financial Aid Eligibility for Programs.

I. General Information

a. Proposed Title of Certificate: Games and Simulation

b. CIP Code: 50.0411, Game and Interactive Media Design.

c. Anticipated first admission term: Spring 2020

II. Requested by The School of Information, College of Social & Behavioral Sciences

III. Program Affiliation – specify whether the UA offers an affiliated undergraduate program – the affiliated program may or may not have the same name as the proposed certificate.

Undergraduate Major and Minor in Information Science and eSociety, Major in Information Science and Technology, and Major in Information Science and Arts

IV. Certificate Description The 12-credit hour Certificate will service a diverse student population, training both 1) technically-minded students the nuances associated with effectively modeling real and imaginary settings, and 2) less technically-minded students the basic skills necessary for making ideas come to life in a digital space. The Certificate will require students to complete an introductory game design course, a more advanced game development course, and one elective course advancing their knowledge of particular theoretical and artistic aspects that arise in the game and simulation design and development process.

V. Purpose The Game and Simulation certificate will provide undergraduate students with the design and development skills necessary to create virtual interactive environments that span across devices and platforms. The certificate will provide students with the real-world skills and experience needed for successful game design, and will signal to employers that students have dedicated the time and energy necessary to build fluency with concepts that underlie virtual world development. No other program like this exists on campus, although there is a sub plan choice for game studies (cultural and historical foci in the College of Humanities). When the sub plan for the College of Humanities was approved, a plan was delineated to avoid overlap across new iSchool programs and CoH. Such a chart can be shared if requested.

VI. Target Audience(s)

This program serves students from across the university.

i. This certificate meets the needs of many of our industry partners.

ii. If a student chooses to do so, they might major in any of the three information science degrees housed in the School of Information at the University of Arizona – the certificate provides and introductory pathway into any of these three degrees:
Undergraduate Major and Minor in Information Science and eSociety
Major in Information Science and Technology
Major in Information Science and Arts

iii. This certificate can help students for professional roles in the game development or serious games fields.

VII. Certificate Requirements - complete the table below to list the certificate requirements, including number of credit hours required and any special requirements for completion. Certificate requirements should include sufficient units to provide a substantive program and an appropriate level of academic rigor and in no case be less than 12 units of credit.

Minimum total units required ***minimum 12 units***	12
Minimum upper-division units required	6

minimum 6 units of credit must be upper division UA coursework	
Total transfer units that may apply to the certificate.	3
List any special requirements to declare/admission to this certificate (completion of specific coursework, minimum GPA, interview, application, etc.)	none
Certificate requirements. List all required certificate requirements including core and electives. Courses listed must include course prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department.	**Core:** **Complete 2 courses (6 units):** ISTA 251 Introduction to Game Design (3) ISTA 451 Game Development (3) **Electives:** **Complete 2 courses (6 units):** ESOC 300 Digital Storytelling and Culture (3) ISTA 301 Computing and the Arts (3) ISTA 302 Technology of Sound (3) ISTA 424: Virtual Reality (3) ISTA 425: Algorithms for Games (3)
Internship, practicum, applied course requirements (Yes/No). If yes, provide description.	none
Additional requirements (provide description)	none

Any double-dipping restrictions (Yes/No)? If yes, provide description. ***A maximum of 6 units may double-dip with a degree requirement (major, minor, General Education) or second certificate.***	None distinct or beyond the University max of 6 units.

VIII. Current Courses–using the table below, list all existing courses included in the proposed certificate. You can find information to complete the table using the UA course catalog or UAnalytics (Catalog and Schedule Dashboard> "Printable Course Descriptions by Department" On Demand Report; right side of screen). If the courses listed belong to a department that is not a signed party to this implementation request, upload the department head's permission to include the courses in the proposed certificate and information regarding accessibility to and frequency of offerings for the course(s). Upload letters of support/emails from department heads to the "Letter(s) of Support" field on the UAccess workflow form. Add rows to the table, as needed.

