DigiPen
INSTITUTE OF TECHNOLOGY
EUROPE - BILBAO

CATALOG FOR THE ACADEMIC YEAR

2011-2012

Updated: March 4, 2011

Notices

Authorization
DigiPen Institute of Technology is authorized by the Washington State Higher Education Coordinating Board (HECB) and meets the requirements and minimum educational standards established for degree-granting institutions under the Degree Authorization Act. This authorization is valid until May 15, 2012*, and authorizes DigiPen Institute of Technology to offer the following degrees:

Bachelor of Arts in Game Design
Bachelor of Fine Arts in Digital Art and Animation
Bachelor of Science in Game Design
Bachelor of Science in Computer Engineering
Bachelor of Science in Real-Time Interactive Simulation
Master of Science in Computer Science

Any person desiring information about the requirements of the Act or the applicability of these requirements to the Institute may contact the HECB by mail at P.O. Box 43430, Olympia, WA 98504-3430, or by calling (360) 753-7800.

**DigiPen Institute of Technology has been authorized since 1996 and strictly adheres to the biennial authorization renewal process.*

Accreditation
DigiPen Institute of Technology is accredited by the Accrediting Commission of Career Schools and Colleges (ACCSC). The ACCSC is listed by the U.S. Department of Education as a nationally recognized accrediting agency.

Copyright Notice

Trademarks

Important Notices
All items including, but not limited to, application forms, transcripts, reference letters, resumes, software, and any accompanying documentation or works of art (collectively "the Items"), forwarded to DigiPen by any person (the "Sender") whether at the request of DigiPen or otherwise, become the exclusive property of DigiPen unless otherwise agreed to in writing by DigiPen, and the Institute** shall be under no obligation whatsoever to return the Items to the Sender. At DigiPen's discretion, the Items may be destroyed after being reviewed.

DigiPen Institute of Technology reserves the right to make changes to the curricula and calendar without any prior notice.

The course offerings and requirements of DigiPen Institute of Technology are under continual examination and revision. This catalog is not a contract; it merely presents the offerings and requirements in effect at the time of publication and in no way guarantees that the offerings and requirements will not change. The Institute specifically reserves the right to change requirements for any major during any particular year. The individual student assumes full responsibility for compliance with all current academic requirements. Current course offerings may be obtained from the Office of the Registrar. Current major and degree requirements may also be obtained from the Office of the Registrar. For the most current information, visit DigiPen's official course catalog online at *www.digipen.edu/academics/course-catalog*.

*** Please note that "Institute" (when used in this book) means "DigiPen Institute of Technology."*

Table of Contents

RULES AND POLICIES FOR THE ACADEMIC YEAR 2011-2012 7

General Information **8**
- Name of the School 8
- Contact Information 8
- Degree Authorization 8
- History of DigiPen 8
- Awards and Recognition 9
- DigiPen Outreach 9
- Mission of Institution 9
- Notice of Non-Discrimination 10
- Program of Studies Offered 10
- About DigiPen Europe-Bilbao's Facilities 10
- Description of the Library Facilities and Internet Access 10

Important Dates 2011-2012 ..... **11**
- Institutional Calendar 11
- Deadlines 12

Tuition and Fees **13**
- Enrollment Application Fee 13
- Registration Fee 13
- Tuition Fee Payment 13
- Late Registration Fee 13
- Books 13
- Tuition 13
- Administrative Fee 13
- Technology Fee 13
- Graduation Fee 13
- Transfer and Waiver Fees 13
- Course Fees 13

Cancellation and Refund Policies 2011-12 ..... **14**
- Tuition Refund Schedule 14
- Tuition Account Reimbursement 14
- Termination Date 14
- Special Cases 15
- Application of Policy 15

Financial Assistance **15**
- Institute-Specific Scholarships 15
- Loans 15

Applying to DigiPen **16**
- Visiting DigiPen 16
- Application Process 16
- Personal Statement 16
- Mathematics Requirements for RTIS Applicants 17
- Admission/Denial to DigiPen's Programs 17
- Reapplication Process 17
- Readmission Information 18
- Transcripts of Non-DigiPen Coursework 18

Waiver Credit, AP Examinations, CLEP, and Other Credit **19**
- Course Waiver Examinations 19
- Advanced Placement Examinations 19
- International Baccalaureate (IB) 20
- College-Level Examination Program (CLEP) 20
- Transfer Credit 20

Articulation Agreements 21
Credit Evaluation Forms 21
Transferability of Credits to Other Institutions 21
Granting Credits for Work Experience 21
Standards of Progress 21
Semester Credit Hour 21
Grading System 21
Grade Reports 22
Grade Point Average 22
Satisfactory Progress 23
Passing Classes and Graduation 23
Academic Probation 23
Failing to Meet Minimum GPA Requirement 23
Failing to Complete Program within the Maximum Time Frame 24
Grade Changes and Appeals 24
Repeating Courses 24
Course Overload 24
Withdrawing from the Institute and the "W" Grade 24
Hardship Withdrawal 24
Dean's Honor List Requirements 25
Process for Grievances and Appeals 25
Transcripts 25
Attendance 25
Exams 25
Student Internships 26
Overview of Internships 26
Objectives of Internship Programs 26
Change of Major and Graduation 27
Requesting a Change of Major 27
Graduation Requirements 27
Applying for Graduation 28
Graduation Application Process 28
Student Affairs 29
Placement Assistance 29
Special Needs 29
Graduate Follow Up 29
Educational Rights and Privacy of Student Records 29
Release of Student Academic and Financial Records 30
Release of Student Directory Information 30
NO to Release of Information 30
Change from NO to YES 30
Regulation of Conduct and Disciplinary Procedures 31
Rules and Regulations 31
Penalties 32
Warnings 33
Procedures 33
Dismissal by the Institute 33
Appeals 33

DEGREE PROGRAMS FOR THE ACADEMIC YEAR 2011-2012 35

Bachelor of Science in Real-Time Interactive Simulation 37
Program Overview 37
RTIS Degree Requirements 38
General Education Courses 39
Recommended Course Sequence 39
Recommended Course Sequence Chart (RTIS) 40
Bachelor of Fine Arts in Digital Art and Animation 41
Program Overview 41
Digital Art and Animation Degree Requirements 42
General Education Courses 43
Recommended Course Sequence 43
Recommended Course Sequence Chart (BFA) 44

COURSE DESCRIPTIONS FOR THE ACADEMIC YEAR 2011-2012 45

Department of Animation and Production 47
Animation 47
Film 47
Projects 48
Department of Computer Science 49
Computer Science 49
Department of Digital Arts 51
Computer Graphics 51
Department of Fine Arts 52
Art 52
Department of Game Software Design and Production 54
Game Software Design and Production 54
Game Application Techniques 55
Department of Humanities and Social Sciences 55
Communications 55
English 55
History 56
Law 56
Philosophy 56
Psychology 57
Social Sciences 57
Department of Life Sciences 57
Biology 57
Department of Mathematics 58
Mathematics 58
Department of Physics 59
Physics 59

RULES AND POLICIES FOR THE ACADEMIC YEAR

2011-2012

General Information

Name of the School
DigiPen Institute of Technology Europe-Bilbao

Contact Information
DigiPen Institute of Technology Europe-Bilbao
Alameda Rekalde 50,
48008 Bilbao
Telephone: 94-4706400
Facsimile: 94-4706401
Email: *info.es@digipen.es*
Web: *www.digipen.es*

Degree Authorization
DigiPen Institute of Technology Europe-Bilbao has been permitted by the Basque Ministry of Education to establish its presence in the Basque Country as a foreign specialized institution.

DigiPen Europe-Bilbao offers the following degree programs for the 2011-2012 academic year:

Bachelor of Science in Real-Time Interactive Simulation
Bachelor of Fine Arts in Digital Art and Animation

History of DigiPen
DigiPen was founded in 1988 by Mr. Claude Comair as a computer simulation and animation company based in Vancouver, B.C. As DigiPen's business grew, the company struggled to find qualified animators to keep up with demand and began its own training program focused on 3D computer animation. When DigiPen's leaders saw that companies in the rapidly expanding video game industry faced a similar shortage of well-trained animators, they approached Nintendo of America with the idea of working together to establish a post-secondary program for those interested in video game programming and animation. The result was the DigiPen Applied Computer Graphics School, also based in Vancouver, B.C., which in 1994 accepted the first class of students into its two-year art and science degree program in 2D and 3D Video Game Programming. That same year, DigiPen began offering game programming and animation workshops to primary and secondary students in what would later become part of the school's ProjectFUN initiative. In 1995, DigiPen introduced a revised two-year 3D computer animation program.

Around this time, the video game industry underwent a paradigm shift from dealing primarily with 2D graphics and gameplay to fully 3D worlds that players could freely explore. As games became more complex, so did the tasks of programming, designing, and animating them. To adapt to these changes, DigiPen developed a four-year bachelor's degree program that would further prepare students for careers in the video game industry.

In 1996, the Washington State Higher Education Coordinating Board (HECB) granted DigiPen the authorization to award Associate and Bachelor of Science degrees in Real-Time Interactive Simulation. Two years later, in 1998, DigiPen Institute of Technology opened its doors in Redmond, WA. In 1999, the school began offering an associate's degree in Applied Arts in 3D Computer Animation, and on July 22, 2000, DigiPen held its first commencement ceremony, where it awarded six graduates Associate of Science degrees and five graduates Bachelor of Science degrees.

By this time, DigiPen had phased out its educational activities in Canada and consolidated its programs in Redmond. DigiPen Institute of Technology in Redmond, WA, received accreditation from the Accrediting Commission of Career Schools and Colleges of Technology in 2002. In 2004, DigiPen began offering three new degrees: Bachelor of Science in Computer Engineering, Bachelor of Fine Arts in Production Animation, and Master of Science in Computer Science*; and in the fall of 2008, DigiPen added two more: Bachelor of Science in Game Design and Bachelor of Arts in Game Design.

To help meet the global demand for video game and animation education, in 2008 DigiPen partnered with Singapore's Economic Development Board to open its first international branch campus, offering the following degrees**: Bachelor of Science in Real-Time Interactive Simulation, Bachelor of Fine Arts in Production Animation (now Bachelor of Fine Arts in Digital Art and Animation), Bachelor of Science in Game Design, and Bachelor of Arts in Game Design.

In 2009, DigiPen revised its master's program, adding a part-time option to make the program more accessible to working professionals and allowing part-time students to choose between a three- or four-year degree completion track.

In 2010, DigiPen announced plans to open its first European campus in Bilbao, Spain, in partnership with

the Bilbao Chamber of Commerce. DigiPen-Bilbao will offer two degrees**: Bachelor of Science in Real Time Interactive Simulation, and Bachelor of Fine Arts in Digital Art and Animation.

To encourage greater cooperation between students of different degree programs and allow the school to expand its enrollment, in the summer of 2010 DigiPen relocated both its Main and Art campuses to the school's current location at 9931 Willows Road Northeast in Redmond, WA. In addition to uniting DigiPen's BFA and BS programs under one roof, the 100,000 square foot building provides more spaces for students to meet, collaborate, and continue to create award-winning games.

Awards and Recognition

DigiPen students are among the most celebrated in the video game industry, earning some of the most prestigious awards that game development has to offer. Since 2001, the Independent Games Festival, part of the annual Game Developers Conference in San Francisco, California, has selected 23 DigiPen student games for its Student Showcase, the most of any college and nearly three times as many as the runner-up. DigiPen students have also won three of the four "Best Student Game" accolades the IGF has awarded since 2007. DigiPen isn't just competitive with other academic institutions, however: It is the only college whose students have been nominated for – and won – awards in the IGF's professional categories, including "Innovation in Game Design" and "Excellence in Visual Arts."

DigiPen students games have made waves outside of the IGF as well, winning awards in the other major independent game development competitions, from the Slamdance Guerilla Gamemaker Competition to the IndieCade Festival, the PAX 10, and the Indie Game Challenge.

DigiPen's students aren't the only ones earning recognition from the industry, however. In 2010, *The Princeton Review* ranked DigiPen No. 2 in its "Top 50 Undergraduate Degrees in Game Design." DigiPen has also distinguished itself as a world-class provider of simulation technology, winning the "Supplier of the Year in Technology" award from Boeing in 2008 among a field of nearly 11,000 contenders.

**ACCSC granted approval for this degree in 2006.*

***DigiPen Singapore is approved by the ACCSC as a branch campus of the Redmond main school. DigiPen Europe-Bilbao does not fall within the scope of ACCSC accreditation.*

DigiPen Outreach

In addition to its post-secondary degree programs, DigiPen offers opportunities for primary and secondary students to learn about the process of video game and 3D animation production. Now branded as part of DigiPen's ProjectFUN Initiative, DigiPen has several programs, which support art, science, and math education.

ProjectFUN Workshops

Since 1994, DigiPen has been offering highly engaging one-week and two-week workshops that give students a first taste of what is involved with programming games, producing 3D animations, and working with robotic vehicles. These workshops are taught at DigiPen's Redmond, WA, campus during the summer and are also offered across the U.S.A. as well as in Canada, Jamaica, New Zealand, and Norway.

ProjectFUN Technology Academies

In 2000, DigiPen began teaching a computer science program in the U.S.A. for junior and senior high school students who are interested in taking a serious computer science program. There are currently ProjectFUN Technology Academy sites in Washington, other states, and foreign countries. Starting Fall 2007, DigiPen began offering an online version of the Technology Academy to students in Washington State. This online program now includes students from across the nation.

ProjectFUN Online

In May 2006, DigiPen launched its newest outreach effort, taught live online by DigiPen instructors. This allows students to participate in this program year-round from the comfort of their own homes and communities. The content is similar in nature to that taught in the workshops and is another option for those unable to attend a workshop.

Mission of Institution

To provide an exemplary education and to further research in digital media, simulation, and interactive computer technologies by teaching the academic fundamentals and applied theory necessary for our students to lead, innovate, and advance these indus-

tries. Through the work of our students, faculty and staff, we strive to empower and inspire these industries on a global level.

Building on a strong foundation rooted in academics and industry experience, we challenge our students to apply their knowledge towards the creation of real-world products for the ever-advancing demands of a technological society. Embracing teamwork and creative exploration, our mission is to produce highly qualified leaders and originators who will instigate growth, productivity, innovation, and success in their professions and industries.

Notice of Non-Discrimination

DigiPen Institute of Technology Europe-Bilbao is committed to maintaining a diverse community in an atmosphere of mutual respect and appreciation of differences. DigiPen Institute of Technology Europe-Bilbao does not discriminate in its educational and employment policies on the basis of race, color, creed, religion, national/ethnic origin, sex, sexual orientation, or age.

Program of Studies Offered

Currently, the Institute offers the following degree programs:

Bachelor of Science in Real-Time Interactive Simulation
Bachelor of Fine Arts in Digital Art and Animation

About DigiPen Europe-Bilbao's Facilities

The Bilbao Chamber of Commerce has modern facilities located at Alameda Recalde 50. The building houses 34 rooms spread over five floors. They have different configurations and sizes and are equipped with audiovisual media (projectors, TV monitors, recorders and readers, cameras and CD players, Internet access, microphones and LCD projection systems).

As the student body grows larger each year, DigiPen will expand its facilities to accommodate the new numbers.

Weekly student access to the DigiPen Bilbao campus is from 9:00 A.M. to 10:00 P.M., Monday through Friday, and from 9:00 A.M. to 2:00 P.M. on Saturday. DigiPen's facilities are not open for student access on Sundays. Core office hours for the administrative staff run from 9:00 A.M. to 5:30 P.M., Monday through Friday, with additional hours as needed.

Major equipment items include microphones and LCD projection systems in many of the classrooms. The majority of the student computers currently range from Pentium 4 1.6 GHz systems with 1GB RAM to Core2 duo - 3GHz systems with 2GB RAM. All computers are on an internal network and have access to printers, servers, and archival media. DigiPen upgrades the computer equipment on a regular basis.

Description of the Library Facilities and Internet Access

Library Services

DigiPen's library aims to support the Institute's curriculum, students, and faculty. Students have access to a variety of resources and reference books relevant to their program of study. The library also subscribes to a selection of major journals and magazines related to the fields of gaming, simulation, and animation. Furthermore, the DigiPen Europe-Bilbao library allocates an annual budget for updating the contents of the library. In addition to these curriculum-related resources, the library has a collection of career-oriented materials, including books on resumes, cover letters, and interviews.

Internet Access

Internet access is a regulated service and is provided for students free of charge. Students may lose this privilege if they do not abide by the *Network and Internet Usage Policy*.

Important Dates 2011-2012

Institutional Calendar

September 1-2, 2011	Orientation - First Year Students	
September 5, 2011	Classes Begin - Fall Semester	
October 12, 2011	Nuestra Señora del Pilar*	No Classes
November 1, 2011	Todos los Santos*	No Classes
December 6, 2011	Día de la Constitución*	No Classes
December 8, 2011	La Inmaculada Concepción*	No Classes
December 12-16, 2011	Fall Semester Final Exams	
December 16, 2011	Fall Semester Ends	
December 17, 2011-Jan. 8, 2012	Winter Break	No Classes
January 2-6, 2012	Intersession	No Classes
January 9, 2012	Classes Begin - Spring Semester	
February 3, 2012	Founder's Day	
March T.B.A., 2012	Spring Break	No Classes
April 1-8, 2012	Vacaciones de Pascua*	No Classes
April 23-27, 2012	Spring Semester Final Exams	
April 27, 2012	Spring Semester Ends	
T.B.A, 2012	Commencement	
April 30-May 4, 2012	Intersession	No Classes
May 1, 2012	Labour Day*	No Classes
May 7, 2012	Classes Begin - Summer Session	
July 23-27, 2012	Summer Session Final Exams	
July 27, 2012	Summer Session Ends	

**The Institute is closed on all statutory public holidays. Exam periods and breaks may be subject to change. The laboratory facilities may be closed for a period of two consecutive days per month for maintenance. It is usually the last two working days of the month unless otherwise posted. Enrollment occurs once a year, in September.*

Deadlines

July 1, 2011	Tuition deposit due for Fall 2011 Semester
July 11, 2011	Last day to submit Request for Change of Major for Fall 2011 Semester Last day to submit Application for Readmission for Fall 2011 Semester
August 1, 2011	Tuition balance due for Fall 2011 Semester
September 5, 2011	Last day to drop Fall 2011 Semester courses for 100% refund
September 12, 2011	Last day to add classes for Fall 2011 Semester Withdrawal deadline for 90% refund
September 16, 2011	Final day to drop classes without academic penalty
October 1, 2011	Tuition deposit due for Spring 2012 Semester
October 2, 2011	Withdrawal deadline for 75% refund
October 28, 2011	Final day to receive a "W" on transcript for Fall 2011 Semester withdrawals, 50% refund Withdrawals from the Institute after this date will receive "F" grades on transcript Final day to drop a class
November 28, 2011	Last day to submit Request for Change of Major for Spring 2012 Semester Last day to submit Application for Readmission for Spring 2012 Semester
December 1, 2011	Tuition balance due for Spring 2012 Semester
January 8, 2012	Last day to drop Spring 2012 Semester courses for 100% refund
January 15, 2012	Last day to add classes for Spring 2012 Semester Withdrawal deadline for 90% refund
January 20, 2012	Final day to drop classes without academic penalty
February 4, 2012	Withdrawal deadline for 75% refund
February 29, 2012	Final day to receive a "W" on transcript for Spring 2012 Semester withdrawals, 50% refund Withdrawals from the Institute after this date will receive "F" grades on transcript Final day to drop a class
April 1, 2012	Tuition balance due for Summer 2012 Session
April 9, 2012	Last day to submit Request for Change of Major for Summer 2012 Session Last day to submit Application for Readmission for Summer 2012 Session
July 1, 2012	Tuition deposit due for Fall 2012 Semester
July 9, 2012	Last day to submit Request for Change of Major for Fall 2012 Semester Last day to submit Application for Readmission for Fall 2012 Session
August 1, 2012	Tuition balance due for Fall 2012 Semester

Tuition and Fees

All tuition and fees are in euros.

