Minor Program Adjustment Template

Faculty: Business and IT	**Date**: September 2016
Program: Bachelor of IT – Game Development and Entrepreneurship	
Undergraduate: ☒	**Graduate**: ☐

Minor Program Adjustments include: New required courses, Deletion of required courses, Other changes to degree requirements or program learning outcomes, New academic requirements or changes to existing requirements.

Motion: The Faculty of Business and IT moves that CPRC approve the removal or replacement of several courses in the Game Development and Entrepreneurship major.

Proposal Brief

Summary of the proposed change

This document summarizes the proposed changes to the game development and entrepreneurship program to take effect in 2017-2018. These changes have been made and approved by the Game Development & Entrepreneurship core faculty at our September 21,2016 Monthly Meeting. Several courses have been developed to combine the relevant content from multiple courses that will replace existing courses.

The reasons for the changes are as follows:
(1) to address concerns from the BIT external review of the program
(2) to meet requirements set by the changing game industry and re-focus our “art”-only courses into more technical-art courses.

Through the BIT review of the program, external examiners noted that some courses were too specific and that there was an imbalance of specificity vs generalizability. This is specifically apparent in the “art” courses such as INFR 1310/1320 (Graphic Design 1/2), INFR 2340/3340 (Intro Modeling & Animation, Intermediate Modeling). These courses will be removed and replaced with new courses that combine content from the existing offerings and re-focus them on a more balanced pedagogical approach to encourage critical thought. INFR 4390 (DemoReel) is being removed due to the lack of pedagogy and value being added to the program, students are better served with a technical elective to deepen their knowledge.

In some instances, two courses will be combined into a single course opening a slot for an elective or another core course in the curriculum. Incorporating additional elective slots allows us to offer more flexibility for our students, help keep them on track more effectively, and hopefully increase student retention. This will enable the introduction of new Minors into the program.

In some instances, we have moved a few courses in terms of scheduling. These modifications are due to the re-introduction of the Creative Writing & Narrative Course into the curriculum and the trickle-down effect of the scheduling of courses to accommodate this request.

Remove 9 core courses

-INFR 1310U - Graphic Design 1
- INFR 1320U - Graphic Design 2
- INFR 2340U - Intro to Modeling & Animation
- INFR 3330U - Adv. Game Design
- INFR 4310U - Social Network Games
- INFR 3340U - Intermediate Modeling Techniques
- INFR 3320U - Filmmaking
- INFR 3310U - Animation and Production
- INFR 4390U - Demo Reel
- INFR4391 - Sp. Topics in Game Development and Entrepreneurship

Replace with 5 core courses
INFR 1315U - Concept & Graphic Design (core)
- INFR 2345U - Modeling & Animation Systems 1 (core)
- INFR 3335U - Social & Multiplayer Game Design (core)
- INFR 3345U - Modeling & Animation Systems 2 (core)
- INFR 3315U - Cinematic Systems Design (core)

Balance of courses will be Technical electives or Open Electives,
- INFR 4340U - Game Analytics (technical elective)
- INFR 4335U - Visual Programming languages (technical elective)

Description of the ways in which the proposed change will enhance the academic opportunities
The proposed changes will enhance the academic experience of students in the game development program in the following ways:

- More elective slots which will enable them to plan accordingly, reduce their course load by taking summer courses. This could lead to higher retention.
- More focused courses. Given that the vast majority of our alumni go on to jobs in the technical and design fields in the industry, it is important for us to strengthen their core 1 technical skills and knowledge. These changes will shift the focus of pure “art” courses to a focus of “technical art” which is highly sought after in the industry.

Process of consultation with other units if the change(s) involves students, staff and faculty from other programs of courses
No impact on other units.

Transition Plan
2013 starts – current 4th years

Student in upper years will transition to the new map effective Fall 2017. In cases where students do not complete the required courses, the following would be the transition plan
- If they fail INFR 4310U, replacement course will be: INFR 3335U
- If they fail INFR 4440U – replacement course will be technical elective
- If they fail INFR 3320U – historically there are no fails, replacement course will be technical elective
- If they fail INFR 2340U – replacement course will be INFR 2345U
- If they fail INFR 1310U or INFR 1320U – replacement course will be the new course INFR 1315U

Analysis of the financial and enrolment implications

These changes will have a reduction in costs for the core curriculum by 2 courses (due to the removal of courses) and enable higher degree of flexibility for offering technical elective courses. There are no enrolment implications to these changes as they only serve to strengthen the message we have been using in our recruitment strategy for the past four years.

• Combining INFR 1310 & INFR 1320 into a single INFR 1315 opens up an Elective spot
(REDUCING COSTS BY ONE COURSE)
• Combining INFR 3320U and INFR 3310U into a single INFR 3315U allows us to offer \
INFR 3350U Game User Research as a core course
(NO CHANGE IN RESOURCES)
• Combining INFR 4310U and INFR 3330U into a single INFR 3335U opens up an elective spot
(REDUCING COSTS BY ONE COURSE)
• Removing INFR 4391U Special Topics in Game Development from core curriculum opens up a technical elective spot
(ALLOWS FLEXIBILITY to offer different courses each year instead of a single special topics course.)