Course prefix and number (include cross-listings)	Units	Title	Course Description	Pre-requisites	Modes of delivery (online, in-person, hybrid)	Typically Offered (F, W, Sp, Su)	Dept signed party to proposal? (Yes/No)
ESOC 300	3	Digital Storytelling and Culture	This course will lay a foundation for understanding how stories shape communities, identities, memories, and perspectives on our lives. In addition, this course will provide opportunities for the theoretical analysis of self representation, composite narratives on behalf of others, cultural heritage, and memories as they are preserved and performed within stories and through narrative. Influences on digital digital		In person and online	Fall and Spring	Proposed from dept. housing this course

			storytelling such as the sociocultural context, the institutional contexts of production the audience, and the needs or goals of the digital storyteller will be examined. Students will be required to call on their own intellectual, emotional, and imaginative processes, as well as to develop their own skills in digital storytelling, interviewing, oral history collection, and the use of relevant digital storytelling tools.				
ISTA 301	3	Computing and the Arts	This course examines the ways in which computing and information science support and facilitate the production and creation of art in current society. A particular focus of the course will be to discuss how artists have used advances in technology and computing capacity to explore new ways of making art, and to investigate the relationships between technical innovation and the artistic process.		In person	Fall and Spring	Proposed from dept. housing this course
ISTA 251	3	Introduction to Game Design	This course provides an introduction to game design and teaches students the fundamental concepts for creating games. Students will survey many different games, exploring the issues game designers face when designing games in different genres. Students will participate in a series of game design challenges and will be responsible for designing and prototyping simple games using a game building tool. Students will present their solutions to these		In person	Fall and Spring	Proposed from dept. housing this course

			challenges in front of the class for general discussion and constructive criticism.				
ISTA 302	3	Technology of Sound	This course will provide the student with the information and experience necessary for the creation and manipulation of digital audio. Students will have the opportunity to experience the music-making process with the technology tools and techniques that are common in both home and professional studios. The class will make use of a variety of software packages designed for contemporary music production, explaining the universal techniques and concepts that run through all major software programs. Topics will include musical analysis, MIDI control, synthesis techniques, audio editing, and audio mixing. Lab assignments will emphasize hands-on experience working with musical hardware and software to provide the necessary skills to create music based on today¿s musical styles. The course provides the foundation for further study, creative applications, and personal expression.		In person	Fall and Spring	Proposed from dept. housing this course
ISTA 424	3	Virtual Reality	Virtual reality is an emerging technology that has been widely used in recent years in various areas, such as education, training, well-being, and entertainment. Virtual reality offers a highly immersive experience as the head mounted displays replace the vision of the users with digital imagery. It encompasses many disciplines, such	ISTA 350	In person	Fall and Spring	Proposed from dept. housing this course

			as computer science, human computer interaction, game design and development, information science, and psychology. This course merges a theoretical and practical approach to give students the necessary knowledge to design, develop, and critique virtual reality games and applications.				
ISTA 425	3	Algorithms for Games	Algorithms is a crucial component of game development. This course will provide students with an in-depth introduction to algorithm concepts for game development. The course will cover basic algorithm and data structures concepts, basic math concepts related to game algorithms, physics and artificial intelligence based game algorithms that are supplemented with modern examples. Unity Game Engine along with C# programming language will be used throughout the class.	ISTA 331 and ISTA 350 or consent of instructor.	In person	Fall and Spring	Proposed from dept. housing this course
ISTA 451	3	Game Development	This course provides an introduction to video game development. We will explore game design (not just computer games, but all games) and continue with an examination of game prototyping. Once we have working prototypes, we will continue with the development of a complete 2D computer game. The remaining course topics include: designing the game engine, rendering the graphics to the screen, and artificial intelligence. Students will be given periodic homework that reinforces what was learned in class. Homework will	ISTA 130 or CSC 110 or CSC 127A or ECE 175 and ISTA 350 or CSC 345 or consent of instructor.	In person	Fall and Spring	Proposed from dept. housing this course

			include developing a game prototype, game design documentation, some programming tasks. Students will work in small teams to develop a working game as a term project. Grades will be primarily based on the term project with some small amount of weight to homework. The examples provided in class will be programmed in Java and available for execution on any operating system. Programming homework assignments will be done in either Java or the language chosen by the instructor. The term project can be written in any programming language with instructor permission.				