Enrollment Application Fee

A 200€ application fee must accompany the application form. The application fee is refundable if the applicant is not accepted to the Institute or if the applicant requests a refund within three days after submitting the application fee and cancels his or her application. If the applicant is accepted and enrolls, the 200€ fee will be applied toward the first semester's tuition payment.

Registration Fee

Upon acceptance into a degree program, a 150€ registration fee must be paid to confirm enrollment. If a student cancels his or her enrollment, he or she may request a refund of the registration fee within three days after signing the enrollment agreement and making an initial payment.

Tuition Fee Payment

Please see the payment schedule in the Student Enrollment Agreement for dates and amounts due. The payment of tuition and all associated fees is the sole responsibility and obligation of the registering student. Tuition increases will be announced six months before taking effect.

Late Registration Fee

Students are responsible for registering for courses and re-registering for courses that need to be retaken each semester by the posted date. All late class registrations will cost an additional 100€ to cover administrative fees.

Books

Text and reference books are estimated to be approximately 900€ per year. This cost is not included as a part of the tuition.

Tuition

The flat-rate structure at DigiPen Europe-Bilbao is based on a semester basis. The tuition costs below are for full-time students (those students taking a minimum of 16 credits or more during each of the fall and spring semesters). In order for a student to complete the degree program in the typical four years, he or she must take an average of 16-20 credits per semester.

No. of Credits	EU	Non-EU
16 or more credits	13.500€* per year	18.000€* per year

**Tuition is subject to change with six months notice. Students re-registering for a course that needs to be retaken must pay the regular course fees and are responsible for re-registering in the course. Students auditing a course must pay the regular course fees.*

Administrative Fee

This fee covers a limited number of transcript requests, add/drop requests, enrollment verifications, and re-registrations. This fee is 50€ per semester for all students.

Technology Fee

This fee covers supplies and maintenance costs for the students' use of equipment and upkeep of the computer labs. This fee is 50€ per semester for all students.

Graduation Fee

This 75€ fee covers the cost of processing the graduation application. This fee must accompany the graduation application.

Transfer and Waiver Fees

Course transfers and waivers are processed at 25€ per credit.

Course Fees

Some courses may require lab or material fees. Please refer to course descriptions on course registration forms.

Cancellation and Refund Policies 2011-12

Tuition Refund Schedule

Cancellation Policies

a. Applicants who have not visited the school prior to enrollment will have the opportunity to withdraw without penalty within three business days following either the regularly scheduled orientation procedures or a tour of the school facilities and inspection of equipment where training and services are provided.

b. All monies paid by an applicant who withdraws will be refunded, if requested, within three days after signing an enrollment agreement and making an initial payment. An applicant requesting cancellation more than three days after signing an enrollment agreement and making an initial payment, but prior to entering the school, is entitled to a refund of all monies paid minus a registration fee of 15% of the contract price of the program. In no event will the school retain more than 150€.

A student who submits an official withdrawal in writing or who is determined by the Administration to have withdrawn from the Institute:

- Before the beginning of classes: Student will be entitled to a tuition refund of all money paid towards tuition for the upcoming semester.
- Before the close of the seventh calendar day after the beginning of classes: Student must pay 10% of the semester's tuition. Any portion of tuition paid over this amount will be refunded.
- Before the close of the 27th calendar day of the semester: Student must pay 25% of the semester's tuition. Any portion of tuition paid over this amount will be refunded.
- Before the close of the 52nd calendar day of the semester: Student must pay 50% of the semester's tuition. Any portion of tuition paid over this amount will be refunded.
- After the 52nd calendar day of the semester: Student must pay 100% of the semester's tuition.

Except for the registration fee, all other assessed fees are refunded on the same schedule as tuition payments.

Tuition Account Reimbursement

Active Student Accounts

If a student has an excess balance of funds in a tuition account, he or she may request at any time that the excess funds be returned to him or her by filling out a Reimbursement Request Form, which can be downloaded from the Student Records System. A reimbursement check will be issued to the student within two to four weeks after receipt of the completed form. If a reimbursement is not requested, any excess funds in a student's account are automatically applied towards future charges.

Inactive Student Accounts

Any earned tuition credit balance remaining in a tuition account that becomes inactive (through graduation, withdrawal, or other means) is returned by mail to the student in the form of a check within 60 days of the account's change of status. If a student wishes to have the funds returned directly to a lender, he or she must complete the appropriate form at the time of withdrawal or graduation from the Institute.

Termination Date

The termination date for refund purposes for institutional withdrawal is the last date of actual attendance at the Institute by the student. The termination date for refund purposes for withdrawal from individual classes is the date of receipt of the appropriate withdrawal form. Notice of cancellation or withdrawal should be given by completing the appropriate withdrawal form, whether it is withdrawal from the Institute or from specific classes for which the student is registered.If the student's account remains delinquent for over 30 days, the Institute reserves the right to cancel the student's registration.

Special Cases

In the documented event of prolonged illness or accident, death in the family, or other special circumstances that make it impractical to complete the program in which the student is enrolled, the Institute shall make a settlement that is reasonable and fair to both parties. These will be determined on a case-by-case basis.

Application of Policy

Any monies due to the student shall be refunded within 60 days from the last date of the student's attendance or within 60 days from the date of receipt of payment, in the event that the date of such receipt is after the student's last date of attendance.If a student's financial obligation is not fulfilled, the Institute is authorized to do the following until the owed monies are paid:

- Withhold the release of the student's academic records or any information based upon the records.
- Withhold the issuance of the student's transcripts.

Financial Assistance

Institute-Specific Scholarships

DigiPen Institute of Technology Europe-Bilbao offers a limited number of need- and merit-based scholarships.

For more information, please visit *www.digipen.es*

Loans

DigiPen Institute of Technology Europe-Bilbao has arranged agreements with a select number of local banks for students to acquire student loans. Interested students should contact the banks directly for details, but may find a list of available options by contacting the Administration Office or by visiting the website (*www.digipen.es*).

Applying to DigiPen

Visiting DigiPen

DigiPen offers regular information sessions for the general public. Anyone interested in finding out more about DigiPen Institute of Technology Europe-Bilbao and its programs is welcome to attend. For information on dates and times for these information sessions, please visit our website at *www.digipen.es* or email *admissions.es@digipen.es*.

Visitors interested in learning about DigiPen's admission requirements, application process, and degree programs are encouraged to schedule a one-on-one meeting and school tour with an admissions representative. To schedule an appointment, please contact the Office of Admissions at *admissions.es@digipen.es* at least one week before your intended visit.

Application Process

DigiPen Institute of Technology works on a rolling admissions basis and only enrolls new students for the fall semester that begins each September. DigiPen will evaluate applications as they are completed and submitted.

Applicants normally receive a decision within two to four weeks after their application has been completed. DigiPen encourages new applicants to apply during the first quarter of each calendar year, but the Institute will continue to accept qualified applicants after that date until all programs have reached their maximum enrollment.

Applicants should submit all application materials within four weeks of their initial application submission. Applicants who need additional time should request an extension, after submitting their initial application, by contacting the Office of Admissions at*admissions.es@digipen.es*.

Except where noted, all applicants must submit the following for consideration:

1. DigiPen Institute of Technology Europe-Bilbao Application for Admission. All applications will be given equal consideration; however, submitting applications online is the preferred method.

2. A 200€ application fee. This fee will be deducted from tuition for applicants who are accepted and decide to enroll.

3. Certified true copies of transcripts from all high schools or secondary/post-secondary institutions attended. Applicants must have completed at least a high school diploma or recognized equivalency certificate. These must be accompanied by English translation if the originals are in any other language besides English or Spanish.

4. Personal statement. Please see the Personal Statement section below for the requirements and recommendations about completing this important component of the application.

5. Letters of recommendation (optional). Two letters of recommendation from individuals familiar with your academic background and/or work ethic, e.g., an instructor, guidance counselor, or employer. Recommendation letters from family members will not be considered. Each letter MUST be sealed, signed, and dated by the author, and each must contain a contact phone number. Please download the recommendation letter templates online at *https://management.digipen.edu/es-srs-app/* or contact the Office of Admissions at 94 470 6400 for copies to be mailed to you.

6. Official scores for the Selectividad. Applicants from outside of Spain may submit scores for the SAT I and should contact the Office of Admissions.

7. Proof of Proficiency in the English Language if English is not the Applicant's first language. See below for further details.

8. Other official documentation (when applicable). This includes, but is not limited to, SAT scores, certified transcripts from all institutions of tertiary education (e.g., university transcripts), and other information as requested by the Office of Admissions.

9. Art portfolio. This is only required of applicants to the Digital Art and Animation (BFA) degree program. Please see the Portfolio section below for complete details about this important component of the application.

Personal Statement

Your personal statement is an important part of your application for admission to DigiPen Institute of Technology. What you write will help us find out informa-

tion about you that is not apparent from your application or transcripts. *Topics*Please address the following four topics in your personal statement:

1. Discuss your reasons for applying to DigiPen and explain how these reasons relate to your future goals (personal, education, and professional).

2. Teachers can inspire us to do great things. Tell us about a great teacher and what you learned through his or her example or inspiration. You may discuss a schoolteacher, coach, mentor, or someone who taught you something without even realizing it.

3. Critique a piece of work. In less than 500 words, fully describe a game or a piece of artwork (painting, drawing, sculpture, film, etc.) that you disliked. Explain in detail why you disliked it and what you would have done to improve it. Focus on a few key areas, and be specific about your improvements.

4. Optional essay. Use this optional essay to explain any unusual circumstances or situations that you think may have an impact on your application.

Guidelines for the Personal Statement
Please consider the following:

- Spelling, grammar, and content will be considered, so proofread your personal statement carefully.

- Except where noted, each question should be answered in no less than 150 words and in no more than 300 words.

- Applicants may answer each question individually or all together in full essay form.

Submission
Applicants may choose to type the answers to the personal statement directly into the online application (in which case, there is an electronic signature and date stamp) or to mail a hardcopy to DigiPen's Office of Admissions where it will be added to the applicant's file. Those who opt for online submission of the personal statement should be sure to have their answers drafted and prepared before beginning the online application.
*Formatting for Hardcopy Submission*Please adhere to the following requirements if submitting the personal statement in hardcopy format:

- Applicant's name and program to which s/he is applying should be printed at the top of each page.

- Each page should be typed and double-spaced.

- The completed personal statement should be signed and dated on the last page.

Mathematics Requirements for RTIS Applicants

In addition to meeting the regular admissions requirements, all applicants to DigiPen Europe-Bilbao's BS in Real-Time Interactive Simulation (RTIS) program must have completed Bachillerato with 7 average in mathematics, including a minimum of Algebra, Geometry, and (when possible) Calculus. Relevant courses in Physics, Chemistry, and Computer Science will also be considered in the evaluation process.

Admission/Denial to DigiPen's Programs

DigiPen considers every part of an applicant's materials and qualifications when evaluating him or her for admission. Meeting the minimum standards is not a guarantee for admission. Applicants who exceed the minimum standards are more likely to be admitted. Accepted applicants will receive an enrollment packet via standard mail. This packet will include a student enrollment agreement and, if applicable, a request to furnish proof of high school graduation before the start of classes in the fall. By returning the signed enrollment agreement, proof of graduation, and the enrollment fee, an applicant has confirmed enrollment. Applicants who are accepted and enroll are required to attend an official orientation session prior to the start of the program. Applicants who are not accepted to the Institute will receive a letter of denial by mail. If an applicant is denied admission to a degree program, the application fee will be refunded. When possible, DigiPen will attempt to provide information about the specific areas in which an applicant needs improvement if he or she wishes to reapply in subsequent years. Please see the section on re-applying for more information.

Reapplication Process

Applicants who are denied admission are encouraged to re-apply for a future year. By improving the areas suggested on the original decision letters (i.e. improving grades by taking community college courses, devoting more time and energy to a new art portfolio, etc.), many of those individuals re-applying for admission are accepted.

To re-apply, applicants should submit a new application form and indicate that they have applied previously for admission. The Office of Admissions retains all materials submitted by applicants for a period of five years. Therefore, items such as transcripts, letters of recommendations (optional for applicants to DigiPen's undergraduate degree programs), and test scores can be transferred from an applicant's original file to the new application file.

Students who are re-applying need to supply the following materials only:

- New application form. Please submit online.
- 50€ application fee.
- Any new or updated documents, such as new transcripts, new test scores, etc.
- A short essay describing the progress and improvements that the applicant has made in the areas recommended in the original decision letter.
- After submitting their new application, readmission applicants are encouraged to contact the Office of Admissions by email at *admissions.es@digipen.es* to confirm whether any additional materials are needed for the completion of their application.

Readmission Information

Any student who wishes to return to DigiPen after an absence may apply to do so by completing a Readmission Application and submitting a non-refundable application fee, certified true copies of transcripts from all institutions attended since last attending DigiPen, and other official documentation for specific circumstances as requested below:

Medical Withdrawals
A physician's statement must be included, and it must indicate that you are ready to resume your studies. Additionally, it should describe any special needs you may require upon your return to the Institute.

Readmission after Academic Dismissal
A statement explaining what you have been doing since you last attended the Institute, why you would like to return, and how you plan to be successful by returning should be submitted as part of your application for readmission.

Readmission after Disciplinary Action
Please include a formal appeal for the Disciplinary Committee to review along with your application for readmission. You must receive clearance from the Disciplinary Committee to return.

Readmission for Personal Reasons
There are usually no impediments to returning to the Institute if there is space available; however, an academic plan may need to be developed with your advisor upon re-enrollment, and students requesting readmission after an extended period of time must meet with an academic advisor to determine the viability of completing their degree program.

Readmission after Non-Payment of Account
You must settle your account before applying for readmission. Once you have settled your account, then the readmission policy follows the same guidelines as being readmitted for personal reasons.

Exceptions to these requirements will only be made on a case-by-case basis at the discretion of the DigiPen Administration.

Transcripts of Non-DigiPen Coursework

If you have taken courses at another college after leaving DigiPen, you must have an official transcript forwarded to the Office of Admissions from the Registrar of each institution attended. The transcripts should show all academic work until the last semester you completed. If you are approved for readmission with coursework in progress, your admission status will be provisional pending receipt of your final transcript.

Waiver Credit, AP Examinations, CLEP, and Other Credit

Students may apply for course waivers if they can demonstrate that their knowledge and skills - whether they were gained by formal education, exam, work experience, or life experience - are equivalent to those gained by courses offered at DigiPen Institute of Technology Europe-Bilbao. Credit may be granted through other means: Advanced Placement (AP) Exam scores, International Baccalaureate courses, College-Level Examination Program (CLEP) subject exam scores, or transfer credits from other post-secondary institutions. A maximum of nine credits per semester may be earned by these means. For undergraduate programs, no less than 75% of a student's total program must be taken at DigiPen. Course transfers and waivers are processed at 25€ per credit.

Course Waiver Examinations

Students may meet an academic requirement, within specified limits, by passing a waiver examination at least equal in scope and difficulty to a final examination in a course. Successful completion of the examination waives the curricular requirement for a specific course but does not result in credit earned. Waiver credits will not reduce the total number of semester hours required for a degree; however, they will increase the available number of elective hours for a degree. Waiver examinations must be taken prior to the final semester of residence at DigiPen Europe-Bilbao, and they may not be repeated.

Students have the opportunity to waive designated core courses by demonstrating mastery of the material in two steps:

1. A waiver petition to the respective department, indicating prior academic coursework and relevant work experience in the subject area; and

2. Performance on a *placement exam* offered by the respective department at the beginning of each term.

To petition waiving a core course, the student must complete a waiver request for each course, submit a transcript or photocopy of transcript with relevant coursework highlighted, and submit the requests to the Office of the Registrar. Waiver requests may be completed online through the SRS system. Once submitted, approval of waiver requests are decided by the department appropriate to the courses. For waiver requests received by July 1, students will receive notification by August 1. Waiver requests arriving in the Office of the Registrar after July 1 will be handled on a rolling basis, as faculty schedules allow. Results of waiver requests received after the deadline are not guaranteed to be available before the start of classes.

It is not possible to predict the results of faculty review of core course waiver requests. Core courses generally include intermediate-level material, so a student who has completed only introductory work in a subject is not likely to be granted a waiver. Faculty take many factors into consideration, including the academic caliber of the school where the course was taken, the difficulty of the text, the grade received, and the time elapsed since completion of the course.

The following restrictions apply to all waiver examinations:

1. A student must have an approved waiver request on file before credit by examination can be recorded on the permanent record.

2. A student must be currently enrolled before a waiver examination can be recorded on the permanent record.

3. A maximum of 15 semester hours may be waived toward a bachelor degree.

4. Examinations may not be repeated.

5. Repeat course work and "F" grades are not open to waiver requests.

6. Students may not take waiver examinations on courses they have audited.

Advanced Placement Examinations

Course waivers or credit may be granted for satisfactory achievement on Advanced Placement Exams of the College Entrance Examination Board taken within the last ten years. An exam score of four or above earns from three to six course waiver credit hours. No grades will be assigned to the courses, nor will they be figured into a student's grade point average. Courses waived or transferred are entered on students' transcripts, but no grades or quality points are awarded. Official results must be sent to the Registrar before course waivers or transfers are granted.A maximum of two courses may be waived or transferred through AP examinations,

and these may be applied to satisfy DigiPen's degree requirements. The examinations and the courses for which waiver hours or credit are granted are listed below. Waivers/credit granted for a specific course count toward the satisfaction of any requirement toward which the listed course counts.

AP Exam	Minimum Score	DigiPen Course
Art - History of Art	4	ART 210
English - Literature and Composition	4	ENG 110
English - Language and Composition	4	ENG 110
History - World History	4	HIS 100
Japanese	4	JPN 101
Mathematics - Calculus AB	4	MAT 150
Mathematics - Calculus BC	4	MAT 150
Physics B - Physics (Introduction)	4	PHY 115
Physics C - Physics (Mechanical)	4	PHY 200
Psychology	4	PSY 101

International Baccalaureate (IB)

In general, three semester credit hours are waived for each Higher Level subject in which a score of five or greater was earned in the last ten years.The IB courses and scores listed below are eligible for waiver hours at DigiPen.

Course & Level	Score
English (A1 & A2) - HL	5, 6, 7

College-Level Examination Program (CLEP)

There are two types of CLEP examinations: General and Subject. DigiPen Europe-Bilbao grants credit or course waivers for Subject Examinations only, and credit will be given only in those areas in which comparable courses are offered at the Institute. Courses waived or transferred are entered on students' transcripts, but no grades or quality points are awarded. These exams may not be repeated. Examination must be taken prior to the student's completion of a total of 40 hours of college credit, and official results must be sent to the Office of the Registrar.

CLEP offers a number of subject-matter examinations. Students obtaining the percentiles established by the mathematics, computer science, and humanities and social sciences departments will receive credit toward those basic requirements. Students wishing credit in courses other than those listed above should consult the appropriate departmental chair. DigiPen Europe-Bilbao will grant credit to students who pass the CLEP Subject Examinations approved by the department appropriate to the examination. The score necessary to receive credit through a Subject Examination will be the mean score achieved by C students in the national norms sample. The appropriate department will determine the number of course credits to be given for passing a Subject Examination.

Students should check with the College Board at *www.collegeboard.org* for further details and information concerning test centers and dates.