Proposed Implementation Date

These changes are to be implemented immediately for incoming students in the 2017-2018 calendar year and with the above transition plan for current students.

Calendar Copy and Program Maps (highlight revisions to existing curriculum)

Please see below the student program maps
Attachment below – Calendar Copy

APPROVAL DATES

Date of submission	September 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

Bachelor of Information Technology
Game Development and Entrepreneurship Specialization
Program Map Proposed changes for September 2017

Agenda Item 8.1.2(a)

Year-Sem.	Subject	Subject	Subject	Subject	Subject
1-1	**INFR 1100U** Introduction to Programming	**INFR 1020U** Essential Math for Games I	**INFR 1330U** Introduction to Game Design	**BUSI 1700U** Introduction to Entrepreneurship **Add**: INFR1315U Concept Graphic Design	**DELETE: INFR 1310U** Graphic Design I **Add: INFR1300U** Creative Writing & Narrative
	INFR 1395U Game Development Workshop I				
1-2	**BUSI 2210U** Marketing	**INFR 2140U** Object Oriented Programming	INFR1030U Essential Math for Games II	INFR1335U Digital Game Design	**DELETE: INFR 1320U** Graphic Design II **Add** : General Elective
	INFR 1396U Game Development Workshop II				
2-1	**BUSI 2550U** Introduction to Project Management	**INFR 1350U** Introduction to Computer Graphics	**INFR 2310U*** Computer Animation: Algorithms & Techniques	**INFR 2330U** Game Design & Production I	DELETE: **INFR2340** Introduction to Modeling and Animation **Add**: **INFR2345U** Modelling & Animation Systems I
	INFR 2395U Game Development Workshop I				
2-2	**BUSI 2120U** Accounting for IT	**INFR 2350U** Intermediate Computer Graphics	**INFR 2820U*** Algorithm and Data Structures	**INFR 2810U** Computer Architecture	**INFR 2370U** Game Sound
	INFR 2396U Game Development Workshop II				
3-1	**BUSI 2700U** Entrepreneurial Finance	General Elective Or Business Minor	**INFR 3110U** Game Engine Design & Implementation	DELETE: **INFR 3330U** ~~Game Design &~~ Production II **Add** : **INFR3335U** Social & MultiPlayer Game Design	**DELETE: INFR 3340U** Intermediate Modeling Techniques **Add: INFR3345U** Modelling & Animation Systems II
	INFR 3395U Game Development Workshop I				
3-2	General Elective Or Business Minor	Open Elective (can be Tech Elective or Business Minor)	**INFR 3830U** Distributed Systems and Networking *Prereq INFR 2140U, INFR 2810U*	**DELETE: INFR 3320U** Filmmaking **Add**: INFR3315U Cinematic Systems Design	**DELETE : INFR 3310U** Animation and Production **Add**: INFR3350U Game User Research
	INFR 3396U Game Development Workshop II				
4-1	*BUSI4340U Business of Game*	INFR4560 Law & Ethics of Game Development	Technical Elective or Business Minor	DELETE: **INFR 4310U** Multiplayer & Online Game Development	**Add: Tech Elective** **Move: INFR 4320U** Artificial Intelligence for Games
	INFR 4490U Pre-Capstone Workshop				
4-2	*Open Elective (can be Tech Elective or Business Minor)*	**BUSI 4995U** UOIT Edge – Capstone Study Project *Prereq Year 4 standing*	***Delete*: INFR 4391U** Special Topics in Game Development and Entrepreneurship **Add: Tech Elective**	**INFR4350U Human Computer Interaction** **Add**: Tech Elective	**DELETE: INFR 4390U** Demo Reel Development

.

Bachelor of Information Technology Bridge Program

Game Development and Entrepreneurship Major

Program Map Changes for Summer 2017

Year-Sem.	Subject	Subject	Subject	Subject	Subject
BRIDGE	**BUSI 1700U** Introduction to Entrepreneurship	**INFR 1020U** Essential Mathematics for Games I	**INFR 1030U** Essential Mathematics for Games II *Prereq: INFR 1020U & INFR 1100U*	**INFR 2140U** Object Oriented Programming *Prereq: INFR 1100U*	**Add: INFR1100U Intro to Programming** **Delete: INFR 2810U** Computer Architecture
3-1	**INFR 2330U** Intermediate Game Design *Prereq : INFR 1335U*	**INFR 2310U** Computer Animation: Algorithms & Techniques *Prereq : INFR 1030U & INFR 2140U*	**INFR 1350U** Introduction to Computer Graphics *Prereq : INFR 1030U & INFR 2140U*	**INFR 4560U** Law & Ethics of Game Development *Prereq: 4th Year Standing*	**Add:** BUSI2550 Intro to Project Mgt. **DELETE**: **INFR 2340U** Intro to Modelling and Animation
	INFR 2395U Game Development Workshop I				
3-2	**Add: INFR2370 Game Sound** **Move: BUSI 2120U** Accounting for IT	**INFR 2350U** Intermediate Computer Graphics *Prereq: INFR 1350U*	**Add:** INFR 2810U Computer Architecture **Delete: INFR 3320U** Filmmaking	**INFR 2820U** Algorithm and Data Structures *Prereq: (INFR 1030U or INFR 1010U) & INFR 2140U*	**Add:** BUSI2700U Entrepreneurial Finance **Move: BUSI 2210U** Marketing for IT
	INFR 2396U Game Development Workshop II				
4-1	**Move:: INFR 4320U** Artificial Intelligence For Gaming **OR** **Delete: INFR 4310U** Social Network Games	**INFR 3110U** Game Engine Design and Implementation	**Add : INFR3335U Social & Multiplayer Game Design** **Delete : INFR 3330U** Advanced Game Design	**BUSI 4340U** Business of Gaming *Prereq: BUSI 2700U*	**Delete : INFR 3340U** Intermediate Modelling Techniques
	BUSI 4990U Pre-Capstone Workshop				
4-2	**Add: INFR3350U Game User Research** **Delete: INFR 3310U** Animation and Production	**Move: INFR 4350U** Human Computer Interaction for Games	**BUSI 4995U** UOIT Edge – Capstone Study Project *Prereq: BUSI 4990U*	**Add:** INFR3830U Distributed Systems & Networking **Delete**: Technical Elective*	**Delete:** Technical Elective*