IX. New Courses Needed – using the table below, list any new courses that must be created for the proposed program. If the specific course number is undetermined, please provide level (ie CHEM 4**). Add rows as needed. Is a new prefix needed? If so, provide the subject description so Curricular Affairs can generate proposed prefix options.

None

Click or tap here to enter text.

X. Faculty & Resources

a. **Current Faculty -** complete the table below. If UA Vitae link is not provided/available, attach a short CV (2-3 pages) to the end of the proposal or upload to the workflow form. UA Vitae profiles can be found in the UA directory/phonebook. Add rows as needed. Delete the EXAMPLE rows before submitting/uploading. **NOTE: full proposals are distributed campus-wide, posted on committee agendas and should be considered "publicly visible". Contact Martin Marquez if you have concerns about CV information being "publicly visible".**

Faculty Member	Involvement	UA Vitae link or "CV attached"
Ren Bozgeyikli	Teaches ISTA 451 and ISTA 424	https://profiles.arizona.edu/person/rboz
Lila Bozgeyikli	Teaches ISTA 425	https://ischool.arizona.edu/sites/ischool.arizona.edu/files/Lila-Bozgeyikli-CV.pdf
Drew Castalia	Teaches ISTA 251 and ISTA 451, 301	http://www.hwstn.com/Resume.pdf
Jamie Lee	Teaches ESOC 300	https://profiles.arizona.edu/person/jalee2

b. **Additional Faculty –** Describe the additional faculty needed during the next three years for the initiation of the program and lis the anticipated schedule for addition of these faculty members.
None

c. **Library Acquisitions Needed –** Describe additional library acquisitions needed during the next three years for the successful initiation of the program.
None

d. **Physical Facilities & Equipment -** Assess the adequacy of existing physical facilities and equipment available for the proposed certificate. Include special classrooms, laboratories, physical equipment, computer facilities, etc. Describe additional physical facilities and equipment that will be required or are anticipated during the next three years for the proposed program.
None

e. **Other Support -** Describe other support currently available for the proposed certificate. Include support staff, university and non-university assistance. List additional staff and other assistance needed for the next three years.
None

f. **Marketing & Recruitment** - Provide a detailed and robust marketing strategy for this certificate.

Girls Who Code (local high school girls bussed in by the iSchool for a Saturday coding event
free using an existing event, 20 new-to-UA students per year (maybe students who otherwise may not have chosen UA.
Undergraduate Major Fair
free, 30 students per year
Hack Arizona https://hackaz.io/
free, 30 students per year
Arizona Simulation Technology and Education Center (ASTEC) student list serves
free, 20 students per year
UA gaming eSport group 1,567 members and growing
free, 40 students per year
UA Game Development club https://uagamedev.blogspot.com/ iSchool's Dr. Ren Bozgeyikli is the faculty advisor
free, 20 students per year
GE courses in data science across the campus – in class visits about the value of the undergrad certificate
free, 30 students per year

g. **Financial -** Provide a copy of the budget for the certificate including start-up costs and the anticipated costs for the first three years. Include some indication of how this fits with the overall department budget.

All courses are existing courses with space for new students – there are no anticipated costs in the first three years.