Transfer Credit

Credit earned by examination at other colleges or universities in the last ten years may be transferred, provided such credit meets the guidelines used by DigiPen Institute of Technology Europe-Bilbao. The Registrar will evaluate college credits earned elsewhere with respect to graduation requirements at DigiPen Europe-Bilbao. Developmental classes, orientation classes, or classes in which a student receives a "Pass" are not eligible for transfer credit consideration. Courses transferred or waived are entered on transcripts, but no grades or quality points are awarded. Transfer credit may be accepted subject to the following conditions and restrictions:

1. The course(s) offered for transfer must be taken at an accredited institution, and these courses must appear on official transcripts from the institution.

2. The course(s) must be comparable in academic quality to DigiPen courses; transfer credit will be denied for courses not meeting this standard. Accordingly, current students are strongly urged to seek transfer approval from their advisor and the Registrar using the form provided for this purpose prior to enrollment in any course for which transfer approval might be sought.

3. Transfer credit will be considered for courses in which the grade of "B-" or better is recorded.

4. Courses transferred to a student's major may also require a validation examination in order to be accepted.

5. "Credit" or "Pass" grades will not be accepted for transfer.

If a course is accepted for credit, it will be counted as a transfer credit. No grade points from such transfer courses will be calculated in the DigiPen Europe-Bilbao grade point average. However, grades transferred for courses taken in residence at institutions with which DigiPen has direct, formal institutional exchange agreements are exempt from this policy and will be recorded. Courses transferred in may not be used to substitute improved grades for passing grades earned at DigiPen Europe-Bilbao.

Articulation Agreements

Credits from a college with an articulation agreement with DigiPen Institute of Technology Europe-Bilbao will be accepted, and grades earned will be included in students' DigiPen transcripts. Please contact the Registrar for a list of colleges with articulation agreements.

Credit Evaluation Forms

Application forms for challenge and waiver examinations may be obtained from the Registrar or online. A student must have approval for an exam prior to taking it.

Transferability of Credits to Other Institutions

A student wishing to transfer DigiPen Europe-Bilbao credits to another institution may request the Institute to furnish transcripts and other documents necessary to a receiving institution. The Institute advises all prospective students that the courses and credits reflected on their transcript may or may not be accepted by a receiving institution. Students should inquire with the specific receiving institution about the transferability of DigiPen credits.

Granting Credits for Work Experience

DigiPen Europe-Bilbao does not grant credit for work experience.

Standards of Progress

Semester Credit Hour

The semester credit hour is the basic unit of credit awarded at the Institute. The academic value of each course is stated in semester hour credits. As a rule, one semester credit hour of academic credit is given for at least 15 hours of classroom contact, at least 30 hours of supervised laboratory time, at least 30 hours of documented independent study activities, or at least 45 hours of internship or work-related experience. In addition, undergraduate students typically will be expected to spend two hours in preparation outside of class for each hour of lecture. Additional outside work may be required for laboratory or studio classes. During the summer session, the student earns semester credit hours for class contact hours that are equivalent to those provided in the fall and spring semesters. Whenever "semester hour" is used in this Catalog, it is synonymous with "semester credit hour" (SCH). A classroom contact hour is 53 minutes in length.

Grading System

The following system applies to undergraduate students; for information on the grading system for graduate programs, please refer to the Master of Science in Computer Science program section.

The following grading system is in use and, except where otherwise specified, applies to both examinations and term work. The weight of a final examination grade is a matter individually determined by each instructor. See the following Grade Point Average section for additional information.

A Excellent = 4.0 quality points
A- Excellent = 3.7 quality points
B+ Good = 3.3 quality points
B Good = 3.0 quality points
B- Good = 2.7 quality points
C+ Fair = 2.3 quality points
C Fair = 2.0 quality points
C- Fair = 1.7 quality points
D Poor = 1.0 quality points; lowest passing grade; failing grade for major
F Failure = 0 quality points

The following grades do not affect the GPA:

AU - Audit
Indicates that the student attended the course without expectation of credit or grade.

IP - In Progress
Indicates that the grade was not available from the instructor at the time the transcript was printed.

I - Incomplete
This grade is used when circumstances beyond a student's control prohibit the student from taking the final exam or completing course work. It is not a grade given to students who need to retake a course because the student has fallen substantially behind. Students will not be given an "I" grade for unacceptable reasons, including, but not limited to, the need to rewrite a paper, the demands of a time-consuming job, the desire to leave town for a vacation or family gathering, the desire to do well on tests in other courses, etc. Students who want to repeat a course can drop it prior to the end of the eighth week of classes, and they will receive a "W" (see "Withdrawal" below). Otherwise, the instructor will assign the appropriate final grade ("D" or "F," for example).

Arrangements for the "I" grade and its completion must be initiated by the student and agreed to by the instructor. An Assignment of Final Grade for Completion of an Incomplete (I) Form must be completed each time a grade of "I" is assigned. On the form, the instructor will specify to both the student and the department the work remaining to be done, the procedures for its completion, the grade in the course to date, and the weight to be assigned to work remaining to be done when the final grade is computed.

If make-up work requires classroom or laboratory attendance in a subsequent term, the students should not register for the course again; instead, the student must audit the course and pay audit fees. If the make-up work does not require classroom or laboratory attendance, the instructor and student should decide on an appropriate plan and a deadline for completing the course. When the student completes the course, the instructor will submit a change of grade to the Registrar's Office. Should the work not be completed within the agreed upon time frame, the Institute will assign a grade of "F."

These procedures cannot be used to repeat a course for a different grade. An "I" grade will not be assigned to a student who never attended class; instead, instructors may assign a failing grade.

W - Withdrawal
Indicates withdrawal from the course before the end of the eighth week of classes or withdrawal from the Institute. The grade of "W" will not be assigned to any student who has taken the final examination in the course. An instructor may not withdraw a student from a course.

P - Pass
Given for internship, seminar, and thesis courses.

Grade Reports

Reports of the final grade in each course will be made available online to students soon after the close of each semester. However, grade reports may be withheld from students who have delinquent accounts with the Administration Office, Security, or Library.

Grade Point Average

The academic standing of each student is determined on the basis of the grade point average (GPA) earned each semester. The GPA is determined by using the quality points assigned to each course grade a student earns. The quality point value for each grade earned during a semester is multiplied by the number of credit hours assigned to that course as listed elsewhere in this catalog. The sum of these points is the total number of quality points earned during the semester. This sum is divided by the number of credit hours attempted (hours from courses with grades of "A" through "F") to obtain the GPA.

The cumulative GPA consists of all courses completed at DigiPen. If multiple attempts were made for the same course, only the grades earned in the two most recently completed attempts are calculated in the cumulative GPA. Course grades of "AU," "I," "W," "S," "U," and "P" are non-punitive grades, so they are not calculated in the overall GPA since they carry no quality points.

The following example will help you calculate your grade point average:

Course	Credits	Grade	Points
CS 100	3	A	12.0 (3 x 4.0)
CS 100L	1	A	4.0 (1 x 4.0)
MAT 100	4	A-	14.8 (4 x 3.7)
CS 105	3	B	9.0 (3 x 3.0)
ENG 110	3	D	3.0 (3 x 1.0)
CS 120	3	B+	9.9 (3 x 3.3)
CS 120L	1	A-	3.7 (1 x 3.7)
Totals	18		56.4

Total grade points divided by total credits equals the cumulative grade point average. Therefore, the grade point average for the above example is 56.4 divided by 18 for a 3.13 GPA.

Satisfactory Progress

Satisfactory progress toward a degree by a full-time student is defined as a full attempt of 24 credits during an academic year. This should include registration for at least 12 credits per semester and successful completion of at least 12 credits per semester. "Full attempt" is defined as the receipt of a final letter grade ("A" to "F") but not the receipt of a "W" or an "I." Successful completion is defined as the receipt of a passing letter grade ("A" to "C-" in a degree's core courses, and "A" to "D" in non-major courses). Core courses and non-major courses are denoted under each individual degree program's recommended sequence of required classes chart. The Registrar makes decisions on student status.A program of study must be completed within a reasonable period of time for a student to be eligible for graduation; that is, the credit hours attempted cannot exceed 1.5 times the credit hours or more than 1.5 times the recommended time required to complete the program. The Registrar will withdraw from the Institute full-time students who do not complete their studies during this time frame.

Undergraduate Students

To maintain satisfactory progress, undergraduate students must attain a minimum cumulative grade point average at various milestones in their program of study.

Milestone	Minimum GPA Requirement
Up to 50% of program - 76 attempted credits for BS in RTIS - 72 attempted credits for BFA*	1.8 or better cumulative GPA
Over 50% of program - 77-153 attempted credits for BS in RTIS - 73-143 attempted credits for BFA*	2.0 or better cumulative GPA
100% of program - 154 attempted credits for BS in RTIS - 144 attempted credits for BFA*	2.0 or better cumulative GPA

** An attempted credit is defined as any credit that is awarded a final letter grade ("A" to "F"). Credits earning a "W" or "I" are not considered attempted credits.*

Appeals involving extenuating circumstances may be addressed to the Chair of the Student Appeals and Discipline Committee for action and resolution.

Passing Classes and Graduation

All students must have a cumulative GPA of at least 2.0 to graduate.

Academic Probation

Students who fail to maintain the required minimum cumulative GPA or who fail to complete their academic program within the maximum attempted credits allowed will be placed on Academic Probation.

Failing to Meet Minimum GPA Requirement

Students who fail to maintain the required minimum cumulative GPA will be placed on Academic Probation the semester following the one where their cumulative GPA falls below the minimum required. Students are removed from Academic Probation as soon as their cumulative GPA is above the minimum required grade point average. Students who earn a 2.0 during their probationary semester but do not raise their cumulative GPA above the minimum requirement will continue Academic Probation until their cumulative average meets the minimum requirement. While on Academic Probation, students will be restricted to a maximum course load of 15 credits of which 50% must be core courses as defined in the course catalog. Probationary

students must achieve a GPA of 2.0 or higher during their probationary semester. Failure to satisfy these requirements will result in academic expulsion, and expelled students must wait 12 months before they can reapply for admission. Students with a cumulative GPA of 0.5 or lower are not eligible for Academic Probation and become academically ineligible to continue. They will not be allowed to re-register for a period of one academic year. Any student in this circumstance may reapply for admission after they have served one year on suspension.

Failing to Complete Program within the Maximum Time Frame

Students who fail to complete their degree program within the maximum time frame, as defined under the satisfactory progress policy, will be placed on Academic Probation to direct them towards completion. Working with their academic advisor, these students will develop a program completion plan that outlines the quickest path to completion. These students will be held to the same conditions of probation as outlined above, with the exception that the maximum credit load per semester is waived.

Grade Changes and Appeals

Only the faculty member who administered the grade may make grade changes. In cases where the faculty is not available to consider a grade change, the department chair, in consultation with the Dean of Faculty, may make such a change.

Grade appeals must be made within 14 days of final grades being issued. Using the Grade Appeal Form, appeals are made in writing to the course instructor or the department chair if the instructor is unavailable. Students may appeal to the department chair and then the Dean if a satisfactory resolution is not achieved.

Repeating Courses

Students may repeat any course in which they did not receive a passing grade (below a "C-" in a core course, below a "D" in a non-core course), as long as they are in good standing with the Institute and eligible to continue their studies. All grades and attempted classes remain on a student's transcript. However, only the grades earned in the two most recent attempts of a course are calculated in a student's GPA. Courses in which a student has earned a passing grade may be repeated as audit courses only.

Course Overload

During a given semester, sophomores, juniors, and seniors may be enrolled in a maximum of 21 credits. Freshmen should check their majors for specific semester maximums. Students seeking special permission to take more than the maximum credits in a given semester should use the Override Form and get approval from their academic advisor.

Withdrawing from the Institute and the "W" Grade

To formally withdraw from the Institute, a student must submit a completed Withdrawal Notice Form to the Office of the Registrar. Withdrawal Notice Forms may be downloaded from the Student Records System. Students below the legal age must have a parent or guardian submit the withdrawal notice.

A student may withdraw from the Institute before the end of the eighth week of instruction of a semester. Please note:

- If a student withdraws before the end of the second week of instruction, no course entries will appear on the student's transcript for that semester.
- If a student withdraws after the end of the second week of instruction and before the end of the eighth week of instruction, the Registrar will assign a final grade of "W" for each course in which the student was enrolled.

At the end of the eighth week of instruction of the semester, withdrawn students will receive final grades for each course in which they were enrolled.

Hardship Withdrawal

Students may seek a hardship withdrawal when one of three conditions prevents a student from completing all courses: death of a close family member, catastrophic illness in the family, or injury or illness that incapacitates the student. Hardship withdrawals may be sought any time after the last date to withdraw from classes, as listed in the Academic Calendar, but not after all materials for a course have been completed (i.e., after submitting the final exam or final assignment).

The Hardship Withdrawal Form, a personal statement, and appropriate documentation (i.e., death certificate, obituary, letter from a state-licensed physician or mental health professional) must be provided to support all requests to Student Affairs. Once all documents are

received, Student Affairs will forward the documents to the Hardship Withdrawal Review Committee.

If the committee grants a hardship withdrawal, the student will receive "W" grades in all classes and is ineligible to receive a grade or an incomplete in any class in that semester. The student will be withdrawn from DigiPen Europe-Bilbao, effective his or her last day of attendance. Regular refund and all Financial Aid policies apply. Students seeking readmission must abide by DigiPen's readmission policy.

Dean's Honor List Requirements

Prepared at the end of each fall and spring semester, the Dean's Honor List officially recognizes and commends students whose semester grades indicate distinguished academic accomplishment. Both the quality and quantity of work done are considered.

You must meet the following qualifications to be a recipient of this honor:

- You must be matriculated.
- You must be registered full-time in credit-bearing courses.
- Full-time students must complete 12 or more credits in one semester.
- Only passing grades ("A," "B," "C," and "D") in credit-bearing courses are counted for eligibility.
- No failing grades: a grade of "F" in any course makes the student ineligible, regardless of other grades.
- Minimum GPA of 3.5 is required.
- Any courses that do not count towards the degree are excluded.
- AP, Internship, and Independent Study credits are excluded.
- Pass/Fail credits are NOT to be counted when calculating qualifying credits.
- Incomplete grades will be evaluated after they are made up. The student must have qualified for the Dean's Honor List before and after the Incomplete grade was made up.
- The student's cumulative grade-point average is not considered; only the grade-point average for that particular semester is relevant.

Process for Grievances and Appeals

Concerns over Academic Standing

Students who would like to file an appeal against a decision regarding their academic standing in a particular course should discuss the matter with their instructor. If a satisfactory resolution is unattainable, students may file an appeal with the head of the department for that course. If the resultant solution is still unsatisfactory, then students may file an appeal with the Dean of Faculty. Students may appeal grades and review exams no later than two weeks after transcripts are issued. The Administration reserves the right to destroy any examination papers after the two-week appeal period. However, academic records will be kept indefinitely.

Transcripts

If a student's financial obligation is not fulfilled, the Institute is authorized to do the following until the owed monies are paid: withhold the release of the student's academic records or any information based upon the records, and withhold the issue of the student's transcripts. Should you have any questions, please contact the Administration office.

To request an official transcript, students should complete a transcript request form (available online or from the front office) and either mail or fax it to the Administration office. Requests are usually processed within three business days. Unofficial grade reports can be viewed or printed anytime using the Student Records System (SRS) online.

Attendance

Students more than 15 minutes late to class will be marked as absent for that entire class. Students may not leave class early without instructor permission. Students absent from all classes without explanation for a period of two consecutive weeks or more are considered to have withdrawn from the Institute as of their last date of attendance. To withdraw from individual classes, a student must complete the appropriate withdrawal form, either in person or online.

Exams

All students are required to be in attendance at the times scheduled by the Institute for final exams. Instructors are not required to make arrangements for

individuals to take final exams at a different time than the rest of the class. Should a student miss an exam, it is the student's responsibility to notify the instructor within 24 hours of the missed exam. In the event that a student fails to provide such notification to an instructor, or if the Institute does not find the reasons for missing an exam justifiable, the student will be given a failing grade for the exam(s).

Should a student miss a final exam and notify his or her instructor within 24 hours of the missed exam, the Registrar shall review the individual circumstances. Only documented emergencies will be considered acceptable reasons for missing exams. Exam retakes shall be allowed at the sole discretion of the Registrar and Department Chair. Examples of unacceptable reasons for missing an exam include the demands of a time-consuming job, the desire to leave town for a vacation or family gathering, the desire to do well on tests in other courses, etc.

A retaken exam shall be different than the original one taken by the students, and the timing of it shall be at the sole discretion of the individual instructor. In all cases, retakes shall be administered no later than one week after the original, missed exam.

Student Internships

Overview of Internships

Student internships are monitored, on-site work or service experiences for which students earn credit. All registered juniors and seniors are eligible for internships. Internships can be arranged for any setting related to a student's career goals. The internship usually takes place in a professional workplace under the supervision of an experienced professional, whereby a high degree of responsibility is placed on the student. Internships can be part-time or full-time, paid or unpaid. They can vary in duration and location, but must be approved in advance by the Institute.

Objectives of Internship Programs

Through an internship program, students establish and meet intentional learning goals through actual product development experience, while actively reflecting on what they are learning throughout the experience. The goals for the internship may include:

- Academic learning - applying knowledge learned in the classroom to tasks in the workplace.
- Career development - gaining knowledge necessary to meet minimum qualifications for a position in the student's field of interest.
- Skill development - an understanding of the skills and knowledge required in a specific job category.
- Personal development - gaining decision-making skills, critical thinking skills, and increased confidence and self-esteem.

Since internships have a strong academic component, students are carefully monitored and evaluated for academic credit. As a rule, one semester credit hour of academic credit is awarded for 45 hours of internship/work experience. Typically, a five credit internship taken during the fall, spring, or summer semester means that the student will spend no less than 225 hours in the experience. Students may register for up to two semesters of internship credit (e.g., RTIS students may not register for more than 10 internship credits).

The element that distinguishes an internship from a short-term job or community service is the intentional "learning agenda" that the intern brings to the experience. In support of a positive experience for the student and the employer, the Internship Coordinator assists in assuring that the work experience meets both student and organizational needs, with priority given to the student's interests and to the assurance that the experience will result in learning outcomes acceptable to his or her degree program.

Change of Major and Graduation

Requesting a Change of Major

Current students may request a change of major by submitting a "Change of Major" form to the Office of Admissions, along with any additional materials needed for the major to which they would like to transfer. The Change of Major form is available online.

A decision will be sent via email or mail to students requesting a change of major. Students who are approved to change majors will need to sign a new student enrollment agreement for the new major before making the change official.

Students who change their majors are encouraged to meet with their academic advisors or with the head of the program to which they are transferring to determine what changes need to be made to their schedules or recommended course sequences.

Important Information Regarding Change of Major Requests

Change of majors will only take effect on the first day of a new semester. To be considered, requests must be submitted at least fifteen working days before the start of a new semester; otherwise, the request will be considered for the next available semester.

Students considering a change of major should remember to consider add/drop deadlines. Requests for change of majors do not exempt students from the add/drop policies at DigiPen.

Students may register for classes in any major prior to the deadline for adding a class, but we recommend that they speak to their academic advisors if they have not yet had their requests for a change of major approved.

Students should speak to the degree program faculty if they have specific questions about transferring from one degree program to another.

Any questions about the status of a change of major request or about this process should be directed to the Office of Admissions or to the Registrar's Office.

Graduation Requirements

Degrees and certificates will be granted at the end of the semester in which students complete the final requirements. For example, if a student receives an "I" grade in a course required for graduation in his or her final semester, he or she will not graduate until the

semester in which the "I" is replaced by a letter grade. During that semester, the student must reapply for graduation.