Game Development & Entrepreneurship

Bachelor of Information Technology

2017 Start BRIDGE PROGRAM

Year Term	Course	Course	Course	Course	Course
BRIDGE*	**INFR 1020U** Essential Mathematics for Games I	**INFR 1030U** Essential Mathematics for Games II	**INFR 1100U** Introduction to Programming	**INFR 2140U** Object Oriented Programming	**BUSI 1700U** Introduction to Entrepreneurship
Year 3 Fall	**INFR 1350U** Introduction to Computer Graphics	**INFR 2310U** Computer Animation: Algorithms & Techniques	**INFR 2330U** Intermediate Game Design	**INFR 4560U** Law & Ethics of Game Development	**BUSI 2550U** Introduction to Project Management
	INFR 2395U Game Development Workshop I				
Year 3 Winter	**INFR 2350U** Intermediate Computer Graphics	**INFR 2370U** Game Sound	**INFR 2810U** Computer Architecture	**INFR 2820U** Algorithms & Data Structures	**BUSI 2700U** Entrepreneurial Finance
	INFR 2396U Game Development Workshop II				
Year 4 Fall	**INFR 3110U** Game Engine Design & Implementation	**INFR 4350U** Human Computer Interaction for Games	**INFR 3335U** Advanced Game Design	**BUSI 4340U** Business of Gaming	**BUSI 2120U** Accounting for I.T
	BUSI 4990U Capstone I				
Year 4 Winter	**INFR 4320U** Artificial Intelligence for Gaming	**INFR 3350U** Game User Research	**INFR 3830U** Distributed Systems & Networking	**BUSI 4995U** Capstone II	**BUSI 2210U** Marketing for I.T.

* Note: Students normally complete the Bridge term in Spring/Summer. Students who take the Bridge in Fall/Winter will be required to take Game Development Workshop I & II, INFR 1395U and INFR 1396U along with the courses listed above.

Information contained herein is subject to change at the discretion of the Faculty of Business and I.T., and is distributed to students for course schedule planning assistance. Any questions should be addressed to the FBIT Academic Advising office (fbitadvising@uoit.ca).

9.4.5 Program details and degree requirements

9.4.5.1 Program details – Game Development and Entrepreneurship major

Game Development and Entrepreneurship is designed to provide students with a wide range of game design development expertise. Students are immersed in the game development process from day one and develop complete video games beginning in their first year. Successful students develop their knowledge and skills in a diverse team environment and learn to work with programmers, artists, and designers to create innovative products that push the medium to its limits.

In Years 1 to 3, all students participate in the Game Development Workshop (GDW). Each course taken in that year is integrated with a GDW project for a semester long game project. Students will work in teams to, apply knowledge learned in all of the program's courses by developing and delivering a game at the end of each year. In Year 4, students can participate in a year-long team-based Capstone program where they work on an industry-driven gaming project, or they can be part of an innovate incubator program where they are assisted in developing their own gaming start-up company

An innovative gaming and virtual reality laboratory features motion capture facilities, an audiometric (sound) room, 3D displays, and the latest in interaction devices. Students acquire business and management knowledge and develop entrepreneurial skills, allowing graduates to quickly advance their careers in the game industry as employees or entrepreneurs in charge of developing and managing their own gaming businesses. Students may take the required business courses to obtain a minor in Marketing, Game Production Management or Operations Management.

Although reasonable efforts will be made to adhere to the following program map, course requirements and term offerings may change. For the most up-to-date list of course offerings, please visit the faculty website at **businessandit.uoit.ca**.