XI. Student Learning Outcomes and Assessment – describe what students should know, understand, and/or be able to do after completing this certificate, and how student outcomes will be assessed. Provided a detailed curricular map linking student outcomes to specific courses and class activities. Consider working with Office of Instruction and Assessment to create a curricular map using Taskstream.

a. Student Learning Outcomes

In completing the Certificate, students will be able to

- Identify the majority of known game genres and several games belonging to each genre, as well as the fundamental components of a game.
- Understand the design issues inherent in different types of games and thoughtfully critique others' game designs.
- Design games from different genres, demonstrated by several working prototypes.
- Clearly communicate game designs both orally to an audience and in the form of written documentation.
- Familiarity with the field of game studies and the game design industry, develop intentional cross-cultural connections and relationships with others in game studies.
- Develop digital games alone and within collaborative work teams.

Assessment Plan
Student Learning Outcomes will be assessed annually through:
Game prototypes and at least one digital game produced relative to students' coursework.
Regular survey of skills, abilities, and responsibilities of program graduates and employers of the graduates.

XII. Certificate Outcomes and Assessment– identify factors that indicate that completion of the certificate enhances the undergraduate experience. Describe measures for programmatic assessment, and provide a detailed plan for assessing certificate outcomes.

Factors indicating that the Certificate leads to gainful employment and/or advancement include:

- offers of employment to interns at their place of internship,
- employment at a desirable position (as articulated by the student) within one year of earning the certificate,
- promotion in professional settings within two years of earning the certificate, and
- long-term satisfaction with working conditions (2, 5, and 10 years out from earning the certificate).
- Indication from annual surveys of our former students that the certificate was a factor in their employment success.

Assessment Plan
Certificate Outcomes will be assessed

- annually through an outgoing survey of Certificate Students regarding the above factors.
- annually through a survey of employers as identified by those who earned the certificate.

XIII. Certificate Demand – *is there sufficient student demand for the certificate?*

a. What is the anticipated student enrollment for this certificate by the third year the certificate is offered? Please provide measurable indicators of student interest in the certificate (survey results of current students or alumni) and with reference to similar programs elsewhere. Provide market analysis or other tangible evidence to support projected enrollment numbers.

Generally, a nearly 3% increase in career placement opportunities is expected for game development and design over time. These kinds of skills in Arizona are predicted to be in need increasingly by about 6% over time. These data are drawn from Looking Glass employment data, and are predictions about our current employment landscape up to 2023.

This certificate program will target:

- returning students already working wanting to improve their skills and/or increase their eligibility for promotion,
- students interested in augmenting their current degree program with this particular skill set (e.g., this is a great certificate to add to a major like Sociology, Geography, or Retail).

Initially, we will target students in our own programs (e.g., BA in Info. Sci./eSoc, BA in Info. Sci./Arts, BS in Info. Sci./Tech) that have already require one of the required certificate courses, since they will only need to take two more courses to complete the certificate.

3-Year Projected Annual Enrollment:

- 1st Year, 5 Certificates Awarded
- 2nd Year, 10 Certificates Awarded
- 3rd Year, 20 Certificates Awarded

b. What community needs, preparation for professional certification exams, degree program recruitment, or employability enhancements will this certificate provide? Please provide evidence of feedback from potential employers regarding the value of the proposed program.

From a recent paper US Bureau of Labor Statistics called “Work for play: Careers in video game development”: Video games aren’t only for play; they also provide work. The workers, known as game developers, make a living creating the games you enjoy playing. Making video games is a serious—and big—business. According to the Entertainment Software Association, in 2009, the video game industry had sales in excess of $10 billion and employed more than 32,000 people in 34 states. Creating these games is complex and requires the collaboration of many developers, who perform a variety of tasks, from production to programming. They work for both small and large game studios to create games that can be played on many different devices, including console systems, computers, and cell phones.