A program of study must be completed within a reasonable period of time for a student to be eligible for graduation. The Institute defines "reasonable time" as the credit hours attempted cannot exceed 1.5 times the credit hours required to complete the program. Full-time students who do not complete their studies during this maximum time frame will be placed on academic probation and will have to complete their program requirements under the conditions of their academic probation. For more information, please see the section on "Academic Probation."

Applying for Graduation

The Institute sets minimum requirements for all students seeking undergraduate degrees. DigiPen reserves the right to change graduation requirements at any time. Every degree candidate is expected to comply with changes in requirements as they relate to the uncompleted portion of coursework.

Most students will follow the graduation requirements published in the catalog for the year they enter DigiPen. Students who interrupt their attendance may be held to the requirements of the current catalog when they return. Students are responsible for ensuring that all graduation requirements have been completed.

Approximately four to six weeks after students apply for graduation, a degree audit report will be issued. This report identifies courses students have taken to complete their degree requirements. This report is used to assist students in planning future coursework to ensure that all graduation requirements are met. Students should take the degree audit report with them when checking progress toward graduation with their academic advisor and/or the Office of the Registrar. Students are responsible for notifying the Office of the Registrar of any changes in their proposed programs and for resolving any questions prior to registering for their final term at DigiPen.

All Incomplete grades and conditions affecting graduation must be removed from the student's record by the last regular class period of the term. All credit course work affecting graduation must be completed by the regular class period of the term. A letter of instruction is mailed to degree candidates in March regarding deadlines and procedures for commencement-related activities.

Undergraduate students who feel there is justification for an exception to these graduation requirements may petition the Appeals/Discipline Committee. Information on filing a petition is available at the Registrar's Office.

Graduation Application Process

Graduation Date	Graduation Application Due Date
April	December 1
July	April 1
December	April 1

Table 1.1

The student completes the Graduation Application and submits the 75€ graduation fee by the deadlines stated in table 1.1.

The academic advisor or administrator will review the most recent transcript or degree plan to verify progress and will notify the student whether or not he or she has completed all courses satisfactorily to date, and, if upon satisfactory completion of courses for which the student is currently registered, he or she will be eligible for graduation.

Final approval will not be made until after final grades are submitted and posted to the student's record. Degrees will be mailed as soon as possible after that process, which should be from four to six weeks after completion. The student needs to keep the Office of the Registrar informed of address changes so that degrees are mailed to the correct address.

Student Affairs

Placement Assistance

Advice on career options is available to enrolled students. With the assistance of Student Affairs and faculty members, the Career Services team works to establish relationships with prospective employers on an on-going basis. It offers resume and job-hunting workshops to supplement career education found in the curriculum. The Institute has a career bulletin board, including an electronic bulletin board, and uses an email mailing list to post current job openings in the industry. The Institute also provides placement services in the form of internships that may be available during the summer; the placement program bases its recommendations of students on their academic performance. Additionally, DigiPen hosts an annual career day that attracts employers from around the country to the campus to review student portfolios and conduct interviews. DigiPen also attends industry events, such as the Game Developer's Conference, to promote the Institute's programs and its students. Placement assistance continues beyond graduation as these services are extended to alumni. For further information, please contact the Career Services department. Please note that employment upon graduation is not guaranteed.

Special Needs

DigiPen Institute of Technology Europe-Bilbao strives to ensure that all students are provided with an equal opportunity to participate in the Institute's programs, courses, and activities. Students desiring special assistance should identify themselves to the Administration and provide current documentation supporting their disability. Students must assist in identifying the proper accommodations they need, and they must negotiate these accommodations at the beginning of each semester. DigiPen will provide reasonable accommodations and academic adjustments as long as provisions do not fundamentally alter the nature of the program or the academic requirements that are considered essential to the program of study.

Graduate Follow Up

The Institute maintains a database of all graduates, and DigiPen alumni are encouraged to report back regarding changes to their professional status. DigiPen hosts an annual reunion at the Game Developer's Conference and extends placement services to all alumni. DigiPen Europe-Bilbao graduates will be welcome to attend these U.S. alumni events.

Educational Rights and Privacy of Student Records

DigiPen Institute of Technology Europe-Bilbao reserves for students certain rights with respect to their education records. These rights are:

- The right to inspect and review the student's education records within 45 days of the day the Institute receives a request for access. Students should submit to the Registrar, Dean, or head of the academic department (or appropriate official) written requests that identify the record(s) they wish to inspect. The Institute official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the Institute official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

- The right to request the amendment of the student's education records that the student believes is inaccurate. Students may ask the Institute to amend a record that they believe is inaccurate. They should write to the Institute official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate. If the Institute decides not to amend the record as requested by the student, the Institute will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

- The right to consent to disclosures of personally identifiable information contained in the student's education records. One exception, which permits disclosure without consent, is disclosure to school officials with legitimate educational interests. A school official is defined as a person employed by the Institute in an administrative supervisory, academic, or support staff position (including law enforcement unit personnel and health staff); a person or company with whom the Institute has contracted (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks. A school official has a legitimate

educational interest if the official needs to review an education record in order to fulfill his or her professional responsibility. Upon request, the Institute discloses education records without consent to officials of another school to which a student intends to enroll.

Release of Student Academic and Financial Records

If a student's parent, guardian, family member, or other individual wishes to obtain any of the student's information (including by not limited to account balance, tuition payments due, class registration, etc.), the student must fill out and submit the Student Consent for Release of Records Form listing the names of the individuals to whom his or her information may be released. This form will be distributed to all students during Orientation and can also be obtained from the Administration.

Release of Student Directory Information

The following information is considered public or directory information and may be released to anyone unless a student informs the Office of the Registrar that he or she does not wish any information released:

- Name
- Local telephone number
- Institute email address
- Major field of studies
- Dates of attendance
- Degrees and awards received
- Full-time or part-time enrollment status
- Number of credits for which a student is registered each semester.
- Educational institutions attended

NO to Release of Information

If a student does not wish to have the Institute release any directory information and/or does not want directory information to appear in any published or electronic Student Directory, he or she may restrict access through the Administration Office. No information will be released on students or to students who have restricted release of directory information, including degrees awarded and dates of attendance.

Change from NO to YES

If a student restricted the release of directory information and now wishes to allow this information to be released, he or she must go to the Administration Office and present photo identification and a completed Release/Restrict of Directory Authorization Form.

Regulation of Conduct and Disciplinary Procedures

The Institute has the right to take appropriate disciplinary action warranted by a student's misconduct. The specific provisions as to offenses, penalties, and disciplinary procedures set out below should not be construed as limiting the general authority of the Institute.

Rules and Regulations

1. It is strictly forbidden to bring in or out of the premises any digital storage and any form of memory sticks or optical media, diskettes, video recorders, etc. other than for academic and approved usages which directly apply to courses being taken by the student during the term of this agreement, or for the required purpose of maintaining back-up copies of student-created projects and assignments. Additionally, it is forbidden to bring in any personal computers or software, as well as any video or audio recording equipment, without first agreeing to and signing a Network and Internet Usage Agreement. Students are responsible for guaranteeing that any files transferred to and from DigiPen's equipment are free of malicious viruses or Trojan horses. In respect to the above, students are only allowed to carry in and out of the DigiPen premises data files only and not executable files. This includes student-created executables. Following this policy will greatly reduce the risks of virus infections to the DigiPen network. In order for DigiPen faculty to review and grade projects and assignments, source code must be stored and executables must be generated at DigiPen from the corresponding source code.

2. Students are forbidden from downloading any files from the Internet or installing any software, including but not limited to freeware and/or shareware, without the written approval from a DigiPen faculty member or from DigiPen's IT department. Furthermore, illegal use of the Internet may be prosecuted to the fullest extent of the law.

3. In order to prevent damage to equipment and facilities, food and/or drink are not permitted anywhere within the training areas of the premises.

4. Smoking is not permitted anywhere within the premises, washrooms, elevators, or stairwells.

5. Student ID tags must be worn visibly when on the premises. Lost or stolen ID tags must be reported to Security as soon as possible.

6. All student projects must receive approval from DigiPen's instructors prior to commencement of any production. DigiPen reserves the right to reject ideas or to stop production of any student game, animation, or project for reasons deemed appropriate to DigiPen. The Institute will not allow the production of any student work that contains or makes a direct or indirect reference to any of the following material/subjects:

   - Religious content
   - Religious symbols
   - Pornographic material
   - Excessive violence
   - Sexual and nude content
   - Promotion of illegal substances
   - Promotion of racism or hate
   - Content demeaning to any group of society

7. Plagiarism will not be tolerated. Any student who submits the work of another person as his or her own is considered to have committed plagiarism. Types of work that can be plagiarized include, but are not limited to, source code, artwork, concepts, designs, or other material. Anyone submitting someone else's work without the explicit written permission from the legal owner may have violated the owner's intellectual property rights or copyrights, in addition to committing plagiarism. If any student is unsure as to what constitutes a case of plagiarism, he or she should consult an instructor for clarification.

8. Students shall not submit any work to the Institute that infringes upon the intellectual property rights of a third party. If, during the program, a student submits such work to the Institute, he or she shall indemnify or hold harmless the Institute from and against all loss, damage, cost (including legal fees), and other liability, which the Institute may suffer as a result of the same.

9. Cheating on an examination will not be tolerated. Using any materials other than those authorized

by the examiners during an exam is an example of cheating.

10. Submitting false documents, transcripts, or any other academic credentials to gain admission to DigiPen or to obtain any academic benefit is grounds for expulsion without recourse.

11. Disrupting instructional activities, including making it difficult to proceed with scheduled lectures, seminars, examinations, tests, etc., shall be considered an offense.

12. In the interest of maintaining an environment that is safe and free of violence and/or threats of violence for its employees, students, and visitors, possession of a dangerous weapon is prohibited on property owned by or under the control of DigiPen. Weapons and ammunition are potential safety hazards. Possession, use, or display of weapons or ammunition is inappropriate in an academic community for any reason, except by law enforcement officials. No weapons or ammunition shall be worn, displayed, used, or possessed on campus. Any member of the DigiPen community who violates this policy shall be subject to appropriate disciplinary action up to and including dismissal from DigiPen. Any person who is not a member of the DigiPen community who violates this policy shall be subject to all appropriate procedures and penalties including, but not limited to, the application of the criminal trespass provisions of local law. Members of the DigiPen community who are aware of any violations of this policy or who have other concerns about safety or weapons should report them to the Student Affairs Director, Dean of Faculty, Senior Vice President of Administration, or the Chief Operating Officer.

13. Evidencing symptoms of alcohol or drug use while on Institute property, or the procurement or possession of alcohol or illegal substances on Institute property, is considered an offense.

14. It is forbidden to damage, remove, or make unauthorized use of the Institute's property or the personal property of faculty, staff, students, or others at the Institute. Without restricting the generality of "property," this includes information, however it may be recorded or stored.

15. It is strictly forbidden to use any equipment in the premises to produce any commercial work. The equipment is only to be used for homework and training purposes. Any attempt to produce commercial work will result in legal action against the offenders.

16. Public areas and equipment of the building must be kept clean. No tampering, moving, defacing, or otherwise altering the premises, equipment, or the building property is allowed.

17. Graffiti, other forms of mural art, or the posting of signs anywhere in the premises and the building without permission of the Administration is not permitted.

18. Office equipment (photocopier, fax, office phone, etc.) is not available for student use.

19. The assault of individuals, whether verbal or physical, including conduct which leads to the physical or emotional injury of faculty, staff, students, or others at the Institute, or which threatens the physical or emotional well-being of faculty, staff, students, or others at the Institute, is considered an offense.

20. In accordance with applicable law, DigiPen prohibits sexual harassment and harassment between faculty/staff and students and between students and students because of race, sex, color, national origin, ancestry, religion, physical or mental disability, veteran status, age, or any other basis protected by local law. Any such harassment may violate the law and will not be tolerated. DigiPen's policy prohibits inappropriate conduct even though it may not reach the legal standard for harassment.

21. It is forbidden to attempt to engage in, aid and abet others to engage in, or attempt to engage in conduct which would be considered an offense.

22. Failing to comply with any penalty imposed for misconduct is considered an offense.

Penalties

1. The penalties that may be imposed, singly or in combination, for any of the above offenses may include, but are not limited to, the following:

2. A failing grade or mark of zero for any course, examination, or assignment in which the academic misconduct occurred.

3. Suspension from the Institute for a specified period of time or indefinitely. Students will not receive credit for courses taken at another institution during a suspension.

4. Reprimand, with the letter placed in the student's file.

5. Restitution, in the case of damage to property or unauthorized removal of property.

6. A notation on the student's permanent record of the penalty imposed.

7. Legal action against the student committing the offense.

Warnings

1. The penalty for plagiarism or for cheating is normally suspension from the Institute.

2. Charges filed under **the local or international law** and/or the commencement of legal proceedings do not preclude disciplinary measures taken by the Institute.

Procedures

Any student suspected or apprehended in the commitment of an offense shall be given the opportunity to explain the incident and, if he or she requests, to meet with department heads, a Student Affairs Officer, or other appropriate person, before the alleged offense is reported to the Discipline Committee. An alleged instance of student misconduct deemed serious enough for action by the Institute shall be referred to the Discipline Committee. After an investigation and hearing at which the student is invited to appear, the committee reports its decision to the Dean of Faculty. If he or she wishes, the student then has the opportunity to meet with the Dean of Faculty to appeal the decision.

Dismissal by the Institute

By written notice to a student, the Institute may, at its sole discretion, dismiss a student at any time if he or she is in default of any of the terms, covenants, or conditions of the Institute. Furthermore, the Institute reserves the right to withdraw a student if he or she is unable to maintain the minimum required GPA in his or her courses at the end of each semester. Upon dismissal, the student shall immediately return to the Institute all materials in his or her possession relating to the program, whether created by the student, other students, or provided by the Institute.

Appeals

A student has the right to dispute a disciplinary decision of the Dean of Faculty. A student who wishes to make an appeal must notify the Chief Operating Officer in writing and must provide a full explanation of the reasons for appealing. Appeal hearings take place before a committee called together by the Chief Operating Officer. A student is entitled to be represented or assisted throughout the appeal process by an advocate who may be a friend, relative, or legal counsel. The student is entitled to explain the reasons for appealing either orally or in writing, and he or she may call witnesses. The Dean of Faculty is also present and puts forth the reasons for the original decision. The members of the committee may ask questions of both the student and the Dean of Faculty. As soon as possible after the hearing is completed, the Chief Operating Officer will notify the student of the final decision in writing.

DEGREE PROGRAMS FOR THE ACADEMIC YEAR

2011-2012

Bachelor of Science in Real-Time Interactive Simulation

Program Overview

The electronic and digital entertainment industry is one of the fastest growing and most exciting career choices of the future. The video game, movie, and military industries are only a few of those that demand well-trained, enthusiastic programmers, designers, artists, and managers. DigiPen Institute of Technology is a key provider of these individuals, and the Bachelor of Science in Real-Time Interactive Simulation prepares programmers for these industries. Designed and developed by industry experts and DigiPen faculty, the Institute's four-year R.T.I.S. program is a computer science degree that is highly focused on the technical area of graphics and simulations. Participants in the R.T.I.S. program specialize in the skills and tools necessary to create real-time simulations of real-world events.

The B.S. in R.T.I.S. program offers extensive training in mathematics and physics as a foundation for the various topics presented in general computer science and computer graphics. Throughout the degree program, R.T.I.S. students participate in several team-based projects. These substantial projects are designed to give students concrete experiences in which they apply the theoretical knowledge gained from their courses. Forming the cornerstone of the program, these projects exemplify many of the skills necessary in the video game industry today: teamwork, design, implementation, follow through, and business knowledge, among others. R.T.I.S. students gain the experience of designing, programming, and testing a variety of simulations and games, including text-based, scrolling, simulation, and two-dimensional and three-dimensional games.

Students in this degree program work both individually and collaboratively to learn the fundamentals of game design, production, and programming. Additionally, they write game design documents and technical design documents, learn how to schedule tools and techniques, and participate in the full production of several games. These game-oriented productions are a perfect media to present complicated subjects in a format agreeable to students. These productions:

- Are graphics-oriented simulations, including two-dimensional and three-dimensional simulations.
- Can realistically reproduce or simulate natural phenomena and real-life events. Flight simulators are excellent examples of such simulations.

- Are highly interactive, requiring an elaborate and efficient graphical user interface (GUI). The development of a GUI requires the management of windows, menus, dialog boxes, and hardware resources including keyboards, mice, and display monitors.

- React in real time. The implementation of such simulations requires a thorough knowledge of computer hardware and computer languages.

- Are story-based simulations requiring a plot in which game objects must interact intelligently with each other. Therefore, in order to make games challenging and interesting, students must design and implement good artificial intelligence algorithms, which serve as the cognitive processes for the computer-controlled game objects.

- Could be designed for either a single-player or multi-player environment. The development of the latter requires the understanding of subjects such as computer networks, TCP/IP, and Internet programming.

- Are excellent examples of large and complex productions. Teamwork is essential to the successful completion of such productions. Therefore, students are divided into teams and are rigorously trained in object-oriented programming languages, paradigms, and software engineering techniques and practices.

Graduates of this program will gain the skills required to successfully pursue entry-level careers in the rapidly growing world of computer technologies in general, and computer graphics and simulations in particular. This degree prepares students to work in the computer and video game industry as intermediate-level programmers in graphics, artificial intelligence, networking, or general programming; beginning designers; or engineering tool staff members. Some of the job titles that graduates of this program may aspire to are Solutions Architect, Compatibility/Playability Tester, Game Analyst, Quality Assurance Engineer, Quality Assurance Supervisor, Computer or Software Programmer, Software Engineer, Game Programmer, Engine and Tools Programmer, Game Graphics Programmer, Artificial Intelligence Programmer, Audio Programmer, Web Programmer, or Software/Lead Tester.

Rather than attempt to provide a broad, general education, this degree program is an intensive educational experience in a specialized and highly technical area, and it prepares students for a career in several rapidly expanding industries. Staff and faculty are prepared to guide students desiring more general education course work about supplementary opportunities available through other institutions.

RTIS Degree Requirements

Number of Credits & GPA

The Bachelor of Science in RTIS requires completion of at least 154 credits with a cumulative GPA of 2.0 or better. The program usually spans eight semesters of fifteen weeks each, or a total of four academic years.

Humanities and Social Sciences Requirement

Required courses are: ENG 110, ENG 150, ART 210, and SOS 150. Five or six additional ENG credits are required, and students can choose from the following: ENG 115, ENG 320, ENG 400, and ENG 450. Students must also select one course (two or three credits) from the following: ANI 125, ART 400, FLM 115, FLM 151, FLM 275, or ART 410. (Total: 18-20 credits)

Computer Science Requirement

The following courses are required: CS 102, CS 120, CS 120L, CS 170, CS 170L, CS 180, CS 200, CS 225, CS 230, CS 250, CS 260, CS 280, CS 300, CS 315, CS 330, CS 350, and CS 365. Students must select four more courses (12 credits) numbered higher than 200 or PHY 350. (Total: 60 credits)

Mathematics Requirement

The following courses are required: MAT 140, MAT 150 or MAT 180, MAT 200 or MAT 230, MAT 258, MAT 250, MAT 300, and one MAT elective numbered higher than 300, or MAT 256. (Total: 24 credits)

Physics Requirement

The following courses are required: PHY 200 and PHY 250. (Total: 6 credits)

Game Projects Requirement

The following courses are required: GAM 100, GAM 150, GAM 200, GAM 250, GAT 300, GAM 300, GAM 350, GAM 400, and GAM 450. (Total: 37 credits)

Electives
Complete seven to nine credits of elective courses, which students can choose from any department at DigiPen. (Total: 7-9 credits)

Grade Requirement and Core Courses
Students must receive a grade of "C-" or higher in all core courses for the RTIS major. (In a non-core course, a grade of "D" or higher is considered passing.) The core courses are all those taken to fulfill the GAM, MAT, and CS requirements as described above. PHY 200 is also a core course.