Current Entry:

Year 1

Semester 1 (15 credit hours)

- BUSI 1700U – Introduction to Entrepreneurship
- INFR 1020U – Essential Mathematics for Games I
- INFR 1100U – Introduction to Programming
- INFR 1310U – Graphic Design I
- INFR 1330U – Basic Introduction to Game Design
- INFR 1395U – Game Development Workshop I

Semester 2 (15 credit hours)

- BUSI 2210U – Marketing in the Information Technology Sector
- INFR 1030U – Essential Mathematics for Games II
- INFR 1320U – Graphic Design II
- INFR 1335U – Digital Game Design
- INFR 1396U – Game Development Workshop II
- INFR 2140U – Object Oriented Programming

Year 2

Semester 1 (15 credit hours)

- BUSI 2550U – Introduction to Project Management
- INFR 1350U – Introduction to Computer Graphics
- INFR 2310U – Computer Animation: Algorithms and Techniques
- INFR 2330U – Intermediate Game Design
- INFR 2340U – Introduction to Modelling and Animation
- INFR 2395U – Game Development Workshop I

Semester 2 (15 credit hours)

- BUSI 2120U – Accounting for IT
- INFR 2350U – Intermediate Computer Graphics
- INFR 2370U – Game Sound
- INFR 2396U – Game Development Workshop II
- INFR 2810U – Computer Architecture
- INFR 2820U – Algorithms and Data Structures

Year 3

Semester 1 (15 credit hours)

- BUSI 2700U – Entrepreneurial Finance
- INFR 3110U – Game Engine Design and Implementation
- INFR 3330U – Game Design and Production II
- INFR 3340U – Intermediate Modelling Techniques
- INFR 3395U – Game Development Workshop I
- One of:
- General elective* **or**
- Business minor elective**

Semester 2 (15 credit hours)

- INFR 3310U – Animation and Production
- INFR 3320U – Filmmaking
- INFR 3396U – Game Development Workshop II
- INFR 3830U – Distributed Systems and Networking
- One of:
- General elective* **or**
- Business minor elective**
- One of:
- Business minor elective** **or**
- Open elective***

Year 4

Semester 1 (15 credit hours)

- BUSI 4340U – Business of Gaming
- BUSI 4990U – Capstone Study Project I
- INFR 4310U – Social Network Games
- INFR 4320U – Artificial Intelligence for Gaming
- INFR 4560U – Law and Ethics in Game Development
- One of:
- Business minor elective** **or**
- Technical elective****

Semester 2 (15 credit hours)

- BUSI 4995U – Capstone Study Project II
- INFR 4350U – Human-Computer Interaction for Games
- INFR 4390U – Demo Reel Development
- INFR 4391U – Special Topics in Game Development and Entrepreneurship
- One of:
- Business minor elective** **or**
- Open elective***

Electives

***General elective**

Students must select a minimum of two non-INFR, non-computer science related courses from any faculty, subject to credit restrictions.

****Business minor elective**

Students may enrol in selected BUSI courses as business minor electives to receive a minor. Details are available under Program information – Bachelor of Information Technology (Honours).

*****Open elective**

Students may enrol in any courses from any faculty as open electives, subject to credit restrictions. These courses may be either non-INFR/non-computer science courses or may include INFR/computer science courses.

******Technical elective**

Students may enrol in selected approved INFR/CSCI courses as technical electives. Details will be sent to UOITnet email accounts prior to registration and available in the schedule of classes. Students officially enrolled in an approved Business minor program may waive the Technical elective requirement to complete their required minor courses.

Proposed Entry:

YEAR 1
Semester 1 (15 credit hours)
INFR 1020U Essential Math for Games I
INFR 1100U Introduction to Programming
INFR 1300U Creative Writing and Narrative
INFR 1315U Concept and Graphic Design
INFR 1330U Introduction to Game Design
INFR 1395U Game Development Workshop I

Semester 2 (15 credit hours)
BUSI 1700U Introduction to Entrepreneurship
INFR 1030U Essential Math for Games II
INFR 1335U Digital Game Design
INFR 1396U Game Development Workshop II
INFR 2140U Object Oriented Programming
General Elective

YEAR 2
Semester 1 (15 credit hours)
BUSI 2550U Intro to Project Management
INFR 1350U Introduction to Computer Graphics
INFR 2310U Computer Animation: Algorithms and
Techniques INFR 2330U Intermediate Game Design
INFR 2345U Modelling and Animation
Systems I INFR 2395U Game Development
Workshop I

Semester 2 (15 credit hours)
BUSI 2210U Marketing for I.T
INFR 2350U Intermediate Computer
Graphics INFR 2370U Game Sound
INFR 2396U Game Development
Workshop II INFR 2810U Computer
Architecture
INFR 2820U Algorithms and Data Structures

YEAR 3
Semester 1 (15 credit hours)
BUSI 2120U Accounting for I.T
INFR 3110U Game Engine Design and
Implementation INFR 3335U Social and Multiplayer

Game Design INFR 3345U Modelling & Animation
Systems II
INFR 3395U Game Development
Workshop I General Elective

Semester 2 (15 credit hours)
BUSI 2700U Entrepreneurial
Finance INFR 3315U Cinematic
Systems Design INFR 3350U Game
User Research
INFR 3396U Game Development Workshop II
INFR 3830U Distributed Systems and
Networking Open Elective

YEAR 4
Semester 1 (15 credit hours)
BUSI 4340U Business of Gaming
BUSI 4990U Capstone Study
Project I
INFR 4560U Law and Ethics of Game Development
3 Technical Electives

Semester 2 (15 credit hours)
BUSI 4995U Capstone Study Project II
INFR 4320U Artificial Intelligence for Gaming
INFR 4350U Human Computer Interaction for Games (formerly Virtual Reality and User Interaction) Technical Elective
Open Elective

***General elective**
Students must select a minimum of two non-INFR, non-computer science related courses from any faculty, subject to credit restrictions. See Undergraduate Course Descriptions.