From U.S. Bureau of Labor Statistics' 2016-2017 Occupational Outlook Handbook: There's never been a better time to learn video game design. The multi-billion dollar video game industry has more than tripled in size over the past decade with no signs of slowing. Beyond the booming market for video games on PCs and the major consoles (Xbox, PlayStation, and Nintendo Wii) the increased popularity and sophistication of mobile technologies has opened up a new world of career opportunities for video game designers and developers. Game designers with mobile development expertise will be especially sought after as smart phones and tablets, such as the iPhone, iPad, and a host of Android devices, continue to change the way we access and play video games. Employment of video game designers is expected to grow by 19 percent from 2014 through 2024, much faster than the 7% average for all occupations.

Related Positions:
Designer/Writer
Game Designer
Game Designer/Creative Director
World Designer
Multimedia Artist/Animator
Video Game Designer
Game Art Designer
Flash Designer
Digital Media Specialist
Interactive Media Developer

Mobile Application Developer
Java Application Developer
Motion Graphics Designer
Flash Animator
Advertising Animator
Web Animator
Mobile Animator
Video Game Animator

Similar programs:
- Mesa Community College's Associate in Applied Science in Game Technology, http://www.mesacc.edu/programs/multimedia-game-technology
- Mohave Community College's Programming and Game Development Certificate, http://catalog.mohave.edu/preview_program.php?catoid=20&poid=2836&returnto=3862
- See "The Top Game Design Schools in Arizona" (U of A not on the list): http://www.gamedesigning.org/schools/arizona/#

c. Will there be any collaboration with other departments or universities to maximize resources? If there is collaboration, please include a memo of support from the applicable parties.

There will be no collaborations with other departments or universities for this certificate program.

XIV. Contacts and Administration

a. List the name and contact information for the primary point of contact for the certificate.

Catherine Brooks, Director, iSchool, cfbrooks@email.arizona.edu

Amy C. Kimme Hea
Associate Dean, Academic Affairs and Student Success

b. List the name and contact information for the person or persons who will serve in the role of Director of Undergraduate Studies (DUS) for the certificate. (This is not always the same as the DUS for affiliated programs or head of the managing academic unit.) Diana Daly, Director of Undergraduate Studies, didaly@email.arizona.edu

THE UNIVERSITY OF ARIZONA

BUDGET PROJECTION FORM

Name of Proposed Program or Unit:

	Projected		
Budget Contact Person:	**1st Year** 2020 - 2021	**2nd Year** 2021- 2022	**3rd Year** 2022- 2023
METRICS			
Net increase in annual college enrollment UG	5	10	20
Net increase in college SCH UG	45	90	180
Net increase in annual college enrollment Grad	-	-	-
Net increase in college SCH Grad	-	-	-
Number of enrollments being charged a Program Fee	-	-	-
New Sponsored Activity (MTDC)	-		
Number of Faculty FTE	-	-	-
FUNDING SOURCES			
Continuing Sources			
UG RCM Revenue (net of cost allocation)			
Grad RCM Revenue (net of cost allocation)			
Program Fee RCM Revenue (net of cost allocation)			
F and A Revenues (net of cost allocations)			
UA Online Revenues			
Distance Learning Revenues			
Reallocation from existing College funds (attach description)			
Other Items (attach description)			
Total Continuing	**$ -**	**$ -**	**$ -**
One-time Sources			
College fund balances	500	250	250
Institutional Strategic Investment			
Gift Funding			
Other Items (attach description)			
Total One-time	**$ 500**	**$ 250**	**$ 250**
TOTAL SOURCES	**$ 500**	**$ 250**	**$ 250**
EXPENDITURE ITEMS			
Continuing Expenditures			
Faculty			
Other Personnel			
Employee Related Expense			
Graduate Assistantships			
Other Graduate Aid			
Operations (materials, supplies, phones, etc.)			
Additional Space Cost			
Other Items (attach description)			
Total Continuing	**$ -**	**$ -**	**$ -**
One-time Expenditures			
Construction or Renovation			
Start-up Equipment			
Replace Equipment			
Library Resources			
Other Items (attach description)	500	250	250
Total One-time	**$ 500**	**$ 250**	**$ 250**
TOTAL EXPENDITURES	**$ 500**	**$ 250**	**$ 250**
Net Projected Fiscal Effect	**$ -**	**$ -**	**$ -**