General Education Courses
The following courses satisfy the general education requirement for the BS in Real-Time Interactive Simulation: ART 210 (2), ART elective (2), ENG 110 (3), ENG 150 (3), ENG elective (2), ENG elective (3), SOS 150 (3), MAT 100 (4), MAT 150 (4) or MAT 180 (4), MAT 200 (4) or MAT 230 (4), PHY 200 (3), and PHY 250 (3), for a total of 31 credits.

Recommended Course Sequence
Listed on the following page is the recommended course sequence for the Bachelor of Science in Real-Time Interactive Simulation. Please note the following:

- Students must achieve a grade of "C-" or higher in the core courses to earn credit toward this degree.
- Students must receive special permission (*) from their academic advisor to take more than 20 credits in either of their first two semesters.

Recommended Course Sequence Chart (RTIS)

Semester	Course	Course Title	Core	Credits
Semester 1	MAT 140	Linear Algebra & Geometry	X	4
	CS 102	Computer Environment	X	4
	CS 120	High-Level Programming I - The C Programming Language	X	3
	CS 120L	High-Level Programming I Lab	X	1
	GAM 100	Project Introduction	X	3
	ENG 110	Composition		3
	ART 210	Art Appreciation		2
		Semester Total		**20***
Semester 2	MAT 150 or MAT 180	Calculus and Analytic Geometry I or Vector Calculus I	X	4
	CS 170	High-Level Programming II - The C++ Programming Language	X	3
	CS 170L	High-Level Programming II Lab	X	1
	CS 230	Game Implementation Techniques	X	3
	GAM 150	Project I	X	3
	ENG 150	Composition		3
	SOS 150 or SOS 180	Society & Technology or Gender & Ethnic Stereotypes in Media & Games		3
		Semester Total		**20***
Semester 3	MAT 200 or MAT 230	Calculus & Analytic Geometry II or Vector Calculus II	X	4
	CS 200	Computer Graphics I	X	3
	CS 225	Advanced C/C++	X	3
	CS 180	Operating System I, Man-Machine Interface	X	3
	GAM 200	Project II	X	4
	PHY 200	Motion Dynamics	X	3
		Semester Total		**20**
Semester 4	PHY 250	Waves, Optics, and Aerodynamics		3
	CS 250	Computer Graphics II	X	3
	CS 260	Computer Networks I, Interprocess Communication	X	3
	CS 280	Data Structures	X	3
	GAM 250	Project II	X	4
	MAT 250	Linear Algebra	X	3
		Semester Total		**19**
Semester 5	CS 300	Advanced Computer Graphics I	X	3
	CS 315	Low-Level Programming	X	3
	CS 330	Algorithm Analysis	X	3
	MAT 258	Discrete Mathematics	X	3
	GAT 300	3D Computer Animation Production I		3
	GAM 300	Project III	X	5
		Semester Total		**20**
Semester 6	MAT 300	Curves and Surfaces	X	3
	CS 350	Advanced Computer Graphics II	X	3
	CS 365	Software Engineering	X	3
	Computer Science or Physics Elective	Any 200-level or higher CS course not required or PHY 350	X	3
	GAM 350	Project III	X	5
	Elective	An elective of the student's choice from any department at DigiPen		3
		Semester Total		**20**
Semester 7	Art Elective	Select one: ANI 125, ART 400, FLM 115, FLM 151, FLM 275, or ART 410		2-3
	English Elective	One English elective chosen from any ENG course, ENG 116 and above		2-4
	Computer Science or Physics Elective	Any 200-level or higher CS course not required or PHY 350	X	3
	One of MAT 350-359, MAT 361	One Math elective chosen among MAT 350 - MAT 350 or MAT 361	X	3
	GAM 400	Project IV	X	5
	Elective	An elective of the student's choice from any department at DigiPen		3
	Semester Total			**18-21**
Semester 8	English Elective	One English elective chosen from any ENG course, ENG 116 and above		2-4
	CS 420	Graphics File Format & Data Compression Techniques	X	3
	Computer Science or Physics Elective	Any 200-level or higher CS course not required or PHY 350	X	3
	GAM 450	Project IV	X	5
	Elective	An elective of the student's choice from any department at DigiPen		3
		Semester Total		**16-18**
		Degree Total		**154 minimum**

Note: Please see the previous page for an explanation of core courses and the [*].

Bachelor of Fine Arts in Digital Art and Animation

Program Overview

As the animation and video game industries mature, there is a noticeable shift by companies to hire employees who demonstrate more than a working knowledge of a specific commercial software package or traditional artistic skills. Industry-quality standards continue to rise, and competition for entry-level positions demands that artists possess sophisticated skill sets before they can even begin their careers. Studios seek artists with a broad and integrated foundation of theoretical, practical, and technical skills in production animation, traditional art, modern computer software, and media story flow. Insight and long-term potential have become increasingly important. The studios also demand professional accountability and consistency.

Despite these changes, digital art and animation remain viable career opportunities. Animation is capable of solving informational, educational, and entertainment problems no other discipline can resolve. It provides a cornerstone for many industries including cinema, broadcast entertainment, cable television, software development, the Internet, education, simulation, product design, research, forensic science, architecture, telecommunications, advertising, travel and tourism, and video games. The fact that these industries depend upon qualified candidates accentuates the need for quality digital art and animation education.

The broad scope of these demands presents a series of significant academic challenges. Most art students enter collegiate training with little or no substantial background knowledge relative to this field. Many secondary schools have been forced to cut back on the level of arts training that they are able to provide. Consequently aspiring artists must acquire this foundation while they are also trying to establish their professional focus. The complexity of the individual components of this field demand highly structured curricula and programmed sequencing simply to enable most students to be successful. Some students are capable of the rapid assimilation of the integrated knowledge the studios now require, but most are better served by a deeper and more sequential approach to the material.

DigiPen's Bachelor of Fine Arts in Digital Art and Animation seeks to address these needs. Examples of student projects can be found in the Digital Gallery. Students who successfully complete this curricu-

lum will possess the following skills and appropriate samples of professional work:

- A broad foundation of production experiences in both 2D and 3D animation. This base allows students to gain an overview of the profession and provides long-term adaptability.
- An area of production specialization and focus. This enables students to target a specific sector of the industry upon graduation. Each student will produce a thesis portfolio to support this focus.
- Strong foundational skills and a thorough grounding in applied drawing. This will include an understanding of how to maintain and continually enhance one's drawing skill throughout his or her career, in addition to building the habits to sustain this growth.
- Strong foundational skills in storytelling. This includes visual storytelling, literary traditions, story through dialog, story through acting, and cinematic conventions.
- Strong foundational skills in applied technology using industry-standard hardware and software. Students will be thoroughly familiar with modern interface and workflow conventions. They will also understand how to learn new software while maintaining a production schedule.
- A solid foundation in professional work habits and attitude. Students will understand how to utilize and integrate professional criticism into their work. Additionally, they will be able to identify and create work that meets professional quality standards. They will also understand production flow and be able to generate and maintain appropriate schedules and production goals for their work. Finally, they will understand the stresses of production and methods for positively managing this stress.
- Social perspective and civic accountability relative to the roles that animation plays in society. Students will explore the long-term ramifications of this industry and be able to intelligently discuss their responsibilities to the betterment of the animation industry and society as a whole.

This degree prepares a graduating student for a career in digital art and digital three-dimensional animation, digital two-dimensional animation, and video game or animation pre-production. Some of the careers for which graduates of the BFA in Digital Art and Animation are trained include Props and Environment Modelers, Texture Artists, Level Designers, Character Modelers, Character Riggers, Character Animators, 3D Lighting and Camera Design, Effects Animator, Conceptual Illustration and Character Design, and Storyboard Artists.

Digital Art and Animation Degree Requirements

Number of Credits and GPA
The Bachelor of Fine Arts in Digital Art and Animation requires completion of at least 144 credits with a cumulative GPA of 2.0 or better. The program usually spans eight semesters of fifteen weeks each, or four academic years.

Humanities and Social Science Requirements
The following courses are required: LAW 115, SOS 115, ENG 116, and ENG 315. (Total: 14 credits)

Art Requirement
The following art courses are required: ART 101, ART 115, ART 125, ART 151, ART 201, ART 251, ART 300, ART 350, ART 401, and ART 450. (Total: 31 credits)

Animation Requirement
The following animation courses are required: ANI 101, ANI 125, and ANI 151. (Total: 9 credits)

Computer Graphics Requirement
The following computer graphics courses are required: CG 201, CG 225, CG 275, and CG 300. (Total: 12 credits)

Film Requirement
The following film courses are required: FLM 115, FLM 151, and FLM 201. (Total: 9 credits)

Science Requirement
The following courses are required: CS 115, PHY 115, BIO 100, BIO 150, BIO 200. (Total: 15 credits)

Projects Requirement
The following projects courses are required: PRJ 201, PRJ 251, PRJ 300, PRJ 350, PRJ 400, and PRJ 450. Please note that INT 390 and INT 450, internship

courses, may be taken in place of PRJ 400 and PRJ 450. (Total: 30 credits)

Electives
Students must take 24 credits from the following: ART 225, ART 228, ART 230, ART 260, ART 301, CG 251, CG 305, CG 350, ANI 300, ANI 350, ANI 400, ANI 450, FLM 250, FLM 275. (Total: 24 credits)

Grade Requirement and Core Courses
Students must receive a grade of "C-" or higher in all core courses for the Digital Art and Animation major. (In a non-core course, a grade of "D" or higher is considered passing.) The core courses are all of the art, animation, computer graphics, film, and projects requirements noted above, except for ART 115, FLM 115, CG 350, ART 401, and FLM 275. BIO 100, BIO 150, BIO 200, ENG 116, ENG 315, CS 115, and SOS 115 are also core courses for this major.

General Education Courses
The following courses satisfy the general education requirement for the BFA in Digital Art and Animation: ART 115 (4), BIO 100 (3), BIO 150 (3), BIO 200 (3), ENG 116 (4), ENG 315 (4), FLM 115 (3), LAW 115 (3), SOS 115 (3), CS 115 (3), and PHY 115 (3), for a total of 36 credits.

Recommended Course Sequence
Listed on the following page is the recommended course sequence for the Bachelor of Fine Arts in Digital Art and Animation. Please note the following:

- Students must achieve a grade of "C-" or higher in the core courses to earn credit toward this degree.
- Students must receive special permission (*) from their academic advisor to take more than 20 credits in either of their first two semesters.

Recommended Course Sequence Chart (BFA)

Semester	Course	Course Title	Core	Credits
Semester 1	ANI 101	Introduction to Animation - Theories and Techniques I	X	3
	ART 101	The Language of Drawing	X	3
	ART 115	Art and Technology		4
	BIO 100	Visual Perception	X	3
	ENG 116	Storytelling	X	4
	FLM 115	History of Film and Animation		3
		Semester Total		**20**
Semester 2	ANI 125	Acting for Animation	X	3
	ANI 151	Advanced Animation - Theories and Techniques II	X	3
	ART 125	Tone, Color, and Composition	X	3
	ART 151	Basic Life Drawing	X	3
	BIO 150	Human Muscular, Skeletal, and Kinetic Anatomy	X	3
	FLM 151	Visual Language and Film Analysis	X	3
		Semester Total		**18**
Semester 3	ART 201	Advanced Life Drawing	X	3
	BIO 200	Animal Muscular, Skeletal, and Kinetic Anatomy	X	3
	CG 201	Two-Dimensional Raster Graphics and Animation	X	3
	CG 225	Introduction to 3D Animation	X	3
	PRJ 201	Two-Dimensional Animation Production	X	5
		Semester Total		**17**
Semester 4	ART 225 or Elective	Three-Dimensional Design and Sculpture or any course from the Elective Requirement list.	X	3
	ART 251	Character Design	X	3
	CG 251 or Elective	Two-Dimensional Vector Graphics and Animation or any course from the Elective Requirement list.	X	3
	CG 275	Three-Dimensional Character Animation	X	3
	PRJ 251	Two-Dimensional Vector Animation Production	X	5
		Semester Total		**17**
Semester 5	ANI 300 or Elective	Acting through an Interface or any course from the Elective Requirement list.	X	3
	ART 300	Perspective, Backgrounds, and Layouts	X	3
	CG 300	Three-Dimensional Environment and Level Design	X	3
	ENG 315	Story through Dialogue	X	4
	ART 350	Storyboards	X	3
	PRJ 300	Limited-Scope 3D Production	X	5
		Semester Total		**21**
Semester 6	ANI 350 or Elective	Voice Acting for Animation or any course from the Elective Requirement list.	X	3
	PHY 115	Introduction to Applied Math and Physics		3
	CG 350 or Elective	Graphics for Gaming or any course from the Elective Requirement list.		3
	FLM 201	Cinematography	X	3
	PRJ 350	Three-Dimensional Animation Production	X	5
		Semester Total		**17**
Semester 7	ART 401	Conceptual Illustration and Visual Development		3
	FLM 250 or Elective	Digital Post-Production or any course from the Elective Requirement list.	X	3
	FLM 275 or Elective	Fundamentals of Music and Sound Design or any course from the Elective Requirement list.		3
	ART 450	Portfolio	X	3
	PRJ 400	Capstone Project I	X	5
		Semester Total		**17**
Semester 8	ANI 400 or Elective	Cinematic Animation or any course from the Elective Requirement list.	X	3
	SOS 115	Media and Ethics: A Social Science Perspective	X	3
	CS 115	Introduction to Scripting and Programming	X	3
	LAW 115	Introduction to Intellectual Property and Contracts		3
	PRJ 450	Capstone Project II	X	5
		Semester Total		**17**
		Degree Total		**144 minimum**

Note: Please see the previous page for an explanation of core courses.

COURSE DESCRIPTIONS FOR THE ACADEMIC YEAR

2011-2012

Course Description Table of Contents

Listed below are the page numbers for the following departments and course titles.

Department of Animation and Production 47
Animation 47
Film 47
Projects 48
Department of Computer Science 49
Computer Science 49
Department of Digital Arts 51
Computer Graphics 51
Department of Fine Arts 52
Art 52
Department of Game Software Design and Production 54
Game Software Design and Production 54
Game Application Techniques 55
Department of Humanities and Social Sciences 55
Communications 55
English 55
History 56
Law 56
Philosophy 56
Psychology 57
Social Sciences 57
Department of Life Sciences 57
Biology 57
Department of Mathematics 58
Mathematics 58
Department of Physics 59
Physics 59

Department of Animation and Production

ANIMATION

ANI 101 - Introduction to Animation - Theories and Techniques I (3 Cr.)

Prerequisite(s): None

This course introduces students to the principles of animation through classical animation techniques. Students will explore the art of creating convincing movement through effective timing, spacing, and drawing. Works of master animators will be screened and analyzed frame-by-frame to illustrate the principles covered in class, and students will put their knowledge to work through a series of exercises. The ultimate goal of both this course and its sequel is to introduce methods by which animators "act" and bring characters to life through sequential images.

ANI 125 - Acting for Animation (3 Cr.)

Prerequisite(s): None

An animator's ability to express attitude, thought, and emotion through body language is a fundamental skill necessary for success. Therefore, this course focuses on presenting tools and techniques for translating thoughts and feelings into specific gestures and actions. The course introduces students to the history of acting in the theater, animation, and film. Students will explore the basic fundamentals and differences of acting for the stage, film, and animation through a series of acting exercises and problems. Special emphasis will be given to classical method acting.

ANI 151 - Advanced Animation- Theories and Techniques II (3 Cr.)

Prerequisite(s): ANI 101

In ANI 151 students will continue to explore and exercise the concepts and techniques of classical animation through a series of assignments. The exercises in this course will be considerably more demanding than those completed in ANI 101 as they will be longer and will require more refinement, subtlety, and creativity. There will also be a greater emphasis on character development - the expression of personality, mood, thought, and attitude through motion and posing.

ANI 300 - Acting through an Interface (3 Cr.)

Prerequisite(s): ANI 125, ANI 151, ART 225, & CG 275

An animator's ability to express attitude, thought, and emotion through a surrogate is a fundamental skill of animation. This course builds upon the earlier acting curriculum and introduces the traditions of puppetry and marionettes. It next explores stop-motion animation techniques. Finally, students will extrapolate their knowledge to 3D bipedal animation and to solving 2D character animation problems.

ANI 350 - Voice Acting for Animation (3 Cr.)

Prerequisite(s): ANI 300

This course explores the nature of acting through the medium of the human voice. The curriculum will explore narration, expressive reading, diction, and vocal refinement. It will introduce students to basic audio technology and recording equipment. The course also covers lip-synchronization techniques in animation and culminates in a series of practical exercises in both 2D and 3D animation.

ANI 400 - Cinematic Animation (3 Cr.)

Prerequisite(s): ANI 350, ART 401, & FLM 275

This course is a culmination of the student's ability to use animation as a storytelling medium. It also provides an opportunity for the student to demonstrate his or her personal artistic growth. Each student will work to complete a short piece of cinematic animation. Working independently or in small groups with the instructor's approval, students may use either 2D or 3D tools.

ANI 450 - Advanced Animation Portfolio (3 Cr.)

Prerequisite(s): ANI 350, CG 300, & PRJ 350

This class requires students to further extend their portfolio work, principally polishing and refining elements that will align them well for current industry needs. With a generous selection of assignment opportunities to be explored, students will gain advanced instruction on more focused 'acting', 'physicality', and 'creature' animation. This class will provide students with an ideal opportunity to improve an area of their portfolio work that will better represent animated 'body mechanics' and 'acting' skills.

FILM

FLM 115 - History of Film and Animation (3 Cr.)

Prerequisite(s): None

This course examines the more than 100-year history of film and animation. Beginning with the scientific and technical advances that made these media technologies possible, students will explore every major movement and genre as well as their impact on society. The course will give special consideration to examining all of the various professional outlets for this technology.

FLM 151 - Visual Language and Film Analysis (3 Cr.)

Prerequisite(s): None

Animation is ultimately "film making," and animators should learn from the many classics on how to effectively bring various film production elements together. Students will review several films and study how the relationships between scripts, cameras, lighting, sets, production design, sound, acting, costumes, props, directing, and production lead to successful visual stories. They will also examine the fundamental theories underlying visual storytelling. Understanding the creative processes utilized by these influential filmmakers will provide insight into how students may improve their own animations.

FLM 201 - Cinematography (3 Cr.)

Prerequisite(s): FLM 151

Like a director of photography, computer animators must have a good understanding of appropriate camera composition and lighting techniques to enhance the visual impact of the story being told. Appropriate composition and camera movement help to reveal action, and lighting establishes focus, place, and mood. Students will analyze examples of effective cinematic techniques from a variety of different animations and films. Assignments in camera composition, movement, and lighting will help students solidify their understanding of the concepts presented.

FLM 250 - Digital Post-Production (3 Cr.)

Prerequisite(s): FLM 151

The last step of any animation project involves the assembly of various production elements ranging from rendered files to sound effects. This is also the stage where the visual effects artists add the effects seen in today's movies. This course teaches the fundamental skills these artists use in post-production. Effective editing skills are the primary outcome of the course. Students will also cover the planning, execution, and addition of special effects to animation.

FLM 275 - Fundamentals of Music and Sound Design (3 Cr.)

Prerequisite(s): None

Every good animation relies on a well-designed soundtrack to enhance the production. While most animators do not produce the soundtrack themselves, they need to understand the effect of music, voice, and sound effects on an audience. Animators must be able to communicate their ideas to a musician and understand the technological possibilities of modern sound design. Initially students will survey a broad range of music from different cultures. Emphasis will be on developing basic listening skills in hearing rhythm, melody, harmony, color, texture, and form. Students will then learn how to apply this to the production needs of animation. The course will give special attention to the generation of sound, how to use sound to advance a story, and how it can create mood, a sense of place, and emphasis.