****Business minor elective**
Students may enrol in selected BUSI courses as business minor electives to receive a minor. Details are available under Program information – Bachelor of Information Technology (Honours).

*****Open elective**
Students may enrol in any courses from any faculty as open electives, subject to credit restrictions. See Undergraduate Course Descriptions. These courses may be either non-INFR/non-computer science courses or may include INFR/computer science courses.

******Technical elective**
Students may enrol in selected approved INFR/CSCI courses as technical electives. Details will be sent to **UOITnet** email accounts prior to registration and available in the schedule of classes. Students officially enrolled in an approved Business minor program may waive the Technical elective requirement to complete their required minor courses.

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Business and IT		
Course title: Concept and Graphic Design		
Course number: INFR 1315U	**Cross-listings:**	**_X__ Core ___ Elective** **If Elective, for which program (s):**
Credit weight: 3	**Face to Face Contact hours:** __3 hr__ Lecture __3 hr__ Lab ____Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO _____ Web Portion: Do you require Adobe Connect? Yes _____ NO_____	

CALENDAR DESCRIPTION

This is an introduction to the fundamental concepts of graphics, principles of light and shadow, and visual image creation, from the perspective of designing assets for video games. Focus will be placed on the use of traditional techniques and how they transition to digital techniques. Students will develop and refine their creative skills for further developing their game concepts.

Prerequisites	**-**
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

On the successful completion of the course, students will be able to:

- Create digital assets for their video games using industry standard tools for image creation
- Discuss the relationship between concepts and asset creation
- Explain the role of the technical artist in a game development team
- Use image creation toolsets for the game design process
- Build pipelines and workflows between image creation tools and game engines
- Create effective graphical user interfaces
- Describe and explain the development process of game art
- Refine art assets through self-evaluation and group-critique
- Critique existing game assets and art-engine pipelines

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply) X face-to-face X hybrid online

TEACHING AND ASSESSMENT METHODS

Lab assignments, development of game art assets (GDW)

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

Every Year

- Lab section split into 2 x 1.5

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

Saad Khattak

SAMPLE TEXTBOOK

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

CREATOR : **Andrew Hogue**

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Game Development Faculty, knowledge of photoshop or other industry standard toolsets, ability to effectively create assets for use in game prototypes

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some finance journals some additional periodical subscriptions maybe necessary.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom already exists in our current building. There are no special equipment or lab facilities to support the offering of this course.

COURSE RATIONALE:

This course provides students with the basic fundamental knowledge and skills required for asset creation within the game development pipeline. This is necessary for students to work effectively in their game development workshop teams (GDW). This course integrates with the GDW by introducing students to the concepts of technical art pipelines and provides them with skillsets necessary to create their game art assets.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October 24, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Faculty of Business and Information Technology		
Course title: Modelling & Animation Systems 1		
Course number: INFR 2345	**Cross-listings:**	**__X__ Core ___ Elective** **If Elective, for which program (s):**
Credit weight: 3.0	**Face to Face Contact hours:** _3 hr_ Lecture __3_hr_ Lab ____Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO _____ Web Portion: Do you require Adobe Connect? Yes _____ NO_____	

CALENDAR DESCRIPTION

This course is an introduction to creation of 3D art assets using computer graphics (CG) software and the consumption of those assets in games. The course will introduce students to CG software similar to Autodesk Maya to create and animate art assets for their games with a technical-art focus. The art to engine pipeline will be introduced where the students will integrate the assets created in existing games and game engines and develop an efficient art-to-engine pipeline.

Prerequisites	**INFR 1320**
Co-requisites	**INFR 2310**
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

On the successful outcome of this course, the students will:

- Use CG software to **model and animate simple 3D game art assets**
- Describe **the art-to-engine pipeline**
- Integrate their **work with existing games and game engines**
- incorporate their own assets into **existing games and game engines**
- **Convert basic CG shaders and effects** to standard real-time shaders used in game engines
- Develop an **efficient art-to-engine workflow**

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply) X face-to-face hybrid online

TEACHING AND ASSESSMENT METHODS

Midterm/Final exam, Lab assignments and quizzes, oral presentation, development and evaluation of a

game prototype (GDW)

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

Annual
Lecture: 1x3 hr.
Lab set up as 2x 1.5

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

2

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

Saad Khattak, Andrew Hogue

SAMPLE TEXTBOOK

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

CREATOR : **Saad Khattak**

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Game development faculty, knowledge of CG software, ability to effectively create game assets and use them in existing games/game-engines

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some finance journals some additional periodical subscriptions may be necessary.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom already exists in our current building. There are no special equipment or lab facilities to support the offering of this course.

COURSE RATIONALE:

This course provides the students with fundamental knowledge and skills required to create 3D assets and import them into their game/game-engine and establish an efficient art-to-engine pipeline.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October 24, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Business and IT		
Course title: Cinematic Systems Design		
Course number: INFR 3315U	**Cross-listings:**	**__X__ Core ___ Elective** **If Elective, for which program (s):**
Credit weight: 3	**Face to Face Contact hours:** __3 hr__ Lecture __3 hr__ Lab ____Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO _____ Web Portion: Do you require Adobe Connect? Yes _____ NO_____	

CALENDAR DESCRIPTION

This course will build on game engine concepts from INFR 2310U and INFR 3110 to focus on how cut-scenes and interactive animation sequences are designed and developed. Concepts from Film production such as camera control, placement/movement, framing, lighting, and staging will be examined and incorporated into students' games. Students will explore through case studies existing games, their camera control schemes and develop systems to develop interactive and non-interactive boss-battles and cut-scenes.