From: Florian, Jim - (florianj)
To: Marquez, Martin - (martinmarquez)
Subject: Re: Feedback: Undergraduate Certificate in Data Science and Visualization
Date: Tuesday, January 21, 2020 3:51:21 PM
Attachments: image001.png

Hi Martin,
Good to go.
Jim

On Jan 21, 2020, at 3:19 PM, Marquez, Martin - (martinmarquez) <martinmarquez@email.arizona.edu> wrote:

> Hi Jim,
>
> Could you confirm that the budget pieces are all good to go? Normally we would have certificates go through UAccess (like majors and minors). However, these were stalled due to the moratorium and the committees wanted to expedite them.
>
> Please let me know!
>
> Best,
> Martin
>
> **From:** Marquez, Martin - (martinmarquez)
> **Sent:** Tuesday, January 21, 2020 3:03 PM
> **To:** Brooks, Catherine F - (cfbrooks) <cfbrooks@email.arizona.edu>; Carlson, Stephanie L - (scarlson) <scarlson@email.arizona.edu>
> **Cc:** Florian, Jim - (florianj) <florianj@arizona.edu>; Kimme Hea, Amy C - (kimmehea) <kimmehea@email.arizona.edu>; Chavez, Kathryn - (kathrync) <kathrync@email.arizona.edu>; Burleson, Win - (win) <win@email.arizona.edu>
> **Subject:** RE: Feedback: Undergraduate Certificate in Data Science and Visualization
> **Importance:** High
>
> Hi Catherine,
>
> Thanks for sending us the two updated certificate proposals. I am including the proposals merged with the budget projection forms to this email. I made a couple of small edits for the certificate in data science and visualization. The ISTA 321 course is 4 units (I removed my comment that was left on the final draft), bringing the total minimum for the certificate to 13. I changed the impacted fields to reflect that minimum (page 3 and 7).
>
> I have added the proposals to the Academic Programs Subcommittee January 28 meeting agenda. The certificates would be the fifth and sixth action items on the agenda. I estimate the presentation time to be 4:10 pm. This is an estimated time and the actual time could be a bit earlier or later, depending on the discussion taking place

From: Kimme Hea, Amy C - (kimmehea)
To: Marquez, Martin - (martinmarquez)
Cc: Salazar, Ricky M - (ricar22)
Subject: RE: Feedback: Undergraduate Certificate in Data Science and Visualization
Date: Tuesday, January 21, 2020 3:57:59 PM
Attachments: image002.png

Dear Martin,

Yes, you have our approval for these certificates.

All best,

Amy

Amy C. Kimme Hea, PhD
Associate Dean, Academic Affairs & Student Success
College of Social and Behavioral Sciences
Douglass Building, Room 200W
PO Box 210028
University of Arizona
Tucson, AZ 85721.0028
520.621.1112

From: Marquez, Martin - (martinmarquez) <martinmarquez@email.arizona.edu>
Sent: Tuesday, January 21, 2020 3:07 PM
To: Kimme Hea, Amy C - (kimmehea) <kimmehea@email.arizona.edu>
Cc: Salazar, Ricky M - (ricar22) <ricar22@email.arizona.edu>
Subject: FW: Feedback: Undergraduate Certificate in Data Science and Visualization
Importance: High

Hi Amy,

Hope you had a nice weekend.

Just want to confirm that the college approves the two certificates. We have your original signature from the original requests, but changes have been made to the proposals since, so we just want to reaffirm (and document college approval). Your confirmation through email works.

Thanks!

Best,
Martin

From: Marquez, Martin - (martinmarquez)