There may be course fees associated with this class. Please see the course registration packet for details.

PROJECTS

Projects Note 1: If one hopes to be a successful professional, it is insufficient for an animator to only understand the theory of animation and art. He or she must also understand the rigors and demands of commercial animation production. The projects classes create academic production environments where students learn the principles, practices, and habits that will help them adapt readily to the demands of the commercial animation industry. Each projects class focuses upon a series of related production problems and culminates in the students generating professional-quality work on a rigid deadline. This work will serve as the foundation for their graduation portfolios. Weekly production meetings with an instructor ensure that the production stays on schedule and that students maintain professional-quality standards.

Projects Note 2: Generally, students decide the subject of the projects class animations, but the instructor must consider the undertaking within the scope of a student's skill set, commercial marketability, academic soundness, and appropriateness in nature. DigiPen reserves the right to refuse any student production proposal that it deems inappropriate. Students are also expected to maintain an exceptional level of professionalism within these production environments, striving to produce quality work. Failure to meet this standard may result in academic discipline.

PRJ 201 - Two-Dimensional Animation Production (5 Cr.)

Prerequisite(s): ANI 151 & ART 125

This is a traditional animation course within the context of a small-production pipeline. This project builds on the cumulative skill sets acquired in ANI 101 and ANI 151 but with a focus on team dynamics rather than individual projects. Students will be responsible for interpreting the initial animatic, storyboards, and workbooks, breaking down sound and music onto exposure sheets, and completing rough and cleaned up animations for a final rough composite. This will require each cohort to learn choreography, continuity, and basic scene analysis, all while working within the confines of a team. New dynamics will come into play, particularly in terms of accountability to small and large groups, as well as increased responsibilities with man-hour projections and general scene management.

PRJ 251 - Two-Dimensional Vector Animation Production (5 Cr.)

Prerequisite(s): PRJ 201

Building on the working rough reel, students will use an industry-standard digital animation tool to convert the drawings to vector-based images. Students will then focus on character and effects clean-up work to complete the final, polished version of the project. The course will give special consideration to workflow projections, scheduling, time management, administrative documentation, and quality control. Additionally, it will emphasize appropriate work habits.

PRJ 300 - Limited-Scope 3D Production (5 Cr.)

Prerequisite(s): CG 275 & PRJ 251

PRJ 300 addresses two of the more serious affective learning challenges facing commercial animators: professional focus and realistic expectations. The goal of this course is to build on the experience gained in production pipeline procedures in PRJ 201/251 as well as the modeling and animation skills developed in CG 225 and CG 275. Students will apply skills learned concurrently in ART 300 and CG 300 to produce an animated short film of limited duration.

PRJ 350 - Three-Dimensional Animation Production (5 Cr.)

Prerequisite(s): ART 300, CG 300, & PRJ 300

PRJ 350 is a continuation of the production started in PRJ 300 where students have completed the pre-production phase of their projects. Students will now focus on completing the work on their projects through to final rendering and post-production. Students will address the realities of commercial art direction, quality control, and production deadlines, as well as technical challenges.

PRJ 400 - Capstone Project I (5 Cr.)

Prerequisite(s): ART 350, ENG 116, PRJ 350, & Senior class standing

Working effectively as producers, the Animation Faculty team will select from student submissions one or more team projects to be produced. They will then assign students to specific teams, based upon their artistic strengths and career goals. Wherever possible, individual students will be introduced to specialist advisers from outside the faculty.

Each student's individual effort will be assessed as well as the overall teamwork and professional success of the team. As in a professional work environment, student teams will not be allowed to exclude individual members due to production conflicts or performance. The faculty alone will retain the right to remove a team member for failure to perform.

PRJ 450 - Capstone Project II (5 Cr.)

Prerequisite(s): ART 401, PRJ 400, & Senior class standing

Having completed the pre-production work for a team-based animated production in PRJ 400, students will complete final rendering and post-production. Students will face the challenges of commercial art direction, quality control, production deadlines, and team dynamics, as well as the many technical challenges.

PRJ 475 - Summer Animation Team Production (3 Cr.)

Prerequisite(s): Interview by permission of department chair, Portfolio evaluation, & Two full-time semesters

This advanced projects class will allow students to gain invaluable experience and knowledge on a short animated film (approximately one to two minutes) in a professional production setting. The instructor will direct and supervise the film, and students will carry out staff roles as designers, layout/ lighting artists, animators, riggers, modelers, and texture artists. This is an opportunity for students to work in a professional setting, which fosters responsibility, teamwork, and artistic excellence.

Department of Computer Science

COMPUTER SCIENCE

CS 101 - Introduction to Computer Environment (1 Cr.)

Prerequisite(s): None

This course provides students with an introductory overview of the fundamental elements on which computers are based. Topics covered by the curriculum include basic computer hardware systems, operations, and structures. An introduction to basic programming logic is also included. This knowledge will provide students with a well-rounded overview of how computers operate.

CS 115 - Introduction to Scripting and Programming (3 Cr.)

Prerequisite(s): CG 350

This class introduces programming environments to students who are not experienced programmers. This course will cover simple logic, programming flow, and the use of variables. It will introduce students to the history of programming and the basic vocabulary of the programming industry. The course culminates in a series of hands-on exercises using this knowledge to solve problems. At his or her discretion, the instructor may cover special topics in programming or scripting. Credit may be received for CS 115 or for CS 120, but not for both.

CS 120 - High-Level Programming I - The C Programming Language (3 Cr.)

Concurrent Course(s): CS 120L

In presenting the C programming language, this course serves as a foundation for all high level programming courses and projects. It provides the fundamentals in programming, including control flows (such as statement grouping, decision making, case selection, procedure iteration, and termination test) and basic data types (such as arrays, structures, and pointers). Additionally, it will discuss intensively the lexical convention, syntax notation, and semantics.

CS 120L - High-Level Programming I Lab (1 Cr.)

Concurrent Course(s): CS 120

CS 120L is the lab component of the introductory High-Level Programming I course. Students will meet for two hours weekly to apply the concepts presented in CS 120 in a controlled environment.

CS 170 - High-Level Programming II - The C++ Programming Language (3 Cr.)

Prerequisite(s): CS 120

Concurrent Course(s): CS 170L

This course is a continuation of High Level Programming I (CS 120). It introduces the C++ language with particular emphasis on its object-oriented features. Topics covered include stylistic and usage differences between C and C++, namespaces, function and operator overloading, classes, inheritance, class and function templates, STL lists, and vectors. Concurrent enrollment in CS 170L is required.

CS 170L - High-Level Programming II Lab (1 Cr.)

Concurrent Course(s): CS 170

CS 170L is the lab component of the High-Level Programming II course. Students will meet weekly to work on topics presented in the CS 170 lectures in a lab environment.

CS 180 - Operating System I, Man-Machine Interface (3 Cr.)

Prerequisite(s): CS 100or CS 101 & CS 120

This course presents an overview of modern operating systems, in particular Windows and Linux/Unix as implemented on modern PCs. After an overview of what an operating system is and does, we cover the following: organization and design (the kernel and various subsystems), process management (creation and management of processes and threads, including an introduction to multi-threaded programming), networks (the TCP/IP stack and the organization of the Internet), interprocess communication, process synchronization (locks, semaphores, and methods to avoid deadlocks), memory management (hardware and process views of memory layout and demand-paged virtual memory), file systems, and security and protection (viruses, worms, and Trojan horses).

CS 200 - Computer Graphics I (3 Cr.)

Prerequisite(s): CS 170 & MAT 140

CS 200 presents fundamental mathematical elements, data structures, and algorithms useful for animating and viewing two dimensional primitives. The course aims to fulfill two objectives. The first objective is to provide students with a sufficient mathematical and algorithmic background to design and implement 2D graphics applications. The second objective is to prepare students with the knowledge required for writing three dimensional graphics applications. The first half of the course deals with scan-conversion algorithms for rasterizing 2D primitives such as lines, circles, ellipses, triangles, and arbitrary polygons. The second half of the course is concerned with the viewing and animation of these 2D primitives. The course covers topics such as interpolation techniques, transformations, culling, clipping, animation techniques, and the 2D viewing pipeline.

CS 225 - Advanced C/C++ (3 Cr.)

Prerequisite(s): CS 170

This course builds on the foundation created in the first two high-level programming courses (CS 120/170). It presents advanced topics of the C/C++ programming language in greater detail. Such topics include advanced pointer manipulation, utilizing multi-dimensional arrays, complex declarations, and standard library functions. Advanced C++ topics include class and function templates, operator overloading, multiple inheritance, runtime type information, the standard template library, and performance issues.

CS 230 - Game Implementation Techniques (3 Cr.)

Prerequisite(s): CS 120

Concurrent Course(s): CS 170

CS 230 presents game implementation techniques and engine architecture. Students will investigate foundational concepts of game architecture, such as game-system component separation and game flow, while learning about essential elements such as the game state manager, input/output handler, and frame rate controller. CS 230 introduces Windows programming, state machines, and collision detection algorithms, which students will integrate into their own remakes of classic games. As part of their implementation, students will create and expand their own collision, vector, and matrix libraries, enabling them to incorporate basic physics engines. Students will survey concepts in space partitioning, particle systems, map editors, and other elements as a bridge to more advanced concepts in implementation techniques and engine architecture.

CS 245 - Introduction to Interactive Sound Synthesis (3 Cr.)

Prerequisite(s): CS 170, CS 180, MAT 140, & PHY 200

This course explores dynamic sound synthesis, 3D-directional auditory effects, and sonic ambience to real-time simulation and video games. The subjects include mixing audio and modulating dry recorded sounds using wave table synthesis. Students will learn how to create collision sounds using additive synthesis, wind effects using subtractive synthesis, natural sounds using granular synthesis and physical modeling, ambiences using layering and spectral filtering, 3D spatialized surround sound panning,

inter-aural time difference, inter-aural intensity difference, and Head Related Transforms (HRTFS). Students will also study algorithms and techniques for real-time multi-threaded programming and synthesized sound integration for the game engine.

CS 250 - Computer Graphics II (3 Cr.)

Prerequisite(s): CS 200

CS 250 examines the mathematical elements and algorithms used in the design and development of real-time three dimensional computer graphics applications such as games, cockpit simulators, and architectural walk-throughs. 3D computer graphics involve drawing pictures of 3D objects, usually on a 2D screen. This process of generating a 2D image of a 3D graphics application can be described as a series of distinct operations performed on a set of input data. Each operation generates results for the successive one. This process is called the graphics rendering pipeline, and it is the core of real-time computer graphics. The graphics pipeline can be conceptualized as consisting of three stages: application, transformation, and rasterization. The course begins by introducing the 3D graphics pipeline. The application stage is examined from the viewpoint of the representation, modeling, and animation of 3D objects. Topics considered include user interaction, camera animation techniques, simulation of dynamic objects, and collision detection techniques. Next, the course examines the process of mapping 3D graphic objects from model-space to viewport coordinates. The transformation stage implements this process. Finally, the conversion of a geometric primitive in viewport coordinates into a 2D image is studied. The rasterization stage implements this final process.

CS 260 - Computer Networks I, Interprocess Communication (3 Cr.)

Prerequisite(s): CS 170

This course introduces the hierarchical network communication in a distributed computing environment. Course topics cover network technologies, architecture, and protocols. The curriculum will give specific emphasis to the TCP/IP stack and in making students familiar with writing portable socket based software. It prepares students for programming multi-player games in later semesters.

CS 261 - Computer Networks II (3 Cr.)

Prerequisite(s): CS 260

This class extends the TCP/IP protocols studied in CS 260 to wireless devices. This course goes further in depth into some topics covered in the introductory networks course as well as additional subjects of interest. Topics include TCP/IP related protocols such as NAT, WAP, and DNS; physical media access such as aloha, OFDM, and WIDEBAND; wireless standards and protocols; and network security. The curriculum will cover additional topics based on the state of the industry.

CS 280 - Data Structures (3 Cr.)

Prerequisite(s): CS 220 or CS 225

This course introduces the classical abstract data types (ADT) in computer science. ADTs provide the hierarchical views of data organization used in programming. Among the topics covered are the algorithms and primitives of the data structures for arrays, linked lists, stacks, queues, trees, hash tables, and graphs. In addition, the course provides an introduction to algorithm complexity and notation.

CS 300 - Advanced Computer Graphics I (3 Cr.)

Prerequisite(s): CS 250

This course introduces students to algorithms that are essential to creating photorealistic images in interactive simulations. Topics covered include an overview of modern GPU (graphics processor unit) architecture and the common graphics APIs used, including OpenGL and DirectX. Rendering techniques covered include texturing, illumination models, transparency, shading algorithms, mapping techniques (bump mapping, environment/reflection mapping, etc.), and shadows. Students will learn how to implement all algorithms by using vertex and pixel shaders.

CS 311 - Introduction to Databases (3 Cr.)

Prerequisite(s): CS 170

This course provides students with a broad overview of database systems. It presents the fundamentals, practices, and applications of computer databases. Topics include database architectures, data modeling, design schemes, relational algebra, query languages, transaction processing, and database implementation. Students will explore massively multiplayer online games (MMOG) to examine a case study of database design and implementation.

CS 315 - Low-Level Programming (3 Cr.)

Prerequisite(s): CS 100, CS 100L, CS 120, CS 120L, & CS 180

This course introduces students to microprocessor architecture as well as the knowledge required to directly address and program the microprocessor and the various hardware devices connected to it. Since the resulting code is usually faster than similar code written in a high-level language such as C or C++, low-level programming has great importance in improving the response speed of real-time interactive programs. In this course, students program a microprocessor used to control a hand-held gaming device. The processor used is typically an 8-bit machine, which is easier to understand than 32 or 64-bit machines, but uses the same principles. Topics include registers, instruction set, addressing modes, the stack, I/O ports, interrupts, graphics, animation, collision detection, scrolling, and windowing. There is also a brief introduction to the instruction sets used on larger machines.

CS 330 - Algorithm Analysis (3 Cr.)

Prerequisite(s): CS 225 or CS 270, CS 280, & MAT 200 or MAT 230

This course provides students with an introduction to the analysis of algorithms, specifically proving their correctness and making a statement about their efficiency. Topics for discussion may include loop invariants, strong mathematical induction and recursion, asymptotic notation, recurrence relations, and generating functions. Students will examine examples of algorithm analysis from searching and sorting algorithms.

CS 350 - Advanced Computer Graphics II (3 Cr.)

Prerequisite(s): CS 300

This course deals with the efficient representation and processing of complex 3D scenes in order to avoid bottlenecks in the use of the CPU and the GPU. Specific topics include a variety of spatial data structures (binary space-partitioning trees, octrees, kd-trees, and grid data structures), several object-culling methods (occlusion, viewport, and portal), and finally the construction and uses of bounding volumes and their hierarchies for collision detection and related geometric operations.

CS 365 - Software Engineering (3 Cr.)

Prerequisite(s): CS 225 or CS 270

This course covers a wide range of topics in software engineering from the practical standpoint. It encompasses project management issues as well as technical development principles and methods. Topics include system architecture, security, methodologies and notation, UML, object oriented analysis and design, requirements analysis, implementation, verification, validation, maintenance, and software engineering standards. Risk management and iterative design receive special emphasis. Student teams will apply acquired knowledge to a substantial project.

CS 370 - Computer Imaging (3 Cr.)

Prerequisite(s): CS 280

The course will be taught at the upper division/ graduate level and will bring image analysis and image processing into a unified framework that provides a useful paradigm for both computer vision and image processing applications. Course material covers methods students can apply in creating special effects with digital images and preparing graphics information for either human or computer interpretation. Course content covers both image processing, which transforms an image, and computer vision, which extracts a measurement or description.

CS 380 - Artificial Intelligence for Games (3 Cr.)

Prerequisite(s): CS 225 & CS 280

This course will introduce students to a wide range of concepts and practical algorithms that are commonly used to solve game AI problems. Case studies from real games will be used to illustrate the concepts. Students will have a chance to work with and implement core game AI algorithms. Topics covered will include the game AI programmer mindset, AI architecture (state machines, rule-based systems, goal-based systems, trigger systems, smart terrain, scripting, message passing, and debugging AI), movement, pathfinding, emergent behavior, agent awareness, agent cooperation, terrain analysis, planning, and learning/adaptation.

CS 381 - Machine Learning (3 Cr.)

Prerequisite(s): CS 280

This course deals with constructing computer programs that automatically improve with experience. Observed events are used to inductively construct decision trees, which can be used by computer-controlled game characters to change behaviors. Students will explore concept learning, partial ordering, reinforcement learning, conditional probability, Bayesian learning, the evaluation of hypotheses and instance-based learning. Types of neural networks examined include perceptrons, back-propagation, radial basis functions, and adaptive resonance theory. We demonstrate the effectiveness of genetic algorithms and show the power of a neuro-genetic approach. The class concludes by looking at inductive analytical learning.

CS 391 - Code Analysis and Optimization (3 Cr.)

Prerequisite(s): CS 280 & CS 315

This course focuses on understanding the details of the computer, compiler, and language, specifically how to apply these toward the practical problem of solving crashes and performance issues. The emphasis is not only on knowing what and why, but also on taking that knowledge and creating useful tools and techniques for solving these problems.

CS 399 - Special Topics in Computer Science (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.

CS 420 - Graphics File Format and Data Compression Techniques (3 Cr.)

Prerequisite(s): CS 250 & CS 280

This course covers data compression techniques for still images and multimedia. Students will learn the theory behind data compression and how it is used in specific formats. Methods covered include run-length encoding, Huffman coding, dictionary compression, transforms, and wavelet methods. Students will learn these techniques by examining various popular graphic file formats, such as BMP, JPEG, DXTn, and MPEG.

CS 460 - Advanced Animation and Modeling I (3 Cr.)

Prerequisite(s): CS 300, GAT 300, & MAT 300

3D animation and modeling play significant roles in computer simulation and video game software. Game developers need to have a comprehensive understanding of these techniques. This course introduces algorithms for specifying and generating motion for graphical objects. It addresses practical issues, surveys accessible techniques, and provides straightforward implementations for controlling 3D moving entities with different characteristics. The class covers two broad categories. Students will first learn an interpolation-based technique, which allows programmers to fill in the details of the motion or shape once the animator specifies certain basic information, such as key frames, paths, coordinate grids, or destination geometry. Then they will learn a behavior-based technique, which generates motion that satisfies a set of rules, such as kinematics, physics, or other constraints.

Department of Digital Arts

COMPUTER GRAPHICS

CG 125 - Introduction to 3D Production for Designers (3 Cr.)

Prerequisite(s): ART 125 or ART 126

Concurrent Course(s): CG 102

This course introduces game design students to current software and production process of 3D animation, with a focus on implementing the art assets into a game engine. The course begins with basic information such as interface organization strategies, equipment options, and production elements. Then it introduces techniques for texture mapping, modeling, rigging, lighting, cameras, and animation. Additionally, it looks at basic interface customization options and strategies in 3D graphics, culminating in a series of applied problems in 3D production techniques.

CG 201 - Two-Dimensional Raster Graphics and Animation (3 Cr.)

Prerequisite(s): ANI 151, ART 101, & ART 125

This course introduces students to the industry-standard software and practices of raster graphics and animation. The course begins with basic information such as interface organization strategies, system components, bit depth, resolution, memory management, and output strategies. Then it explores techniques and critical thinking skills for digital painting, scanning, still compositing, and texture creation. Additionally, it looks at basic interface customization options and strategies in 2D raster graphics.

CG 225 - Introduction to 3D Animation (3 Cr.)