Prerequisites	**INFR 3110U**
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

Students who have successfully completed this courses will:

- **Identify the core systems that are necessary to create cinematic effects**
- **Explain the core systems involved in interactive and non-interactive cut-scenes**
- **Develop cut-scenes for their games**
- **Develop systems that are reactive and interactive and cinematic**
- **Employ concepts from film production into their games**
- **Critique existing games on their use of cinematic techniques**

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply) X face-to-face X hybrid online

TEACHING AND ASSESSMENT METHODS

Homework Assignments, Final Exam, GDW, Participation, case studies, deconstruction of existing games, development of games, integration with GDW.

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

This is a core course and should be taught by core gaming faculty each year.

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

3

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

Andrew Hogue, Saad Khattak, James Robb

SAMPLE TEXTBOOK

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

CREATOR : **Andrew Hogue**

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Technical understanding of game engine design.

Understanding of Software design patterns.

Understanding of core camera control paradigms.

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some finance journals some additional periodical subscriptions maybe necessary.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom ~~is~~ already exist~~ed~~ in our current building. There are no special equipment or lab

facilities to support the offering of this course.

COURSE RATIONALE:

This course is to replace the existing Filmmaking and Animation and Production courses. The relevant concepts from these two courses will be integrated in a more theoretical and technical pedagogical approach. The previous courses did not employ theoretical principles or critical thinking skills to examine existing games and provide students with a complete understanding of how to create content and technical systems. This course will serve as a re-focusing of the other two and provide students with a deeper understanding of these concepts in a more technical (programming) manner.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October 24, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Business and IT		
Course title: Social and Multiplayer Game Design		
Course number: INFR 3335U	**Cross-listings:**	**__X_ Core ___ Elective** **If Elective, for which program (s):**
Credit weight: 3	**Face to Face Contact hours:** __3 hr_ Lecture ~~__3~~ 1.5hr__ Lab ____Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO _____ Web Portion: Do you require Adobe Connect? Yes _____ NO_____	

CALENDAR DESCRIPTION

This course will explore the recent history of social games. The course aims at dissecting real-world examples of social games and analyzing them both from a game design aspect as well as a business aspect, extends a student's knowledge of concepts behind game design and production. Various social games will be explored, discussed and evaluated. Students will examine and critique the different methods that can bring success to social games, as well as what it takes for a game to be truly social. The knowledge acquired in this class will provide students with foundations for developing successful social games in the game industry (an asset that is highly sought in the current employment context of the game industry). Students will examine these topics through experience by developing and critiquing several social game design strategies and implement the successful methods into their final games in the Game Development Workshop.
Topics include multiplayer design patterns, design documentation, prototyping, game testing and the game production pipeline. Students will be required to develop a multiplayer game prototype.

Prerequisites	**INFR 2330U**
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

On the successful completion of the course, students will be able to:

- Evaluate the design of their own game as well as others
- Explain how to design games that are compelling to replay
- Describe the fundamentals of designing social games
- Employ key business metrics and analytics for social games
- Discuss the methodology and practice of making social games
- Develop new social media strategies for integration into games
- Evaluate social and multiplayer strategies in their own game designs
- Integrate successful social and multiplayer game design methods into their own games

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply)	**X face-to-face**	**X hybrid**	**X online**

TEACHING AND ASSESSMENT METHODS

Midterm exam, Lab assignments and quizzes, oral presentation, development and evaluation of a game prototype (GDW)

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

N/A

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

Every year,

- 3 Hr Lecture, (1 Section)
- 1.5 Hrs Lab ~~(2 Sections)~~
-

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

3

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

James Robb, Pejman Mirza-Babaei, Loutfouz Zaman

SAMPLE TEXTBOOK

J. Radoff, Game On: Energize Your Business with Social Media Games, Wiley, 1st edition

T. Fields, Mobile & Social Game Design: Monetization Methods and Mechanics, A K Peters/CRC Press, 2nd Edition

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

N/A

CREATOR : James Robb and Loutfouz Zaman and Pejman Mirza-Babaei

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Knowledge in game design and social network games

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some finance journals some additional periodical subscriptions maybe necessary.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom already exists in our current building. There are no special equipment or lab facilities to support the offering of this course.

COURSE RATIONALE:

This course provides students with fundamental knowledge of social game design, which will complement the training they have received in the first and second years of their program at UOIT. The course also contributes to the GDW 3 which focuses on development of a multiplayer network game by providing the foundations for understanding and creating multiplayer network games.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October 24, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Business and IT		
Course title: Visual Programming Languages		
Course number: INFR 4335U	**Cross-listings:**	**___ Core _X__ Elective** **If Elective, for which program (s):**
Credit weight: 3	**Face to Face Contact hours:** __3 hr__ Lecture ___3 hr_ Lab ____Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO _____ Web Portion: Do you require Adobe Connect? Yes _____ NO_____	

CALENDAR DESCRIPTION

This course will explore the applications of the visual programming paradigm in generative graphic design and game development. Students will explore applications data-flow programming in the area of generative graphic design, game logic design, animation and shader design. Students will be studying and working with various popular industry and research tools such as Processing, NodeBox, GEM-NI, Grasshopper 3D, Dynamo, Unreal Engine Bluprints, Blender Game Engine's Node and Logic Editor, among others.
The knowledge obtained from this course will provide sound foundations for understanding and creating generative designs, game logic, animation and shaders using data-flow programming languages – skills that are highly desired by the game industry employers today. Students will be required to develop a project at the end of the course.

Prerequisites	**INFR 3330U**
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

On the successful completion of the course, students will be able to:

- Define the basic properties of visual programming languages
- Explain the need for visual programming languages in the gaming context
- Critique existing implementations of visual languages in existing game engines
- Create extravagant, crystalline structures that can form the basis of anything from patterned textiles and typography to lighting, scientific diagrams, sculptures, and buildings using traditional and visual generative design tools.
- Use visual scripting to develop gameplay mechanics, UI, visual effects, artificial intelligence, animations,

and more.

- Extend the functionality of existing data-flow programming languages by implementing their own nodes

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply) **X face-to-face** **X hybrid** **X online**

TEACHING AND ASSESSMENT METHODS

Midterm exam, lab assignments and quizzes, final project and presentation

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

N/A

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

Every year,

- Lab set up as 1 x 3 hr

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

4 (Loutfouz Zaman, Andrew Hogue, Saad Khattak, James Robb)

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

Loutfouz Zaman,

SAMPLE TEXTBOOK

Bohnacker H., Generative Design: Visualize, Program, and Create with Processing, Princeton Architectural Press

Sewel B., Blueprints Visual Scripting for Unreal Engine

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

N/A

CREATOR : _____ Loutfouz Zaman -_____

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Knowledge in generative design, data-flow languages, Unreal Engine Blueprints

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some HCI journals some additional periodical subscriptions maybe necessary.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom already exists in our current building. There are no special equipment or lab facilities to support the offering of this course

COURSE RATIONALE:

This course provides students with fundamental knowledge of visual programming languages and their applications. This course is highly multi-disciplinary: it builds on the disciples of game engine design, object oriented programming, data structures and algorithms, graphic design and game design. This will complement the training they have received in the second and third years of their program at UOIT. During the Ubisoft Faculty Night, which took place on September 29, 2016, it was revealed that visual scripting is the only type of scripting that is used in the company for game level design. This is now true for a great number of studios at an increasing pace. Soon, traditional scripting will no longer be used in the game industry due to the proliferation of visual scripting tools in modern game engines. It was also revealed that Unreal Engine Blueprints are a desired skill to have for animation job applicants. Therefore, possessing the skills learned in this course would give a competitive employment advantage to UOIT graduates across the industry.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October 26, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Business and IT		
Course title: Game Analytics		
Course number: INFR 4340U	**Cross-listings:**	**__ __ Core __x_ Elective** **If Elective, for which program (s):** Game
Credit weight: 3	**Face to Face Contact hours:** __3 hr__ Lecture ___ Lab __1.5_Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO _____ Web Portion: Do you require Adobe Connect? Yes _____ NO_____	

CALENDAR DESCRIPTION

The game industry is based on analytics: from understanding how well your game is performing in the market to understanding player behaviour it is necessary to have a solid basis of statistics and game design knowledge to be successful in Business, QA, Game User Research, Production, Marketing and Design. This course will explore game analytics, how to use analytics tools to understand their games and players more effectively, and ultimately develop better games.

Prerequisites	**INFR 3350**
Co-requisites	
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

Students who have successfully completed this courses will:

- Explain why analytics is necessary
- Use analytics tools to generate reports
- Use analytics tools to understand player behaviour
- Apply quantitative and qualitative research methods in a game user research context
- Develop core systems and instruments for their games to collect analytics
- Discuss current trends in the game industry surrounding analytics
- Interpret results from analytics tools to gain insight into game designs
- Integrate results to strengthen their game designs for their Game Development Workshop game

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply)	**X face-to-face**	**X hybrid**	**online**

TEACHING AND ASSESSMENT METHODS

Homework Assignments, participation, midterm exam, Case studies, final group project report, implementation of analytics system, oral presentation

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

This is an elective course for the Game Development and Entrepreneurship major in our Bachelor of IT program. This course is also proposed as a core course for Games User Research minor.

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

3

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

Loutfouz Zaman, Pejman Mirza-Babaei, James Robb

SAMPLE TEXTBOOK

Game Analytics: Maximizing the Value of Player Data
Editors: Seif El-Nasr, Magy, Drachen, Anders, Canossa, Alessandro (Eds.)
DOI: 10.1007/978-1-4471-4769-5

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

Access to DeltaDNA platform (Academic license is free for students)

CREATOR : **__Andrew Hogue_and Pejman Mirza-Babaei_____**

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Technical understanding of game design & analytics.

Understanding of qualitative and quantitative research methods.

Understanding how to use current game analytics tools.

Understanding of statistical analysis.

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some finance journals some additional periodical subscriptions maybe necessary.