Prerequisite(s): ANI 151, ART 101, & ART 125

This course introduces students to the industry-standard software and practices of 3D animation. The course begins with basic information such as interface organization strategies, equipment options, and production elements. Then it introduces techniques and critical thinking skills for texture mapping, modeling, rigging, lighting, cameras, and animation. Additionally, it looks at basic interface customization options and strategies in 3D graphics, culminating in a series of applied problems in 3D production techniques.

CG 251 - Two-Dimensional Vector Graphics and Animation (3 Cr.)

Prerequisite(s): CG 201

This course examines the principles and practices of 2D vector graphics and animation. It will introduce students to industry standard software, output options, and production strategies for using vector graphics in both graphic design and animation. The course will give special consideration to critical thinking and refinement strategies when modifying vector images. Students will examine methods of using vector-based tools for creating web and broadcast animation, and the course concludes with a series of applied problems in 2D vector animation.

CG 275 - Three-Dimensional Character Animation (3 Cr.)

Prerequisite(s): CG 105 or CG 225

Students will continue to explore and exercise the concepts and techniques of 3D animation through a series of assignments applied to characters. Exercises in this course will be considerably more demanding than those completed in CG 125 as they will be longer and require more refinement, subtlety, and creativity. The course will emphasize character development - the expression of personality, mood, thought, and attitude through motion and posing. It will also give special consideration to proper model rigging.

CG 300 - Three-Dimensional Environment and Level Design (3 Cr.)

Prerequisite(s): CG 275

This course introduces students to the principles of 3D environment design. Theatrical sets, architectural simulations, and level design will all be considered. In order to provide students with a broader skill set, this course also presents the "mechanics" of how to use another 3D animation program, with an emphasis on the unique strengths of the package. Students will explore the comparative strengths of different software packages and the impact that this has on workflow. The course will emphasize critical thinking skills and strategies for tool selection.

CG 305 - Digital Sculpture (3 Cr.)

Prerequisite(s): CG 275

This course introduces an array of digital modeling, sculpting, and painting techniques with a set of industry-standard 3D and 2D tools. After a series of exercises, students will learn the tools and workflow of digital sculpting and will enhance their knowledge of anatomy. As part of this class, students will create a highly finished 3D character that is fully designed, modeled, posed, sculpted and textured. They will also demonstrate knowledge of environmental sculpting.

CG 315 - Texturing for 3D (3 Cr.)

Prerequisite(s): CG 201 & CG 275

This class will focus on how to generate efficient and accurate texture maps. Students will explore techniques for generating landscape, architectural, objects, and character based textures. Topics will include: clamped textures, tileable textures, advanced methods for generating normal maps, z-depth, displacement, and emissive type textures. Students will explore UV mapping, unwrapping, multi-layered shaders, animated texturing methods, use of photo reference, manipulation, compositing and other techniques to create complex textures.

CG 350 - Graphics for Gaming (3 Cr.)

Prerequisite(s): CG 300

This course examines the unique problems of creating graphics for games, and it teaches effective production techniques for addressing these issues.

Department of Fine Arts

ART

ART 101 - The Language of Drawing (3 Cr.)

Prerequisite(s): None

This course explores the nature of drawing as a language skill and the use of drawing by production artists and animators. Applied drawing goals and critical thinking skills will be given special consideration. Students will be introduced to basic professional habits in drawing practice, drill, and play. Design principles, basic research, and the design process will be introduced and applied to a series of practical problems. This course also explores basic drawing materials, drawing strategy, drawing sequence, linear drawing methodology, practice, and theory.

ART 115 - Art and Technology (4 Cr.)

Prerequisite(s): None

This course provides an overview of art history from Paleolithic times until the modern day. It traces the technological advances of society and art and considers the interplay between art and technology. Classical art materials and methods will be examined, and students will explore how art has historically impacted society. This course has a worldwide scope and is not limited to just European and Western traditions.

ART 125 - Tone, Color, and Composition (3 Cr.)

Prerequisite(s): ART 101

This course continues to build upon students' abilities to draw by exploring the nature and use of tone, color, and composition in drawing. It emphasizes methods of creating tone, ways to use luminance as an organizational element, and the importance of thinking critically. Additionally, the course will introduce students to a variety of classical tonal systems and tonal illusions, including atmospheric perspective, sculptural modeling, basic direct lighting, lighting position relative to viewpoint, light intensity, local value, and reflectivity. Students will then explore the artistic use of color. The course will cover systems and traditions of organizing hue and saturation, and it will examine methods of building from tonal preliminary studies. Students also will explore classical forms of compositional organization such as symmetry, asymmetry, golden mean, and figure-ground relationships.

ART 151 - Basic Life Drawing (3 Cr.)

Prerequisite(s): ART 101

This course introduces students to the challenges of drawing the human form for animation. Students will examine life drawing for animation in addition to methods for attaining these goals. The course will emphasize capturing skeletal structure, muscle form, emotion, and gesture. Using clothed and nude models of both genders, students will learn to apply lessons in anatomy to the figure, significantly expanding their understanding of human kinetics and structure. Additionally, students will practice extrapolating basic human life drawing strategies to other animals.

ART 201 - Advanced Life Drawing (3 Cr.)

Prerequisite(s): ART 125 & ART 151

This course builds upon the anatomy and drawing courses students have already taken. Students will continue to improve their ability to capture kinetics in humans and animals. By engaging in a series of exercises designed to enhance their visual memory, students will build the foundation for drawing accurate figures from their imagination. They will also explore putting the figure into an environment, figurative composition, and introductory sequential figurative composition.

ART 210 - Art Appreciation (2 Cr.)

Prerequisite(s): None

This introduction to art will provide students with a better understanding of the artistic influences upon our modern culture. Along with the history of art, students will study the meanings, purposes, styles, elements, and principles of art and the various media used to create works of art. In helping students gain basic awareness, knowledge, and enjoyment of the visual arts, the course will provide the groundwork for further personal study in the arts. In turn, this will influence the development of their creativity.

ART 225 - Three-Dimensional Design and Sculpture (3 Cr.)

Prerequisite(s): ART 201

This course introduces students to the principles of 3D design using both traditional and digital tools. Students will become acquainted with additive, subtractive, and cast sculpture. They will consider the basic concepts of architectural space, interior design, landscape design, surface interplay with light, lofted forms, and skinning systems. Students will use modern polymer clays and build an animation maquette.

ART 228 - Figurative Sculpture (3 Cr.)

Prerequisite(s): ART 101 & BIO 150

This course introduces students to the challenges of sculpting the human figure from life. Using traditional techniques to build an armature and complete a sculpture in clay, students will enhance their understanding of the human form in three-dimensional space. Emphasis will be placed on gesture, proportion, and anatomy as well as developing a strong sense of form and volume.

ART 230 - Painting (3 Cr.)

Prerequisite(s): ART 125

This course explores ideas and various techniques related to painting. The use of color and the representation of space will be emphasized. Students will explore masterworks, studio painting, and painting en plein aire. Technical and social problems related to painting will be explored using portraiture, still life, and environment/landscape. A portable field easel and appropriate painting supplies will be required. The course will culminate in a group show of student projects.

ART 251 - Character Design (3 Cr.)

Prerequisite(s): ART 201

Students will leverage their drawing and anatomy knowledge to the creation of animation characters. This course introduces student to the traditions of character design and the basic structural strategies for creating animation characters. Students will explore simplification gradients relative to human, animal, and inanimate object-based characters. They will consider issues of costume, personality, and story interaction. The course will emphasize professional applications, techniques, and standards of quality. The work completed in this course will serve as pre-production design for PRJ 300, PRJ 350, or ANI 300.

ART 260 - Graphic Design, User Experience, and Input (3 Cr.)

Prerequisite(s): None

Students will explore elements of visual design and apply them to computer user interfaces. They will analyze various types of sensory interfaces and improve their skills in creating representations of information valuable to a system user. Additionally, emphasis will be placed on the overall enjoyment of the user experience, plus consideration towards relating the user experience to the theme of the game or system. Students will learn how to use various industry-standard languages related to prototype interfaces.

ART 300 - Perspective, Backgrounds, and Layouts (3 Cr.)

Prerequisite(s): None

This course explores the animation pre-production skills of background and layout art. Students will review classical depth cue and perspective systems and apply this knowledge to the creation of animation backgrounds and layouts. Additionally, students will explore means of using drawing to create camera lens illusions, architectural space, theatrical sets, level design, matte painting, and surface texture. The course will emphasize professional applications, techniques, and standards of quality. The work completed in this course will serve as pre-production design for PRJ 300, PRJ 350, or ANI 300.

ART 301 - Concept Art Resources (3 Cr.)

Prerequisite(s): ART 251, CG 201 &CG 275

This course will build upon all art disciplines, primarily 2D related skills, to prepare students for positions requiring the creation of concept art. Emphasis will be placed on the importance of balancing speed of content generation with quality, as this if one of the most pressing and relevant challenges in this field. With this mindset, students will be challenged to evaluate and understand new forms of character and environment generation. Both theory and technique will be heavily stressed during this course, with the final tangible outcome being multiple portfolio pieces that demonstrate the individual's abilities and unique style/interests.

ART 350 - Storyboards (3 Cr.)

Prerequisite(s): ART 201, ENG 116, & FLM 151

This course explores the animation pre-production skills of storyboard art. Students will leverage their knowledge of drawing, storytelling, and cinematography to create both production and presentation storyboards. They will also explore means of using drawing to create story flow, character development, mood, time, and place. The course will emphasize professional applications, techniques, and standards of quality. The work completed in this course will serve as pre-production design for PRJ 300, PRJ 350, or ANI 300.

ART 400 - Drawing Fundamentals (2 Cr.)

Prerequisite(s): None

The development of strong drawing skills is of extreme importance since they are essential tools for expressing ideas, particularly during the pre-production stages of an animation project. Therefore, this course presents the basic elements of drawing and graphic design in order to improve the student's practical ability to draw with skill and imagination. It will cover methods of observing, describing, and organizing forms using various mediums such as pencil, charcoal, and color pencils.

ART 401 - Conceptual Illustration and Visual Development (3 Cr.)

Prerequisite(s): ART 300

This course explores the animation pre-production skills of conceptual illustration and visual development. Students will apply their knowledge of drawing, storytelling, and composition to create speculative drawings for animation. They will review compositional systems, design process, and illustration techniques. Additionally, students will explore means of using drawing to visually explore story and character ideas from both existing and original story materials. They will also consider adaptation, stylization, and visual variety. The course will emphasize professional applications, techniques, and standards of quality. The work completed in this course will serve as pre-production design for PRJ 300, PRJ 350, or ANI 300.

ART 450 - Portfolio (3 Cr.)

Prerequisite(s): PRJ 350

Students will use this course to compile the elements of their professional portfolio, which will serve as their B.F.A. thesis. Additionally, this course will introduce students to the marketing campaign needs of modern animation portfolios including visual continuity, business documents, traditional still art portfolios, process and practice samples, digital portfolios, web sites, demo reels, and promotional items. They will use this knowledge to assemble their own portfolios. The course will also cover related information regarding job interviews, trade shows, professional standards, and contract negotiation.

Department of Game Software Design and Production

GAME SOFTWARE DESIGN AND PRODUCTION

GAM 100 - Project Introduction (3 Cr.)

Prerequisite(s): None

This class presents an overview of the way the game development industry works and a history of game development. It will expose students to the positions and job responsibilities that each member of a game development team has along with the industry requirements for the creation of a game design document (GDD) and a technical design document (TDD). Over the course of the semester, the instructor will organize students into teams responsible for designing and developing text-based games, complete with a functional GDD and TDD, schedule, and milestones. Additionally, each student will create individual games using the ProjectFUN game development environment created by DigiPen. Games created via ProjectFUN will be graphical in nature, serving to enhance the student's retention of C/C++ coding techniques and math functions taught in the first semester CS and MAT classes.

GAM 150 - Project I (3 Cr.)

Prerequisite(s): CS 120 & GAM 100

Continuing with the teams to which they were assigned in GAM 100, each team will prepare a GDD and TDD for one team-based project. Teams will complete the approved game design according to the schedule they will establish in their technical design. They will present these completed games to the Institute during the final week of the semester. Additionally, each student will design and develop smaller projects using a variety of tools. These projects reinforce the game design and implementation curriculum.

GAM 200 - Project II (4 Cr.)

Prerequisite(s): CS 170, CS 230, GAM 150, & MAT 140

This project is divided into two semesters and focuses on the creation of a simple real-time game/simulation with 2D graphics for the PC platform (3D games are not allowed). Students will work together on teams of three or four members and implement technical features such as audio effects, music playback, pattern movement, simple artificial intelligence, same-machine multiplayer (networking is not allowed), particle systems, scrolling, and simple physics. All projects must be written with a core of C/C++ code and cannot use middleware such as pre-existing physics engines, networking engines, etc. In addition, students will continue to learn about effective team communication, planning, documentation, play-testing, and iterative software development techniques.

GAM 250 - Project II (4 Cr.)

Prerequisite(s): CS 225 & GAM 200

Continuation of GAM 200. This project is divided into two semesters and focuses on the creation of a simple real-time game/simulation with 2D graphics for the PC platform (3D games are not allowed). Students will work together on teams of three or four members and implement technical features such as audio effects, music playback, pattern movement, simple artificial intelligence, same-machine multiplayer (networking is not allowed), particle systems, scrolling, and simple physics. All projects must be written with a core of C/C++ code and cannot use middleware such as pre-existing physics engines, networking engines, etc. In addition, students will continue to learn about effective team communication, planning, documentation, play-testing, and iterative software development techniques.

GAM 300 - Project III (5 Cr.)

Prerequisite(s): CS 200, CS 260, CS 280, GAM 200, & PHY 200

This project is divided into two semesters and focuses on the creation of an advanced real-time game/simulation with 3D hardware-accelerated graphics for the PC platform. RTIS students will work together on teams of three to five members and implement technical features such as networking, artificial intelligence, and physics. All projects must be written with a core of C/C++ code and cannot use middleware such as pre-existing physics engines, networking engines, etc. In addition, students will continue to learn about effective team communication, planning, documentation, play-testing, and iterative software development techniques.

GAM 350 - Project III (5 Cr.)

Prerequisite(s): GAM 300

Concurrent Course(s): CS 250

Continuation of GAM 300. This project is divided into two semesters and focuses on the creation of an advanced real-time game/simulation with 3D hardware-accelerated graphics for the PC platform. RTIS students will work together on teams of three to five members and implement technical features such as networking, artificial intelligence, and physics. All projects must be written with a core of C/C++ code and cannot use middleware such as pre-existing physics engines, networking engines, etc. In addition, students will continue to learn about effective team communication, planning, documentation, play-testing, and iterative software development techniques.

GAM 390/490 - Internship I/II (5 Cr.)

Prerequisite(s): GAM 200 & GAM 300

An internship is any carefully monitored work or service experience in which an individual has intentional learning goals and reflects actively on what she or he is learning throughout the experience. It is usually a professional activity under general supervision of an experienced professional and in a job situation, which places a high degree of responsibility on the student. Internships are well structured along the Internship Guidelines available in the Administration Office.

GAM 400 - Project IV (5 Cr.)

Prerequisite(s): CS 250 & GAM 300 or GAM 352 &GAT 251

This project is divided into two semesters and focuses on the creation of an innovative game, simulation, or demo. Students may use current software and hardware technologies with instructor approval, such as web technologies, gaming consoles, mobile devices, and commercial physics engines. These technologies can be used to implement technical features such as 3D animation, advanced lighting and rendering, full 3D physics, high-performance networking, and advanced AI algorithms. Innovation can also come from the design, visuals, and/or audio components of the project. Students will work independently or in teams, as appropriate to the scope of their project. In addition, students will learn about working in the industry, interviewing, resumes, personal networking, and career strategies.

GAM 450 - Project IV (5 Cr.)

Prerequisite(s): GAM 400

Continuation of GAM 400. This project is divided into two semesters and focuses on the creation of an innovative game, simulation, or demo. Students may use current software and hardware technologies with instructor approval, such as web technologies, gaming consoles, mobile devices, and commercial physics engines. These technologies can be used to implement technical features such as 3D animation, advanced lighting and rendering, full 3D physics, high-performance networking, and advanced AI algorithms. Innovation can also come from the design, visuals, and/or audio components of the project. Students will work independently or in teams, as appropriate to the scope of their project. In addition, students will learn about working in the industry, interviewing, resumes, personal networking, and career strategies.

GAME APPLICATION TECHNIQUES

GAT 300 - 3D Computer Animation Production I (3 Cr.)

Prerequisite(s): None

This course introduces students to the basic theories and techniques of 3D computer animation. The curriculum emphasizes standard 3D modeling techniques, including polygonal and spline modeling, texture map creation and application, keyframing, and animating through forward kinematics and inverse kinematics. Earlier catalogs listed this course as GEN 300.

GAT 350 - 3D Computer Animation Production II (3 Cr.)

Prerequisite(s): GAT 300

This course builds on the fundamentals taught during GAT 300. Students will learn about key framing, special effects, final rendering, and recording.

GAT 388 - Portable Game System Programming -- Introduction to Portable Game System Development (3 Cr.)

Prerequisite(s): CS 250 & GAM 250

This course introduces students to portable game system programming, which is different from PC programming due to the embedded system of the machine. Students will learn to deal with a very limited amount of memory and CPU power, as well as programming for a limited graphics engine. Additionally, students will learn how to use the 3D graphics engine of a portable game system and how to merge both 2D and 3D objects into the same buffer. During the course, several topics specific to portable game systems will be discussed, such as wireless capabilities and sound/character recognition functionality.

GAT 399 - Special Topics in Game Application Techniques (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.

GAT 480 - Senior Portfolio (1 Cr.)

Prerequisite(s): Completion of 100 semester credits

This one-credit course covers portfolio development for game designers. Students will organize and present their work in online, paper, and electronic media. Resumes, cover letters, interviewing, and job preparation skills are also covered.

GAT 488 - Console Programming - Introduction to Console Development (3 Cr.)

Prerequisite(s): CS 350 & GAM 350

This course introduces students to the game development process on a gaming console platform. It covers both the technical features and design considerations of console development. Topics covered include an overview of game console hardware and comparison with the PC environment, memory management, asynchronous data loading, graphics API, reading optical and motion sensor data, optimization, and NAND data management. As students learn the material, they will work on a game project that takes advantage of the unique capabilities of gaming consoles.

Department of Humanities and Social Sciences

COMMUNICATIONS

COM 150 - Interpersonal and Work Communication (3 Cr.)

Prerequisite(s): ENG 110 or Equivalent

Students will explore how their culture, gender, economic status, age and other personal characteristics influence their work communications. The course will explore verbal and non-verbal communication skills in a global work environment. Students will learn written communication techniques most effective for use in the technology workplace. Additionally, students will explore and practice negotiation skills, both internally and externally to their workplace.

ENGLISH

ENG 110 - Composition (3 Cr.)

Prerequisite(s): None

George Leonard, a leading writer on education, wrote, "To learn is to change. Education is a process that changes the learner." Writing is also a process that changes the writer. In this practical course in composition, students will spend time generating ideas for writing, sharing and critiquing their writing and ideas, revising their ideas, and learning more about themselves as a result. The course will emphasize using writing as a tool to explore and discover their thought processes, beliefs, and world concepts. Students will employ writing as a tool to develop critical thinking skills. In the process of organizing ideas and, subsequently, manifesting those ideas into various compositional styles and forms, students will become conscious of the concepts which have shaped and are continually shaping their personal realities.

ENG 150 - Mythology for Game Designers (3 Cr.)

Prerequisite(s): ENG 110

The power of myth resides in its ability to touch the essence of our humanity and put meaning into our lives. Artists, filmmakers, game designers, and writers have appropriated elemental mythological premises and updated them to create modern myths accessible to contemporary audiences. Whether we are playing a role-playing game wherein the task is to rescue the princess and save the planet, reading the latest cyberpunk novel, or watching an animated Disney classic, the power of mythology touches our psyches. This course is an overview and analysis of cross-cultural mythology presented as poetry, prose, film, drama, and game. This class will provide an in-depth discussion of the idea that myths have influenced cultures of the past and continue to inform and influence our culture today. It also will examine the practical use of myth. Additionally, it will emphasize the mono-myth of the hero's journey and how a game developer may redefine the archetypal figures and adventures therein and incorporate them in a game design. One central aim of this course is to identify the many characteristics of the hero and suggest reasons why the hero is such a common figure in disparate traditions.

ENG 243 - Epic Poetry (3 Cr.)

Prerequisite(s): ENG 110, ENG 116, or ENG 150

This course provides an introduction to the literary form of the epic poem. Students will gain in-depth knowledge of the form and will apply this experience by adapting the epic's themes and structures into their own creative endeavors, including video games. Students will also produce an epic-based creative work as a final project in the course.

ENG 245 - Introduction to Fiction Writing (3 Cr.)

Prerequisite(s): ENG 110

This course provides an introduction to the study and practice of fiction writing. Students will learn how to analyze characterization, plot, point of view, and other elements of fiction by reading a variety of stimulating works of short fiction. In examining the elements of fiction, students will gain the insights and skills they need to write compelling fiction of their own. Students will complete weekly writing assignments, as well as two full-length short stories. In addition, students will learn how to give and how to receive constructive criticism regarding their creative work. Although the focus will be on the form of the short story, we will also discuss how narrative is employed in graphic storytelling and video games. By the end of the course, students will gain confidence in their ability to analyze, to discuss, and to write short stories. They will acquire a deeper understanding of the creative process, particularly as it applies to writing.

ENG 399 - Special Topics in English (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.

ENG 440 - Advanced Fiction Writing (3 Cr.)

Prerequisite(s): ENG 245, ENG 315, or ENG 340

This course builds upon the concepts and skills taught in previous writing courses. Advanced Fiction Writing offers students the opportunity to further develop their fiction-writing skills by engaging in intensive writing and regular critique of their peers' creative work. The emphasis is on refining narrative writing skills and developing individual style and voice. Students will write three full-length short stories and read contemporary fiction by established authors not discussed in previous courses. Enrollment will be limited to a maximum of twelve students. The limited class size will afford the intensive production schedule and frequent discussion of writing.

ENG 450 - Elements of Media and Game Development (2 Cr.)

Prerequisite(s): None

Relative to modern technological media, the most important issue to consider is the nature of the interactive loop of influence between media and culture. Interactivity is one of the most powerful and important potentials of the game medium, but the term is often used with superficial understanding of its implications. This course emphasizes the nature of interactivity primarily from psychological and sociological perspectives. Students will review and define interactive media using examples drawn from academic research, film, television, and games. Students will have ample opportunity to contemplate and discuss how they can apply a more comprehensive understanding of interactivity in order to surpass the current limits of interactive media products.

HISTORY

HIS 100 - Introduction to World History I (3 Cr.)

Prerequisite(s): None

Covering a wide range of world history (Prehistoric to Middle Ages, Western and Asian Civilizations), this course provides an overview of events, civilizations, and cultures throughout time that form major historical shifts. Students will analyze a series of case studies with particular focus on governments, technology, religion, and culture, and how clashes between these (and other) themes created changes in culture, power, and civilizations. Three major themes connect several topics discussed in this course with those explored in HIS 150: issues of authority and inequality within civilizations; encounters and conflicts between civilizations; and cultural and technological exchanges within and between civilizations.

HIS 150 - Introduction to World History II (3 Cr.)

Prerequisite(s): HIS 100

This course continues the topics covered in HIS 100, covering from approximately 1650 A.D. until present day (Renaissance to present day, Western and Asian Civilizations). Students will analyze a series of case studies with particular focus on governments, technology, religion, and culture, and how clashes between these (and other) themes created changes in culture, power, and civilizations. Three major themes connect several topics discussed in this course with those explored in HIS 100: issues of authority and inequality within civilizations; encounters and conflicts between civilizations; and cultural and technological exchanges within and between civilizations.

LAW

LAW 115 - Introduction to Intellectual Property and Contracts (3 Cr.)

Prerequisite(s): None

The animation and computer software industries are founded upon the principle of intellectual property. This course introduces students to the social concepts and traditions that led to the idea of intellectual property. It surveys the various international legal systems governing intellectual property, giving special consideration to Title 17 and the local statutes that govern copyrights, trademarks, and patents in the United States. Students will grapple with fundamental issues surrounding this field such as fair use, international relations, and economics. The course will also introduce students to a basic overview of contracts including structure, traditions, and vocabulary.

PHILOSOPHY

PHL 150 - Introduction to Philosophy (3 Cr.)

Prerequisite(s): ENG 110

This course will introduce some of the basic philosophical issues and questions related to everyday life. Topics include human nature (self, mind, consciousness, and freedom), values (ethics, morality, and aesthetics), knowledge (reasoning, rationality, and truth), philosophy of science (universe and origins of life), philosophical positions (naturalism, idealism, realism, pragmatism, and existentialism), and philosophy of religion (god(s) and religion). Students will apply these concepts to the philosophical issues related to games and video games, specifically definitional issues, philosophical themes in games, and art in games, among others.

PHL 399 - Special Topics in Philosophy (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.

PSYCHOLOGY

PSY 101 - Introduction to Psychology (3 Cr.)

Prerequisite(s): None

This course introduces major topics in psychology, specifically as they relate to cognition and learning. These topics include perception, cognition, personality and social psychology, and biological aspects of behavior. Students will also be introduced to human information processing, memory, problem solving, attention, perception, and imagery. Other topics covered may include mental representation and transformation, language processing, and concept formation.

SOCIAL SCIENCES

SOS 115 - Media and Ethics: A Social Science Perspective (3 Cr.)

Prerequisite(s): None

This course guides students in the ethical assessment of both the processes and outcomes of social decision-making. After an introduction to basic ethical theories, students will acquire an understanding of the structure of social institutions and the process through which one makes social choices. Central to the analysis is a study of ethics as a criterion for assessment of social decision-making with emphasis on the study of particular issues of social choice. The course also provides a theoretical framework within which to spot and analyze ethical issues in the media.

SOS 150 - Society and Technology (3 Cr.)

Prerequisite(s): None

This course draws on techniques and perspectives from the social sciences, humanities, and cultural studies to explore technology and change in the modern era. In particular, students will examine how technology influences and is influenced by values and cultures in America and abroad. The course will help students recognize the range of consequences that technology in general, and information and communication technology (ICT) in particular, have when shaped and used by individuals, organizations, and society. Through readings, discussion, lectures, and written assignments, students will become acquainted with current controversies related to the socio-cultural dimensions of technology in the "digital era."

While the course examines the impact of technologies—including video gaming and robotics—on the contemporary world, it will also use an historical approach to address some of the technological innovations that have most affected U.S. society in the past. The course will consider how technologies are developed and sustained, and how they interact with and affect our urban culture. Specific themes likely to be addressed include technology's impact on the private and public spheres; the body and the self in cyberspace; and the criteria we use to determine a technology's success, failure, and danger.

SOS 180 - Race and Gender in Twenty-First Century America (3 Cr.)

Prerequisite(s): ENG 110

This course takes a close look at current debates on race, gender, and ethnicity in American society. We will begin with an overview of definitions of race, gender, and ethnicity, exploring what they have meant in the past and what they mean now. We will then examine the intersections between race, gender, and ethnicity, asking the following questions: How do race and ethnicity differ, and how are they related? What difference does race make? How are race and gender related? where does sexual orientation fit into the discourse on gender, and how does it fit into discussions on race and ethnicity?

Current debates on race, gender, and ethnicity were highlighted by the 2008 election of the first African-American president and the ever-growing prominence of women in the highest levels of American politics. Does this mean that we have entered a post-racial era? Where exactly do we stand on women and gender-related issues? What about the place of GLBT issues in the public domain? This course explores these themes and topics.

SOS 399 - Special Topics in Social Sciences (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.

Department of Life Sciences

BIOLOGY

BIO 100 - Visual Perception (3 Cr.)

Prerequisite(s): None

This course explores the nature of human visual perception. Beginning with the physics of light and the anatomy of the human eye, the course examines how human beings process light information and use this data to survive. Additionally, students will examine neurophysiology, perceptual psychology, and artistic traditions. The course will give special consideration to the modern technological and professional uses of this knowledge.

BIO 150 - Human Muscular, Skeletal, and Kinetic Anatomy (3 Cr.)

Prerequisite(s): None

This course explores the skeletal and muscular structures of the human body. Students will learn to identify skeletal and muscular forms from both live models and anatomical references. Additionally, students will consider terminology, structural arrangement, and kinetic function. The course will give special emphasis to adapting this knowledge to the needs of artists and animators.

BIO 200 - Animal Muscular, Skeletal, and Kinetic Anatomy (3 Cr.)

Prerequisite(s): BIO 150

This course introduces the major skeletal and muscular structures of animals. Students will extrapolate their knowledge of the human form to the structure and form of a variety of animal types, specifically focusing upon the impact of locomotion and feeding strategies upon form. Additionally, students will consider terminology, structural arrangement, and kinetic function. The course also considers standard locomotion cycles and the relationship between humans and various animals. It will give special emphasis to adapting this knowledge to the needs of artists and animators.

Department of Mathematics

MATHEMATICS

MAT 140 - Linear Algebra and Geometry (4 Cr.)

Prerequisite(s): None

The two main themes throughout the course are vector geometry and linear transformations. Topics from vector geometry include vector arithmetic, dot product, cross product, and representations of lines and planes in three-space. Linear transformations covered include rotations, reflections, shears and projections. Students will study the matrix representations of linear transformations along with their derivations. The curriculum also presents Affine geometry and affine transformations along with connections to computer graphics. This course also includes a review of relevant algebra and trigonometry concepts. Students may only earn credit for one of MAT 100 or MAT 140.

MAT 150 - Calculus and Analytic Geometry I (4 Cr.)

Prerequisite(s): MAT 100 or MAT 140

This course introduces the calculus of functions of a single real variable. The main topics include limits, differentiation, and integration. Limits include the graphical and intuitive computation of limits, algebraic properties of limits, and continuity of functions. Differentiation topics include techniques of differentiation, optimization, and applications to graphing. Integration includes Riemann sums, the definite integral, anti-derivatives, and the Fundamental Theorem of Calculus.

MAT 200 - Calculus and Analytic Geometry II (4 Cr.)

Prerequisite(s): MAT 150 or MAT 180

This course builds on the introduction to calculus in MAT 150. Topics in integration include applications of the integral in physics and geometry and techniques of integration. The course also covers sequences and series of real numbers, power series and Taylor series, and calculus of transcendental functions. Further topics may include a basic introduction to concepts in multivariable and vector calculus.

MAT 250 - Linear Algebra (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230

This course presents the mathematical foundations of linear algebra, which includes a review of basic matrix algebra and linear systems of equations as well as basics of linear transformations in Euclidean spaces, determinants, and the Gauss-Jordan Algorithm. The more substantial part of the course begins with abstract vector spaces and the study of linear independence and bases. Further topics may include orthogonality, change of basis, general theory of linear transformations, and eigenvalues and eigenvectors. Other topics may include applications to least-squares approximations and Fourier transforms, differential equations, and computer graphics.

MAT 256 - Introduction to Differential Equations (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230

This course introduces the basic theory and applications of first and second-order linear differential equations. The class will emphasize specific techniques such as the solutions to exact and separable equations, power series solutions, special functions and the Laplace transform. Applications include RLC circuits and elementary dynamical systems, and the physics of the second order harmonic oscillator equation.

MAT 258 - Discrete Mathematics (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230

This course gives an introduction to several mathematical topics of foundational importance in the mathematical and computer sciences. Typically starting with propositional and first order logic, the course considers applications to methods of mathematical proof and reasoning. Further topics include basic set theory, number theory, enumeration, recurrence relations, mathematical induction, generating functions, and basic probability. Other topics may include graph theory, asymptotic analysis, and finite automata.

MAT 300/500 - Curves and Surfaces (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course is an introduction to parametrized polynomial curves and surfaces with a view toward applications in computer graphics. It will discuss both the algebraic and constructive aspects of these topics. Algebraic aspects include vector spaces of functions, special polynomial and piecewise polynomial bases, polynomial interpolation, and polar forms. Constructive aspects include the de Casteljau algorithm and the de Boor algorithm. Other topics may include an introduction to parametric surfaces and multivariate splines.

MAT 340 - Probability and Statistics (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230, & MAT 258

This course is an introduction to basic probability and statistics with an eye toward computer science and artificial intelligence. Basic topics from probability theory include sample spaces, random variables, continuous and discrete probability density functions, mean and variance, expectation, and conditional probability. Basic topics from statistics include binomial, Poisson, chi-square, and normal distributions; confidence intervals; and the Central Limit Theorem. Further topics may include fuzzy sets and fuzzy logic.

MAT 351/551 - Quaternions, Interpolation, and Animation (3 Cr.)

Prerequisite(s): MAT 300/500

This course gives an introduction to several mathematical topics of foundational importance to abstract algebra, and in particular the algebra of quaternions. Topics covered may include: operations, groups, rings, fields, vector spaces, algebras, complex numbers, quaternions, curves over the quaternionic space, interpolation techniques, splines, octonions, and Clifford algebras.

MAT 354/554 - Discrete and Computational Geometry (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

Topics covered in this course include convex hulls, triangulations, Art Gallery theorems, Voronoi diagrams, Delaunay graphs, Minkowski sums, path finding, arrangements, duality, and possibly randomized algorithms, time permitting. Throughout the course, students will explore various data structures and algorithms. We will discuss the analysis of these algorithms, focusing specifically on the mathematics that arises in their development and analysis. CS 330 is recommended background.

MAT 355/555 - Graph Theory (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course provides an introduction to the basic theorems and algorithms of graph theory. Topics include graph isomorphism, connectedness, Euler tours, Hamiltonian cycles, and matrix representation. Further topics may include spanning trees, coloring algorithms, planarity algorithms, and search algorithms. Applications may include network flows, graphical enumeration, and embedding of graphs in surfaces.

MAT 356/556 - Advanced Differential Equations (3 Cr.)

Prerequisite(s): MAT 250 & MAT 256

This course covers the advanced theory and applications of ordinary differential equations. The first course in differential equations focused on basic prototypes such as exact and separable equations and the second-degree harmonic oscillator equation. This course builds upon these ideas with a greater degree of generality and theory. Topics include qualitative theory, dynamical systems, calculus of variations, and applications to classical mechanics. Further topics may include chaotic systems and cellular automata. With this overview, students will be prepared to study the specific applications of differential equations to the modeling of problems in physics, engineering, and computer science.

MAT 357/557 - Numerical Analysis (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course covers the numerical techniques arising in many areas of computer science and applied mathematics. Such techniques provide essential tools for obtaining approximate solutions to non-linear equations arising from the construction of mathematical models of real-world phenomena. Topics of study include root finding, interpolation, approximation of functions, cubic splines, integration, and differential equations. Further topics may include stability, iterative methods for solving systems of equations, eigenvalue approximation, and the fast Fourier transform.

MAT 361/561 - Introduction to Number Theory and Cryptography (3 Cr.)

Prerequisite(s): MAT 250 & MAT 258

This course is an introduction to elementary number theory and cryptography. Among the essential tools of number theory that will be covered are divisibility and congruence, Euler's function, Fermat's little theorem, Euler's formula, the Chinese remainder theorem, powers modulo m, kth roots modulo m, primitive roots and indices, and quadratic reciprocity. These tools will then be used in cryptography, where we will discuss e.g. encryption schemes, the role of prime numbers, security and factorization, the DES algorithm, public key encryption, and various other topics, as time allows.

MAT 399/599 - Special Topics in Mathematics (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.

Department of Physics

PHYSICS

PHY 115 - Introduction to Applied Math and Physics (3 Cr.)

Prerequisite(s): None

We live in a world governed by physical laws. As a result we have become accustomed to objects' motions being in accordance with these laws. This course examines the basic physics and mathematics governing natural phenomena such as light, weight, inertia, friction, momentum, and thrust as a practical introduction to applied math and physics. Students will explore geometry, trigonometry for cyclical motions, and physical equations of motion for bodies moving under the influence of forces. With these tools, students will develop a broader understanding of the impact of mathematics and physics on their daily lives.

PHY 200 - Motion Dynamics (3 Cr.)

Concurrent Course(s): MAT 200 or MAT 230

This calculus-based course presents the fundamental principles of mechanics for simulation and engineering majors. Students will learn the laws that govern the mechanical world and how to use these laws to form a simulated world. They will examine the concepts involved with kinematics, Newtonian dynamics, work and energy, momentum, rotational motion, and statics.

PHY 250 - Waves, Optics, and Aerodynamics (3 Cr.)

Prerequisite(s): PHY 200

This calculus-based course provides a fundamental understanding of fluid dynamics, oscillations and waves, optics, and thermodynamics. By understanding the physical laws governing these phenomena, students will be able to implement ray casting and ray tracing algorithms, as well as create realistic flight simulators, lens effects, and many-body simulations.

PHY 270 - Electricity and Magnetism (3 Cr.)

Prerequisite(s): PHY 200

This calculus-based course studies the basic concepts underlying electrical and magnetic phenomena. It considers the following topics: atoms and free electrons; Coulomb's law; the electric field, Gauss's Law, and potential; capacitance, properties of dielectrics, current, resistance, and EMF; DC circuits and instruments, and Kirchhoff's rules; the magnetic field and magnetic forces on current-carrying conductors; magnetic field of a current; electromagnetic induction and magnetic properties of matter; alternating current; Maxwell's equations; electromagnetic waves; semiconductors and the PN junction; and photoelectric effect.

PHY 290 - Modern Physics (3 Cr.)

Prerequisite(s): MAT 200 or MAT 230, PHY 200, & PHY 250 or PHY 270

The wake of modern physics has given rise to massive technological advancements that have changed our daily lives. This course covers many of the modern issues within the field and emphasizes the problem-solving nature of physics. The class is a calculus based scientific examination of topics from general relativity and quantum mechanics through nuclear physics, high-energy physics, and astrophysics.

PHY 300 - Advanced Mechanics (3 Cr.)

Prerequisite(s): CS 200, CS 250, MAT 150 or MAT 180, MAT 200 or MAT 230, MAT 250, PHY 200, & PHY 250

This course covers the physics behind more complex mechanical interactions as well as the numerical techniques required to approximate the systems for simulations. A thorough analysis of mechanical systems through energy analysis will provide the basis for the understanding of linear and rotational systems. The combination of theoretical physics and numerical methods will provide students with the background for simulating physical systems with limited computational power. Topics covered include Lagrangian Dynamics, Hamilton's Equations,

dynamics of rigid bodies, motion in non-inertial reference frames, the use of the inertia tensor, collision resolution, and numerical techniques including methods of approximation.

PHY 350 - Physics Simulation (3 Cr.)

Prerequisite(s): MAT 300/500 & PHY 300

In this course, students will gather into teams of two to three and create a physics engine with minimal interface and graphics. Weekly lectures will go over the implementation of concepts covered in PHY 300 as well as collision resolution, objects on surfaces, holonomic and non-holonomic constraints, numerical approximations, and special topics that address project-specific physics.

PHY 399 - Special Topics in Physics (3 Cr.)

Prerequisite(s): Permission of instructor

The content of this course will change each time it is offered. It is for the purpose of offering a new or specialized course of interest to the faculty and students that is not covered by the courses in the current catalog.