Drachen, A., and Canossa, A. Evaluating motion: Spatial user behaviour in virtual environments. International Journal of Arts and Technology 4, 3 (2011), 294--314.

Drachen, A., Sifa, R., Bauckhage, C., and Thurau, C. Guns, swords and data: Clustering of player behavior in computer games in the wild. In Proc. of the IEEE Conference on Computational Intelligence and Games (2012), 163--170.

Ben Medler , Michael John , Jeff Lane, Data cracker: developing a visual game analytic tool for analyzing online gameplay, Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, May 07-12, 2011, Vancouver, BC, Canada [doi>10.1145/1978942.1979288]

Wallner, G., and Kriglstein, S. Visualization-based analysis of gameplay data -- a review of literature. Entertainment Computing 4, 3 (2013), 143--155.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom already exists in our current building. There are no special equipment or lab facilities to support the offering of this course.

COURSE RATIONALE:

Games Analytics (GA) has become an important part of designing and developing games. As we offer Game Development as a major in our Bachelor of IT program, it is crucial for our students to learn about GA and learn to consider and implement analytics solutions in their games. This is a hands-on course that introduces students to GA approaches and visualisations to encourage more discussion regarding what students should learn and how best to utilise it.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October 24, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016

TEMPLATE 8-A

NEW COURSE TEMPLATE

For changes to existing courses see Course Change Template

Faculty: Faculty of Business and Information Technology		
Course title: Modelling & Animation Systems 2		
Course number: INFR 3345	**Cross-listings:**	**_X__ Core ___ Elective** **If Elective, for which program (s):**
Credit weight: 3.0	**Face to Face Contact hours:** __3_ Lecture __1.5___ Lab ____Tutorial Hybrid (1.5 face to face time, 1.5 Web) Yes _____ NO __X__ Web Portion: Do you require Adobe Connect? Yes _____ NO__X__	

CALENDAR DESCRIPTION

This course builds up on INFR 2345 by introducing more advanced concepts in 3D art assets using computer graphics (CG) software and the consumption of the assets in games. The concepts will include high poly modeling, mesh retopolization (for use in games), camera control and importing their complex scenes in game engines. Students will improve the art-to-engine pipeline by developing tools in the CG software and existing game engines by developing scripts and plugins. Students will also learn efficient ways of converting the shaders in the CG software for use in-game and optimize their assets when importing to game engines.

Prerequisites	INFR 2340
Co-requisites	INFR 3110
Credit restrictions	
Credit exemptions	
Grading Scheme	**X Letter Grade pass/fail**

LEARNING OUTCOMES

On the successful outcome of this course, the students will:

- be able to create **detailed and efficient (i.e. optimized) 3D assets** for use in games
- be able to **differentiate between good and bad mesh topology** and have the skills to perform the necessary fixes
- be able to improve existing art-to-engine pipelines with **custom tools and plugins**
- be able to work with existing games and game engines and **efficiently incorporate their own assets**
- be able to ***efficiently*** recreate complex shaders and lighting (created in the CG software) in existing game engines

DELIVERY MODE AND TEACHING METHOD (S):

(check all that may apply) X face-to-face hybrid online

TEACHING AND ASSESSMENT METHODS

Midterm/Final exam, Lab assignments and quizzes, oral presentation, development and evaluation of a game prototype (GDW)

CONSULTATION AND FINANCIAL IMPLICATIONS, WHERE APPROPRIATE

New Course Proposal Detail

INSTRUCTION:

PLANNED FREQUENCY OF OFFERING AND NUMBER OF SECTIONS ANTICIPATED (EVERY YEAR, ALTERNATE YEARS ETC.)

Every year, 3 Hr Lecture, (1 Section) 1.5 Hrs Lab)

NUMBER OF FACULTY MEMBERS CURRENTLY COMPETENT TO TEACH THE COURSE:

2

INSTRUCTOR (S) LIKELY TO TEACH THE COURSE IN THE COMING YEAR:

Saad Khattak, Andrew Hogue

SAMPLE TEXTBOOK

ANY RESOURCES TO BE PURCHASED/PROVIDED BY STUDENTS:

CREATOR : __Saad Khattak_____

FACULTY QUALIFICATIONS (ACADEMIC AND EXPERIENCE) TO TEACH THE COURSE:

Game development faculty, knowledge of CG software, ability to effectively create game assets and use them in existing games/game-engines

BIBLIOGRAPHY:

List of bibliography will be prepared by the instructor to stay current with the market trend. However, while the Library currently subscribes to some finance journals some additional periodical subscriptions may be necessary.

OTHER RESOURCES:

This course only requires a technology-enhanced classroom with laptop connections, data projector, and internet access. This type of classroom is already existed in our current building. There are no special equipment or lab facilities to support the offering of this course. Additional journals will need to be subscribed to by the Library.

COURSE RATIONALE:

This course provides the students with advanced knowledge and skills required to create high quality 3D assets and import them into their game/game-engine and establish an efficient art-to-engine pipeline by extending existing CG software and game engines.

FACULTY APPROVAL FOR CROSS-LISTINGS:

APPROVAL DATES:

Date of submission	October, 2016
Curriculum Committee approval	October 2016
Faculty Council approval	November 2016